Case Studies

The following case studies demonstrate how the *IUCN Red List Categories and Criteria* should be applied to a number of different taxa. For the purposes of this exercise, no outside knowledge about the taxa should be used. Please go through these examples and try to assess each taxon using the *IUCN Red List Categories and Criteria* booklet and the summary table on the criteria.

Difficulties may be experienced because you are not familiar with the taxon concerned and do not know the biology of the taxon or the particular circumstances that may affect the outcome. Please remember that estimation, inference and projection are perfectly acceptable. Although the majority of people should reach the same conclusion about the status, there will not be total consistency because of people's different approach to using inference and projection and how precautionary they are. There will be even less consistency in the criteria used, which is to be expected. All assessments for the IUCN Red List are done by people who know the taxon concerned, and are further evaluated by people who know the situation faced by the taxon and know the IUCN Red List Criteria.

Case study 18

Species: ***Cryptocoryne bogneri*** **Rataj**

Class: LILIOPSIDA

Order: ARALES

Family: ARACEAE

Images from The Crypts Pages by Jan D. Bastmeijer
http://users.bart.nl/~crypts/index.html
(Accessed: 31 January 2003)

Distribution:

This is an aquatic plant endemic to Sri Lanka.

Population:

The species was believed to be extinct as it had not been recorded since 1900. However, a researcher studying and sampling *Cryptocoryne* species discovered a new population of this species at a site in the southwest of Sri Lanka in 1999 (M. Nalinda Peiris pers. comm. 2002). The physical appearance and flower of these individuals indicated that it was distinct from the two other closest species of *Cryptocoryne (*as well as from all other *Cryptocoryne* species in Sri Lanka) while corresponding in all aspects to the original description of *C. bogneri (de Wit 1975).* More than 250 individual plants were recorded.

Habitat:

The area is a small 75 ha patch of swamp forest on the edge of an extensive rubber estate. This forest also contains several other rare endemic species of plants that are confined to this site or have very limited distribution ranges. This forest is on private land within the heavily populated and extensively cultivated Western Province. The most recent observations were made during a relatively dry period and most of the individuals were seen on the muddy banks of a stream, although this species is recorded as being present under submerged conditions.

Threats:

This species is not commercially exploited (other species in this genus are widely grown in aquatic horticulture, but this species is difficult to cultivate), and the present owner of the site location is conserving the land as the area contains many other endemic species. The water level at the site fluctuates naturally but it is not known whether there is regular fluctuation in the numbers of mature individuals. Expanding agricultural activities and human settlements have impacted the other sites where this species was previously recorded.

Sources:

De Wit, H.C.D. 1975. *Cryptocoryne alba* de Wit (nov. sp.) en *Cryptocoryne bogneri* de Wit (nov. sp.). *Het Aquarium* 45(12): 326-327.

Jacobsen, N. 1987. *Cryptocoryne*. *A Revised Handbook to the Flora of Ceylon* Vol. 6: 85-99.

Rataj, K., 1975. Revision of the genus *Cryptocoryne* Fischer. Studie CSAV, c.3.Praha.

Assessment 17	
Criterion A: Declining population in the past or future?	
Criterion B: Small distribution, population fragmented or in few locations, and continuing decline or fluctuation?	
Criterion C: Small population size and decline?	
Criterion D: Very small or restricted populations?	
Criterion E: Quantitative analysis?	
Conclusion:	

Case study 19

Species:	***Diospyros xoloctzii* Madrigal & Rzedowski**
Class:	MAGNOLIOPSIDA
Order:	EBANALES
Family:	EBENACEAE

Distribution:

D. xoloctzii is endemic to La Mintzita, Michoacan de Ocampo, Mexico (see Figure 1 below). It is known only from an area of 25 ha, in a highly fragmented habitat. Despite many surveys since 1998, no other locations have been found.

Population:

In 2005, a census for this species found 36 trees, but in 2006 only 34 individuals remained. One was felled for agricultural activities, and the other was severely damaged by human-caused fire in February 2006 and died in July 2006. The remaining population is fragmented.

Habitat & Ecology:

D. xoloctzii grows in subtropical dry forest and woodland. It is a dioecious plant with a low rate of pollination success (based on the low number of fruits observed). It apparently reaches sexual maturity around 25 years old. There is no trade for this species. But, the fruit is commonly eaten, and the species can be used as an ornamental plant. The plant can also be used in the genetic improvement of other species in the same genus.

