



## Park Profile - Mexico Chamela-Cuixmala Biosphere Reserve

**Date of most recent on-site evaluation:** May 2003

**Date of publication:** September 2003

**Location:** Jalisco State

**Year created:** 1993

**Area:** 13,142 ha

**Ecoregion:** Jalisco dry tropical forest

**Habitat:** low and medium dry deciduous forests, wetlands, and mangroves



### Summary

#### Description

Chamela-Cuixmala Biosphere Reserve is located on the Pacific Coast of Mexico, in a mountainous region dominated by rolling hills and alluvial plains. Its climate is hot and humid with an annual median temperature of 24.9 degrees Celsius and well-defined seasons. During the dry season, the lowland forest appears to be lifeless, unappreciated even by some researchers. But, when the rains come, an amazing metamorphosis occurs, life is renewed and the area is cloaked in green. The rainy season lasts from July through October and the dry season is November through June. The median annual precipitation is 748 mm in the hilly Chamela region and 782 mm in the Cuixmala region, which spans from the coast to the mountains. The forest is characterized by its diversity of flora and fauna and a very high number of endemic species. Two groups, the Autonomous University of Mexico (UNAM) and the Cuixmala Ecological Foundation, A.C. own the majority of the land in the reserve. The name of this protected area is derived from the small town of Chamela, which was an important port many decades ago, and the Cuixmala River, which has the largest water flow of all the rivers in the region and acts as a natural boundary for the reserve.

#### Biodiversity

Chamela-Cuixmala contains 1,149 species of plants including the endemic tree *Jatropha chamelensis*, the cactus *Opuntia excelsa*, and other species like *Agave colimana*. Other studies of the area list 1,877 species of arthropods, 110 species of fish, and 72 species of mammals. The herptofauna consists of 87 species, 68 reptile and 19 amphibian species. The reserve has many important nesting sites for marine turtles, including the green turtle (*Chelonia mydas*) and the leatherback (*Dermochelys coriacea*). Also found in the area is the Mexican-bearded lizard (*Heloderma horridum*), one of only two venomous lizards in the world, and the river crocodile (*Crocodylus acutus*). All of these species are in danger

of extinction. There are 270 bird species, of which 60 percent are residents and the rest are migratory.

### *Threats*

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The Chamela-Cuixmala Biosphere Reserve is considered **vulnerable**, which means that there is a high risk that the protected area will not be able to protect or maintain the biological diversity in the long run and therefore requires constant monitoring. The most imminent threats include: highway projects, tourism infrastructure, hunting and wildlife trafficking.



*The dominant vegetation in the reserve is dry tropical forest*

## **Description**

### *Physical Description*

Federal Highway No. 200 *Barra de Navidad* divides the reserve into two sections; to the east of the highway is the section called Chamela and to the west is Cuixmala. The reserve is located on the coast of Jalisco, approximately 120 km from Manzanillo City, Colima. It is situated in the southern Sierra Madre province and in the subprovince of Sierras de la Costa of Jalisco and Colima. It covers 13, 142 hectares and the altitude ranges from 0 to 500 meters above sea level (masl). The annual mean temperature is 24.6 degrees C; average high is 30 C and low 19.5 C. The average precipitation is 788 mm, with yearly variation ranging from 453 mm to 1,393mm. This large variation is due to chance occurrences of tropical storms and hurricanes off the Pacific Coast (García-Oliva *et al.* 1991). The seasons are well defined, the rainy season occurs between July and October and the dry season from November to June.

The principal characteristic of Chamela-Cuixmala's dominant forest is that it loses its leaves during five to eight months of the year. The maximum tree height is between 8 – 12 m, classifying it as a low height forest (Trejo y Dirzo 2000). In Mexico, it is known as a dry tropical forest. The Chamela–Cuixmala Reserve is part of the Jalisco dry tropical forest ecoregion. The

habitats represented are deciduous dry forest, semi-deciduous medium dry forest, riparian zones and wetlands (Dinerstein et al. 1995).



