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The distribution of Guatemalan Black Iguanas (*Ctenosaura plearis*), also known as Paleate Spiny-tailed Iguanas, is restricted to the Motagua Valley. Populations are known to be sparse and the species stands to benefit from the preservation of this unique ecoregion.

# The Conservation of Thorn Scrub and Dry Forest Habitat in the Motagua Valley, Guatemala: Promoting the Protection of a Unique Ecoregion<sup>1</sup>

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Photographs by author unless otherwise indicated.

The semi-arid region of the Motagua Valley in northeastern Guatemala has been classified as an ecoregion in the classification developed by the World Wildlife Fund (WWF) (Dinerstein et al. 1995) based on its biodiversity and high degree of endemism, among other unique qualities. Because the region is also highly threatened, the Guatemalan NGO Fundación Defensores de la Naturaleza (FDN), with the support of The Nature Conservancy (TNC) and Dutch cooperation, are leading a participatory and interinstitutional conservation program.

## Description of the Area

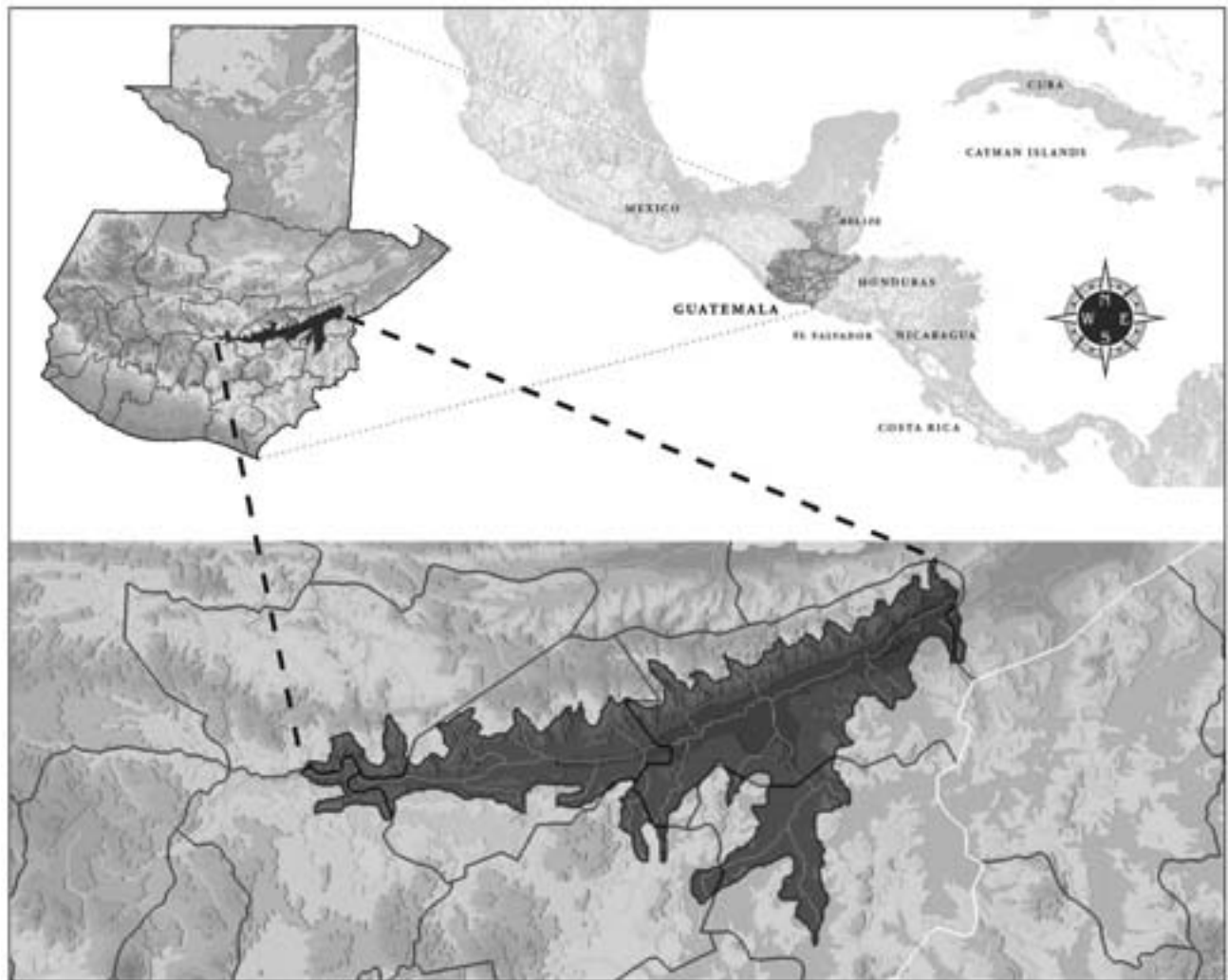
The small (approx. 200,000 ha), semi-arid region of the Motagua Valley is in the departments of El Progreso, Zacapa, and Chiquimula, and contains two habitat zones: Subtropical thorn scrub and subtropical dry forest (TNC and FDN 2003). The valley is surrounded by the Sierra Las Minas, with peaks reaching to 3000 m above sea level creating a natural barrier to