Threats:

Agriculture: The species' habitat is severely impacted through agriculture (corn subsistence cultivation), which directly threatens the remaining trees. For example, in 2006, one tree was felled to allow for agricultural expansion. In addition to this, farmers use insecticides (e.g., Malathion), which indirectly affect the tree by removing pollinators. Agricultural fire is a serious threat to the plant: in 2006 one tree was lost to human-caused fire, and more than five adults trees were severely damaged. Clear-cutting in the area is also common practice to control the plants growth and to open new areas for agriculture.

Livestock: The presence of cows and goats in the area threatens the remaining trees. Livestock eat young plants and near-ground level foliage, severely affecting the surrounding habitat and compacting the ground.

Urban development: The human population is increasing in the area, and urban expansion is ongoing. This has several impacts on *D. xoloctzii*, as there is an increase in solid waste, human-caused fire, wood collection, and the introduction of alien species of plants (e.g., Eucalyptus and Casuarina trees) and animals (e.g., cows and goats). The growing human population also brings an increase in water extraction.

Recreation: The area is used for recreation purposes, because there is a small lagoon present there. Many people use the area and often they start fires, leave solid waste behind, and cut many of the plants. The area is not protected and vandalism is frequent, with trees being damaged.

Conservation Actions:

The species is included Mexico's official listing of species at risk (the NOM 059 SEMARNAT 2001), in the category of Special Protection. However, this is not enforced for this species and there is no specific programme for conservation or policy to protect the species. To ensure the future survival of this species, conservation actions should be put in place locally and by the State or Federal government.

Sources:

Carranza González, E. 2000. *Flora del Bajío y Regiones Adyacentes. Fascículos 83*. Instituto de Ecología, A. Centro Regional del Bajío. Pátzcuaro, Mich. México.

Garduño Monroy, V.H. 2004. Contribuciones a la Geología e Impacto Ambiental de la Región de Morelia. *Instituto de Investigaciones Metalúrgicas - UMSNH* Vol. 1:156-166.

Norma Oficial Mexicana NOM 059 SEMARNAT 2001. *Protección Ambiental- Especies nativas de México de la flora y fauna silvestres - Categorías de riesgo y especificaciones para su inclusión, exclusión o cambio- Lista de especies en riesgo*. Diario Oficial de la Federación. 6 de marzo 2002. México. D. F.

Madrigal Sánchez, X. 1997. Ubicación fisiográfica de la vegetación en Michoacán, México. *Rev. Ciencia Nicolaita* No. 15 65:75.

Madrigal Sánchez, X. and Guridi Gómez, L. 2002. Los árboles silvestres del Municipio de Morelia, Michoacán. México. *Rev. Ciencia Nicolaita* No. 33: 29-57.

Madrigal Sánchez, X. and Rzedowski, J. 1988. Una especie nueva de *Diospyros* (Ebenaceae) del municipio de Morelia, estado de Michoacán (México). *Acta Botánica Mexicana* 1: 3-6.

Madrigal Sánchez, X. and trujillo García, M.P. 2001. Algunas consideraciones para la planeación de plantaciones en la cuenca de Cuitzeo, Mich. México. *Rev. Ciencia Nicolaita* No. 27: 45-61.

Villaseñor Gómez, L. 2005. *La biodiversidad en Michoacán. Estudio de Estado*. CONABIO-SUMA-UMSNH, México.

