Ecotourism and the Treetops

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Around the world, ecotourism has been hailed as a panacea: a way to fund conservation and scientific research, protect fragile and pristine ecosystems, benefit rural communities, promote development in poor countries, enhance ecological and cultural sensitivity, instill environmental awareness and a social conscience in the travel industry, satisfy and educate the discriminating tourist, and some claim, build world peace.

—M. Honey, Ecotourism and Sustainable Development, 1999

Principles of Ecotourism

A new century of environmental consciousness is dawning. Under the pressures of explosive human population growth, our planet’s natural communities are shriveling rapidly. They are shrinking on all sides due to the expansion of agriculture, urbanization, damming, logging, road building, and even more indirect human impacts such as the invasion by exotic species and the distribution of genetic crops.

As a tropical biologist for over 30 years, I have witnessed the impact of tourism on many relatively pristine tropical rainforests. In contrast, I have also witnessed the salvation of exploited tropical regions by the interests of conservation and the economy of ecotourism working collectively. In the not-too-distant future, our wilderness areas will be small islands of biodiversity amid seas of domesticated landscape. Ecotourism creates both an impact on natural ecosystems and a salvation for the conservation of these regions. As the planet’s natural ecosystems become increasingly rare, more people aspire to see what isolated populations of wildlife remain. In Nepal, ecotourists flock to hike one of the remaining wilderness regions on the planet; but hikers have stripped the landscape bare of sticks and twigs for fuel and have left trash that spoils the experience for future visitors. In the Galápagos, burgeoning numbers of visitors strain these sensitive and fragile islands. Disease, fire, and theft have altered the natural balance of the island ecosystems.

Ecotourism is loosely defined as nature-based tourist experiences where visitors travel to regions for the sole purpose of appreciating natural beauty. As early as 1965, responsible tourism was defined to respect local culture, maximize benefits to local people, minimize environmental impacts, and maximize visitor satisfaction (Hetzer 1965). The first formal definition, coining the term “ecotourism,” was published in 1987: “traveling to relatively undisturbed or uncontaminated natural areas with the specific objective of studying, admiring, and enjoying the scenery and its wild plants and animals, as well as any existing cultural manifestations (both past and present) found in these areas” (Ceballos-Lascurain 1987; see also Weaver 2001). Subsequently, many other definitions have arisen (e.g., Valentine 1990, 1992; Figgis 1993; Orams 1995; Perry 1995; Higgins 1996; Lowman 1998; Weaver 1998). Ecotourism probably had its foundations in the ethics of conservation, but its
The recent surge has certainly been economic, as developing countries have begun to recognize that nature-based tourism offers a means of earning money with relatively little exploitation of resources. It is this economic incentive, perhaps more than the consciousness of human ethics, that has given rise to the global expansion of environmentally responsible tourism activities.

The objectives of ecotourism are to provide a nature-based, environmental education experience for visitors and to manage this in a sustainable fashion. These requirements have made it increasingly difficult to provide a true ecotourism experience—as forests become logged, as streams become polluted, and as other signs of human activity become ubiquitous. To compensate for the “invasion” of human disturbance, ecotourism has promoted the educational aspects of the experience, including such opportunities as working with scientists to collect field data in a remote wilderness (e.g., Earthwatch) or traveling with a naturalist to learn the secrets of a tropical rainforest (e.g., Smithsonian Institution travel trips). Environmental education serves to provide information about the natural history and culture of a site; it also promotes a conservation ethic that may infuse tourists with aspirations of pro-environmental attitudes. The question of sustainability remains untested since many sites have relatively new initiatives of nature-based tourism and the long-term impacts are not yet measurable. The challenges of removing trash from remote wilderness lodges, of constructing low-impact electric wires across a beautiful valley, or of minimizing the introduction of exotic bacteria to Antarctica require the test of time to determine their success.

Types of Ecotourism

In most cases, ecotourism follows two important principles of sustainability: to support conservation of the natural ecosystems and to support local economies (Blamey 2001). These underlying principles are the pillars that will provide a lasting basis for ecotourism and will also create sound economic support for the conservation of natural resources. They provide ultimately competitive reasons for the expansion of ecotourism above and beyond other types of leisure activities. A challenge arises, however, when ecotourism becomes successful in the sense that too many tourists will destroy the reason for success. In the case of ecotourism, as different from many other marketed products in our western economy, economic success is a matter of limiting supply no matter how much the demand.

