

# Native Plants for Recreation and Conservation in Mexico

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A survey of plants and opportunities for coastal areas in Baja California and Yucatan.

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In recent years the coastlands of Mexico have become the scene of intense recreational and urban development. In addition to the political, demographic and socioeconomic reasons for increased tourism, the great variety of natural landscapes and climate types has turned Mexico into a tourism magnet. In fact, tourism is now the second most important economic activity in this country (Bringas & Ojeda, 1992).

Coastal landscapes are considered, of all natural areas, one of the main tourist attractions. This benefits local economies, but also causes environmental problems, which are especially severe in Mexico due to lack of ecologically sensitive regional planning (Merino, 1987; Bójorquez-Tapia & Ongay-Delhumeau, 1992). One result is that developers and protectors of natural landscapes are at odds. On one hand, rural and natural areas are promoted to attract tourism; on the other, recreational development typically changes the natural landscape to an artificial one dominated by exotic species such as coconut palms and eucalyptus. Such imports are almost always self-defeating ecologically, and also to some extent esthetically, since they replace the distinctively Mexican landscape visitors seek with exotic species, not to mention lawns, golf courses and so forth, imported from other parts of the world. Despite this, however very little has been done to develop landscaping practices based on the structure and processes of native Mexican ecosystems, though a designer may occasionally include a "Mexican touch," siting a golf course, for example, among Mayan ruins, or between patches of native vegetation.

This is unfortunate because the coastal landscapes of Mexico are diverse, and in many cases very beautiful. They also

include many rare, beautiful and interesting species, including many endemics. Indeed, Espejel (1988) has already explored the ornamental potential of the coastal flora of the Yucatan Peninsula. Ojeda (1991) has published similar studies for cities along the northern coast of Baja California. And both of us have compiled databases on the ornamental value of the vegetation of these areas. So it should be possible to develop landscapes that are both ecologically sensitive and attractive to visitors. This, of course, is a task for the landscape designer.

In this paper we explore the value for ornamental landscape purposes of the vegetation and flora of two coastal sites frequented by tourists: the Yucatan and Baja California peninsulas. Though quite different ecologically, socioeconomically, and politically these two areas share many of the basic problems affecting "green areas" along the Mexican coast: loss of native vegetation and water shortages. Here we discuss these problems and suggest two strategies for dealing with them.

## The Native Vegetation— and Artificial Substitutes

The northwestern Pacific coastlands of Baja California are composed of sandy and rocky beaches, dune systems, and rocky cliffs covered by a Mediterranean-type vegetation consisting of coastal chaparral, sand-dune scrub, sage, and succulent scrub. This drought-tolerant coastal flora is diverse and high in endemics (107 species). At present, only 10 percent of the original coastal sage scrub survives in California (Westman, 1986; O'Leary, 1989), and the northern part of northwestern Baja California is rapidly moving in the same direction.

The coastlands of the Yucatan Peninsula are composed of beaches, dune systems, barrier islands, and rocky coves covered by sand-dune scrub, mangroves, and low, rainforest vegetation. The dry coastal flora has Caribbean elements as well as mesoamerican species. The diversity is high (280 plant species), as is the endemism (six percent). Developments for tourism on the Caribbean coast and for summer housing on the Atlantic coast, have greatly modified the native landscape.

Several vegetation studies and floristic lists have been produced for the area (Mulroy *et al.*, 1979; Thorne, 1976, 1982, 1984; Westman, 1983; Moreno-Casasola and Espejel, 1986; O'Leary, 1989; Espejel, 1993; Oberbauer, 1991). We used these studies to select plants on the basis of their ornamental value as described by Schmidt (1980).

While some natural vegetation still exists in both areas, increasing areas in both Yucatan and Baja California are being replaced by artificial landscapes dominated by exotic species. In both areas, arid coastal lands are now covered by water-demanding grasses on golf courses and in hotel yards. Exotic trees are abundant, including magnolia (*Magnolia grandiflora*), a beautiful tree from the humid southeastern United States; the South American jacaranda tree (*Jacaranda mimosifolia*); *Erithrina crista-galli* from Brazil; and *Hibiscus rosasinensis* from Asia. All are species that demand more water than is available naturally.

