

# Bajo del Tigre

## Trail Guide



**Welcome! Thank you for your visit**

## WELCOME TO BAJO DEL TIGRE

The Children's Eternal Rainforest (or "BEN" after its Spanish name, Bosque Eterno de los Niños) is so named because it was bought and protected thanks to fundraising efforts of children from around the world. The BEN is the largest private reserve in Central America and, straddling 7 different life zones, is one of the most biologically diverse 23,000 hectares on the planet.

Bajo del Tigre is a unique part of the BEN. Like the jaguar for which it is named, the kind of forest found in Bajo del Tigre is now rare in Costa Rica. It is a remnant of the type that once covered much of what is now the central valley where San José is located.

With a unique and rich diversity of flora and fauna, this small reserve is in a transition zone from premontane wet forest to premontane moist forest. Because of its elevation, humidity, and location on the Pacific slope, Bajo del Tigre is a habitat very different from other reserves in the area. Thirty of the tree species in Bajo del Tigre are among those in the Monteverde area that have recently been identified as new to science.



Located between 1,020-1,380 meters (3,400-4,500 feet), it receives 2,411 millimeters (95 inches) of rain per year near the visitors' center. At the bottom of the river canyon, rainfall is significantly less. Bajo del Tigre has a six month dry season from mid-November through mid-May; the rest of the year is rainy, with the heaviest rains in October. The trade winds are strongest from November through January, sometimes carrying mist to the area.

We invite you to walk slowly, silently, and gently on the trail of the jaguar. See, hear, smell, and feel the ecosystem that is home to a vast variety of tropical vegetation that provides food and shelter for many species of mammals, reptiles, birds, and insects. You will be sharing the home of the two-toed sloth, white-faced monkey, agouti, coati, olingo, kinkajou, margay, prehensile-tailed porcupine, hog-nosed skunk, fox, coyote, armadillo, and bats, plus a myriad of insects, reptiles, and birds. Species such as the anteater and mountain lion have become rare and the Jaguar who once roamed these canyons leaves only its spirit and name.

We ask that you cooperate by carrying out all trash, staying on the trail, and leaving all flowers and plant parts for others to enjoy. You are welcome to eat your lunch or snack at the benches out front or picnic table indicated on the map.



### DEDICATION

*This booklet is dedicated to Ken and Irma Scudder whose farm became the cornerstone of Bajo del Tigre. They donated it to the BEN and Monteverde Conservation League for educational purposes in 1988.*

### **Why Do We Need The Rain Forests ?**

In addition to being places of beauty and natural wonders, the rain forests provide many useful services to humans.

- Rainforests produce 40% of the oxygen that we breathe.
- Rainforests provide plants for medicinal use.
- Rainforests act like "Carbon Sinks"
- The trees in the forests and the soils that are held in place by them are critical for taking in Carbon Dioxide and therefore regulating global climate.
- The Children's Eternal Rainforest (BEN) creates educational and job opportunities for nearby communities.
- The BEN protects important watersheds for hydroelectricity that the country uses for its main source of power. Among the main protected watersheds we find the Penas Blancas, Esperanza, San Lorenzo, Aranjuez, Cano Negro, and Guacimal rivers.

Amazing fact - One rainforest tree, produces enough oxygen for a person to breathe for 25 years!

## **1. AN UNTAMED GARDEN**

**David Hunter Wildlife Planting.\*** The concept of this garden is to create a collection of plants that will attract hummingbirds, fruit-eating birds, butterflies, and mammals. It is an alternative to artificial hummingbird feeders and exotic ornamental plantings. The 40 species of plants chosen are either native to the Monteverde area or are naturalized (have been introduced and now reproduce outside of cultivation). While many are not big and showy, they play important roles in the lives of a variety of animals. Some of the plants are host plants for

butterflies--keep an eye out for caterpillars munching on leaves. In the rocky section, you can see certain plants that thrive on the slopes in the lower section of Bajo del Tigre where the climate is warmer and drier.

