Palms – highly prized, highly endangered

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Of all the woody plants in tropical forests, palms are the easiest to recognise. Whether you are a tourist intent on basking on sunny beaches, an enthusiastic amateur naturalist setting out to experience tropical forests first-hand or a professional botanist on a tropical collecting trip, you will almost certainly be able to correctly identify a palm. We're bathed in images of palms in films and advertising – coconuts along the beach, date palms in exotic oases, and royal palms along city boulevards. Bank and hotel lobbies and shopping centres are studded with pots of multi-stemmed palms, as are the dark corners of our homes. At banquets and receptions, palm leaves are mingled with exotic, brightly coloured flowers. No wonder we recognise them.

Even with this familiarity, few non-specialists realise that palms are both diverse and extremely threatened in their natural habitats. There are about 3,000 species of palm in more than 200 natural groups (genera). While most species grow in lowland tropical rainforests, others thrive in deserts, savannahs and tropical mountaintops. Everywhere they grow, local people have relied on them for building materials and food and have domesticated some of the most useful species. Animals large and small have depended on palms for food and shelter far longer, as fossils of palms date back to the Cretaceous period, when dinosaurs still roamed the Earth.

Why are palms so threatened now, having survived and diversified over the past 80 million years? Habitat destruction is one major and well-documented factor. As human populations increase, so more land is cleared for cultivation or grazing. Ironically, many palm-rich tropical forests are cut and replaced with monocultures producing coconuts, palm oil and palm hearts. However, a second less-publicised factor is threatening palm species in intact forests throughout the tropics. Recall those public spaces filled with potted palms, rattan furniture and big bouquets studded with palm leaves? There is a huge global market for these palm products, especially leaves and seeds for the horticultural and floral trade. This demand is partly met by commercial nurseries, but a significant amount is still harvested directly from the tropical forests and threatens the long-term survival of these species, even in the remaining uncut forests.

The Department of Botany at the Natural History Museum has just begun research on one such group of palms from the New World that is particularly threatened by a combination of habitat loss and over-harvesting. *Chamaedorea* is the most diverse genus of Neotropical palms, with about 100 species, and also the most widely traded ornamental palms in the world. At least one species of *Chamaedorea* is found in most rainforests from Mexico to Bolivia. Most species have a very limited geographic range, but a few are widespread in Central or South America. The two centres of diversity, where the highest number of local endemics can be found, are in Costa Rica/Panama and in Mexico/Guatemala. The palms themselves are typically small, understorey plants growing in the shade below the tall canopy, although a few push up to seven metres tall. Species are distinguished by differences in size, shape and colour of the leaves, flowers, and inflorescences. Many species show striking combinations of these characters, such as the Mexican *C. metallica* with its steely blue-green foliage.

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As well as being the most widely traded ornamental palms in the world, *Chamaedorea* palms are also among the most endangered according to The World Conservation Union, with about 75 per cent of species threatened. As with other tropical plants, the accelerating rate of habitat destruction is a serious danger to most *Chamaedorea* species. Local endemics, some of which are known from areas less than five kilometres square, are most at risk from forest clearance. These local endemics are often the most unusual or beautiful species and are highly sought after by private enthusiasts for their collections. In the past, whole plants were ripped out of the ground and carried off. Populations of the most rare and desirable species have

Opposite page: Fruits and flowers of *Chamaedorea* species provide food for many animals.

This page: Establishing palm study plots around Las Cuevas Research Station.

Above, top two images: Adult plant and flowers of *Chamaedorea ernesti-augustii*, a xaté palm from Belize.

Above, third image from top: Fruits and flowers of *Chamaedorea* species provide food for many animals.

Above, lowest photograph: *Chamaedorea linearis*, a South American species.

Far right: Sally Henderson analyzing palm DNA in the Botany Molecular Laboratory.

been wiped out and some species are no longer known from the wild.