*Location of the reserve within Jalisco state, on the Pacific Coast of Mexico*

### *Biodiversity*

The diversity of both aquatic and terrestrial habitats in this heterogeneous environment are such that there is a great variety of animals, including 540 vertebrate species. There are 72 mammal species, 270 bird species, 68 reptile species, 19 amphibian species and 110 fish species found in the park (Ceballos 1989; Arizmendi et al. 1991; Arizmendi et al. 2002; Espinosa et al. 2002; García y Ceballos 1996; Ramírez-Bautista y Vitt, 1997; Ceballos et al. 1999). Invertebrate studies conclude that there are 1877 arthropod species, 14 of which are in the class arachnid and 1863 in the class hexapod (Pescador-Rubio et al. 2002; Noguera et al. 1996). Among the species found in the park listed as endangered by the Official Mexican Ecological Register 059 (NOM-ECOL-059) are the green (*Chelonia mydas*), leatherback (*Dermochelys coriacea*), hawksbill (*Eretmochelys imbricata*) and olive ridley (*Lepidochelys olivacea*) sea turtles. Other endangered reptiles found in the park are the Mexican-bearded lizard (*Heloderma horridum*), the green iguana (*Iguana iguana*), and the American Crocodile (*Crocodylus acutus*). In terms of mammals, the reserve boasts the jaguar (*Panthera onca*), the ocelot (*Leopardus pardalis*) and the margay (*Leopardus wiedii*). Birds found in the park include the yellow-headed parrot (*Amazona oratrix*), the green macaw (*Ara militaris*), the muscovy duck (*Cairina moschata*) and the least tern (*Sterna antillarum*). The IUCN lists the following species as endangered: *A. oratrix*, *C. Mydas*, and *L. olivacea*. Listed as vulnerable are *C. acutus*, *A. militaris*, and *H. horridum* and as critical are the turtles *E. imbricata* and *D. coriacea* (IUCN 2002).



*Ocelot (Leopardus pardalis)*  
*One of the felines found in the area*



*The American crocodile (Crocodylus acutus) is found in the wetland areas.*

The flora of the reserve is very diverse, consisting of 1,149 species. Endemic vegetation comprises 10% of the total, among which are the trees *Sciadodendron excelsum*, *Jatropha chamelensis* and *Celanodendron mexicanum*, the cacti (*Peniocereus cuixmalensis* and *Opuntia excelsa*) and other species such as *Agave colimana* (Lott 2002). The species considered to be endangered by NOM-ECOL-059 are *Conocarpus erecta*, *Laguncularia racemosa*, *Dalbergia congestiflora* and *Platymiscium lasiocarpum*. The vegetation is divided into 8 different categories: 1) Lowland deciduous forest, the most abundant; 2) Xerophytic scrub, distributed near the ocean; 3) Medium semi-deciduous forest found in patches commonly in canyons; 4) Mangroves are present in the Cuixmala region closest to the ocean, the dominant species are *L. racemosa* and *R. mangle*; 5) Manzanillera forest dominated by the manchineel tree, also known as the poison guava tree (*Hippomane mancinella*); 6) Riparian vegetation, distributed



along the Cuixmala River and the Chamela Stream; 7) Reeds and aquatic vegetation, found in Cuixmala, the representative species are cattail (*Typha latifolia*), water hyacinth (*Eichornia crassipes*) and waterlily (*Nymphaea ampla*); 8) Coastal Dune vegetation, located in areas near the ocean; and 9) Pastizales, or grasslands, which are restricted to sandy soils and were most affected by grazing before the reserve was created (Rzedowski 1978; Ceballos et al. 1999).



*The wetlands hold an amazing variety of animal species and aquatic vegetation.*

From a biological point of view, the region where the reserve is located is one of the most important of the country. It encompasses a diversity of environments from wetlands to low tropical forests (WWF and IUCN 1994-97). The diversity of species is exceptional, including a high concentration of species endemic to the country. One example is the Lilac-crowned parakeet (*Amazona finschi*), a species endemic to the Pacific coast. This reserve represents the first effort of Mexico to protect the dry deciduous forests of the Mexican Pacific coast (Ceballos y Garcia 1996).