Along the tropical Caribbean coast of the Yucatan Peninsula an Australian species, casuarina (*Casuarina equisetifolia*) has been widely planted in order to stabilize the dunes. It does stabilize dunes. However it is unattractive, and is reported to interfere with turtle nesting (Austin, 1978) and to create dense thickets that reduce the value of the beaches for recreation.

### Strategy I: Natives as Ornamentals

According to Schmidt (1980), native ornamentals should have one or more of the following characteristics:

- a) fine foliage,
- b) many and colorful flowers,
- c) colorful fruits and seeds, and
- d) some outstanding feature besides the seasonal ones—attractive bark, for ex-

ample, or ornamental thorns, or an unusual shape.

In addition to Schmidt's criteria, we advise the use of a variety of forms, mixing trees,

shrubs, and herbs, in order to create at least a semblance of the native vegetation (Table 1). It is also desirable that at least some of these be attractive to animals, especially native birds, which are of interest to visitors.



Diverse, low-growing vegetation on a well-preserved dune at El Socorro in Baja California offers a glittering wave of bloom in season, and serves as a model for native-based artificial landscapes. Photo by C. Siguenza

Table 1: Number of species of native plants of various life-forms judged to have ornamental value for coastal areas of the Baja California and Yucatan peninsulas of Mexico.

	Baja California	Yucatan Peninsula
trees	6	22
shrubs	25	31
forbs (annual)	several	42
creepers	3	17
climbers/vines	few, not recorded	11
palms	2	7
succulents	—	—
upright cactus	100+	7
rosette forms	4	2

From this perspective, our two study areas are quite different. Because of its arid climate, Baja California has mostly scrub flora, while in Yucatan, trees and various forms of herbs (erect, creeping and climbing) dominate. Baja California, however, does have an important tree-dominated vegetation composed of poplar (*Populus tremula*), oaks (*Quercus* spp.), aliso or sweet gum (*Liquidambar* spp.) and sycamore (*Platanus* spp.) found on moist soils in riparian areas. In general, however, the vegetation of Baja California provides a good palette of species for the creation of gardens dominated by succulents such as cacti and stonecrops (*Crassulaceae*), while Yucatan offers more species for the creation of palm gardens and other shady landscapes.

