

## 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.

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## Case study 18

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**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.

<b>Assessment 14</b>	
<b>Criterion A: Declining population in the past or future?</b>	<b>NO</b>
<p>It is not possible to know if there have been population declines over the last ten years, since this species was wrongly thought to have been extinct until its rediscovery in 1999. Therefore criterion A cannot be used.</p>	
<b>Criterion B: Small distribution, population fragmented or in few locations, and continuing decline or</b>	<b>NO</b>
<ul style="list-style-type: none"> <li>• The species is currently known from one small location, with extent of occurrence and area of occupancy within the thresholds for Critically Endangered (CR B1a+2a).</li> <li>• The land is currently protected by the owner and there seems to be no cause for concern about the area or the habitat. The species does not appear to be at risk from collectors (the plant is not commercially exploited). Therefore continuing decline cannot be inferred and hence subcriteria B1b+2b cannot be used.</li> <li>• Although water levels at the site undergo natural fluctuations, it is not certain whether this causes fluctuations in the population size.</li> </ul> <p>Since only one subcriterion applies, criterion B cannot be used, but NT might be an option.</p>	
<b>Criterion C: Small population size and decline?</b>	<b>NO</b>
<p>Population size is noted as at least 250 individuals, but there is no evidence of continuing decline. Therefore, criterion C does not apply.</p>	
<b>Criterion D: Very small or restricted populations?</b>	<b>YES</b>
<ul style="list-style-type: none"> <li>• Population size is more than 250. It could be assumed that there are fewer than 1,000 (VU D1), but this is more suspicion than estimation (note that under criterion D1, the population size is an estimation). So, VU D1 potentially could be used</li> <li>• The population is found at only one location with an area of occupancy of less than 10 km<sup>2</sup> (VU D2).</li> </ul> <p>The plant qualifies for <b>Vulnerable D2</b> (possibly also D1).</p>	
<b>Criterion E: Quantitative analysis?</b>	<b>NO</b>
<p>A quantitative analysis has not been carried out.</p>	
<p><b>Conclusion:</b> <i>Cryptocoryne bogneri</i> is <b>Vulnerable D2</b> (VU D1 may also apply). (2006 Red List: NE)</p>	

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## Case study 19

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<b>Species:</b>	<b><i>Diospyros xolocztii</i> Madrigal &amp; Rzedowski</b>
<b>Class:</b>	MAGNOLIOPSIDA
<b>Order:</b>	EBANALES
<b>Family:</b>	EBENACEAE

### **Distribution:**

*D. xolocztii* 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. xolocztii* 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. xolocztii*, 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.