In just 20 years, this type of recreation has burgeoned to include many different intensities and levels of experiences (reviewed in Orams 2001). There is soft versus hard ecotourism, alluding to the physical rigor of the conditions experienced by the visitors. Trekking on the Inca Trail is much more rigorous than visiting Machu Picchu and staying in the lodge. There are arguments over the natural versus unnatural versions of ecotourism; in other words, proponents of ecotourism believe that humans are part of nature and their impact is part of the natural process, whereas critics of ecotourism uphold that people simply should not visit natural areas since they invariably degrade them. Ecotourism can be passive (viewing the Grand Canyon), active (rafting down the Colorado River), or exploitive (staying in the lodge on the rim of the canyon). And ecotourism can be mass tourism (where maximization of income is the most important factor, and expanding programs are measures of success) versus alternative tourism where environmental sustainability (therefore limiting the number of tourists) is the most important measure of success. In most cases, a continuum of both economic and ecological incentives results in many varying levels of ecotourism.

Global Impact of Ecotourism

Since Thomas Cook began the world’s first travel agency in 1841 (Gartner 1996), the number of people who enjoy organized travel has continued to increase. Today, an estimated 1.6 billion
people from all cultures and all walks of life participate in different avenues of tourism, spending over US $2 trillion (Hawkins and Lamoureux 2001). On a global scale, ecotourism is growing because of its international appeal. Tourists recognize that if they travel with sensitivity to the environment, they will not only contribute to conservation but also become educated about a new habitat, country, or culture.

Eco-labels or certification for authentic nature-based tourism have been established in some countries, such as Green Globe (international) or Committed to Green (Europe). This enhances the credibility of an experience for tourists who come to know specific reputable names. In contrast, some negativity in certain countries will affect tourism negatively, such as the 2002 bombing in Bali or the reputation of drug-trafficking in Colombia. Exotic countries with stable governments such as Belize are the true beneficiaries of ecotourism in contrast to some of their neighbors who cannot offer the same reliability of ecotourist experience. As politics continue to affect our ability (or lack thereof) to travel, regional tourism will be significantly affected by local government and policies related to stability.

**Case Studies of Canopy Ecotourism**

**The Aerial Tram in Costa Rica**

Many see Costa Rica as a shining example of conservation, but it is neither better nor worse than many other countries. Banana cultivators, lumbermen, and farmers are stripping those lowlands of rainforest trees. At this time, Costa Rica has proportionally less rainforest left than many other tropical countries. In fact, only a few islands of relatively untouched lowland Caribbean rainforest remain. Less than 10 percent of Costa Rica’s forests are national parks. Moreover, both the national park service and FUNDACORE, a nonprofit organization devoted to the conservation of national parks, acknowledge there is not enough money to protect the national parks and their boundaries from encroachment and destruction (Perry, pers. comm.).

While Costa Rica is busy cutting the remaining 10 percent of its forest outside the parks, there is concern that Costa Rica will then begin to harvest timber inside the parks. At the current rate, non-park forests will only last five to 10 years in this country that supposedly represents the bastion of conservation in Latin America (Perry 1995).

Travel to Costa Rica to admire a country with tropical rainforests is popular. As tourism grows, the determination of Costa Ricans to protect their natural resources will also grow. The Aerial Tram had its origin in Don Perry’s efforts to devise tree-climbing techniques for scientific investigation. After experiencing the limitations of single-rope techniques, he realized that to study the canopy effectively, researchers needed a vehicle for access. In 1982, the development of this vehicle became his primary objective. In 1983, Perry teamed up with the engineering expertise of John Williams, and together they created the Automated Web for Canopy Exploration (AWCE) at Rara Avis in Costa Rica. This device is composed of a power and winch station, support and control cables, and a radio-controlled steel platform that holds up to three people. The support cable spans a forested canyon and is about 300 m in length. The platform is suspended from the support cable and can move along its length. It can also carry scientists from ground level to above the treetops through approximately 22,000 cubic meters of forest. This was constructed at a cost of approximately $1.82 per cubic meter of access. Because the support cable is stationary, the AWCE is a linear system. It is also a prototype for a canopy vehicle for researchers to investigate the treetops.

Subsequent to the AWCE was the construction of the Aerial Tram, closer to San Jose and more suitable for ecotourists. The tram occupies a 1.3-km route through pristine lowland rainforest, and 24 cars each hold up to six people, including one guide. The cars are attached to a cable that rotates around two end stations—in actuality, the system is a converted ski lift.
Approximately 70 people per hour are carried through the canopy with an estimated 40,000 visitors per year (Perry 1995). Free rides are donated to students, and Costa Ricans now own and operate the aerial tram ecotourist operation. Displays at the site educate visitors about the tropical rainforest canopy and its inhabitants. This site is the first of its type worldwide, but more aerial trams and canopy walkways are now in operation in other countries such as Australia, Peru, Panama, and Florida, USA.