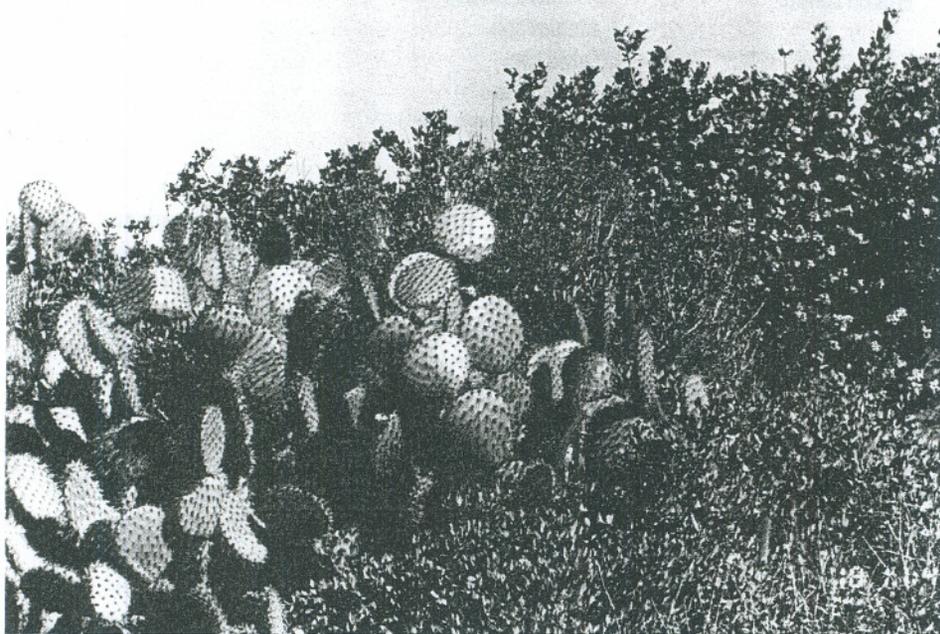
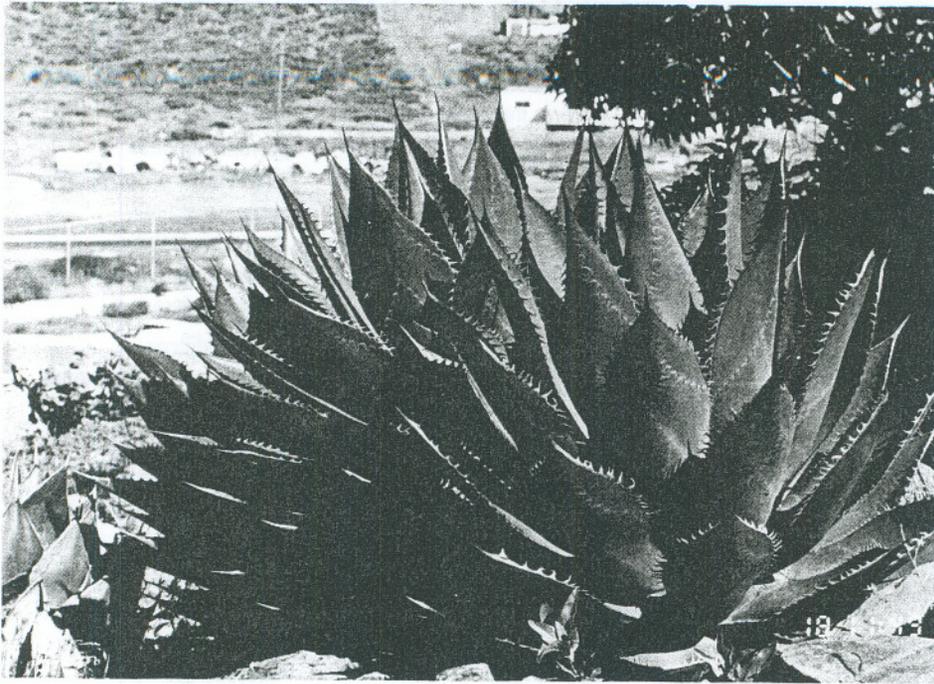
Of course in Mexico as elsewhere, public expectations are an important barrier to the use of native plants as ornamentals. As Gilbert (1989) points out, natives often do not suit popular taste, and there is also resistance from park staff, who are likely to be unfamiliar with native plants and the management of native vegetation.

Gilbert points out that good information on the phenology and cultural requirements of the native species can be useful in overcoming this resistance, and our databases on the flora of our regions should be useful in planning and maintaining ornamental plantings. Our database for Baja California, for example, shows that many plants with attractive flowers are in bloom from late February until early June in this area, reaching a peak in March and April. In contrast, in the palm shrublands of the Yucatan and Quintana Roo coasts most flowers are small and inconspicuous, though there are remarkable exceptions, such as the orchid (*Schomburgkia tibiscinis*), which flowers in May and June, and a lily (*Hymenocallis littoralis*), which flowers in June and July.

Similarly, information about which species meet various landscaping needs can be useful in encouraging this use. Our database contains detailed information on this, some of which is summarized in Table 2. This database, which consists of Dbase IV computer lists, has not yet been published, but copies can be obtained by mail or e-mail.

Table 2: Native ornamental suitable for various landscape applications.