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<sup>1</sup> Translated by AJ Gutman



The semi-arid region of the Motagua Valley is seriously threatened. Despite its importance and singularity, it is barely represented in the Guatemalan Protected Areas System.



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Geographic location of the semi-arid region of the Motagua Valley, Guatemala.

the moisture originating from the Atlantic (TNC and FDN 2003). With annual precipitation of approximately 500 mm per year, the area has the lowest annual precipitation recorded for any part of Central America (Powell and Palminteri 2001), whereas the surrounding mountains receive up to 3000 mm of annual precipitation (Powell and Palminteri 2001).

Precipitation data indicate a rainy season extending from May to September. The average relative humidity ranges from 60–72%, and the average temperature varies from 22–28 °C (Castañeda 1997), reaching a maximum of 45 °C during the warmest months of March and April, and a minimum of 7 °C in December (Valle et al. 1999).

#### Vegetation

The climatic conditions of the region have resulted in the development of caducous vegetative communities, in which leaves fall at the beginning of the dry season and appear at the beginning of the rainy season (TNC and FDN 2003). Thorn-bearing species make up approximately 50% of the plant life, hence the descriptive habitat name of “thorn scrub” (Castañeda and Ayala 1996). With the exception of the gallery forests, in which the constant flow of water permits the development of very differ-

ent and much greener vegetative communities, which provide a refuge to many animal species, the lower elevations of the region are dominated by thorny species such as the Cactaceae, Acacia, and leguminous shrubs (Powell and Palminteri 2001).

Recent studies of the thorn scrub in the Motagua Valley have documented the presence of 107 families and 598 species of plants, of which 140 are trees, 89 shrubs, 273 grass, 74 lianas,



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Several bromeliads and species of cacti, such as this *Melocactus*, are threatened by illicit extraction.

12 epiphytes, 4 parasitic species, and 3 aquatic species (Véliz et al. 2005). The most diverse families are Asteraceae and Euphorbiaceae with 46 species each, Fabaceae with 41, Poaceae with 39, Mimosaceae with 28, Caesalpiniaceae with 20, Convolvulaceae with 18, and Boraginaceae, Cactaceae, and Solanaceae with 15 species each.

Geologic processes affecting the region have created isolation that has favored plant speciation, producing a number of new species with distributions restricted to the Motagua Valley, for example, various Cactaceae, Euphorbiaceae, and Mimosaceae (Castañeda 1997, Valle et al. 1999, Morales 2003). The endemic bromeliad, *Tillandsia xerographica*, is in danger of extinction. It, along with species of cacti in the genera *Mammillaria* and *Melocactus*, are extracted illegally for the ornamental plant trade.