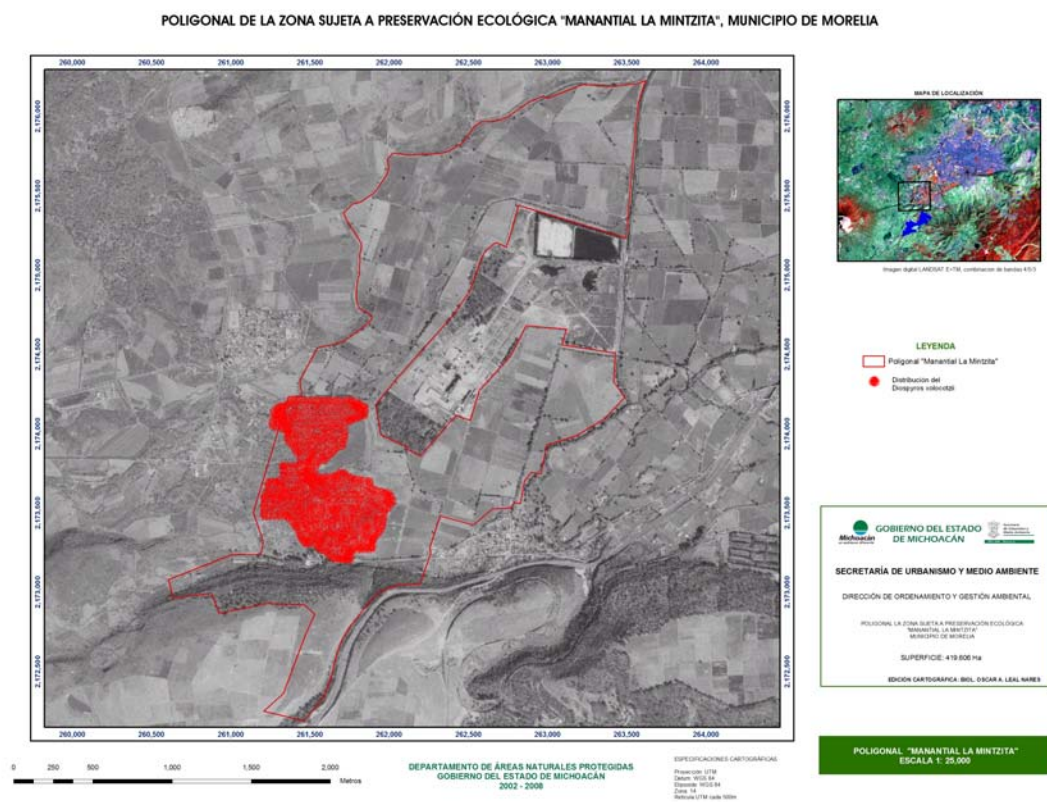


Figure 1. The shaded area indicates the range of *Diospyros xolocotzii*

## Assessment 19

### Criterion A: Declining population in the past or future?

Although there are clearly declines in the population (past, present and future), however, there is no quantitative information provided to be able to estimate, infer or even suspect what the population reduction could have been or would be in the future. Hence criterion A cannot be applied.

### Criterion B: Small distribution, population fragmented or in few locations, and continuing decline or fluctuation?

- With a range of only 25 ha the species qualifies for CR under the thresholds for both extent of occurrence and area of occupancy (CR B1+2).
- Although the habitat is highly fragmented, it is not clear if this constitutes severe fragmentation or not. But perhaps the low rate of pollination indicates that the trees are becoming isolated from each other, in which case they would be severely fragmented. There are a number of threats that would affect the whole area, so it could also be considered a single location (B1a+2a).
- There is clearly a continuing decline in the remaining number of individual trees because of ongoing threats and the habitat is under constant pressure, with intensive agriculture all around (B1b(ii,iii,v)+2b(ii,iii,v)).

The plant thus qualifies as **Critically Endangered B1ab(ii,iii,v)+2ab(ii,iii,v)**

### Criterion C: Small population size and decline?

- The population of 34 plants is well below the threshold to qualify for CR under criterion C.
- There is continuing decline in mature individuals as discussed under criterion B above, but the rate is hard to estimate (C2).
- There is only a single subpopulation (C2a(ii))

The plant qualifies as **Critically Endangered C2a(ii)**

### Criterion D: Very small or restricted populations?

With a population size of 34, it meets the threshold under criterion D.

The plant qualifies as **Critically Endangered D**

### Criterion E: Quantitative analysis?

A quantitative analysis has not been carried out.

### Conclusion:

***Diospyros xolocztii* is Critically Endangered B1ab(ii,iii,v)+2ab(ii,iii,v); C2a(ii); D**

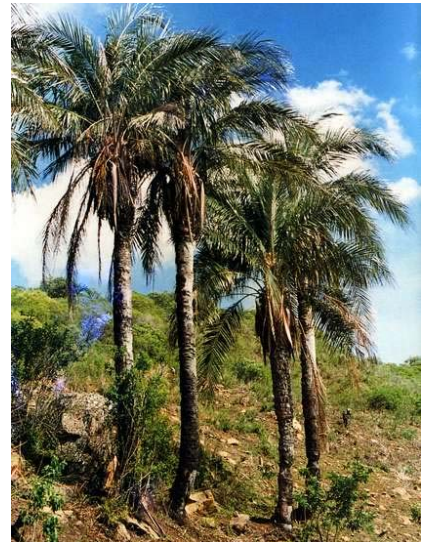
(Will be in 2007 Red List)

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## Case study 20

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<b>Species:</b>	<b><i>Parajubaea sunkha</i> Moraes</b>
<b>Common Name:</b>	Sunkha Palm
<b>Class:</b>	LILIOPSIDA
<b>Order:</b>	ARECALES
<b>Family:</b>	PALMAE / ARECACEAE



### 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* understory, 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).