In this particular case, it is important to mention that in addition to the native fauna of this ecoregion, Sir James Goldsmith (deceased) introduced exotic animals onto his private property in the Cuixmala region before the creation of the Chamela-Cuixmala Reserve. This was done with legal authorization and under the strict control of the Mexican Wildlife Agency (*Dirección General de Vida Silvestre* in Spanish). There are 32 common eland (*Taurotragus oryx*), eight Burchell's zebras (*Equus burchellii*) and nine blackbucks (*Antelope cervicapra*). The exotic species are restricted to areas that were previously altered from their natural state. They are confined to a fenced-in area in the buffer zone of the reserve, where the Goldsmith family resides. There are permanent infrastructure maintenance and security measures for the enclosed area. The animals are given veterinary care and birth control in order to control illness and reproduction so there is no population growth. The exotic species were brought to Cuixmala for the family's enjoyment.

Sir James cared for nature in general and for this region in particular. Because of this, in 1988, he created the Cuixmala Ecological Foundation (Foundation) and secured financial backing for

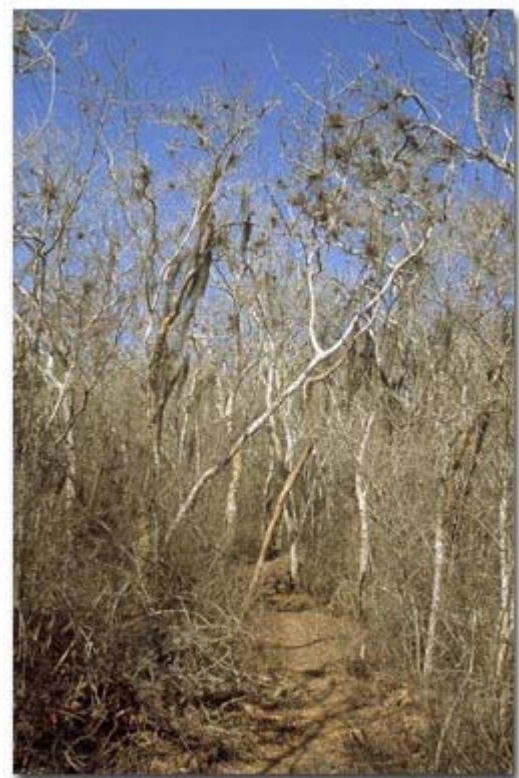
its operation. Its objective is to promote conservation of tropical ecosystems on the Jalisco coast and to give an impetus to the effective protection of the zone. The Foundation also provided technical and financial assistance during the creation of the Reserve.

### ***Management***

Chamela-Cuixmala Biological Reserve was created in December of 1993 covering 13,142 hectares. The management plan was published in 1999. It covers a broad array of topics, including programs and subprograms of development, conservation and management. We believe that some programs and subprograms were not sufficiently developed or described. For example the plan does not describe the use of non-timber resources by communities adjacent to the reserve, the rules regarding fishing in streams, or how the laws and their corresponding regulations are applicable to the protected area. The park's coordinates are: 19° 22' 03", 19° 35' 11" N and 104° 56' 13", 105° 03' 25" W.

The National Commission of Natural Protected Areas (CONANP) is in charge of the supervision and general administration of the reserve. An official agreement exists between the principal landowners, the Autonomous University of Mexico (UNAM) and the Foundation, for its management and conservation (for more information about land ownership issues, see the section called Human influence). The official document established a Board of Directors made up of the two institutions and designated a director of the reserve (Ceballos et al.1999).

There are two zones within the reserve, each with its own kind of management. The core zone is split into four sections and covers 80 percent of the reserve. The objectives in this zone are to maintain biological diversity and to promote research. This zone is subject to strict protection, the only permitted activity is scientific research. Management of the area is oriented toward protection and elimination of perturbation factors and conditions created by humans (Ceballos et al.1999).



