

Excerpt from

SPIRIT OF ENTERPRISE

THE 1990 ROLEX AWARDS



Gerardo Ceballos-Gonzalez
Honourable Mention

The diversity and
conservation of Mexican mammals

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The Rolex Awards for Enterprise – 1990

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Over the past few centuries, human action has caused large-scale perturbation of natural ecosystems, and resulted in the extinction of many species. Extinction rates have increased dramatically in recent decades and thousands of species may become extinct before the end of the century. The effects of such losses of biodiversity on the ecology and evolution of the earth's biota are unknown, but could be catastrophic. Mexico has an extremely rich and unique flora and fauna; there are some 30,000 species of vascular plants, 500 species of mammals, 1,000 species of breeding birds, and thousands of species of reptiles, amphibians and fishes. The country boasts 450 species of land mammals and 50 marine species, and 33% of them are Mexican endemic.

Many species of mammals in Mexico are on the brink of extinction owing to habitat destruction, hunting, illegal trade or poisoning. Unfortunately, the scope of the conservation problems of Mexican mammals is not fully understood. At least seven species of mammals, including the bison (*Bison bison*), monk seal (*Monachus tropicalis*), grizzly bear (*Ursus arctos*), San Pedro Nolasco deer mouse (*Peromyscus pempertoni*), and elk (*Cervus elaphus*), have become extinct or have been extirpated from Mexico in this century. Many more species are threatened or in danger of extinction, and will become extinct if appropriate measures are not taken soon.

Establishing a database of Mexican animals

Starting in 1987, I launched a research programme to determine the conservation status of all Mexican mammals, and trends in mammalian diversity. This information will allow me to design conservation strategies for the endangered species, including an assessment of the habitats and ecosystems critical for their long-term conservation. To complete this study I need to build an extensive database about Mexican mammals and to carry out field studies on the most endangered species.



The tropical porcupine (Coendu mexicanus) is a species found in tropical wet forests.

Viable populations are still found in southern Mexico. However, it is extremely important to protect some of the remnant habitats to ensure this animal's long-term conservation.

Assessing the conservation status of all the species of Mexican mammals is a formidable task and consequently I have developed a model for conservation classification that combines information about biological vulnerability to extinction and the potential impact of human activities on mammalian populations. Currently, I am evaluating the status of each species using a set of ten criteria that measure the impact of human activities and the presence of the biological characteristics correlated to extinction. However, much work is still needed both to finish the database and to analyze the data. Thousands of records kept in foreign museums also have to be incorporated.

Preliminary results of the conservation classification model have shown, for example, that many more species of Mexican mammals face conservation problems than was previously thought. At least 46 species are considered fragile, 36 threatened, 34 endangered, and seven extinct or extirpated; the next step will be to undertake field studies about the 40 most endangered species. The study has, in particular, highlighted our lack of information about many species on the brink of extinction, such as, for example, the Mexican wolf.

A state of dwindling diversity

The second part of the project is to analyze the patterns of mammalian diversity in Mexico and determine which areas are unique for their high diversity, high endemism and high concentration of endangered species. This information is essential in order to implement conservation strategies that will protect our endangered species and preserve most, if not all, our species of mammals.

To carry out this part of my research I am using the database generated with the information about geographic ranges. So far, I have finished the analyses of the latitudinal trends of species diversity in 2x2 degree quadrants. I am working now doing the same analysis with quadrants of 20x20 km which will give me a

higher resolution. Based on the results of these analyses, it will be possible to determine which areas and habitats should be protected to ensure that most of the mammalian diversity of Mexico is preserved. For example, the results of the first analysis indicate that, at the generic level, two regions are extremely important for the number of endemic genera: the transvolcanic belt of central Mexico and the tropical dry forest of western Mexico. At the species level, however, there are more endemic taxa in Baja California and the transvolcanic belt. In terms of endangered species, the most important and threatened habitat is the tropical rain forest of Chiapas and Oaxaca where the last survivors of the tapir (*Tapirus bairdii*), white lipped peccari (*Tavassu pecari*), grison (*Galictis allamandi*) and many more endangered animals are found.

A need for international collaboration

The combination of species-specific and habitat-specific conservation strategies will maximize the conservation of the biological diversity of Mexico. For example, my studies about prairie dogs, a species-specific strategy, began because of the alarming destruction of their habitat. After three years of studies it has become apparent which areas are critical for the preservation of these societies. Presently, I am collaborating with several international conservation agencies to protect some of these areas. The protection of the prairie dogs will also benefit many other mammals, including several endangered species such as the pronghorn antelope (*Antilocapra americana*).

Finally, it is important to emphasize that the conservation of the biological diversity of Mexico will not be possible with the limited financial resources of the country. The responsibility of safeguarding its unique flora and fauna should involve national and international efforts. After all, a primary goal for mankind should be to protect and maintain the biological diversity of the earth and Mexico is a key area in which to accomplish it.



The jaguar (Felis onca) is one of the most endangered species in Mexico. Jaguars are protected by international regulations, but hundreds are still killed each year for their skins, to protect cattle and other domestic animals, and as the result of substantial habitat destruction. The jaguar's chances for long-term survival appear slight.