

# Natural Rhythms Of an Endangered Ecosystem The Chamela-Cuixmala Biosphere Reserve

Gerardo Ceballos\*



Photos by Gerardo Ceballos

Delta of the Cuixmala River.

We take off from Colima early for the Jalisco coast in a little bi-plane. As we leave the city behind in what seems an alien world, a valley stretches out before us full of irregular geometric designs, a mosaic of corn and sugar cane fields. We make a slow ascent in the direction of the Manantlán Mountains, with its abrupt slopes standing proud, formidable obstacles. We pass over an arid valley, a lost corner of the country between the Nevado de Colima Volcano and the Manantlán mountains that inspired Juan Rulfo to write his book

\* Researcher at the UNAM Ecology Institute.

*El llano en llamas* (The Plain Afire). Up until now, the flight has gone smoothly. At the top of Manantlán we encounter a wide, very well preserved plateau covered with pine, oak and a few fir. After the mountains, we descend toward the Pacific coastal plain. Now the landscape is very different, dominated by hillocks and very special vegetation: tropical dry forests. I look out toward the horizon, the ground seemingly covered by unbroken forest, and I ask myself how long it will last and continue to shelter innumerable species of plants and animals. A sudden bump brings me back to reality. We're about to arrive, the air pockets moving the lit-

tle plane as though it were a sheet of paper. We land close to Chamela Stream on a dirt runway lined with enormous fig trees. We have arrived at our destination, the Chamela-Cuixmala Biosphere Reserve.

Created in 1994 by presidential decree, the reserve covers more than 13,000 hectares and holds more than eight different kinds of vegetation, the most important of which is tropical dry forest, dominant on the hillsides. The rest of the reserve, located on the alluvial plain of the Cuitzmala River, protects a beach, a medium-sized forest and riparian vegetation, as well as a series of more humid environments,

including permanent lakes, mangroves, *manzanilla* forests and land covered with reed-grass. One thousand two hundred species of vascular plants have been recorded here, and of these, almost half are to be found only in the dry forest.

The fauna of the Chamela-Cuixmala reserve is spectacular, including more than 440 species of vertebrates and thousands of species of inverte-

brates. One of its most outstanding characteristics is that it houses a great number of endemic species, exclusive to Mexico. Of the vertebrates, approximately 30 percent are endemic, 25 percent considered endangered. Jaguars and pumas still wander through the dry stream beds of the area; three species of marine tortoises lay their eggs on its beaches; the mangroves are home to a growing population of crocodiles; and parrots and spoonbills dot the horizon. The drama unfolding outside the reserve is alien to all of them.

The tropical dry forest is characteristic of a vast region of the Pacific coast, extending from southern Sonora to northern Chiapas and reaching throughout the Balsas River Basin to the states of Mexico and Morelos in the center of the country. In Central America it used to extend from Guatemala to Costa Rica, but today is very limited. The tropical dry forest owes its name to some of the traits that give it its special appearance: the average height of its trees is no greater than 20 meters and

begins in winter. With the passing weeks, the forest becomes desolate and gray, as though devoid of life. The last vestiges of humidity disappear under the lash of the implacable, white-hot sun. The withered leaves fall off the branches to form a dense layer on the forest floor. Heeding imperceptible signals, many plants, already leafless, flower simultaneously in a few days' time, in-



The contrast between the rainy season (left) and the dry season (right) is very sharp in the tropical dry forest.

their tops are wider than their trunks. However, its main characteristic is that most of its plants lose their leaves in the dry season, creating the impression that they have died from drought.

#### THE CYCLES OF THE TROPICAL DRY FOREST

Water-land, heat-cold, rain-drought: dualities that have marked the rhythms of nature from the beginning of time. For thousands, perhaps millions, of years, the rain-drought cycle has marked patterns and cadences in the tropical dry forest. Each year, the long dry season

creates the likelihood of pollination. This explosion of intense colors dresses the forest periodically in white, yellow, pink and red flowers. After the flowering period, they produce abundant fruit and seeds.

The dry season is a difficult time for the fauna. Each species, however, has developed different strategies to deal with it. For some, like the mouse opossum, the coati and the chachalaca, nectar, flowers and fruit are essential for surviving the periods of food scarcity. Others, like insects, frogs, tortoises, rattlesnakes and Gila monsters (or beaded lizards), become completely inactive to reduce their expenditure of



energy, burrowing underground, under stones or into the bark of trees. They come out of these refuges only when the rains arrive. Finally, others, like the green macaw and the long-tongued bat, migrate to other areas dozens or hundreds of miles away seeking food and shelter.