In 1996, volunteers from the U.S., Great Britain, Canada, and France helped prepare the site and transplant the many of the plants that are flourishing here now. Local school children help with the maintenance.

\* (David Hunter, an avid birder, died of AIDS in 1990. A friend's donation helped make this garden possible.)



## 2. HERE'S THE BEEF

**Invaders.** Many of the grasses that you see in fields and along roadsides in Costa Rica are African in origin. Early settlers found these aggressive sun-loving species useful as fodder for livestock. Once given free range in clearings, the grasses spread rapidly and are difficult to eradicate. Due to their thick, impenetrable coverage the tall “gigante” or elephant grass, and the shorter wandering “estrella”, a type of Bermuda grass, slow the process of natural regeneration in abandoned pastures.

## 3. A MONTEVERDE MAHOGANY

**Cedro, or Spanish Cedar.** Until 2006 a cedro tree near this sign managed to beat the odds, germinating and surviving in what was then a heavily-grazed pasture. Today, its offspring are scattered through the nearby pasture grasses, where they are one of the few types of tree saplings that survive. Currently, they are only a few inches in diameter, are 8-10 feet tall and have a smooth white bark. This is because they develop only a tall, straight, unbranched trunk for the first several years, giving the climbing estrella grass little or no purchase to grow up and over and thus smother the young tree. They and a few other species of trees are slowly creating shade, which will eliminate the grass and allow other species of trees to get started and develop a mature forest. Unlike most trees in Bajo del Tigre, the Cedro loses its leaves during the months that would be winter in the north, thus minimizing damage from strong winds that blow at that time of the year.

Cedros of several species are valuable lumber trees, belonging to the mahogany family. Since they are fast growing, they have potential for use in tree plantations. When the inconspicuous, greenish-yellow flowers are produced by the cedro, you may notice an objectionable garlic-like odor. Later, capsules of wind-dispersed seeds appear, further distinguishing cedro from most Monteverde trees, which tend to be bird and mammal dispersed.





#### 4. MAKING BAT SPLATS COUNT

**Seed Dispersal.** Near this sign are three groups of plants that depend on bats for dispersal of their seeds. The shrubs and treelets (some of which have large aromatic leaves) with candle-like fruit spikes that may be erect or hanging are pipers, which belong to the black pepper family. Other shrubs have small, round tomato-like fruits that are green or greenish-yellow. These are solanums and belong to the tomato/potato family. Finally, the tree with the huge hand like leaves, the cecropia, produces clusters of long, hanging greenish fruit that is eaten by birds and arboreal mammals as well as by bats. All of these fruits have many small seeds, which the bats swallow with the pulp. After passing unharmed through the gut, the seeds are voided elsewhere completing the job of seed dispersal for these abundant and important plants. Bats are perhaps the most common vertebrates in tropical forests. There are about 50 species in Monteverde (more than in the whole United States) accounting for more than half of all mammal species here. In addition to the many kinds of fruit bats, there are bats that feed on the nectar of flowers, and bats that eat insects.

## 5. TREACHEROUS EMBRACE

### Adaptation to Light Competition.

The strangler fig avoids the struggle for light on the forest floor by germinating in the treetops. Starting life as an epiphyte on a branch, it sends down long roots along the trunk. Over a number of years the roots fuse, grow thicker and eventually surround the original tree. The host tree will die, in part due to "strangulation" by the fig's tight embrace. Shading and competition for nutrients also contribute to the support tree's demise. The strangler fig is considered a hemiepiphyte because as the host tree dies the fig becomes its own free standing tree having a hollow center where the host tree once stood. For the daring, finding a fig tree in this stage can be an adventure as it provides a vertical tunnel great for climbing. However, one should always beware of defensive ants. The fig's fruits are popular with a variety of animals-monkeys, coatis, kinkajous, bats, birds (including quetzals and bellbirds), and squirrels - that in turn spread seeds throughout the forest. It is considered a keystone species because it fruits year round providing a safety net for animals whose first choice of food is not available.