*View from Cerro Colorado in Core Zone I.*

The buffer zone covers approximately 4934 hectares, and includes both pristine natural areas and areas modified by man. Within this zone, activities such as research, community outreach, and community support are permitted. In addition, low-impact activities or public works are allowed as long as environmental impact assessments are completed and show favorable results and the Board of Director approves.

A third, unofficial zone is the zone of influence. This zone consists of private properties, tourist developments, ejidales (Mexican community-owned lands), small populations centers and rural areas that are located near the reserve. The activities and programs in development in this zone include environmental education and technical assistance. The objective of these programs is to contribute to adequate natural resources management and to control the effects of human activities.

The reserve also has a biological station. The biological station has a director, an administrator, three park guards, two secretaries, three members of the service corps and four maintenance employees. The foundation also employs at least 5 park guards stationed at the guard posts located on the ends of the road entering and exiting the park, on the beach, and strategic positions where the reserve borders towns. Other Foundation employees are a scientific coordinator, camp worker coordinator, service personnel, maintenance workers, research assistants, cooks, gardeners, mechanics and many others that also work directly for the original property owners that still live in Cuixmala. In total, there are more than 50 employees. In both cases, there are vehicles available for security purposes, maintenance and conservation both inside and outside the borders of the protected area.



*Chamela Biological Station, UNAM*

UNAM's budget for the Biological Station, strictly for its maintenance, is \$90,900 dollars annually. Salaries of the employees and services such as light, telephone, water, Internet and infrastructure maintenance is managed from the UNAM's general administration office in Mexico City. The foundation does not give money to the budget annually, but claim that they have sufficient resources to secure the management and conservation of the protected area.

### *Human influence*

In Chamela-Cuixmala, landownership is mostly private, but the lagoons and coasts are federal property. The principal private owners are the Foundation and UNAM, followed by the University of Guadalajara, some small landowners, and a portion of the ejido Ixtan, which has not yet been inhabited. Land ownership in the reserve is legally divided into private properties, resulting in lesser pressure on the resources and no people actually living within the borders of the reserve.

On a few occasions, there have been threats of human encroachment and alteration of the ecosystems inside the reserve by neighboring landowners. These situations have been resolved by legal means since the institutions that administer the reserve have all the documents that give them full property rights.



This reserve, even with its particular land ownership situation, has not been able to escape entirely activities such as hunting, fishing, and removal of both timber and non-timber products. Fishing, however, is considered a low intensity activity because the long dry season and low water levels in the reserve's rivers make fishing impossible during the majority of the year. Some residents of the towns of Francisco Villa and Emiliano Zapata along the reserve's southern border and the population of Chamela along the northern border take advantage of the reserve by harvesting timber and non-timber products, although, it is not constant or intense, since the area is frequently under vigilance. There have been attempts to establish tourist projects near the borders of the reserve, so far without great success (Arriaga et al.2000).

Access to this area is by federal highway 200, Barra de Navidad - Puerto Vallarta. The city of Manzanillo is located 125 km away and Puerto Vallarta is 180 km away. Both cities have bus routes that pass this area. The Chamela Biological Station is located at kilometer 59 of Highway Barra de Navidad - Puerto Vallarta. The foundation's buildings are located on kilometer 45 of the same highway.



*The highways that intersect the reserve are in perfect condition.*

Tourism on the Carey Coast just outside of the reserve is very low. There are only two luxury hotels, both with very low capacity (Hawksbill Hotel and Club Med), the latter recently closed down. Hotel occupation is not very regular and there is no information on the approximate number of visitors. The hotels provide employment for a number of inhabitants in the reserve's Zone of Influence in the form of maintenance and service jobs. The town of Chamela recently opened a rustic economical hotel that offers both rooms and a camping area. Inside the protected area, there is no tourism. The only visitors are researchers who must obtain permission from the reserve's administrators before they are allowed entry or access to Chamela Biological Station or the Foundation buildings.