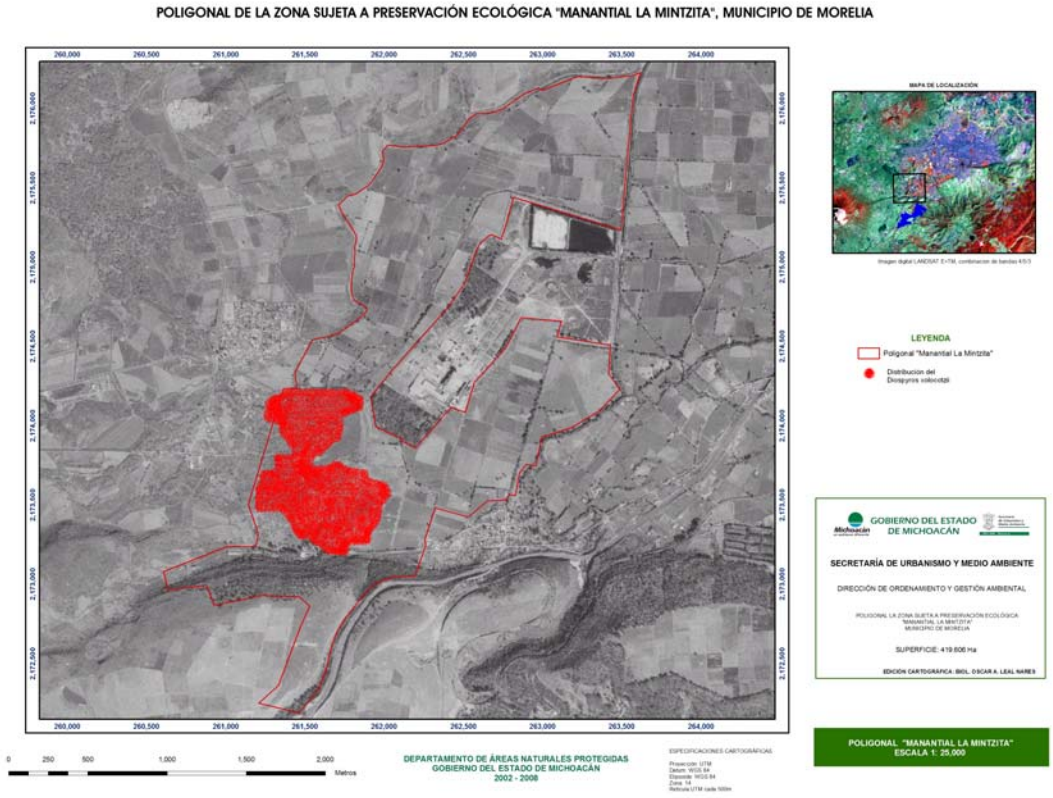
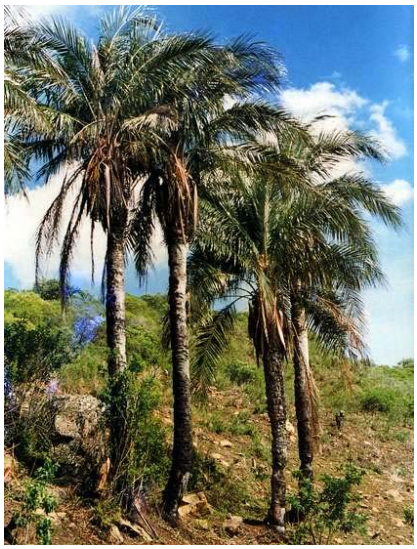


Figure 1. The shaded area indicates the range of *Diospyros xolocotzii*

Assessment 19	
Criterion A: Declining population in the past or future?	
Criterion B: Small distribution, population fragmented or in few locations, and continuing decline or fluctuation?	
Criterion C: Small population size and decline?	
Criterion D: Very small or restricted populations?	
Criterion E: Quantitative analysis?	
Conclusion:	

Case study 20

Species: ***Parajubaea sunkha* Moraes**
Common Name: Sunkha Palm
Class: LILIOPSIDA
Order: ARECALES
Family: PALMAE / ARECACAE



Distribution:

Parajubaea sunkha is endemic to only a few inter-Andean valleys in the province of Vallegrande, in the department of Santa Cruz, Bolivia (Vargas 1994). Using Figures 1 and 2 below, the extent of occurrence (EOO) and area of occupancy (AOO) for *P. sunkha* can be determined.

Population:

According to Vargas (1994) (see Figure 3) there are 14 subpopulations, most of which comprise only a few individuals (1 to 100). The only significant subpopulations are to be found in locations numbered 11 (Mataralcito) and 12 (El Palmar) with an estimate of up to 17,000 mature individuals. The degree of fragmentation is high. Approximately half of the subpopulations are fragmented and are thought to be barely viable. Figure 4 shows the population structure at four sites.