## 6. CONTRASTING COLORS

**Berry on a Platter.** Often bird dispersed fruits have bright colors, or have reddish stems. Berry on a platter, also known as cup and saucer, or Napoleon's buttons, have a bright red calyx upon which sets the round black fruit. The Costa Rican name is 'chupeta', which means pacifier.

## 7. RESURRECTION FERN

**Adaptation to Climate.** This rock is covered with a fern that is uniquely adapted to the wet/dry seasons experienced by the forests on the Pacific slopes of Costa Rica. Aptly named the resurrection fern, this plant undergoes a period of dormancy during the dry months, when the fronds curl up and turn brown. The fern resurrects, however, with the first rains. Take a closer look at how the roots of this fern collect and hold soil that provides the plant with nutrients.



## 8. THE EDGE OF THE FOREST

**Witness Trees.** On the far side of this former pasture, there are three trees emerging above the canopy of the remaining forest. These are witness trees, silent testimonial to the original forest that was selectively logged and cut for pasture in the 1940s. In the foreground, an area that was pasture before 1991 is growing up. The seeds of Guavas, tomato relatives, melastomes, and other species that thrive on lots of sunlight, have germinated and are filling in this large gap.

### WATCH FOR....

**Hide and seed.** You may see an agouti, a large rodent, standing motionless in the trail or moving slowly through the underbrush in search of food. Generally reddish brown in color, this mammal is an important seed disseminator. It buries seeds to dig up and dine on later when they may be scarce, stashing away a surplus scattered around the forest. They also eat fruits, fungi, flowers, leaves, and insects.



### TRAIL JUNCTION

The guided walk continues along the Bellbird Trail offering a view of the Guacimal River Canyon and passes by a picnic table about ten minutes ahead. From March to September you will hear the distinctive clanks and rusty hinge squeaks of the Three-wattled Bellbird. The final portion of the guided walk is on the Monkey and Children's Trails. A short-cut return to the Visitor's Center is the Arboretum trail.



## 9. SLASH AND BURN

**Old Bean Field.** In 1987 the regenerating forest area just below the trail was a bean field. Poor rural people, who must grow their own beans if their family is to have enough to eat, rarely own their own land. Instead they must grow their bean crop wherever space is available, often on the farm of a friend, relative, or employer with whom they must share the crop. This often means planting on steep slopes that are worthless for other agricultural uses. Such fields will produce a good crop only if allowed to lay fallow for several years. This plot had laid fallow for seven years prior to 1987. The accumulated regenerating vegetation was cut to the ground and the bean seed scattered among the resulting brush piles. When heavy rains began the seeds sprouted and grew upward, climbing the brush, while the roots fed off the decaying plant material.

This is called shifting agriculture (or often "slash and burn," since a common practice is to burn the vegetation and plant among the ashes). It can be seen throughout the tropics, and it works if there is a lot of land and few people. But rising populations result in pressure to reduce the fallow time. The end result is poor crops and loss of soil fertility due to, leaching, erosion, and landslides. Such slopes are most productive when allowed to remain in forest. Nevertheless, during periods of extremely heavy rain, landslides can occur, as can be seen on the opposite side of the canyon.

## 10. ASHES TO ASHES

**Decomposition.** The remains of once vigorous life represented by this rotting log is paying back the debt accrued over the years. Tropical soils often contain few minerals to sustain growth, so new growth is dependent upon recycling the leaves, branches and trunks of the previous generation. All of the trees have their roots near the surface of the soil to absorb the nutrients before the heavy rains wash them away. The recycling process begins before the tree actually falls.

Years of declining health allow limbs and trunk to be softened by bacteria and fungi. Parasitic plants send roots into the resulting fissures. Eventually the tree uproots or breaks off and once on the ground, insects burrow into the wood, while mosses and liverworts live and die on the surface, thus aiding the bacteria and fungi in recycling of nutrients. Seeds may sprout on the softened surfaces, and even small trees may begin growing on the log. If the log is hollow small animals live within its shelter and larger animals, such as coatis, tear at the log looking for insect larvae or other animals inside.



