

Forest Decline in Trinidad & Tobago

Paul L. Comeau

c/o The National Herbarium, U.W.I., St. Augustine, Trinidad

Perceptions of a tropical forest.

“Man masters nature not by force but by understanding”
(J. Bronowski).

Personal bias contributes to society's perception of a forest. To nature enthusiasts, it is a place for recreation and education; to environmentalists, it is a reserve for natural regeneration and biodiversity; to forestry officers, it is protection for watershed or space for tree plantations; to hunters, it is a place to obtain wild meat, and a place to exercise dogs; to poachers, it is access to the black market; to governments it is a source of foreign exchange; to taxonomists, it is a place to find new species; to paper manufacturers it is a source of pulp; to sawmill operators, it is a source of building material; to the handicraft industry, it is a source of raw material; to squatters, it is a site for clearing; to bird watchers, it could be paradise; to Town and Country Planning, it may be a site for new settlements; to ranchers, it is potential space for grazing animals; to engineers, it may be a site for hydropower development; to mining companies, it is a hindrance; to subsistence farmers, it is a source of firewood or forage; to chemists, it is a source of pharmaceuticals via bush medicine; to marijuana growers, it is a place for clandestine activities; to horticulturalists, it is the temptation to collect and sometimes over-exploit; to animals and indigenous man it is home. The list is by no means exhaustive but it does represent a wide spectrum of attitudes; some negative, others allowing for compatible management practices on a sustained basis.

Misconceptions

Often our perceptions are based on second-hand information or false impressions. For example, many think of tropical forests as being hot, dripping wet, dark and full of danger, but it is hotter on our denuded hillsides or inside a teak plantation in the dry season. A tropical forest can be pleasantly dry.

The majority are mesophytic, i.e. they are neither swamps nor deciduous, but the greater the moisture extremes, the fewer the species. Tropical forests have gaps in the canopy owing to natural tree fall which increase light intensity. As for being dangerous, highways are more so; getting to the forest can be more risky than being inside the forest. These misconceptions influence our attitude when our attention is focused on the forest. In Trinidad and Tobago, most of us refer to the forest as bush, a term that often implies it is useless, a nuisance and deserving of no respect. It is either ignored, avoided, chopped or burnt. From the roadside, the forest can look like an impenetrable, tangled mass. This is the result of edge-loving species taking advantage of increased light, invasion by weedy plants and frequent disturbance from roadside fires.

Beyond this seemingly impenetrable barrier a few surprises may be in store (Longman & Jenik 1987); the tangled mass (bush or jungle) gives way to openness in the understory with little ground cover to hinder one's movements. The climate is not uniform (hot and humid) but is highly variable depending on elevation. Seasonality can be slight (rain forest) or pronounced (seasonal forest). Dry season rainfall can be as low as 25 mm (1 inch), the amount some deserts receive in a year. Wet season rainfall can be more than 4000 mm (160 inches) accompanied by thunder storms which can damage the forest by rain impact and high winds, not fire. Heavy rains actually lower light intensity (more cloud cover) and temperature. Tropical trees do not grow continuously throughout the year. Very few do so beyond the seedling stage. Where seasonality is pronounced, the age of tropical trees can be determined. Growth in numerous species is confined to periods of a few weeks, while buds remain dormant for much of the year. This sporadic growth can also apply to girth and roots. The euphotic layer (upper tree canopy) is the most productive part of the forest in terms of

biomass and diversity of animal life. Root penetration is not always shallow, some tropical trees can form large tap-roots and sinkers penetrating to a depth of several meters (4% of native Trinidad & Tobago trees fall into this category, e.g. black kiskidee, galba, chenet, angelin, locust, puni, guatecare, balata, cypre, yellow poui, and black fiddlewood). Seed production in some species tends to increase over a 4 to 5 year period then crash (eg. mora). Nutrients are recycled above ground in shallow-rooted trees, making the soil beneath nutrient deficient. Drip-tips on many emergent trees are developed only in the under growth, and seedling leaves may not resemble the leaves of the mature plant. Soil characteristics can vary considerably over very short distances (as little as 10 m). There is no diurnal fluctuation of soil temperature below a depth of 75 cm.

Historical perspective

An earlier paper (Comeau 1991), dealt with natural events (geological and botanical) in Trinidad up to the time of Columbus. The current presentation covers the botanical natural history of Trinidad & Tobago since Columbus the last 500 years. Important historical events that influenced the natural vegetation, began shortly after Columbus's third voyage in 1498. At that time there were approximately 30,000 to 40,000 Arawaks in Trinidad (Brereton 1981). Around 1620 (under Spanish occupation) the Amerindian population had declined to about 4,000. The chief staple of the country was tobacco while cacao was grown on the hillsides (Espinosa, ca. 1620). In 1783, the European population of Trinidad numbered no more than 300. This was almost 300 years after Columbus's 3rd voyage in 1498 (Fermor 1987). Initially, Spain used the island only as a stepping stone to Central and South America (El Dorado) but eventually decided to colonize it with French immigrants. After 1783, Trinidad's plantation economy was controlled mainly by the French settlers. Deforestation started around