Habitat:

P. sunkha is a montane palm species which grows at an altitude of 1,700 to 2,500 m above sea level in subtropical forest, dry forest and even grassy areas. Mean annual precipitation in this region is about 550 mm per year with a marked dry season of five months between June and October; in some years it lasts even longer. In the wet season frosts can occur at night. This makes the palm suitable for cultivation in Mediterranean localities with similar climates (Vargas 1994). Seedlings and young plants prefer shady conditions, but as they grow they out-compete the adjacent vegetation and become a canopy plant in full sunlight. In the dark *Parajubaea* understorey, the humid microclimate and rotten leaves forming a humic topsoil provide ideal conditions for the germination of the palm seeds. After pollination, the fruit ripens for about 20 months. When the fruits fall to ground, the seed is dispersed by rodents that feed on the fruit. It is estimated that rodents do not disperse the seeds further than 100 m from the parent tree. Under natural conditions, the seeds need another 17 months until they germinate (Vargas 1994), but with the help of *in vitro* cultivation the germination time of *P. sunkha* and *P. torallyi* can be brought down to only several weeks (Ibisch 2004).

Threats:

If the palm is left undisturbed it shows abundant natural regeneration, but overgrazing, land clearing, fires and human use of the palm's fibres have a strong impact on the regeneration dynamics of this species (Vargas 1994).

At many sites the palm is a direct competitor to agriculture. The custom of felling the tallest trees when their productivity ceases, clearly shows that a palm will not be preserved unless it provides important socio-economic benefits to the farmers. This means that there is a dilemma between the usefulness and the subsequent overexploitation of the species, and the uselessness and clear cutting of the remaining populations.

A first inventory was carried out in January 2001. The diagrams of the forest inventory (see Figure 4) depict the population structure of four representative palm stands of one hectare in size that belong to four different farmers. The diagrams show that the population structure is skewed: while two to five year old palm plants are very abundant in all subpopulations, the number of 0.5 m tall palm trees is missing in subpopulations P1 and P2 and is underrepresented in populations P3 and P4.

The absence of palms around 0.5 m of height (+/-20 years old) can be traced back to the construction of a road that connects the rural area with the town. Before the road was built, farmers transported the palm fibre to the local market on the backs of donkeys. This limited them in terms of the quantity they could transport which meant that adult palms could produce enough fruit to ensure adequate regeneration. Since the road was built in 1984, it has been possible to harvest and transport much larger quantities of palm fibre. Farmers confirm that after the road was built almost all palms were over-exploited. As a result, regeneration almost came to a halt. This is shown by the absence of the 0.5 m tall palms in subpopulations 1 and 2 (Figure 4).

The subpopulations 3 and 4 belong to farmers that live within about an hours walk from the road. As a result, exploitation in these palm stands was not as intensive and regeneration could occur to some degree. This is testified by the presence of more young palms between 0.5 and 1 m of height compared to subpopulations 1 and 2 (Figure 4).

Utilization

The palm produces a fibre, which grows in its leaf axils and is locally used to make mattresses, ropes and saddle pillows. Apart from subsistence use these products are sporadically sold on local markets.

The leaves are used to manufacture hats, baskets and fans (Vargas 1994). Leaves and fruits serve as fodder for livestock. Furthermore, the species is internationally traded as an ornamental plant.