## 11. LIVE FAST, DIE YOUNG

**The Cecropia, a Colonizing Species.** Growing up to three meters (10 feet) per year, cecropias are some of the fastest growing trees out of the more than 600 species in the Monteverde area. In spite of its quick start, the cecropia is only a colonizer. It is called a pioneer species because it is among the first to grow in forest light gaps (openings in the forest) and along other cleared areas.



## 12. THE LAST OF THE JAGUARS

**Jaguar Canyon.** Bajo del Tigre (Jaguar Canyon) received its name in 1949 when the last pair of jaguars was killed in what is now the Monteverde/Santa Elena community. The homesteaders relied upon hunting to supplement the family food supply, placing them in direct competition with jaguars and mountain lions for such mammals as deer, peccary, and tapir. Each year there were fewer animals for the jaguars to hunt.

The last pair was confined to an area between the top of the "cliff edge" (the lower limit of what is now Monteverde) and the bottom of the canyon, trapped between the families who settled in the San Luis valley below and those in Monteverde above.

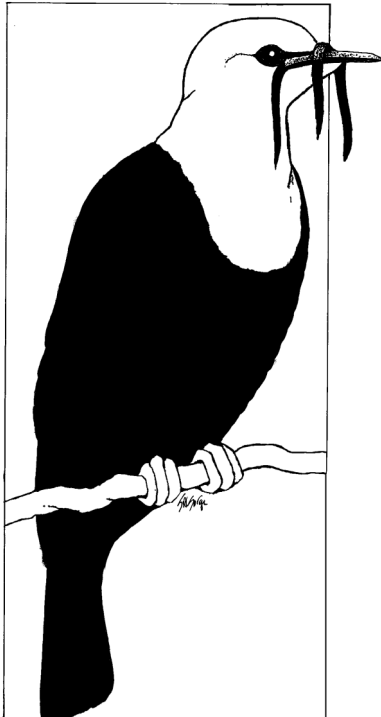


When a jaguar was observed killing a pig, eight hunting dogs were sent to chase it away, but only two dogs returned — jaguars really relish dog meat! A few days later a hunting party went down the cliff with more dogs, killed the jaguar and carried it home. The man who had seen the pig being killed informed the hunters that they had killed the wrong jaguar, because the one he had seen was a female about to give birth. Unfortunately, the hunters were able to locate the female in her den and kill her too.

The Monteverde Conservation League is trying to preserve a large enough area to ensure that some representatives of each species will survive. We know that jaguars live in remote areas of the BEN, as they have been detected using motion sensor cameras since February 2012.

### 13. THE "BONK" BIRD

**Altitudinal Migrant.** The extremely loud "bonks" plus a variety of rusty hinge squeaky sounds that issue from nearby trees from early March through September are the mating calls of a male Three-wattled Bellbird, a spectacular species that nests only in the mountains of Costa Rica and adjacent Panama. Look for him on a limb at the very top of a tree, although he sometimes



long black wattles surrounding his mouth. Occasionally he will be accompanied by the drab female and you may be lucky enough to witness the fascinating courtship sequence. The Bellbird, which eats large fruits like wild avocados and figs, raises its two young in Monteverde, although the nests are rarely found. The bellbird is an altitudinal migrant that descends to lowland forest in Costa Rica, Nicaragua, and Panama during October and November, to return in late February and March. We could easily lose this beautiful bird if its lowland rain forest habitat is not protected.

### 14. NEW TO SCIENCE

**Myrcianthes sp.** This tree in the Myrtle and Eucalyptus family (Myrtaceae) was discovered in this area and exemplifies one of more than 30 tree species in Monteverde that are new to science or only recently described. For several years this tree was confused with a well-known species that grows in Monteverde at higher elevations. Bajo del Tigre is a special area with regard to plant species as it occurs at an elevation in which much of the forest throughout the country has been destroyed for farmland and cities. In protecting this remnant forest, we can help save rare species that live only in this narrow elevational band.

## 15. MONKEY BUSINESS

**White-faced Capuchin Monkeys.** Although troops of white-faced monkeys can be seen almost anywhere in Bajo del Tigre, they are most common along the Monkey Trail, where it passes through primary forest on the upper edge of the Maquina River Canyon. Often they are heard and not seen.