this time as plantations became established in the north and south. In the deep south (Moruga district) clearing did not start until after the 1820's (Brereton 1981). Cotton was the most important export crop by the 1780's, grown mainly by the French (they also grew coffee) while the Spanish preferred cocoa as a crop. Sugar, started by the French in the 1780's as a commercial crop, had become Trinidad's most important export commodity by the 1790's. When Britain took over at the turn of the century (1797-1802) Trinidad's population had risen to almost 20,000; in 1797 there were 2151 Europeans, 1082 Amerindians, 4476 Freeman, and 10,009 Slaves (Brereton 1981). The Amerindian population had declined 75% in less than 200 years.

Subsequent events saw the expansion of the sugar industry which reduced forest cover on both Trinidad and Tobago. Emancipation in 1834-1838 increased the need for land (freed slaves numbered 20,656 in 1838; Brereton 1981). Indentureship (from 1845 until the end of World War I) also had the same effect (143,939 Indians came to Trinidad during this period). From 1869 to 1880 all male Indians who had lived in Trinidad for 10 years could be granted 10 acres of state land in exchange for all claims to a free return passage to India. This land amounted to 7,717 ha (19,055 acres). Silviculture in Trinidad began early in the 20th century.

The Current Status

Three states of forest (Prescott-Allen 1986) can be recognized in Trinidad and Tobago: the first forest (pre-Columbian, undisturbed, approximately 7% of the total land area); the second forest (natural regeneration on abandoned farms and estates, approximately 18% of the total land area); and the third forest (managed through cutting and plantation, approximately 25% of land area). At present in Tobago, according to Chalmers (1992), natural forest occupies 4,914 ha (16.4% of land area), lastro and bamboo 14,613 ha (48.9%), tree crops 5,772 ha (19.3%) treeless areas 4,662 ha (15.5%). The Western Hemisphere's first forest reserve was established on Tobago's Main Ridge in 1765 (Trinidad's earliest forest reserves were set up in 1902).

Major Threats

The major threats to our forests are fire, plantation and quarries. Minor threats in both Trinidad and Tobago include controlled logging, diseases, pests and pollution. Between 1987 and 1989, 27,857 ha of forest and secondary vegetation were damaged by fires. This represents 5% of the total land area or 11% of the total forested area in Trinidad and Tobago (Homer 1990). As regards plantation, in 1989, between 13,143 and 15,329 ha (approximately 14,236 ha or 3% of total land area; 5.5% of total forested area) were planted with teak and pine. With respect to quarries, in the Valencia Forest reserve and Wallerfield area 2,800 ha have been mined. This is 1% of the total forested area. Thus about 17.5% of the total forest area (based on an 1897 estimate of 256,613 ha) in Trinidad and Tobago has been affected by fire, plantation and quarrying. With regard to these major threats, Erin Savanna represents a good example of degradation. The forest in the Erin district has been greatly altered by fire, and plantation forestry has been established in the area. The original forest surrounding Erin Savanna was Evergreen Seasonal (Beard 1953).

Evidence of the negative environmental impact of plantations has been well documented. Rivers flowing from primary forest release twice as much water halfway through the dry season, and between three and five times as much at the end of the dry season, as do rivers flowing through coffee plantations (Myers 1988). In addition, conversion of teak forests in southern India to teak plantations caused the organic matter content in the upper 30 cm of the soil to drop by 60% (Longman & Jenik 1987).

Tropical forest is a valuable natural resource, but as already demonstrated, it is not highly prized (except for some of its timber), its modification has been on a large scale (eg. in Nigeria, moist forest cover has been reduced by at least 90% - Myers 1988), and it is often replaced by uniform plantation species, bulldozed for grazing land or flooded for dams. A complex system involving flow of energy, materials and genetic information is sacrificed for short term gain.

Are we dealing with ignorance or indifference? An editorial in the Trinidad Guardian newspaper for Friday, April 16, 1993 states: "The more forests that are destroyed by slash and burn farmers, the more hillsides that are denuded by bush fires, the less is the country's capacity to fill its reservoirs." We are all familiar with the water woes this country faces, but how many of us make the connection between water excess or absence and those denuded hills? Anne Hilton, a member of the Trinidad & Tobago Field Naturalists' Club and an environmental columnist for the Trinidad Guardian, recently wrote an article entitled "The Haitianisation of Trinidad" in which she states: "Shortly after I joined the Field Naturalists Club in 1967, I remember asking what the club could do to stop the burning of the hills. To my surprise club members seemed to think I was making a fuss about nothing. Hadn't I noticed, said they, that the vegetation recovered in the rainy season? On a field trip to the southern slopes of the Northern Range (12 June 1991), during the Tropical Forestry Action Programme project, Country Mission Team leader Dan Chalmers, when shown the denuded hillsides, made the comment: "Gentlemen, we are not far from Haiti."