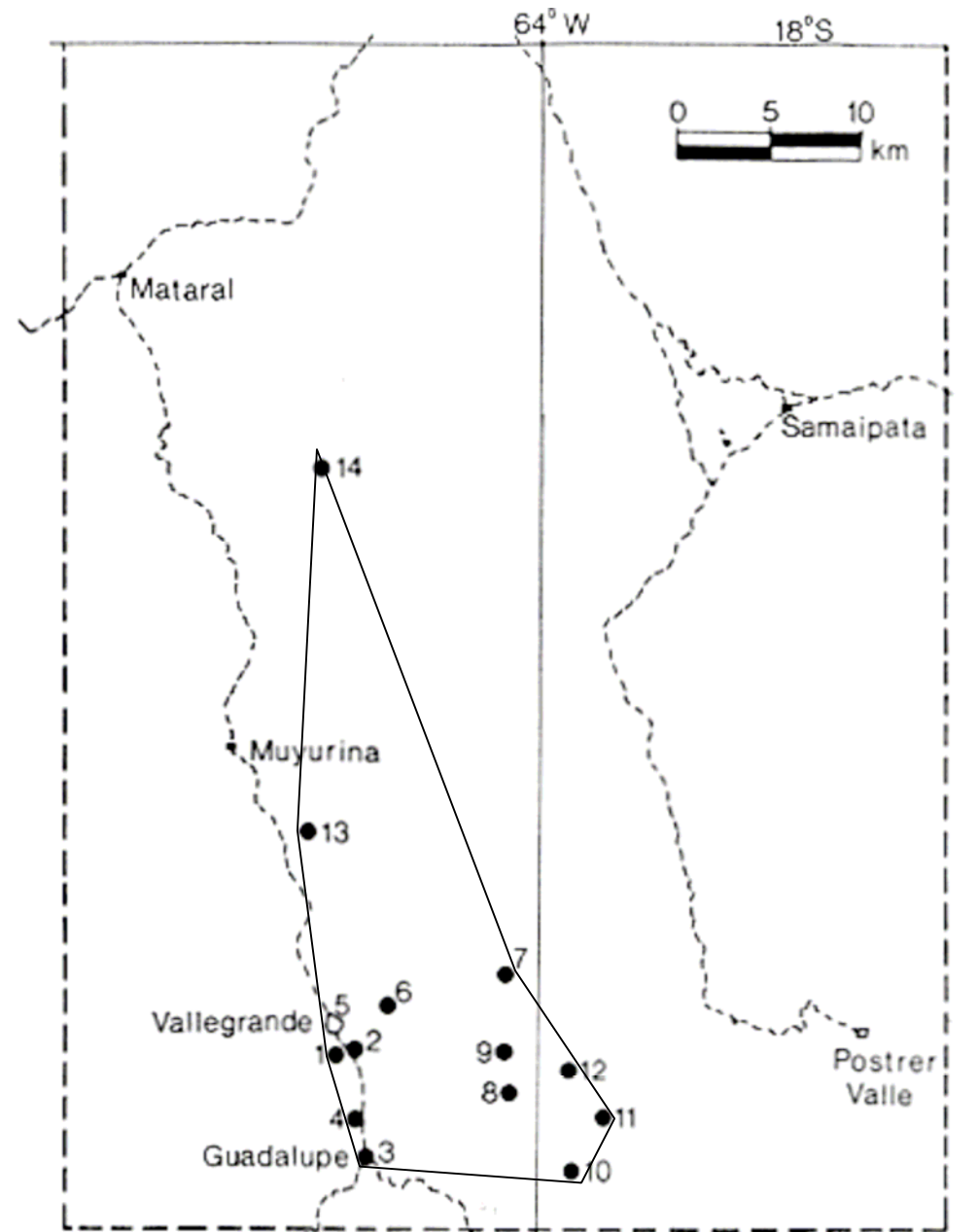
### **Utilization**

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.