**Climbing of Age in Samoa: Canopy Walkways for Conservation**

Paul Cox, internationally recognized ethnothecanist, has worked for many decades on the islands of the South Pacific. In particular, Cox spent many years in the village of Falealupo on the island of Savai‘i. He befriended the village healer, a wonderful botanist named Pele, who taught him how Samoans use their local plants as an apothecary. In the early 1990s, Cox partnered with Canopy Construction Associates on an ecotourism project that now serves as a model for the application of canopy research to conservation (Lowman et al. in press).

A monsoon demolished the school and many other buildings in Samoa during the early 1990s. As a consequence, the Samoan government mandated that all villages must build (or rebuild) schools for their children, and they must be solid structures made from cement. The cost of construction for the school at Falealupo was estimated at $65,000. The village had no cash economy since the local people fished for food and carefully harvested plants for medicines, clothing, and shelter. The per capita economy was less than US $100 per year, so the notion of paying for a school was beyond the villagers’ comprehension.

The village was offered a large sum of money in exchange for logging rights to their forest. As an island, the forest composition was unique and the likelihood of restoration of the original forest composition was nil. Island ecosystems are chance events since the combination of species collects via drift, wind, and bird dispersal. In addition to the unusual diversity of an island ecosystem, the Samoan forests were sacred to the people. The villagers depended on the forest for everything—food, clothing, medicines, and homes. The forests nurtured even their ancestors, whose spirits were embodied in the flying foxes (*Pteropus samoensis* that lived and bred within the forest. Spiritual, economic, biological—the forest provided all the needs of the village and had done so for many generations. The chiefs were not happy about the proposal to log their forest, but they needed to pay for their school.

Paul Cox had a novel suggestion for the chiefs. What about developing ecotourism to bring in a cash economy yet manage the forest sustainably? He suggested a canopy walkway to attract tourists, who would pay for the privilege of walking in the treetops of Samoa. A loan was obtained and some generous seed funding was offered from Seacology Foundation in the United States.

Three staff from Canopy Construction Associates (Meg Lowman, Bart Bouricius, and Phil Wittman) joined Cox for a reconnaissance trip to determine the feasibility of an ecotourism walkway in Falealupo. The walkway represented a relatively radical idea for the village. Not only was the school debt large and unprecedented, but also the notion of encouraging tourists to visit was a new and perhaps frightening notion. The walkway team was led into the meetinghouse and met with fifteen village chiefs.

They honored the team with a kava ceremony. In the center of their circle was a large wooden bowl with a muddy liquid. The ceremonial drink, kava, was made from the roots of a tropical shrub (*Piper myristicum*), an important medicinal plant in the South Pacific. (I called it the consensus plant because after drinking several cups, all 15 chiefs voted “yes” to the walkway.)

Canopy Construction Associates spent many hours with the chiefs, with the schoolteachers, and with others in discussion and field reconnaissance for the canopy walkway. At long last, we agreed that an enormous emergent fig would represent the center of all construction from which a bridge could be spanned to adjacent trees.
A CLIMB FOR CONSERVATION

Stephen R. Madigosky

Approximately 160 km down the Amazon River and up the Napo River from Iquitos, Peru, the Amazon Conservatory for Tropical Studies (ACTS Field Station) is managed by the Peruvian non-profit organization CONAPAC (Conservación de la Amazonica del Peru, A.C.).

Constructed in one of the most biologically diverse forests in the world, the ACTS serves as an open laboratory for tropical research, educational initiatives, workshops, and sustainable development projects that promote sound conservation practice throughout the region. The large thatched buildings at the conservatory provide both laboratory and rooming facilities for scientists as well as overnight lodging for tourists. A donation to maintain and enlarge the surrounding reserve and canopy walkway is included in the tariff paid by tourists for each night spent at the ACTS. Station facilities include a kitchen, dining area, the Alwyn H. Gentry Research Laboratory, a conference room, and 20 guestrooms each with two twin beds covered by mosquito netting. Solar batteries and a gasoline generator provide for the station’s electrical needs. A short hike from the field station is the ACTS aerial canopy walkway network, more than 500 meters long and 36 meters high (see Figure 1). The walkway consists of a series of single and double platforms and bridges that connect more than a dozen trees, including emergents, in the Upper Amazon of Peru. It was constructed over a three-year period and officially opened in 1993. In addition to the canopy walkway, extensive trails in over 250,000 hectares of primary rainforest are available for exploration by visitors and scientists alike. The facility maintains a 5-ha medicinal plant garden that contains over 240 species of native plants valued for their pharmaceutical use and potential. Requests for research guidelines and applications for the ACTS Field Station may be made to Director of Research, ACTS Scientific Advisory Board, Widener University, One University Place, Chester, PA 19013.