Use	Baja California	Yucatan Peninsula	
Sand fixers	<i>Abronia maritima</i>	<i>Sesuvium portulacastrum</i>	
Hedges	<i>Rhus ovata</i>	<i>Bravaisia tubiflora</i>	
	<i>Hetromeles arbutifolia</i>	<i>Tournefortia gnaphalodes</i>	
	<i>Rhamnus californica</i>	<i>Suriana maritima</i>	
	<i>Atriplex canescens</i>	<i>Croton punctatus</i>	
	<i>Arctostaphylos</i> spp.	<i>Caesalpinia vesicaria</i>	
	<i>Simmondsia chinensis</i>	<i>Bumelia retusa</i>	
Access control	<i>Fouquieria splendens</i>	<i>Opuntia dillenii</i>	
	<i>Machaerocereus gummosus</i>	<i>Acanthocereus pentagonus</i>	
	<i>Lemaireocereus thurberi</i>	<i>Cephalocereus gaumeri</i>	
	<i>Lophocereus schottii</i>	<i>Nopalea gaumeri</i>	
Shade		<i>Metopium brownei</i>	
	<i>Quercus</i> spp.	<i>Bursera simaruba</i>	
	<i>Cercocarpus betuloides</i>	<i>Capparis incana</i>	
	<i>Cupressus forbesii</i>	<i>Coccoloba humboldtii</i>	
		<i>Hippocratea celastroides</i>	
		<i>Pithecellobium keyense</i>	
		<i>Thevetia gaumeri</i>	
		<i>Coccoloba uvifera</i>	
	Erosion control	<i>Rhus laurina</i>	
		<i>Artemisia californica</i>	
<i>Atriplex</i> spp.			
<i>Salvia</i> spp.			
<i>Agave shawii</i>			
<i>Sambucus mexicana</i>			
Hanging	<i>Viguiera</i> spp.		
	<i>Erogonium fasciculatum</i>		
		<i>Canavalia maritima</i>	
		<i>Ipomoea pes-caprae</i>	
Flowerpots		<i>Tillandsia</i> spp.	
		<i>Echites yucatanensis</i>	
	<i>Dudleya pulverulenta</i>	<i>Beucarnea gracilis</i>	
Gardening		<i>Agave angustifolia</i>	
		<i>Aechmea bracteata</i>	
	<i>Encelia farinosa</i>	<i>Cordia sebestena</i>	
	<i>Dalea spinosa</i>	<i>Boerhaavia coccinea</i>	
	<i>Isomeris arborea</i>	<i>Caesalpinia vesicaria</i>	
	<i>Penstemon</i> spp.	<i>Ernodea littoralis</i>	
Windbreaks	<i>Romneya coulteri</i>	<i>Scaevola plumieri</i>	
	<i>Lavatera assurgentiflora</i>	<i>Tournefortia gnaphalodes</i>	
	<i>Washingtonia robusta</i>	<i>Suriana maritima</i>	
	<i>Washingtonia filifera</i>	<i>Bumelia retusa</i>	
		<i>Scaevola plumieri</i>	
	<i>Coccothrinax readii</i>		
	<i>Thrinax radiata</i>		
	<i>Pseudophoenix sargentii</i>		



*Agave shawii* (top), and prickly *Opuntia* species growing with *Rhus ovata* in an ornamental garden at the University of Baja California exemplify spectacular native species available to designers in the area. Photos by Ileana Espejel

### Strategy II: Ecosystem Fragments for Recreation and Conservation

In general, the coastal landscape of Mexico is a high-contrast mosaic of developed urban sites and well-preserved natural ecosystems. Although developers have the tendency to "create" green areas instead

of leaving fragments of the natural vegetation intact, high-quality fragments do remain in some areas, and may have considerable ecological, esthetic, educational and recreational value (Escofet and Espejel, 1991).

For instance, the bottomlands of the

several river mouths that cross the coastal landscape of northern Baja California provide habitat for the only tree species native to the region. The arid coastlands of the Gulf of California have mesquite (*Prosopis glandulosa*) and palo verde (*Cercidium praecox*). Similarly alisos or sweet gum and poplar are still abundant along the intermittent rivers along the Pacific Coast. Vernal ponds isolated behind coastal sand dunes provide habitat for many unusual plants and birds (Escofet and Espejel, 1991). And along the Yucatan coastline and the Quintana Roo coastline there are patches of rainforest forming scattered islands in mangrove thickets called *petenes*.

There are also promising opportunities for restoration in some areas. In the unplanned coastal cities of Mexico, for example, there are many abandoned fields where the seed bank has not been lost. These areas can be restored by inexpensive methods, including watering with recycled water from the neighboring houses or even from city water-treatment facilities (Ojeda & de la Parra, 1991), and removal of exotics where necessary.