## *Conservation and Research*

In addition to administering the reserve, both UNAM and the Foundation carry out research and conservation projects in the area and have been doing so since before the reserve was created (Gómez-Pompa et al. 1995). In fact, UNAM's conservation and research interest in the previously unstudied region helped spark the idea to create a reserve in the first place. This, along with the Foundation's interest, produced the synergy needed to make the idea a reality. Today, these combined forces and the 30 years of research generated by UNAM's Biological Institute and other researchers taking advantage of Chamela's Biological Station have made the Chamela-Cuixmala Reserve one of the most studied and understood tropical regions of the world, biologically speaking. Chamela-Cuixmala's long-term studies on population dynamics, tropical forest dynamics, and watershed management are also well known (Mendoza 1997; Campo et al 2001; Campo et al 2000).



Recently, the Foundation has promoted and helped investigations that have scientific elements to develop conservation strategies. In the coastal zone, where the wetlands are located, they are monitoring species such as the American Crocodile, marine turtles and birds such as the least tern. In the hills of the lower forest, studies are being done regarding patterns of distribution and habitat use by birds such as the Lilac-crowned parakeet, and mammals like the jaguar and the coati (Nuñez et al. 2000; Renton y Salinas 1999; Renton 2001; Valenzuela 1999). The foundation also started a permanent monitoring program for the conservation of the vegetative cover, including flights over the reserve. Another permanent program executed by the Chamela Biological Station and the Foundation is environmental education with groups of students from the region and community members. They give instructional talks and lead walks on the reserve's interpretive trails.

*Students from UNAM pursue long-term studies of small mammals.*

Other Mexican institutions that conduct studies in the Reserve are the University of Guadalajara, the Ecological Institute of UNAM, The University of the Estado del Mexico, and the University of Michoacan. International institutions are the University of California, the University of Arizona, Oregon State University and the University of Georgia, among others. Since there is a large body of scientific research, we only mention some of the research themes here. Among them are studies of the physical environment with geological, topographical, climatic information on both local and regional scales. There are nearly complete inventories of plants, fish, reptiles, amphibians, mammals, birds, and invertebrates, in which the arthropods are the

best-studied group (Arizmendi et al. 1991; Ayala 1999; Yáñez y Floater, 2000; Noguera et al. 1996). The webpage for the Chamela Biological Station lists the accumulated bibliography of articles and theses.



*Biological Monitoring Station Cuixmala*



*Interpretive trail in Chamela*

Many studies have been conducted covering functional aspects of the ecosystem, vegetation structure of different sites, primary production, nutrient cycling and other aspects of ecosystem function (Gosz, et al. 2000). There are five watershed experiments that have generated important knowledge about hydrological dynamics, energy, biogeochemistry and the effects of ecosystem perturbations (Campo et al. 2001; Sarukhán et al. 2000). Other studies deal with the effects of deforestation and fragmentation on the terrestrial mammal fauna (Miranda 1996).



*This long-term stream research has been on going for over 15 years.*

The patterns of ecosystem productivity, and general genealogical patterns in tree and arthropod communities have been well studied. There are also additional studies of plant-animal interactions, herbivory by insects, and plant-pollinator interactions (Ayala 1999), among others.

## Threats

We believe that the threats affecting Chamela-Cuixmala have been well managed by the administrators of the area. They continually achieve good results in both management and conservation activities. However, we realize that in the medium-term, some of the principal threats could result in important changes in this fragile ecosystem that is already quite affected by human activities over the years. Among the threats that have persisted are hunting, illegal wildlife trade, which as seen in other protected areas, can lead to animal extinctions. This means that if these threats are not addressed, the trees within the forest may be conserved, but without the animals. The highway and infrastructure projects could also have drastic consequences for the ecosystem; they have already affected wildlife populations through fragmentation and isolation.