They make soft or loud barking sounds, different from dogs, and on occasion loud screams when a fight is underway. Also heard are the sounds made by the monkeys as they jump from limb to limb. If you hear such sounds, watch for the sudden movement of tree limbs, and expect to see the animals shortly afterward. White-faced monkeys tend to follow the leaders of their group, using exactly the same route going from tree to tree. Keep watching, as groups may number up to 20.

## 16. NAUGHTY COATI

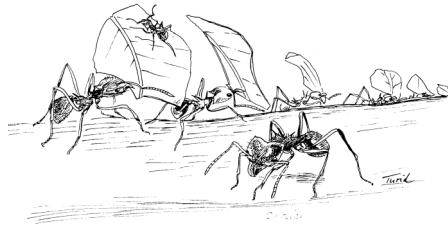


These mischievous critters can be seen throughout the park, and they have even been known to sneak into the information center at times. Coatis prefer to feed on litter, arthropods and figs, however they will eat just about anything they can get their paws on. They usually forage on the ground, pushing their noses through the dirt, but are also very adept climbers and are often seen in trees. Coati social structure is intriguing, with males living on their own for most of the year except for mating season and females living in bands of up to 25.

While a coati may appear to be quite friendly, remember it is a wild animal and its space should be respected.

## WATCH FOR...

**Underground Farmers.** Watch for leaf-cutter ants as you walk. The pieces are usually larger than the ants. On their own small trails, foragers transport pieces of leaves, cut from a wide variety of plants, to their underground nests.



There the leaves are cleaned and chewed by specialized ants called minimas riding on the piece of leaf before being added, along with saliva and fecal material, to a fungus garden that the ants tend and harvest for food. Leaf cutter ants harvest up to an astonishing 15 % of vegetation in the area.



## 17. MARCHING TO WAR, ANT STYLE

**Army Ants.** Almost any ants you observe crossing the trail in dense columns or masses of solid ants are army ants (leaf-cutter ants also move in columns but carry sizable pieces of leaves-see above). They range from tiny in size to over one centimeter in length, with formidable jaws. There may be as many as 100,000 in a large army. Although they pose no particular threat to humans, they will climb your leg and bite you if you inadvertently stand in one of their columns. Fortunately, they do not sting.

Army ants are primarily insectivorous, catching insects that live on the forest floor. They also eat spiders and other invertebrates. If you are able to squat down and watch a column, you will often see the ants carrying pieces of insects. These are taken back to the bivouac site to feed the brood. The bivouac is usually a hollow log where a temporary nest is built. Once a brood of larvae is raised and metamorphose into adults, the army moves to a new site.

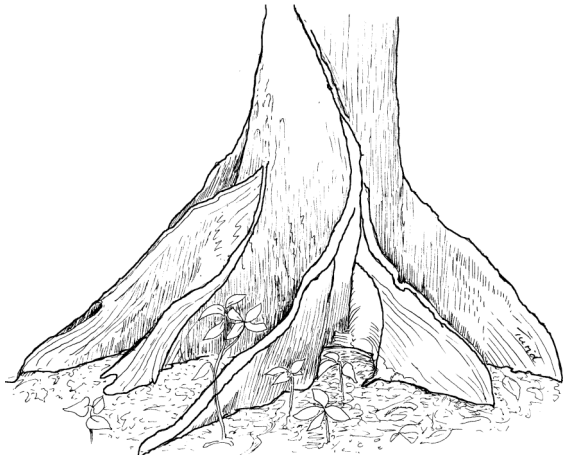
## 18. MAQUINA CANYON OVERLOOK

**Migration Corridors.** Many of the animals that visit the Bajo del Tigre sector of the BEN are not permanent residents. The Resplendent Quetzal makes a yearly migration between the remnant Pacific premontane forest and the Caribbean foothills. Butterflies, other insects, bats, and birds also make temporary use of the Bajo del Tigre as a forest corridor. Listen for the sounds of the Maquina River in the canyon below.