Forest Degradation

The signs of forest degradation are all around us: Treeless slopes mainly covered in guinea grass (*Panicum maximum*) is the most visible sign. This coarse grass is a tough competitor where fires are frequent. Abundant clumps of bamboo (*Bambusa vulgaris*) on slopes and ridges is another highly visible sign, though bamboo staking (eg. for yams) on ridges could account for the dominance of this vegetation type in some areas (eg. Tobago). An increase in the number of Gru-gru palms (*Acrocomia aculeata*) is a further indicator. Beard (1953) noted that "this palm has become common in Trinidad in areas of shifting cultivation but is unknown elsewhere in the natural forest" (except around the fringes of Erin Savanna). Beard speculates that "it appears probable that burning is essential to the germination of the thick walled *Acrocomia* seed." Other signs of degradation are relic populations of the

fire-resistant cocorite palm (*Maximiliana maripa*); clumps of balisier (*Heliconia bihai*) along forest margins and inside the forest; a broken forest canopy with numerous dead standing trees; pine (*Pinus caribaea*) and teak (*Tectona grandis*) plantations; and coconut (*Cocos nucifera*) plantations in coastal areas.

Lessons to be Learned

Some hard lessons must be learned before it's too late. "History shows that long-term survival of a country depends on a balance of wild, seminatural and artificial ecosystems. Whenever humans have disrupted this balance, animals have disappeared, plants have died, watersheds have been poisoned and the soil has eroded. Such destruction robs both human and non-human communities of their self-reliance, - the freedom to call upon locally available resources for the goods of life, air, water, food - the very basis of a secure nation." (Nikiforuk 1990). Will Trinidadians and Tobagonians take heed? "Nature's economy, undervalued and unappreciated, performs a myriad of functions. In wetlands, it purifies water. In the mountains, it stores water and protects against erosion. In the rainforests, it provides storm cover and biological diversity." (Nikiforuk 1990). Or will posterity record that these words fell on deaf ears?

The tropical environments are more vulnerable than elsewhere. The impact of forest devastation on the water supply in temperate and boreal regions is somewhat lessened by the accumulation of organic deposits and the development of peatlands which conserve water and release it slowly. This back-up system is absent in the tropics and once the forest is removed the ability of the land to store water is drastically reduced.

Signs of Hope

There are signs of hope, however, where recovery from forest degradation has taken place. Sea island cotton (*Gossypium* sp.) was cultivated extensively on little Tobago prior to acquisition by Sir William Ingram who discontinued this practice and introduced the Birds of Paradise in 1909. The island has had official protected status since 1928. The island's present vegetation is Deciduous Seasonal Forest which shows little signs

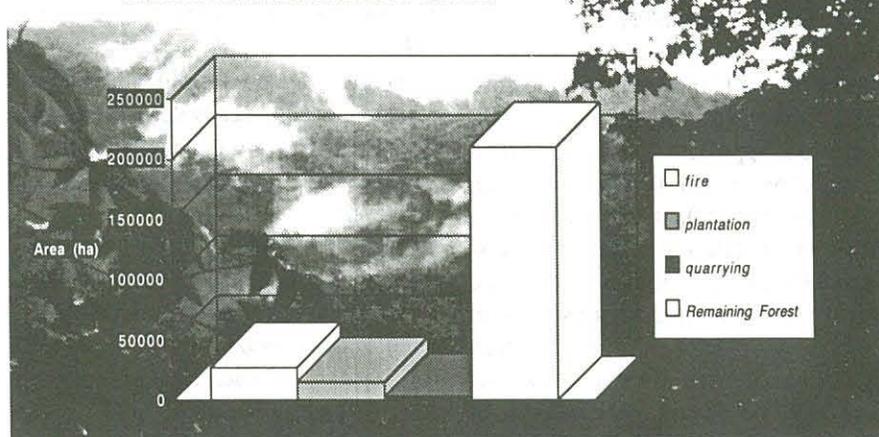
of previous cultivation (Beard 1944, IUCN 1982). Pigeon Hill, Tobago was private land up to 1912 and most likely was cultivated but since that time it has formed part of the Forest Reserve and is now covered in vegetation characteristic of Lower Montane Rain Forest (Beard 1944).

What of future forest reserves? The best candidates in Trinidad are the Eastern and Northern Ranges and the Trinity Hills, plus the Main Ridge in Tobago, the only areas large enough to maintain integrity of habitat. "The smaller the forest, the faster the decline of insects, birds and mammals." (Linden 1989). What changes will the next 500 years bring? To modify a line from one of the first environmental songs to make the popular music charts: "In the year 2525" will Trinidad's forests still survive? Perhaps, - provided the comet Swift-Tuttle, due to collide with the Earth in 2126, doesn't wipe us out first!

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FACTORS IN FORESTS DECLINE 1987-1989



1987-1989 Figures for Forest Fires, Plantations and Quarrying.