Of course there is disagreement over the ecological value of habitat fragments of this kind, and over the value of connecting them by corridors of preserved or restored vegetation (Simberloff *et al.*, 1992). Nonetheless, in some parts of Mexico, surviving fragments of certain kinds of habitat are so abundant that they may act essentially as corridors—or archipelagos—in maintaining regional and local biodiversity (Naiman *et al.*, 1993). An example is the riparian habitat of the northern Baja California coast.

This seems especially likely because, especially in coastal areas, the vegetation of both Baja and the Yucatan has a naturally patchy distribution, and so may prove relatively insensitive to fragmentation. No one has studied fragmentation with or without corridors in Mexican coastal regions, so its effect on animal or plant populations is unknown. Nevertheless, a fragment isolated by the construction of residential housing in 1989 has been studied in Punta Banda, a sand-bar spit, south of Ensenada, Baja California. There, a heterogeneous fragment of beach and dune vegetation, salt marshes, dune scrub, and abandoned orchards appeared

to retain its richness of migratory and resident bird species over a period of three years (Escofet and Espejel, 1990). Also the plant community maintained the same number of species (although some declined in abundance) over a period of 20 years (Espejel, 1993). Ponds or vernal pools are another example of sites that are

worth considering for conservation purposes despite their small size. In general, our research supports the idea that small, unconnected patches can contribute to the conservation of native coastal species. This lends support to joint projects with developers to ensure preservation or restoration of native vegetation structure in

small areas, such as have recently been proposed by Gómez-Morín and his colleagues (Gómez-Morín, 1993, 1994).

## ACKNOWLEDGMENTS

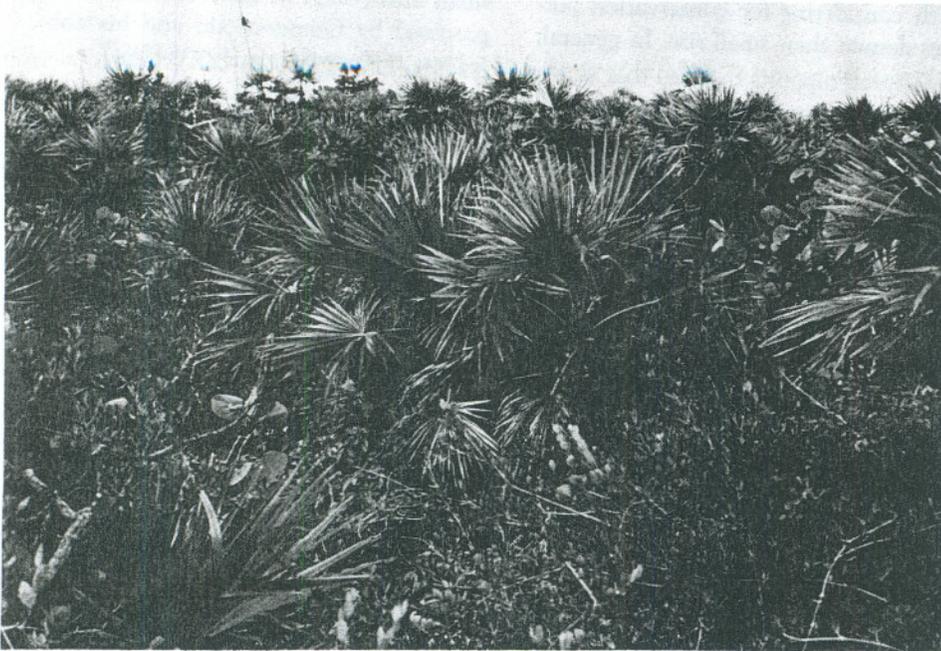
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Native vegetation offers attractive models and many species are useful for landscape design in coastal areas of Yucatan and Quintana Roo as well. This backdune vegetation in San Benito, Yucatan, includes the tall *Coccothrinax readii*, a palm endemic to the Yucatan Peninsula—and a good ornamental substitute for exotic coconut palms—and an understory with *Bravaisia tubiflora*, a fragrant shrub. Photos by Leonardo Gus, courtesy of Roger Orellana



*Thrinax radiata*, another palm with great ornamental value, occurs in many part of the Caribbean.

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