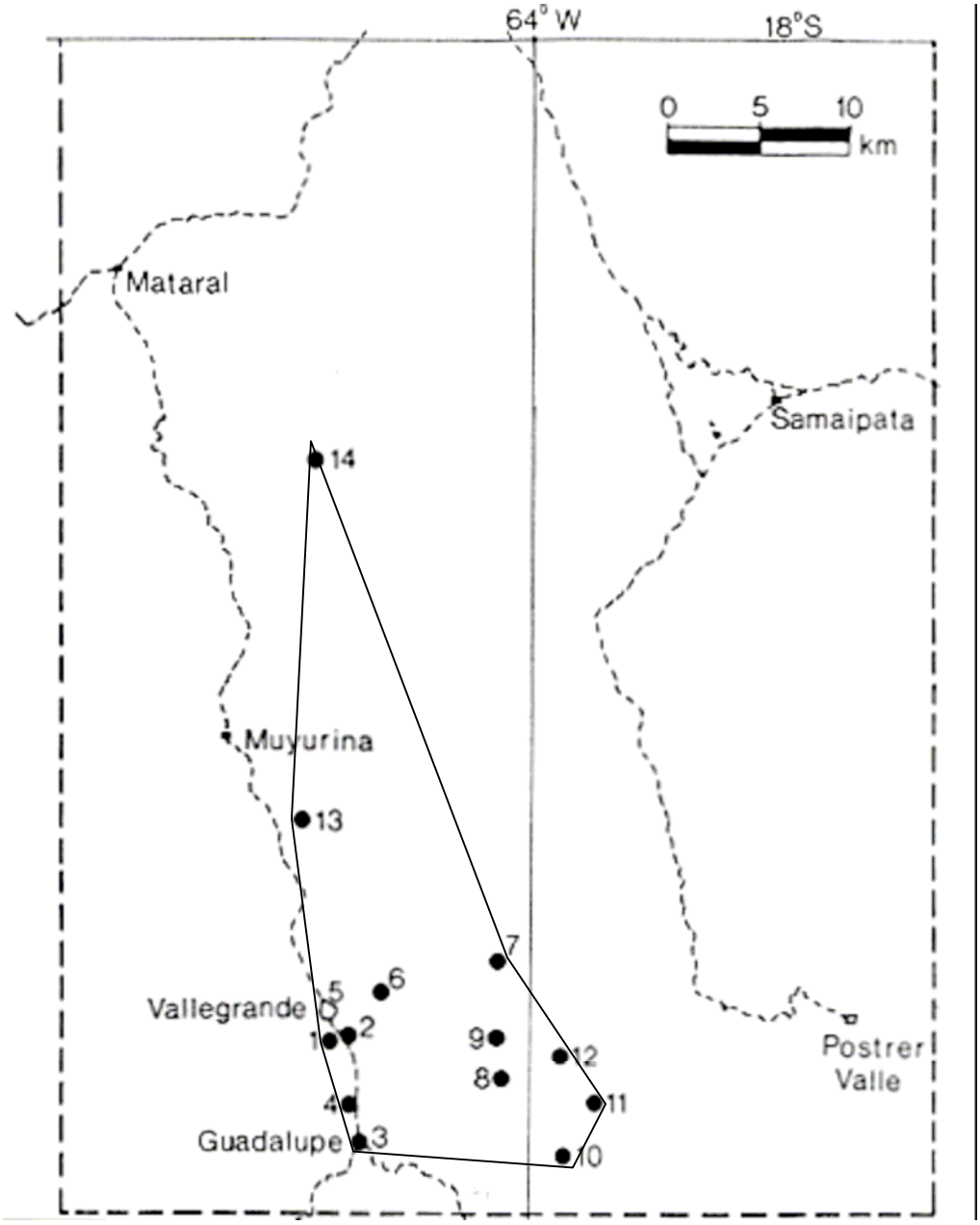
Sources:

Fundación Amigos de la Naturaleza (FAN-Bolivia). 2003. Perfil de proyecto: Conservación, manejo y commercializavión de la palmera endémica *Parajubaea sunkha* Moraes. Santa Cruz, 04/2003 (unpublished).

Ibisch, P.L. 2004. Degradation and loss of terrestrial biodiversity through direct use. In: P.L. Ibsich and& G. Mérida (eds) *Biodiversity, the richness of Bolivia*, pp: 209- 429. Fundación Amigos de la Naturaleza (FAN) 2004.

Moraes, R.M. 1996. Novelities of the genera *Parajubaea* and *Syagrus* (Palmaea) from inter-Andean valleys of Bolivia. *Novon* 6: 85–92.

Vargas, C.I. 1994. Ecology and uses of *Parajubaea torallyi* in Bolivia. *Principes* 38: 146–152.