Among the most common and typical species in the thorn scrub of Guatemala are *Guaiacum coulteri*, *Caesalpinia velutina*, *Cassia emarginata*, *Cassia skinneri*, *Haematoxylon brasileto*, *Leucaena collinsii*, *Ximenia americana*, *Bursera schlenthendali*, *B. graveolens*, *Acacia farnesiana*, *Prosopis juliflora*, *Juliania adstringens*, *Stenocereus pruinosus*, *Pereskia lychnidiflora*, *Nopalea guatemalensis*, *Pilosocereus leucocephala*, *Cordia dentata*, and *Cordia truncatifolia* (Véliz et al. 2005).

Many important tree and shrub species are used by the local inhabitants for firewood, wood for small and medium-sized industry or crafts, and as a source of medicinal plants, food, and ornamentals (Castañeda 2004). The main species that make up the cover in the thorn scrub, recognizing the limitations of the zone, are the Ceibillo (*Ceiba aesculifolia*), Orotoguaje (*Acacia deamii*), Yaje (*Leucaena diversifolia*), Aripín (*Caesalpinia velutina*), Mountain Oak (*Bucida macrostachya*), Jiote (*Bursera simarouba*), Caraño (*Juliania adstringens*), Guayacán (*Guaiacum sanctum*), and the Barreto (*Plocosperma buxifolium*) (Castañeda 2004). The Barreto and the endemic Motapino (*Mimosa zacapana*) also have ornamental uses (Castañeda 2004).

#### Fauna

The semi-arid region of the Motagua Valley is home to a greater diversity of species in some groups of vertebrates compared with other types of forest, largely due to the interactions between the riverine and semi-arid forests (TNC and FDN 2003). The presence of 48 species of mammals and 101 species of birds has been reported (Valle et al. 2003), some of which make use of the gallery forest that provides them with food and sites for reproduction (TNC and FDN 2003). The bird families Columbidae, Tyrannidae, Icteridae, and Fringilidae are sufficiently abundant



Gallery forest and dry forest in the Motagua Valley, showing the river basin during the dry season and the gallery forest that remains green.



CESAR QUEJENE

The Russet Crowned Motmot (*Momotus mexicanus*) is a species that is considered to be a reliable indicator of high-quality habitat.

as to be considered characteristic of the region (Land 1970). The valley is the only site in Central America where the Russet Crowned Motmot (*Momotus mexicanus*) is found, a species that is considered to be a reliable indicator of high-quality habitat. Nevertheless, recent studies (Perez 2003, Nájera 2004) indicate that most bird species whose presence was recorded in the valley are habitat generalists and little affected by disturbed habitat.

The threatened mammalian species in the region include the bats *Pteronotus dhabi*, *P. parnelli*, and *Leptonycteris curasoae*, the Armadillo (*Dasypus novemcinctus*), which is endangered due to hunting, the skunks (*Conepatus semistriatus*, *Mephitis macroura*) due to exploitation for medicinal uses, Cacomistle or Bassarisk (*Bassariscus sumichrasti*), and the Water Possum (*Chironectes minimus*), which is threatened by the advance of the agricultural border (Valle et al. 2003).

Sixteen species of amphibians and 54 reptiles have been reported in the Motagua Valley (Acevedo 2004). The frog, *Craugastor inachus*, that was only recently described (Campbell and Savage 2000) is endemic, and the salamander, *Oedipina taylori*, is a regional endemic (Acevedo 2004). Among the reptiles is the Guatemalan Beaded Lizard (*Heloderma horridum charlesbogerti*), an endemic subspecies that is in serious danger of extinction. Recent studies of this species (Masaya 2005, Ariano 2003) report that, even in the most optimistic scenario, the surviving population of *H. h. charlesbogerti* is only around 174 individuals (Masaya 2005).

