

Chapter 10: Sustaining Biodiversity: Saving Ecosystems and Ecosystem Services: Core Case Study Costa Rica—A Global Conservation Leader

Book Title: Living in the Environment

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Core Case Study Costa Rica—A Global Conservation Leader

Tropical forests once covered Central America's Costa Rica, a country smaller in area than the U.S. state of West Virginia. Between 1963 and 1983, politically powerful ranching families cleared much of the country's forests in order to graze cattle.

Despite such widespread forest loss, Costa Rica is a superpower of biodiversity, with an estimated 500,000 plant and animal species. A single park in Costa Rica is home to more bird species than are found in all of North America.

This oasis of biodiversity results mostly from two factors. One is the country's tropical geographic location. It lies between two oceans and has coastal and mountainous regions with a variety of microclimates and habitats for wildlife. The other is the government's strong commitment to land conservation.

In the mid-1970s, Costa Rica established a system of nature reserves and national parks (Figure 10.1). By 2014, this system included more than 27% of its land—6% of it reserved for indigenous peoples. Costa Rica has increased its beneficial environmental impact by devoting a larger proportion of its land to biodiversity conservation than any other country—an example of the biodiversity **principle of sustainability** in action.



Figure 10.1

La Fortuna Falls is located in a tropical rain forest in Costa Rica's Arenal Volcano National Park.



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To reduce *deforestation*—the clearing and loss of forests—the government eliminated subsidies for converting forestland to rangeland. Instead, it pays landowners to maintain or restore forests and manage them under 10- to 15-year agreements.

The strategy worked. Costa Rica has gone from having one of the world's highest deforestation rates to having one of the lowest. Over three decades, forests went from covering 20% of its land to covering 50% of it.

Ecologists warn that human population growth, economic development, and poverty put increasing pressure on the earth's ecosystems and on the ecosystem services they provide. According to a recent joint report by two United Nations environmental bodies: "Unless radical and creative action is taken to conserve the earth's biodiversity, many local and regional ecosystems that help to support human lives and livelihoods are at risk of collapsing."

This chapter is devoted to helping you understand the threats to the earth's forests, grasslands, and other storehouses of terrestrial biodiversity. We will also look at ways to sustain these vital ecosystems and the ecosystem services they provide.

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Chapter 10: Sustaining Biodiversity: Saving Ecosystems and Ecosystem Services Designing and Managing Nature Reserves
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Designing and Managing Nature Reserves

In establishing nature reserves, the size and design of the reserve is important. Research by Thomas E. Lovejoy (see [Individuals Matter 3.1](#)) and other scientists indicates that large nature reserves typically sustain more species and provide greater habitat diversity than do small reserves. Their research also indicates that in some areas, several well-placed medium-size reserves may better protect a variety of habitats and sustain more biodiversity than a single large reserve with the same area.

Establishing protected *habitat corridors* between isolated reserves can benefit more species and allow migration by vertebrates that need large ranges. Corridors will also allow some species to move to areas that are more favorable if climate change alters their existing areas.

On the other hand, corridors can threaten isolated populations by allowing movement of fire, disease, and pest and invasive species between reserves. They can also increase exposure of migrating species to natural predators, human hunters, and pollution. Some research suggests that the benefits of corridors outweigh their potential harmful effects, especially as the climate changes.

Conservation biologists call for using the *buffer zone concept*, whenever possible, to design and manage nature reserves. Establishing a buffer zone means strictly protecting an inner core of a reserve, usually by establishing one or more buffer zones in which local people can extract resources sustainably without harming the inner core (see the [Case Study](#) that follows). By 2015, the United Nations had used this concept to create a global network of 631 *biosphere reserves* in 119 countries. However, most biosphere reserves fall short of these design ideals and receive too little funding for their protection and management. The [Case Study](#) that follows describes Costa Rica's approach to sustaining its remarkable biodiversity.

Case Study

Identifying and Protecting Biodiversity in Costa Rica

For several decades, Costa Rica ([Core Case Study](#)) has been using government and private research agencies to identify the plants and animals that make it one of the world's most biologically diverse countries ([Figure 10.24](#)). The government consolidated the country's parks and reserves into several large conservation areas, or *megareserves*, with the goal of protecting and sustaining 80% of the country's biodiversity ([Figure 10.25](#)).



GOOD
NEWS

Figure 10.24

This scarlet macaw parrot is one of the more than half a million species found in Costa Rica.

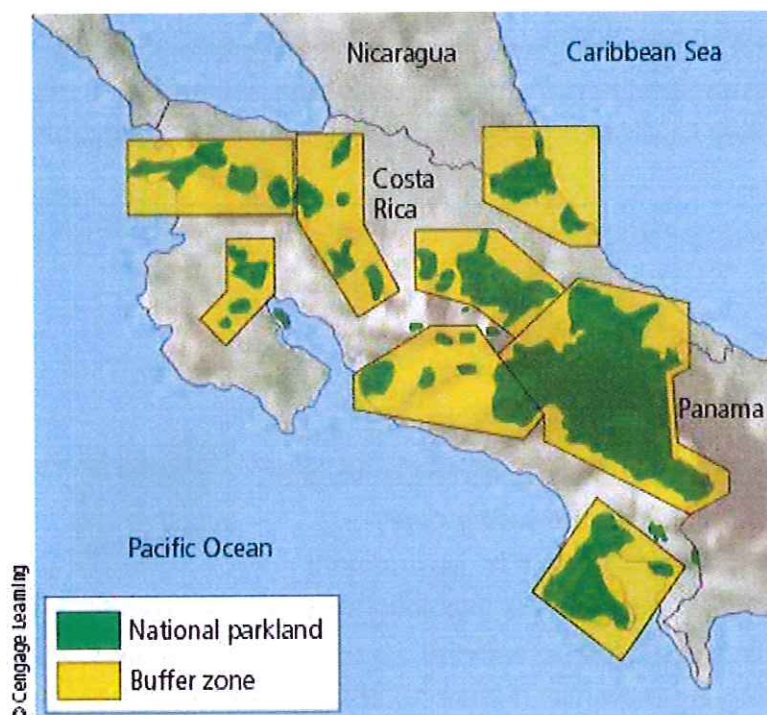


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Figure 10.25

Solutions: Costa Rica has created several *megareserves*. Green areas are protected natural parklands and yellow areas are the surrounding buffer zones.



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Each reserve contains a protected inner core surrounded by two buffer zones that local and indigenous people can use for sustainable logging, crop farming, cattle grazing, hunting, fishing, and ecotourism. Instead of shutting local people out of reserve areas, this approach enlists local people as partners in protecting a reserve from activities such as illegal logging and poaching. It is an application of the biodiversity and win-win **principles of sustainability**.



In addition to its ecological benefits, this strategy has paid off financially. Today, Costa Rica's largest source of income is its \$3-billion-a-year travel and tourism industry, almost two-thirds of which involves ecotourism. In 2013 this industry provided 12% of the country's total employment and 12% of its economic activity.

There are potential threats to Costa Rica's conservation efforts. One serious threat is the clearing of forests to grow pineapples in plantations for export to China. Ecotourism helps to fund parks and conservation efforts and reduces exploitation of conservation areas by providing income for local people in visited areas, but excessive numbers of ecotourists can degrade sensitive areas.

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