## 19. FOREST RESERVOIR

**Watershed Protection.** The leaves of the trees on this hillside prevent heavy rains from scouring the soil while their roots act like sponges, holding the rainwater in the soil and maintaining the water level, ensuring a more constant supply of water to the stream below. The Bosque Eterno de los Niños, of which Bajo del Tigre is an isolated part, provides this service on a larger scale. It is crucial watershed supplying Lake Arenal with water.





## 20. A TROPICAL BUCKEYE

**The Cockroach Tree.** This tree is a relative of buckeye and horse chestnut. Its common name supposedly comes from the fact that cockroaches and other insects hide out under the large flakes of bark on the trunk. Old red leaflets are seen under the trees, and in the latter months of the year the 3" hard fruits, each with one maroon seed, drop to the forest floor. These large trees are a source of attractive lumber.

## 21. PALMS

Palms are a typical component of tropical forests. In the Bajo del Tigre region, there are relatively few palms in the understory compared to wetter regions. In the Atlantic lowland rainforests, many more palm species occur both in the understory and in the canopy. The common palm that grows in colonies in this forest belongs to a group known as the "parlor palms," used as ornamentals. This species is called Costa Rican bamboo palm because of the bamboo-like stems.



## 22. MADE FOR EACH OTHER

**Coevolution.** The curved, yellow flowers of the heliconia are found inside the more visible red claws, which are actually modified leaves. These bracts fill with water, creating tiny "moats" where various aquatic insect larvae live. The lobster claw heliconia attracts nectar-seeking hummingbirds with long, curved bills. Short billed hummingbirds can reach the nectar in the shorter, straight flowers of the near-by Hamelia shrub. Some flower tubes house hummingbird mites that hitchhike from flower to flower perched on the hummer's bill. Large numbers of mites feeding in flowers can significantly lower the amount of nectar and pollen.



## 23. MANAKINS

### A Song and Dance.

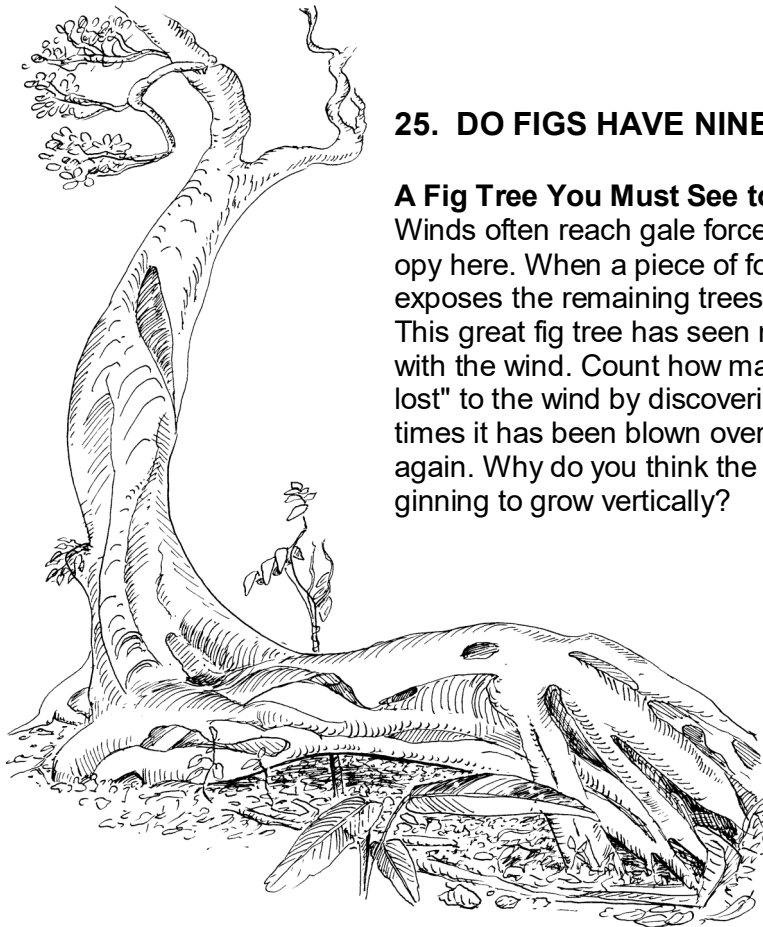
The long-tailed manakin is one of the more common birds in Bajo del Tigre. Listen for its courtship and dance songs from February to October. Two males perched on a branch a few inches apart will give a whistled call every few seconds, which sounds like "toledo" (its Spanish name). This pair of males will practice for years to perfect their duet. When their call is good enough, females will