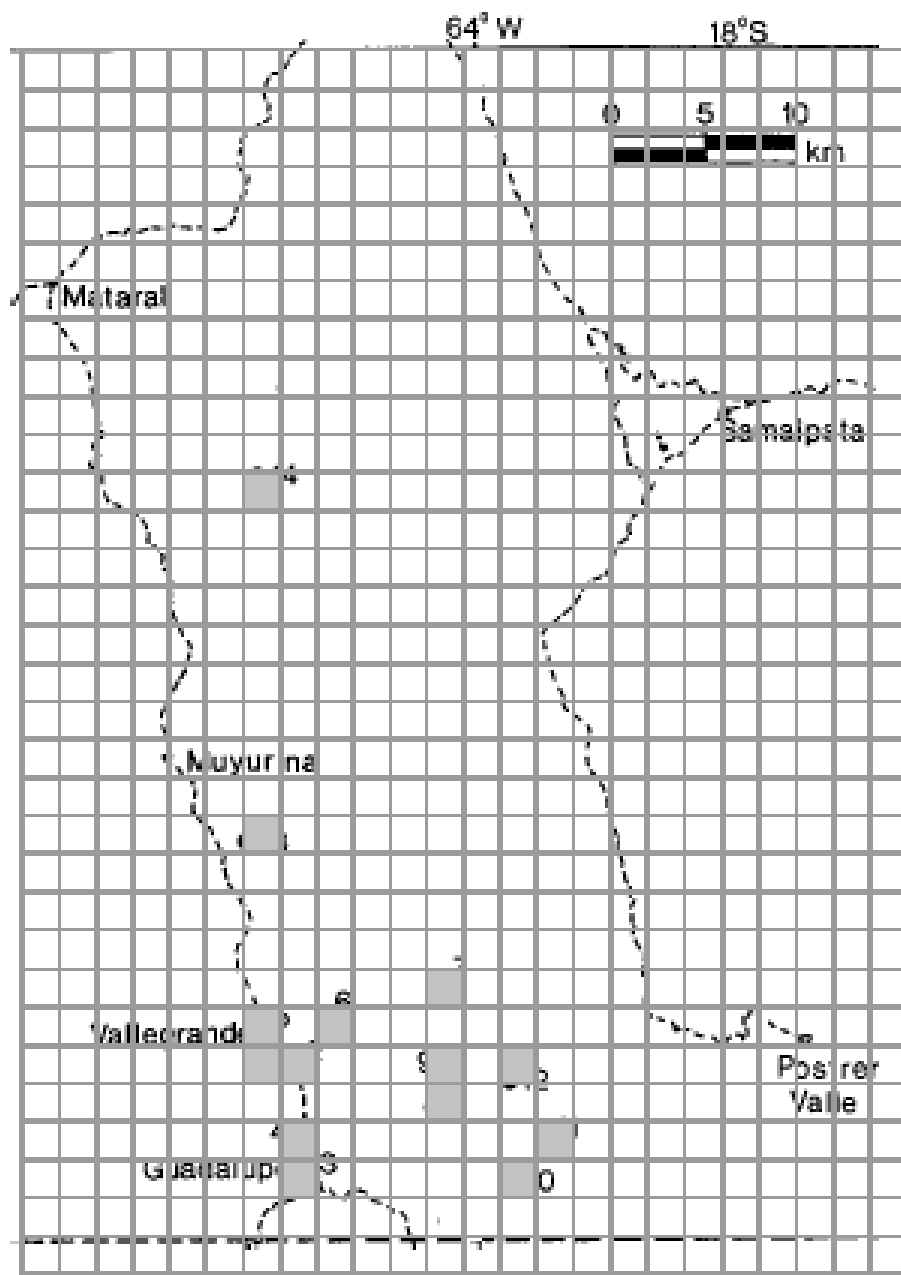
### **Sources:**

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

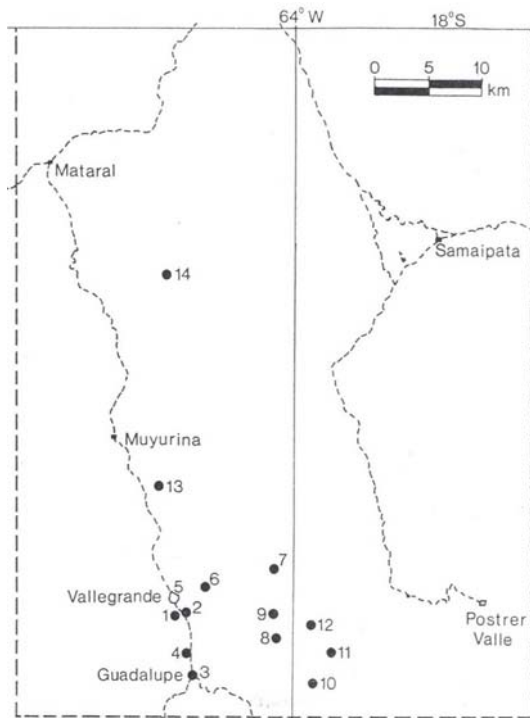
**Figure 1.** Extent of occurrence for *Parajubaea sunkha*



Map: Vargas (1994)

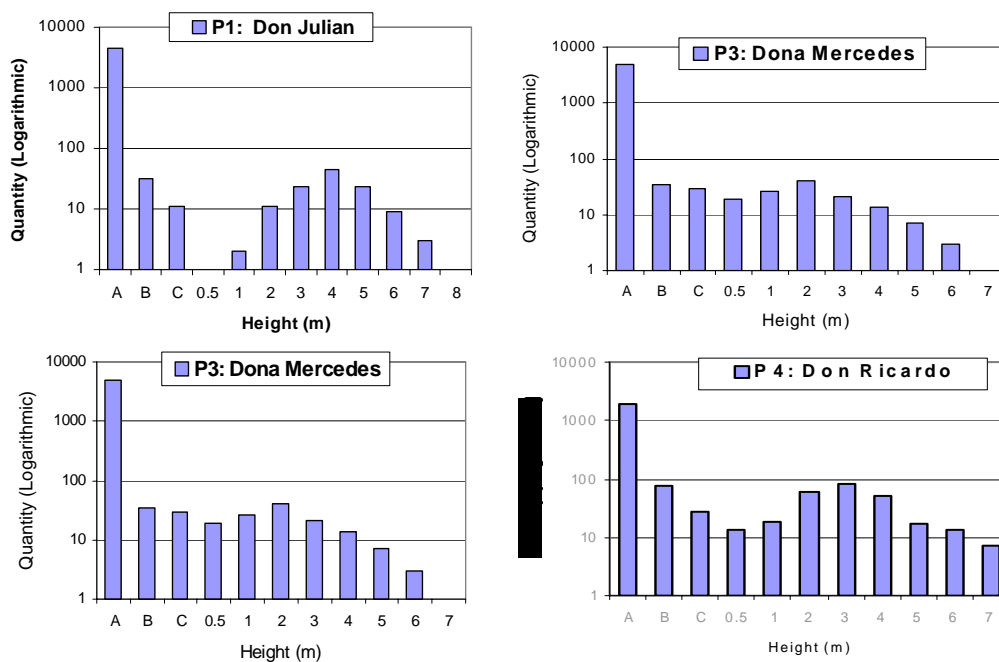
Grid scale: 4 km<sup>2</sup>

**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 Guadalupe (3 individuals)
3. Guadalupe (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 Quinia-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

### Criterion A: Declining population in the past or future?

It is suspected that the taxon might meet the criteria for Endangered under A2acd (population decline of at least 50% over the last three generations and the threats have not ceased) but these criteria cannot be evaluated properly due to the lack of adequate survey data over time.