Map: Vargas (1994)

Figure 1. Extent of occurrence for *Parajubaea sunkha*

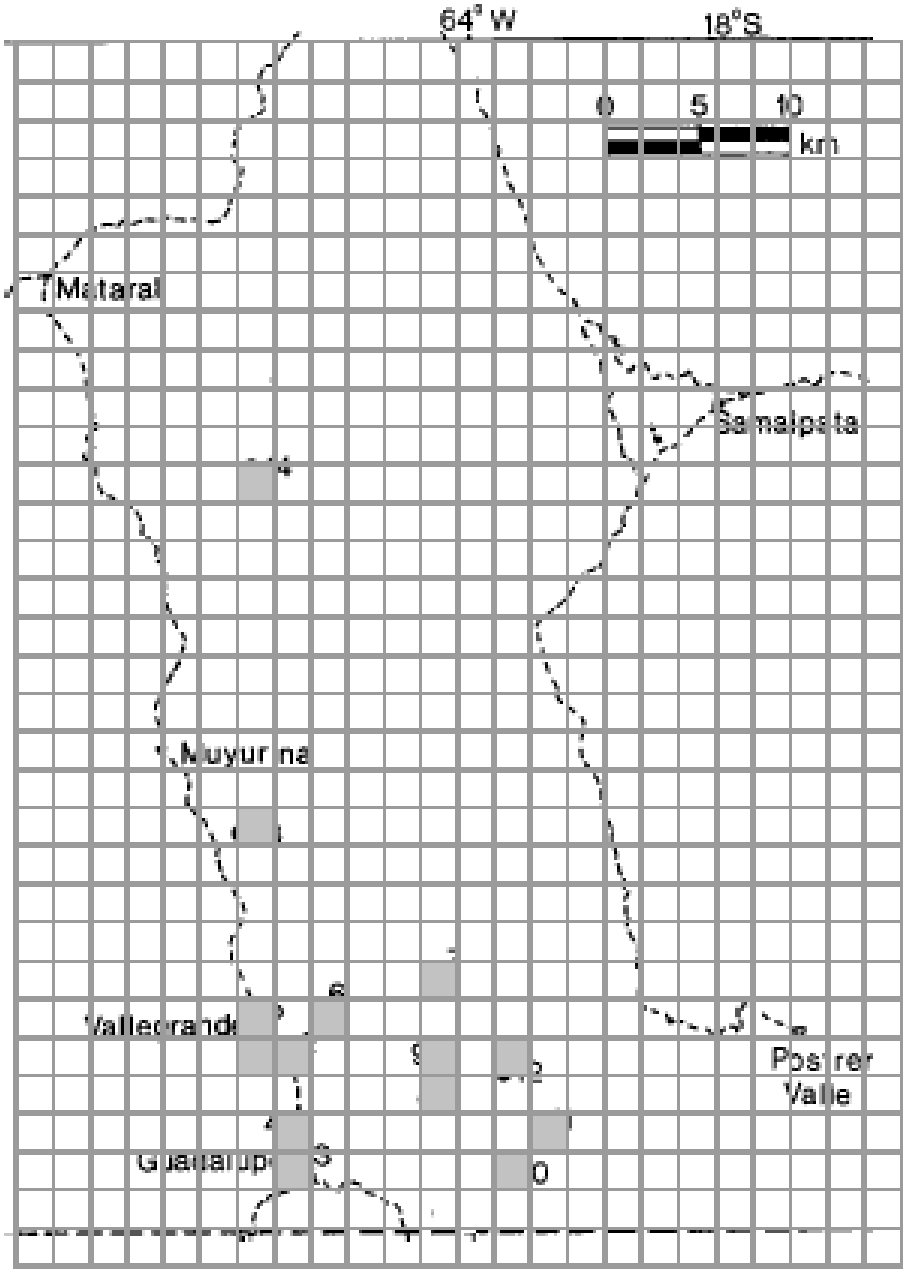
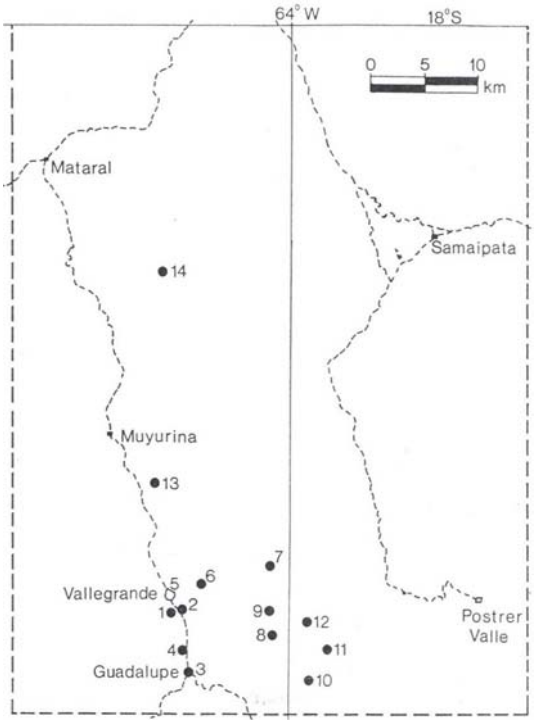