approach and be invited to view their dance. They use a vine or horizontal branch about one half meter (20 inches) off of the ground. When the males are dancing for females, their call sounds somewhat like a slow meow, meow, meow, meow.

## 24. BENEFICIAL BOARDERS

**Plant-Insect Interaction.** Listen for a hollow sound while knocking on the trunk of this large cecropia, a tree conspicuous for its ringed trunk and lobed leaves. This species of cecropia owes part of its growing success to colonies of aggressive azteca ants that live inside its hollow trunk. The ants act as guards, cutting the tendrils of climbing vines that try to grow on the branches. They will also rush out to attack any herbivore that might try to eat the leaves. The tree, in turn, supplies ants with a special food supply at the base of leaf stalks and gives them a home. Because of the protection of the ants, the tree does not have to produce toxins to discourage herbivores.



## 25. DO FIGS HAVE NINE LIVES?

### **A Fig Tree You Must See to Believe.**

Winds often reach gale force in the tree canopy here. When a piece of forest is cut, it exposes the remaining trees to the wind. This great fig tree has seen many battles with the wind. Count how many “lives it has lost” to the wind by discovering how many times it has been blown over and rooted again. Why do you think the fig is finally beginning to grow vertically?

## 26. A STICKY PROBLEM

### Plant Defenses: Limoncillo.

Plants have evolved both chemical and mechanical defenses against leaf destruction. Tropical plants produce a formidable arsenal of thorns and poisons. Although toxic, plant chemicals can be useful to the animals (including man) that have developed ways to use them to their benefit.

What type of defense has this limoncillo tree evolved?



## 27. ARBORETUM

**Reforestation.** After many years of use as a cattle grazing area, soil and nutrient loss made this pasture an unfriendly environment where few tree seedlings could germinate and survive on their own.

In this area, the Monteverde Conservation League, with the help of local biologists, has started an arboretum of native trees with approximately 70 species represented. Along the Arboretum Trail, you will encounter a sampling of the 180 individual trees that have been tagged and mapped.



## **ACKNOWLEDGEMENTS**

*This 2013 revision of this trail guide was made possible through the efforts of the Bajo del Tigre committee: Bob Law, Richard LaVal, and Willow Zuchowski. We built upon the excellent work done in the original edition by author Patricia de la Rosa and illustrator Turid Forsyth. A few illustrations by Willow Zuchowski and Susan Sprague have been added.*



### **The Bosque Eterno de los Niños.**

Children dreamed a dream, and children and adults from around the world have made it come true. The Children's Eternal Rainforest (or "BEN" after its Spanish name, Bosque Eterno de los Niños) is so named because it was bought and protected thanks to fundraising efforts of children from around the world.

The BEN is the largest private reserve in Central America and, straddling 7 different life zones, is one of the most biologically

The BEN protects thousands of species of plants and animals, including such endangered species as the jaguar, tapir, and Resplendent Quetzal.

The BEN is owned and managed by a Costa Rican nonprofit organization called the Monteverde Conservation League (MCL). The mission of the MCL is to conserve, preserve and rehabilitate tropical ecosystems and their biodiversity. With your help, we can continue to make this dream a reality!

### **Contact us:**

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### US-based organizations:

Friends of the Rainforest ([www.friendsoftherainforest.org](http://www.friendsoftherainforest.org))

Engage Globally ([www.engageglobally.org](http://www.engageglobally.org))