### *Illegal Hunting*

It is common for the residents of the towns surrounding the reserve to hunt within the protected area. Some of the hunting is “subsistence” or “opportunity” (when the prey crosses their path), but another percentage is with the intent to obtain hunting trophies or for sport. The fauna most in danger from hunting includes the white-tailed deer (*Odocoileus virginianus*), the collared peccary (*Tayassu tajacu*), the mountain lion (*Puma concolor*), the jaguar (*Panthera onca*), Muscovy duck (*Cairina moschata*), the Black-bellied whistling duck (*Dendrocygna autumnalis*), the green iguana (*Iguana iguana*), and the boa (*Boa constrictor*). Many of the hunters intentionally avoid the areas near the Chamela Biological Station and the Foundation Cuixmala installations.



*Species such as the white-tailed deer are the most sought after for trophy hunting*

Regarding the exotic fauna, they are found within one of the best-monitored areas of Cuixmala, near the coast, where there does not exist any possibility of entry for hunters. These species are completely fenced in.



## ***Wildlife Trafficking***

The trade of wildlife species in this area is most intense for the bird species. Populations of some species, such as the green macaw (*Ara militaris*) and the yellowheaded parakeet (*Amazona oratrix*) have been extinguished locally, due in part to the pet trade. Other parrots that are still being trapped are the Lilac-crowned parrot and Mexican Parrotlet in addition to larger ornate birds like the white-throated magpie-jay (*Calocitta formosa*) and the Northern mockingbird (*Mimus polyglottus*).

## ***Contamination***

Trash generated in the region's towns and hotels is burned in open trash pits near the reserve's borders. These sites are hot spots for disease and infection, sources of soil contamination, and can generate fires with the potential to get out of hand and burn the reserve.



*Garbage could be a serious threat to the reserve.*

## **Future Threats**

### ***Highway expansion and road paving projects***

Highway No.200 Melaque - Puerto Vallarta planned enlargement and new lanes is a potential threat that has generated diverse opinions regarding possible effects on the protected area over the last few years. Currently, this road crosses the reserve and divides it into two fragments. It is becoming more common to see dead animals that have been killed by vehicles on the side of the road. Expanding this road could produce additional road-kill victims. Other projects, like paving Huerta Road leading to the town of Chamela in the Northeast region of the reserve, have



already been approved by Jalisco's government. This project could potentially increase fragmentation and isolation of conserved ecosystems.

### ***Infrastructure and tourism development in the region***

Some privately funded projects for tourism development and infrastructure, have, on repeated occasions, tried to construct landing strips, roads, and most recently a golf course and marina less than 5 km from the reserve. Without a doubt, the intention is to generate anchors of tourist attractions in order to encourage other businessmen to invest and further develop the tourist industry in the region.

### ***Introduction of exotic fauna***

Before the reserve was created, exotic species such as elans (*Taurotragus orix*), zebras (*Equus burchellii*) and black necked-antelopes (*Antilope cervicapra*), were introduced into what is now considered the buffer zone. Our observations of the area permit us to evaluate the conditions in which these animals exist, such as the means of security used to confine them, in addition to getting to know the personnel in charge of their care. The animal enclosures and general condition of the animals indicate that they are well managed, but we believe that because the animals are from another part of the world, their presence implies a risk for Chamela-Cuixmala. Under circumstances out of the owner's control, such as natural phenomena or disasters, the possibility for these animals to escape exists, and therefore, makes these exotic species a potential threat to the reserve.

## **Recommendations**

### ***Illegal Hunting***

It is very important that the Board of Directors continues the work it has started to secure additional training and recognition of the reserve's guards from the Federal Environmental Protection Agency Prosecutors (Procuraduría Federal de Protección al Ambiente-PROFEPA) and to involve local citizens in anti-hunting campaigns. By carrying out this work, they will have more legal and judicial tools for dealing with and hopefully eradicating this age-old hunting problem. Along with these actions, we recommend that the reserve administrators demand that the environmental laws are applied and those breaking those laws suffer the consequences. This would serve as an example and deter others from breaking the laws in the future and help raise awareness in the communities.