In the middle of June, clouds herald the coming rains. In just a few days, the air becomes heavy with humidity, the clouds turn dense and dark and on the horizon, lightening and thunder shake heaven and earth. One day, with no warning, it starts to rain, sometimes in downpours, sometimes only enough to dampen the ground. Drop after drop, the incessant rain saturates the soil, forming tiny torrents that weave together until they form small flows, first becoming streams and creeks and later flowing rivers. The forest is transformed and resumes its activity. In a few weeks the plants are covered with foliage of a thousand colors, giving the forest back the lushness that it will retain for the next five or six months. Now the nights are warm and humid and filled with singing frogs, toads, grasshoppers, and crickets. Tadpoles, frogs and snakes move through the puddles and ponds. Night rains are frequent and lightning an everyday sight. The organic matter accumulated in the soil during the dry season decomposes rapidly under the action of innumerable beautiful-colored fungi.

But the abundance of water is ephemeral. At the end of November, the first leaves will fall from the trees in a dance that in a few weeks will pull them all down in a dizzying avalanche. Once again the days will be clear, cloudless. Once again the environment dries. Activity in the forest will slow considerably. Nothing will be left of the



Ghost bat (*Diclidurus albus*).

rush of water whose force months before created stream beds, now dried up. The days will be shorter and the nights longer. The transition between the season of life and the season of latency begins. Soon, very soon, drought will have its way with this land.

#### THE CHALLENGE OF CONSERVATION

In the spring the sounds of axes and saws invade the forest. One by one, thousands, perhaps millions of trees are felled mercilessly, pulling down orchids, vines and frogs with them, bringing down all forms of life as they fall. The piled up trees will be burned a few weeks later. The magnitude of the destruction is such that on some days the sky is black with the smoke of the fires. After several weeks of almost uninterrupted burning the smoke is extremely thick and the outline of the Sun can just barely be seen. What was a garden teeming with life will now give way to pastures and decrepit crops. Exotic grasses will replace the exuberance of the natural vegetation, and cows and goats will take the place of deer and peccaries.



Mulato tree (*Bursera simaruba*).

It is said that when the Spaniards set foot on this hemisphere for the first time, a squirrel could have traveled through the tropical dry forest from Sinaloa all the way to Panama over the treetops without ever touching the ground. Now, that is a tale out of the past. Every year, an average of 300,000 hectares of these forests —the equivalent of an area three times the size of Mexico City— are destroyed mainly because of the encroaching agricultural and pas-





Leatherback turtle young (*Dermochelys coriacea*).



Spring tree (*Tabebuia Donnell-Smithii*).

ture lands. This rate of deforestation and that of the humid forests are the highest of all the ecosystems in Mexico. Year after year, the area covered by dry forests gets smaller and smaller, and, if things continue this way, the last ones will disappear in coming decades.

Every year, in the region of Chamela-Cuixmala, the reserve is increasingly strangled by advancing deforestation. In many other regions of the

country, there are now only patches of forest sitting amidst pastures and crops, like islands surrounded by deep seas. For the fauna and flora, the fragmentation of the vegetation has severe consequences, most of the time practically irreversible. For many species, a pasture or a cultivated field is an insurmountable barrier, and this means that with time the populations isolated in the remaining stretches of forest tend to die out.

In the Chamela-Cuixmala Reserve, the National Autonomous University of Mexico's Biology and Ecology Institutes and the Cuixmala Ecological Foundation promote scientific research for the conservation and appropriate management of the forest. For example, with the collaboration of colleagues and students like Lorena Morales, Ricardo Ayala and Andrés García, I am doing a study on the magnitude of the effects of the fragmentation on the biological diversity of areas where cultivation, pasture land and the remains of forests coexist. There is a great deal that we need to learn: What are the general effects of fragmentation on biological diversity? What makes some species

more susceptible to fragmentation than others? What percentage of the original flora and fauna can survive in an area whose ecosystem has been disturbed and where the remains of a forest now exist side by side with cultivation and pasture land? What are the consequences for environmental services of the loss of biological diversity? How can the impact of the fragmentation of areas that now support productive activities like cattle raising and agriculture be mitigated? Our studies and those of other biologists have shown that it is important to increase the area protected by the Chamela-Cuixmala Reserve to be able to maintain regional biological diversity and that this reserve must be joined by biological corridors to others nearby like the Manantlán Biosphere Reserve.

#### EPILOGUE

Given the seriousness of the circumstances of the country's tropical dry forests, the creation of the Chamela-Cuixmala Reserve was a triumph of reason. At the peak of the El Mirador Hill, one of the highest points in the area, the splendor of the reserve is an example of what must be repeated elsewhere. The last rays of the sun fade before the imminent arrival of the night, repeating an infinite cycle. I listen carefully to the sounds of the jungle and hope for the success of the efforts to find solutions to the conflict between short-term development and conservation. Our future quality of life depends on them. And in time, with the centuries' old rhythms that eventually change everything, this heaven and this earth will see other horizons, with no man-made smoke in the sky. ■■■