#### The Conservation Plan

In 2003, the FDN and TNC undertook the task of creating a Conservation Plan for the semi-arid region of the Motagua Valley, in view of the importance of biodiversity in this area and of the urgency to initiate formal actions for its preservation. In 2005, the plan was updated based on new findings and lessons learned during the first years of work in the Motagua Valley (FDN and TNC 2005).

The Conservation Plan is based on the methodology of Planning for the Conservation of Areas (PCA), proposed by TNC (TNC 1999) and which takes into account all available ecological and social data on the area in question. The methodology is based on the identification and selection of conservation

elements, and an analysis and prioritization of the threats and advantages affecting those elements. The next step is the definition of strategies to reduce the threats and maximize advantages. The final step is to define indicators that can be used to measure the success of the proposed strategies.

The application of this methodology to the region permits an approach to the initiative from a local perspective, recognizing the region's inhabitants as stakeholders in the conservation process. To date, the FDN has focused on promoting the declaration of both private and municipal protected areas, environmental education, incentives for forest conservation, ecotourism, and the enforcement of existing conservation legislation.

#### Conservation Elements

The conservation elements identified for the semi-arid region of the Motagua Valley are: (1) Thorn scrub and dry forest, (2) Tillandsias and cacti threatened by extraction, (3) Guatemalan Beaded Lizards (*Heloderma horridum charlesbogerti*), (4) gallery forests, and (5) the fluvial system. These five elements and the key ecological processes by which they are connected are the focus of the conservation efforts undertaken since 2004 at the field level.

#### Threats and Advantages

The most serious threat identified to date is agricultural practices inconsistent with conservation. Areas of thorn scrub and dry forest converted for agricultural use have led to the destruction of 60,000 ha (ca. 30% of the land in the region; Secaira 2004). Also considered serious threats are incompatible forestry



Cacti in the Valley are threatened by extraction.



Guatemalan Beaded Lizards (*Heloderma horridum charlesbogerti*) are endemic to the Motagua Valley.

practices, the elimination and extraction of *H. b. charlesbogerti*, and non-sustainable selective forest product extraction. The most threatened elements within the thorn scrub and dry forest ecosystem are the Beaded Lizards and the fluvial system, because the factors threatening them are severe and could eliminate them entirely in the near future if no action is undertaken.

Investigations in the area have identified further factors leading to the degradation of the ecosystem, including decreases in the amount of forest, an overall reduction in biodiversity, and contamination of the rivers. Another element to consider is the implementation of monoculture systems and the pressures that the impoverished human populations exert on the local flora and fauna (Valle et al. 1999).

Nevertheless, factors also exist that favor the conservation of biodiversity in the Motagua Valley. Among the most significant of these is the presence of diverse institutions and local governments that are actively increasing awareness of the importance of the region and of conservation projects centered on the thorn scrub and dry forest. Also, since the formal implementation of the PCA in 2004, an increasing interest in scientific research and ecotourism in the Motagua Valley has served to directly and indirectly promote the conservation of biodiversity.

#### Strategic Objectives and Advances

The strategic objectives for the reduction of threats and an increase in the positive factors affecting the conservation elements are set for a term of five years from the update of the Conservation Plan in 2005. One of the main objectives is to

establish formal conservation mechanisms in at least 10% of the present natural cover, which amounts to having at least 10,000 ha of thorn scrub and dry forest under protection by 2010. With the collaboration of local governments, communities, and private landowners, the first protected areas have been established in the region adding up to a total of 934 ha, comprised of municipal regional parks and private natural reserves. Disputes over land ownership have inhibited further progress on this objective. In some instances, well-preserved areas with cooperative and enthusiastic owners could not be declared as protected areas due to the lack of property registries. In many other cases, a lack of realization of the importance of the ecosystem on the part of local property owners, communities, and governments works against the creation of new protected areas, thus the intense focus on environmental education for adults and children in the region.