The commercial importance of *Chamaedorea* palms has developed only in the past 50 years, unlike other globally traded palm species. Of the small and shade-tolerant species, such as the 'parlor' palm (*C. elegans*), several are commonly sold as houseplants and these and larger species are grown for landscaping. While seedlings for distribution are usually grown in commercial nurseries, seed is still mostly collected from wild populations of these species in Central America because most species do not set seed in these nurseries. The cut-leaf trade is more recent, but was already worth more than US $30 million a year in Mexico and Guatemala 10 years ago. Almost all the leaves are cut from wild plants.

Our interest in *Chamaedorea* was rather rudely and suddenly awakened by recent incursions of palm leaf collectors into the Chiquibul Forest of Belize, where the Museum's Las Cuevas Research Station is located. The Chiquibul Forest is one part of the vast Maya Forest that stretches across the low limestone plateau of Mexico, Guatemala and Belize. In this region, the *Chamaedorea* species harvested for the cut-leaf trade are collectively called *xaté* (pronounced *sha-tay*) and their collectors *xateros*. Unsustainable harvesting of *xaté* in the areas of Guatemala west of the Chiquibul Forest has decimated local populations. Consequently, the number of *xateros* illegally crossing the forested border into Belize has increased dramatically in the past five years. Without doubt, continued unregulated harvesting will quickly destroy *xaté* populations in the Chiquibul Forest, one of the last strongholds of these species.

To counter this threat, we are working with the Belize Forest Department and the Belize Botanic Gardens to develop a sustainable management plan for *xaté* in the Chiquibul Forest. We must first document the distribution and abundance of all *xaté* species in the Chiquibul and then determine experimentally what rates of leaf harvesting per plant are safe. From this we can develop a management plan that will not only safeguard *xaté* species in the Chiquibul Forest but will also provide a much-needed source of income for local people as *xateros*, processors and local distributors of the cut-leaf. In addition, we are exploring ways to cultivate *xaté* to provide additional income to local people and to reduce pressure on natural populations. There is considerable land already cleared of forest in this area of Belize, including old orange groves and small holdings, on which *xaté* might be grown. As a native species adapted to the limestone-derived soils of the Maya Forest, *xaté* might prove more successful than many of the introduced crops now grown for export.

Given the threat to all species of *Chamaedorea*, not just the *xaté* species of Belize, we have also begun to study the evolutionary relationships of species within this genus, in collaboration with palm experts and botanic gardens around the world. We are using molecular methods to produce a phylogeny (evolutionary tree) of *Chamaedorea*. Understanding the relationships among species will give us a better idea of what factors have caused speciation in the genus, the most diverse in the New World, and whether this diversification is old or recent. Having a phylogeny of *Chamaedorea* will also provide practical guidance for conservation efforts. It will confirm whether the current subgenera are natural

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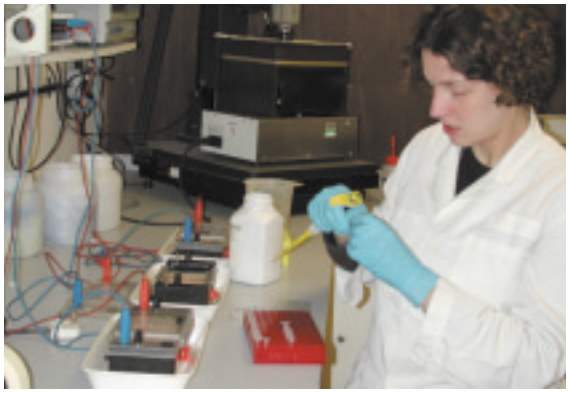
groups (that is, comprised of the most closely related species) and whether species found in the two centres of diversity represent two independent adaptive radiations. Additional genetic analyses will help establish the number of species in the genus – current estimates of the number of species range from 70–100, with new species still being described. We need to know whether these



are all well-differentiated species or if some are simply minor local variants of a more widely distributed species. With funds always in short supply, this knowledge will guide hard decisions of where to focus conservation efforts. In addition, further molecular analyses of isolated and unidentified plants growing in private collections and botanic gardens can be tested to identify them as true species or hybrids. Individuals from rare or threatened species could then be brought together to increase the genetic diversity of the offspring produced for reintroduction into the wild.