### ***Wildlife trafficking***

To combat this activity, decisive actions and cooperation on the part of PROFEPA, are required. Although some of these trade routes and animal storage facilities are already known, there isn't enough personnel to enforce the law. The institutions' private security in the reserve, in coordination with local authorities and PROFEPA state representatives, should enforce private property rights with total authority of the law.

### ***Contamination***

Some progress has been made towards implementing integrated waste management in the region, such as recycling, but unfortunately, it appears to have been discontinued. It is therefore necessary to plan other alternatives like sanitary landfills that could better integrate the territorial laws of the region. Also, preventative actions should be considered, such as developing a program against fires by explaining possible threats that burning trash can cause. It is important to take into account exceptional climatic conditions and natural phenomena such as El Niño that can generate disasters that put the reserve's ecosystem at risk.

### ***Highway expansion and road paving projects***

Institutions in charge of the administration and management should not lose sight of the existing environmental legal tools, such as environmental impact studies and measures available for mitigating negative impacts brought upon the reserve by potential developmental projects.. We suggest that if the public works projects, such as road expansion, are inevitable, the administration of the reserve needs to take action to ensure that biological corridors are also built for the fauna whose habitat will be fragmented by the roads. There are many methods that can guarantee animals' safe passage between vegetation fragments, such as underpasses, that could be developed along with new roads/highway expansions.

### ***Infrastructure and tourism development***

In the reserve's zone of influence of and within the reserve itself, public works projects already exist that affect the surface there. Coordination between Chamela-Cuixmala and PROFEPA must be maintained in order to evaluate and halt projects that might negatively impact the protected area. Also, it is necessary that PROFEPA apply the corresponding sanctions against those that commit environmental crimes and in that case undertake mitigation measures.

### ***Introduction of exotic fauna***

We recommend that the Ecological Foundation of Cuixmala continue to maintain security measures for the management of the exotic species lodged there. Also, the Mexican Wildlife Agency that authorized their introduction needs to follow these populations closely. Population growth needs to be inhibited in order to guarantee the health of the reserve's ecosystem.

### **Conclusion**

The management plan and private ownership under which the Chamela-Cuixmala Biosphere Reserve operates has achieved impressive results. Ninety-five percent of the original vegetative cover of the area has been maintained and there are no doubts regarding ownership of the land. The area's management program has been an excellent tool to help the reserve achieve conservation, research, and information dissemination successes. Nonetheless, we think that some programs have been underdeveloped and as a result, there is lack of full understanding how certain problems and laws affect the reserve.

Some threats such as hunting and the extraction of wildlife have not been addressed with permanent protection programs. Other projects, such as the development of tourism that could affect the protected area indirectly, are already being negotiated with the responsible parties to look for alternatives that do not negatively affect the environment. Nevertheless, pressures exist outside the reserve's borders that threaten biological diversity inside the reserve. For this reason, we classified Chamela-Cuixmala as vulnerable.

Inside the reserve deforestation has been stopped, thanks to the permanent vigilance and monitoring (both on land and from the air). The rest of the ecosystem, since it is not in a protected area, is still being lost to human activities such as deforestation, grazing, agriculture, and urban and tourism development. To date, Mexico has lost 90% of this ecosystem, on the order of 300 thousand hectares per year (annual 1.9%), including the higher elevation humid forests. In order to stop the increasing loss of this ecosystem, the reserve now works beyond the borders of the protected area, involving to communities and local governments in conservation projects, environmental education and urban development.

Without a doubt, the biological wealth, high endemism and complex processes involved in the dry tropical deciduous forests of this area have given scientists and conservationists worldwide many surprises and satisfying discoveries. But it is necessary to recognize that fragmentation of this ecosystem is incredibly high, producing species isolation and the local extinction of a high number of species.

We recommend that the institutions responsible for the Chamela-Cuixmala's administration and the Federal government analyze the possibilities and other strategies in order to obtain more land suitable for conservation in order to better represent this ecosystem. It is almost certain that if these types of actions are not taken, cattle ranching, urban development and encroaching tourism will gain more and more ground in the fight for the protection of the dry tropical deciduous Mexican forests.

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