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## Smithsonian Tropical Research Institute Fact Sheet

The Smithsonian Tropical Research Institute is the world's premier tropical biology research institute, dedicated to increasing the understanding of the past, present and future of tropical biodiversity and its relevance to human welfare. STRI's focus is curiosity-driven basic research conducted primarily in tropical forest and coral reef ecosystems. STRI scientists discover new organisms, test scientific explanations for ecological adaptation and evolutionary innovation, develop methods to restore degraded ecosystems, train students and promote conservation of tropical ecosystems. Headquartered in the Republic of Panama, STRI provides a comprehensive tropical sciences library; a network of research stations in the American tropics and in Kenya, protected under international treaties and equipped for sophisticated studies; a 96-foot oceangoing research vessel; and two construction-crane canopy access systems. STRI also coordinates the Center for Tropical Forest Science Observatories, a global network of more than 20 tropical forest research and monitoring stations in Asia, Africa and Latin America. Dynamic education and outreach projects reach school kids, voters and decision makers in the United States, Panama and abroad.

### History

STRI's roots in Panama can be traced to President Theodore Roosevelt's mandate to "Make the dirt fly!" By 1904, entomologists were working to understand the biology of malaria and yellow fever that had crippled French efforts to build a canal. In 1923, a rustic field station was constructed on Barro Colorado Island in the Panama Canal waterway. The Smithsonian was one of several organizations participating in research there. In 1946, BCI became a bureau of the Smithsonian dedicated to conducting long-term studies in tropical biology. The organization changed its name to Smithsonian Tropical Research Institute in 1966 and expanded by establishing field stations throughout Panama, including marine science laboratories on both coasts.

### Budget

STRI's annual operating budget is approximately \$23 million—approximately 25 percent from private donors.

## **Staff**

Research at STRI is conducted by an international group of 35 scientists and 300 staff who also support approximately 1,000 visiting scientists and students each year. Visitors represent nearly 150 institutions worldwide and 40 U.S. states.

## **Scientific Research**

**Tropical Diversity and Its Origins**—Tropical biodiversity is at first bewildering due to the astronomical number of species. Recent intense sampling of insects in forest canopies, for example, suggests that the number of insect species is staggeringly large, perhaps reaching 10 million or more. Scientists do not know the names of most of these species, let alone their biology; yet these little-known organisms may harbor potential as biocontrol agents for pests of crop plants, or sources of new medicines and other compounds. Panama has one of the world's best-known tropical floras, which is now being screened for biomedical compounds.

**Marine Ecology and Evolution**—The Isthmus of Panama is an ideal setting for studying processes that generate biodiversity because it is a barrier that isolated Atlantic from Pacific marine populations when it was formed about 3 million years ago. STRI studies how marine organisms become genetically different with time and how they become reproductively isolated via behavioral and molecular mechanisms.

**Ecology and Physiology of Tropical Forests**—STRI's Center for Tropical Forest Science coordinates forest ecology research sites in 20 nations, involving almost 8,000 tree species and 3 million individual trees, providing a "Global Observatory" fundamental to understanding forest dynamics, timber management and reforestation. STRI's plant physiology program reveals the myriad ways that plants respond to environmental stresses, including changes in light and water levels. Growing concern about greenhouse gases and global warming has driven a major effort to understand how plants respond to elevated concentrations of carbon dioxide, including the first large-scale study of multiple tree species in the tropics. Tropical forest canopies are among the least-explored habitats on Earth because of their inaccessibility. STRI pioneered the use of construction tower cranes to explore this frontier.

**Behavior and Adaptive Evolution**—Animal behavior, among the most fascinating aspects of tropical diversity, embraces the activities by which individuals are socialized, select mates and modify their environments. Successful conservation efforts depend on understanding animal behavior, such as how far a bee carries the pollen of a rare orchid or how mammals disperse seeds.

**Archaeology, Anthropology and Human Ecology**—Human populations play a crucial role in shaping tropical forest environments, and their manipulations vary with their social organization and technical expertise. The accumulated knowledge of tropical forest peoples allowed them to flourish, yet their knowledge and environments are rapidly disappearing. By studying the history and development of regional economies and social formation, STRI researchers identify the conditions that lead either to the depletion of local resources or to their more sustainable use.

**Paleoecology**—At STRI, paleoecologists study the biological consequences of the closing of the Panamanian Isthmus, a geological event that separated the Caribbean and Pacific Ocean, creating

two marine realms, and that linked the previously distinct floras and faunas of North and South America. STRI has developed a century-long record of coral growth rates, showing that coral growth has been declining due to increasing turbidity of the water from increasing sediment of the runoff from the coast, itself a result of massive deforestation. STRI terrestrial paleoecologists focus on the climatic and vegetational history of lowland tropical forest from more than 60 million to 500 years ago, including the profound environmental effects of prehistoric agriculture. These long-term records may help researchers model potential ecosystem collapse due to future climatic disturbances and the restoration of ecosystems following activities that promote sustainable development.

## **Publications**

STRI research is reported in more than 300 scientific journal articles per year, including many in the journals *Science* and *Nature*, as well as in numerous books and edited volumes.

## **Education and Public Programs**

A fellowship program provides training opportunities to students worldwide, and STRI offers advanced graduate studies with affiliated institutions. A bilingual public education and outreach program interprets STRI research and promotes conservation, offering site visits, a weekly newsletter, public lectures, media releases and seminars for decision makers.