One factor stimulating efforts to conserve thorn scrub and dry forest has been the recent inclusion by the Guatemalan National Forest Institute of these types of habitat into their Forest Incentives Program (Programa de Incentivos Forestales, PINFOR). This program provides economic incentives to private and municipal owners to maintain the existing natural vegetative cover on their properties or to reforest them with native species. To date, five private owners have been provided with economic assistance for choosing to conserve the forest on their property.

The goal for 2010 with regard to *Heloderma horridum charlesbogerti* is to maintain existing population numbers



(Masaya 2005, Ariano 2003). Beaded Lizards are seriously threatened by destruction of their habitat, elimination due to false suppositions regarding the dangers posed by this venomous animal, and illegal extraction for the exotic pet trade. Various institutions have initiated their own environmental education programs to sensitize the local population to the need for protection. Recently, the national strategy for *Heloderma* conservation was developed (Zootropic and TNC 2005), and work moves forward on the telemetry studies initiated in 2004 (Masaya 2005), as well as environmental education efforts within the distribution of *Heloderma* to ensure the protection of the remnant population of this species.

The strategic objectives for the gallery forests and the fluvial system are largely the purview of the FDN team that works in the adjacent Sierra de las Minas Biosphere Reserve (SMBR). Since the water supply of the Motagua Valley comes almost entirely from the Sierra de las Minas, in which 63 permanently flowing rivers originate, an initiative for the integrated management of the water supply has been created ("Fondo del Agua" = Water Fund). The objective of this project is to ensure the volume and quality of the water originating in the SMBR for the long term by providing technical and financial assistance to improve water management and the river basins (FDN 2004). For the semi-arid region of the Motagua Valley, the strategic objective for 2010 is to maintain the quality and volume of water produced annually by the SMBR, and to ensure the preservation of the gallery forests of three high-priority river basins between the Motagua Valley and the SMBR. Work toward these objectives has been accomplished primarily through the Water Fund project with the formation of river basin committees and through education emphasizing the importance of sustainable usage of hydro resources in the region.

To improve progress towards the fulfillment of the proposed objectives, a plan for the conservation of cultural patrimony has been developed and integrated into the existing PCA in an effort to take advantage of synergies between nature and culture to increase local and institutional support, education, and the promotion of sustainable tourism. This Natural and Cultural Conservation Plan (FDN and TNC 2005) tries to inte-



The archaeological sites of the Motagua Valley, such as this one called Guaytán, are among the cultural elements in need of conservation.

grate the diverse stakeholders and local institutions through the formation of an "alliance for the conservation of the semi-arid region of the Motagua Valley." The objective of this alliance is to promote and coordinate activities for the conservation of the natural and cultural resources of the region, and to extend management support to national and international organizations for the implementation of the PCA. The alliance also seeks to generate political support and to establish strategic alliances with participating institutions and local governments, to continue working on the application of effective environmental legislation, the conservation and recovery of high-priority areas, social organization, and environmental education, with the purpose of promoting and consolidating mechanisms likely to preserve the natural and cultural resources of the Motagua Valley.

Since early 2004, we have made discernible progress on all proposed strategic objectives, and have learned many lessons. One of the latter is the necessity and importance of a combination of interinstitutional alliances and local support to develop a more integrated and sustainable long-term initiative. Promoting conservation in this region of Guatemala has been a challenge, but the participating institutions truly hope that the conservation efforts that are being implemented will ensure the permanence of this important ecosystem, as well as fortify and consolidate diverse areas of conservation in the semi-arid region of the Motagua Valley.

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### Dear Donors and Volunteers,

On behalf of Zoo Atlanta and the IRCF, we extend our sincere gratitude to you for your help in making this year's NRB Expo auction to benefit the Guatemalan Beaded Lizard a tremendous success. Thanks to your generosity and hard work, we raised \$18,000 to help this deserving species. These funds will help save some of the most critically endangered lizards in the world.

Our sincere thanks to each of you.

Brad Lock, Zoo Atlanta, and John Binns, IRCF

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