Figure 2. Area of occupancy (AOO) for *Parajubaea sunkha*



1. *Quebrada del Zorro* (3 old individuals)
2. *San Antonio*, on the road from Vallegrande to Guadelupe (3 individuals)
3. *Guadelupe* (3 cultivated individuals)
4. *Quebrada Huasacañada* (2 cultivated trees)
5. *Vallegrande* (single young tree)
6. *Cañada Arteaga*, three km NE to Vallegrande (2 very tall individuals, formerly palm grove)
7. *Río San Blas* (2 tall trees and many small ones, formerly abundant in this area but cut down)
8. *Río San Blas – Río Rodeo* (only small trees in this population)
9. "Nameless" (many trees in the ravines)
10. *Río Piraymirí* (10 young trees in a steep valley)
11. *Mataralcito* (a number of larger trees which are under fibre exploitation)
12. *Alto El Palmar* and *Peñon* (the biggest population of *Parajubaea sunkha*, as well as under exploitation; according to rough estimates (Enssle) approx. 17,000 mature individuals)
13. *Abra Qunia-Quina* (steep canyon with scattered trees with regeneration in association with *Ceroxylon* sp.)
14. *Quebrada La Palma* (several mature individuals)

Figure 3. Location of *Parajubaea sunkha* subpopulations (Vargas 1994)

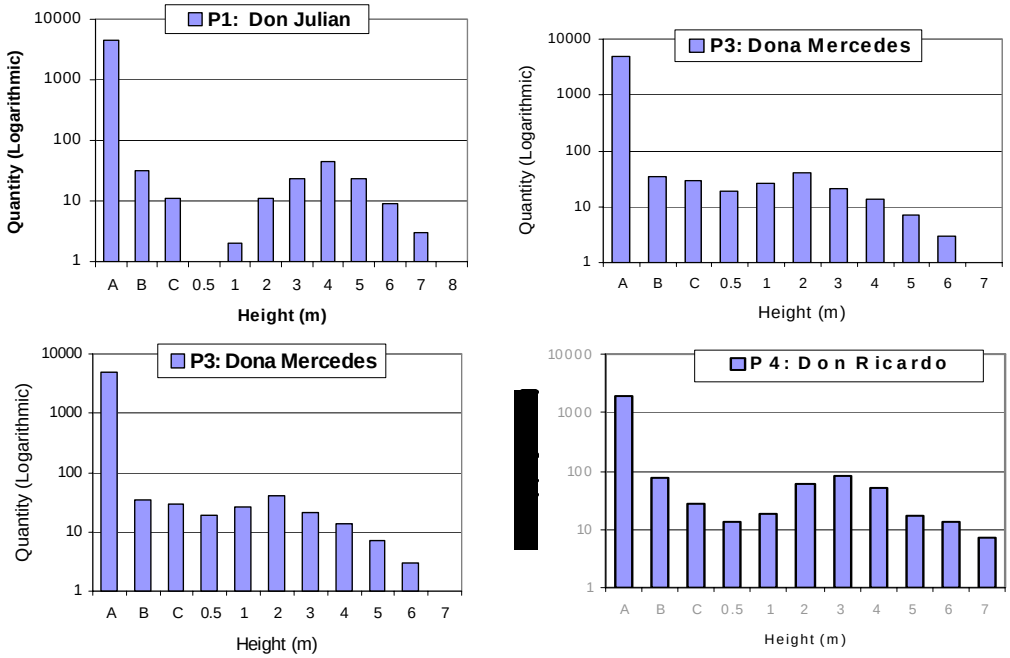


Figure 4. Population structure of four representative palm subpopulations. Where A = 1–2 years (Saplings); B = 3–5 years (Rosettes); C = stem smaller 0.5 m