*Figure 1* ACTS aerial canopy walkway network. Photograph by Donna J. Krabill.
As predicted, the planning phases in the U.S. involved hundreds of hours of telephone time among the building team and a good deal of speculation about issues at the site that could not be double-checked. Some of the builders had grave concerns about liability: What if a storm hit the new walkway? Who would inspect the site each year? What if some equipment was damaged during shipment? In the case of an accident, how would a builder be evacuated from this remote island? What was the timetable for completion, and how would weather affect it? The logistics of the builders became more difficult than dealing with the chiefs, who spoke a different language altogether. In the midnight hour, Canopy Construction Associates handed the job over to another smaller construction team, Kevin Jordan and Stephanie Hughes, who were willing to take on the risks of a weather-controlled timetable, no liability, and innovation if some equipment were lost or damaged. The end result is a wonderful walkway (see Figure 25-1) that is contributing to the economy of the village of Falealupo in a sustainable fashion and insuring the conservation of their precious forest for future generations.

**Biosphere 2 Canopy Access System**

Most canopy construction in natural forests has involved estimating the load-carrying capacity of trees based on visual observation, judgment, and professional experience. A number of such systems have been designed and utilized for research and ecotourism over the past 15 years.
The Myakka Canopy Walkway spans 26 m through a subtropical hammock in a popular state park outside Sarasota, Florida. Though the aerial suspension bridge is just 7.6 m above ground level, the height is optimum to explore this typically low hardwood hammock canopy of the south Florida peninsula. A 23-m tower at one end provides access to all levels of the canopy and a view of the Myakka River, Upper and Lower Myakka Lakes, and the hammock/prairie interface (see Figure 1).

The project (touted as a vehicle for research, education, and ecotourism) is the result of an alliance among Marie Selby Botanical Gardens, TREE Foundation, Friends of Myakka River, and Myakka River State Park. It was financed primarily with funds from local foundations and benefited from contributions by community and service clubs, local businesses, park visitors, and school groups. Funding was also paired with another project to send
24 disadvantaged students to visit the Amazon Conservatory for Tropical Studies (ACTS), a canopy walkway downriver from Iquitos, Peru. Each student raised $100 for the trip and another $100 for a donation toward the construction of the Florida walkway.

The structure was designed and primarily constructed by Canopy Construction Associates (Amherst, Massachusetts), a group that specializes in building walkways and towers without the use of cranes or heavy equipment. All tools and materials were transported to the site along a winding nature trail via a small pickup truck. Park volunteers contributed 47 percent of the 2,571 hours logged on the project, which kept construction costs within budget. Total expenditures were $98,860. A $15,000 endowment fund was also established for future maintenance and yearly inspections.

Acquired in 1931, Myakka River State Park is one of Florida’s largest and oldest state parks. Fourteen miles of the “Florida Wild and Scenic” Myakka River flow through the park; and two shallow lakes attract large numbers of wading birds, migrating waterfowl, and shorebirds. Approximately 45 percent of the 14,973 hectares under park management is globally imperiled Florida dry prairie with a history of decades of fire exclusion. Park research efforts usually prioritize fire ecology, uplands restoration, and hydrological monitoring. Little attention has been devoted to studying the oak/palm hammocks, inventorying their inhabitants, or analyzing ecosystem functions. The canopy walkway focuses awareness on this subtropical forest system.

The walkway traverses a canopy of live oak (Quercus virginiana), laurel oak (Quercus laurifolia), and sabal palm (Sabal palmetto). Other trees in the park’s hardwood hammocks include elm (Ulmus americana), sugarberry (Celtis laevigata), willow (Salix caroliniana), Carolina ash (Fraxinus caroliniana), snowbells (Styrax americana), water locust (Gleditsia aquatica), and red maple (Acer rubrum). Canopy epiphytes include six species of Tillandsia, two orchids, and four ferns. The hammock lies within the Myakka River floodplain and floods at least annually.

Over 250,000 people a year visit the park, and it is highly utilized by primary schools and universities as an outdoor laboratory for studying the state’s unique natural communities and their inherent natural processes. Since completion in June 2000, the walkway and tower have become very popular for both ecotourism and education. A 33 percent increase in park visitation over the first summer and fall was attributed to the walkway. The walkway’s popularity has not waned, as evidenced by the nature trail’s continuously overflowing parking lot. It is also a primary destination of school buses and tour buses entering the park.