The future population trend is also unknown and depends on local socio-economic developments. A second inventory is planned for the year 2008 and a reassessment will be carried out then to evaluate whether criterion A4acd applies.

Possibly Endangered A2acd+A4acd.

### Criterion B: Small distribution, population fragmented or in few locations, and continuing decline or fluctuation?

*P. sunkha* has a restricted range; extent of occurrence (EOO) is 288 km<sup>2</sup> (using a rough calculation EOO might be estimated to be 640 km<sup>2</sup> which is still well within the threshold for Endangered); and area of occupancy (AOO) is 56 km<sup>2</sup> (EN B1+2).

More than 50% of its total AOO is in habitat patches that are smaller than would be required to support a viable population, and separated from other habitat patches by a large distance, hence it is severely fragmented (B1a+2a).

Quality of habitat is degrading rapidly due to the many Threats (B1b(iii)+2b(iii))

Extreme fluctuations in the number of mature individuals have been directly observed (measured) and can be traced back to harvest intensities (B1c(iv)+2c(iv)).

The species qualifies as **Endangered B1ab(iii)c(iv)+2ab(iii)c(iv)**.

### Criterion C: Small population size and decline?

The population size is too large to qualify under any of the criteria C thresholds (>10,000 mature individuals).

### Criterion D: Very small or restricted populations?

The population is too large to qualify under the D1 criterion.

The species has a fairly restricted range, but with an AOO of 56 km<sup>2</sup> that is probably too large to qualify the species under Vulnerable D2. Likewise the number of locations is 14, so much greater than the typical five or fewer guideline. With the small AOO and clear threats, Near Threatened could be an option if no other criteria were met.

### Criterion E: Quantitative analysis?

A quantitative analysis has not been carried out.

### Conclusion:

***Parajubaea sunkha* qualifies as Endangered B1ab(iii)c(iv)+2ab(iii)c(iv)**

(In 2006 Red List)

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## Case study 21

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<b>Species:</b>	<b><i>Kniphofia leucocephala</i> Baijnath</b>
<b>Class:</b>	LILIOPSIDA
<b>Order:</b>	LILIALES
<b>Family:</b>	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 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, South Africa.

## Assessment 21

### Criterion A: Declining population in the past or future?

There was a decline of 69% in 7 years between 1991 and 1998, however, the population has since recovered from 21 plants to 350 plants. The reasons for the decline are understood, they have stopped and by doing so the population recovered, hence it could qualify as Endangered under criterion A1 (A1ac). It would not meet A2.

There are concerns about a future decline, but it is hard to project how much that is likely to be. Hence criteria A3 and A4 cannot be met.

The plant thus qualifies as **Endangered A1ac**.

### Criterion B: Small distribution, population fragmented or in few locations, and continuing decline or fluctuation?

The species clearly meets the area thresholds for Critically Endangered under both EOO and AOO (B1+B2).

The site can be considered a single location (B1a+2a).

The key debate concerns continuing declines, although there is no population decline evident at present, there will clearly be a continuing decline in habitat quality which from past experience is likely to impact the population (B1b(iii)+2b(iii)).

The plant thus qualifies as **Critically Endangered B1ab(iii)+2ab(iii)**

### Criterion C: Small population size and decline?

The population is small enough to potentially qualify as Endangered under criterion C. However, there is currently no continuing decline in number of mature individuals. Although that may happen at some point in the near future as the habitat quality is affected.

Possibly **Endangered C2a(ii)**.

### Criterion D: Very small or restricted populations?

Under criterion D the population size qualifies the species for Vulnerable D1.

The species is known only from a single location and there are clear future threats so it also meets Vulnerable D2.

Hence would be listed as **Vulnerable D1+2**.

### Criterion E: Quantitative analysis?

A quantitative analysis has not been carried out.

## Conclusion:

***Kniphofia leucocephala* qualifies as Critically Endangered B1ab(iii)+2ab(iii)**