Assessment 20	
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Criterion D: Very small or restricted populations?	
Criterion E: Quantitative analysis?	
Conclusion:	

Case study 21

Species:	***Kniphofia leucocephala* Baijnath**
Class:	LILIOPSIDA
Order:	LILIALES
Family:	ASPHODELACEAE

Distribution:

Two collections were made of this species in 1970 near Lake Msingazi in the vicinity of Richards Bay, northern KwaZulu-Natal, South Africa. Dr. L.E. Codd, an expert on the genus, looked at these collections and suspected they might represent a new species but he did not publish a new name. No further plants were collected until twenty years later in 1990 when a new population was discovered in a wetland that was being planted to timber trees at KwaMbonambi north of Richards Bay. Following this discovery, the species was formally described and named.

By the time this species was described, the habitat had been almost completely been transformed by commercial forestry plantations and urban expansion around Richard's Bay. Hence it is impossible to guess what the past range and population size could have been. The population discovered in 1990 is still the only known extant subpopulation, and the wetland where it grows, is owned by a forestry company and is completely surrounded by plantations.

Population:

In 1991 there were about 70 plants, which declined to about 21 individuals in 1998. Fortunately the forestry company developed a strong conservation focus and the wetland was declared a natural heritage site and considerable effort has been put in since 2000 to rehabilitate the wetland and implement a conservation management plan. The result is that the *K. leucocephala* population is now thriving and numbers have increased to around 350 individuals.

Habitat:

K. leucocephala grows in wetlands in the coastal grasslands.

Threats:

Most of the wetland habitat in the Richards Bay area was extensively 'reclaimed' in the 1970s and 80s to allow for the massive expansion of new industrial and urban areas associated with the development of a major new shipping port at Richards Bay. In addition the remaining areas not impacted by urban growth, have been planted up with extensive stands of non-indigenous tree plantations (predominantly 'water thirsty' blue gum (*Eucalyptus sp.*) species) for the paper pulp industry and also for timber.

Although the population is showing good signs of recovery, the local conservation authority remains concerned about the future of this species. They think the future survival of the population is by no means guaranteed and in their opinion this species is still facing inevitable extinction. The reasons for their concern are several:

- As long as the wetland is owned by the forestry company its conservation and management is dependent on the company's policies and on competent individuals working for the forestry company who are willing to put in the effort to continue managing the site.
- There is virtually no potential for the population to expand beyond this wetland except by reintroductions, as forestry land would have to be rehabilitated to create new habitat for this species as virtually nothing remains.
- Perhaps the most serious concern is that new blocks of gum trees have been planted all around the wetland. These are not currently impacting the site but it is feared that as the trees mature they will use more and more water, which may cause the water table in the wetland to drop below suitable levels.
- There are also some pressures for so-called 'unused' land to be made available to local people for agricultural purposes (under a land claim scheme).

The population did decline in the past when the wetland site was not managed, but the local conservation authority staff monitoring the population believe that many of the individuals that "appeared" after conditions in the wetland improved were not new recruits but mature individuals that had gone into dormancy whilst conditions were unfavourable - apparently Kniphofias are adapted to survive droughts by means of their underground rhizomes. Hence there is some uncertainty if as the gums mature whether most individuals of this species will die or whether they will remain in dormancy to reappear again once the trees are felled and the wetland restored.

There was an apparent 69% decline over the seven-year period between 1991 and 1998, and it is believed believe that the gums should be harvested in the next 7 to 8 years if they are to be used for paper pulp, but the timber company will wait much longer (unknown how long, but possibly 15 to 25 years) if the trees are to be used for wood, but no-one can say yet what the end purpose will be as it depends on market trends, supply and demand, etc.

If the forestry company's conservation policies and efforts do not change radically (and there is no land claim on the site) the wetland may not be degraded again to such a bad state as it was prior to 2000. Wetland conditions would certainly improve again after the trees are felled, but only until the next lot of trees are planted and left to mature.

Sources:

Aggenbach, L. pers. comm. 2007.
Scott-Shaw, C.R. 1999. *Rare and Threatened Plants of KwaZulu-Natal and Neighbouring Regions*. KwaZulu-Natal Nature Conservation Service, Pietermaritzburg, Soutgh Africa.

Assessment 17	
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Conclusion:	