The walkway proved its practical value with a shocking discovery a few months after it opened (Benshoff 2002). An exotic weevil from Central America, accidentally released in Ft. Lauderdale about 1990, arrived at Myakka. Metamasius callizona lays its eggs in tank bromeliads, and the larvae consume the heart of the plant, killing the epiphyte before it can flower and reproduce. Ten species of native bromeliads are now considered endangered or threatened by the State of Florida because of the weevil. The weevil’s discovery at this popular park and ensuing associated monitoring projects gained media attention. The publicity brought this cryptic insect into public view, making it easier for the University of Florida to obtain funding for developing a biological control. If the project is successful, the park could be the first release site for a biological control to save keystone species of Florida hardwood forests.
Another benefit of the canopy walkway project has been the ongoing partnership between the park, New College, and the TREE Foundation. A research station is planned that will provide opportunities for independent researchers to study subtropical canopy ecosystems. It also serves as an outdoor laboratory for local students. Meanwhile staff members at the park and the TREE Foundation in the development of interpretive brochures and signage to deliver their shared conservation message to the world.

Reference


(Lowman and Bouricius 1995; Lowman and Wittman 1996). In most forest situations, canopy access structures utilize tall canopy tree trunks for structural support. In Biosphere 2, however, such mature trees did not exist in the rainforest biome, so the canopy access system needed to rely on support from the structural members of the glass pyramid itself. Access to the canopy also required a simple model with minimal light reduction, little or no impact on the vegetation, and maximum accessibility for researchers with safety compliance under U.S. Occupational Safety and Health Administration (OSHA) standards (Leigh et al. 1999).

The Biosphere 2 canopy access system is the first construction of its kind that utilized OSHA Standards for Fall Protection in its design (Marino and Odum 1999). Details of the canopy access system are described elsewhere (Grushka et al. 1999). In summary, the OSHA standards were achieved by the installation of a fall arrest system utilizing the strength of the supporting space-frame. A double cable system was erected that allowed a transect for the researcher and offered the safety element of the OSHA standards. Both horizontal and vertical access to all major tree canopies within the rainforest biome were possible from the cables, and the lateral load was tested to 5000 lb on the frame (if a climber fell), as per OSHA requirements. With this guaranteed level of safety, Biosphere 2 represented a unique contribution to the field of forest canopy research. All key components of equipment for the fall arrest system met with the standards of the American National Standards Institute, and were tested under dynamic conditions where possible. Specific equipment is described in Grushka et al. (1999) and can also be viewed by ecotourist visitors who are now allowed to tour the Biosphere 2 site near Oracle, Arizona. The staff employ a rigorous schedule of maintenance training for users of the canopy access system, and a strict requirement that all climbers have a group support person for extra safety. To date, gas exchange and other detailed data collection has been safety employed from the Biosphere 2 canopy access system.

Wheelchairs in the Canopy: An ADA-Sponsored Walkway

It was a lifelong aspiration for me to create canopy access for the public without fees or restrictions. At the Marie Selby Botanical Gardens, a handicapped-accessible canopy walkway was constructed in 1998, and in Myakka River State Park, a public canopy walkway and tower opened in June 2000. Both of these projects came from public funding and awareness of the importance of bringing people into forests.

The Selby Gardens walkway was the inspiration of a local builder, Michael Walker Associates. Walker donated a children’s exhibit for a Gardens’ theme-based activity whereby children’s
books were brought to life. Walker modeled his construction after the children’s book, *The Most Beautiful Roof in the World*, by Kathryn Lasky. Walker carefully built a child-friendly structure to ADA-regulations, so that anyone—in a wheelchair, with a stroller, or with a walker—can enjoy the treetops. The bridge climbs into a fig tree on the Gardens’ campus and was the site of the nation ADA 10th anniversary celebrations in 2000. A group of delegates in wheelchairs cut the ribbon, officially opening the walkway. Many tears of joy were shed by these wheelchair-bound adults who had always dreamed of “climbing” a tree. The Myakka River State Park walkway was built to educate the public about the importance of forest conservation and is open to the public (Lowman et al. in press; see Sidebar). It has received national acclaim and has been featured on several educational television programs.

Ecotourism, in partnership with research, has the potential to affect forest conservation significantly and in many positive ways. The influx to local economies, as well as their education potential, make canopy walkways a unique solution to potential deforestation trends in many regions.

References


