Review of extinction risk in African Cycads

Revisión del riesgo de extinción de las Cícadas Africanas

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Abstract. Over a long period of time, cycads endemic to Africa have been facing high risk of extinction. Several conservation efforts have been made to reduce the risk of losing these highly endangered species. In this study we review the current risk of extinction of all African cycads species. We calculated the percentages of each category of species found in African cycads using the IUCN (International Union of Conservation of Nature) red list of threatened species 2014 version. We compared our result with that of Donaldson (2003) on percentages of different categories of IUCN for cycads in Africa which was carried out a decade ago. We also calculated the percentage of population trend in African cycads. When comparing these results, we discovered that over one decade there was no improvement in cycads conservation despite several conservation efforts that were made during this period. The results of the population trend also showed that the majority of African cycads are experiencing population decreases. These results highlight that the risk of extinction of African cycads is still very high and much conservation effort is still required to properly tackle ecological factors pushing these endangered species to extinction.

Keywords: African cycads; Extinction; IUCN categories; Threat.

Resumen. Las cicadáceas, endémicas de África, han estado expuestas a un alto riesgo de extinción durante un largo período de tiempo. Se han hecho varios esfuerzos de conservación para reducir el riesgo de perder estas especies en gran peligro de extinción. En este estudio revisamos el riesgo actual de extinción de todas las especies de cicadáceas Africanas. Calculamos los porcentajes de cicadáceas en cada una de las categorías de peligro en extinción usando la versión 2014 de la lista roja de la IUCN (Unión Internacional de Conservación de la Naturaleza) de especies amenazadas. Comparamos nuestros resultados con los de Donaldson (2003), obtenidos 10 años antes, respecto a los porcentajes de cicadáceas en África en las diferentes categorías de la IUCN. También calculamos el porcentaje de la tendencia poblacional de las cicadáceas Africanas. Comparando los resultados revisados, descubrimos que durante más de una década no hubo mejoras en la conservación de las cicadáceas a pesar que se hicieron varios esfuerzos de conservación durante este período. Los resultados de la tendencia poblacional también mostraron que las cicadáceas Africanas están experimentando reducciones en su población. Estos resultados destacan que el riesgo de extinción de las cicadáceas Africanas es aún muy grande y se necesitan muchos esfuerzos de conservación para abordar apropiadamente los factores ecológicos que están exponiendo a estas especies en peligro de extinción hacia su extinción.

Palabras clave: Cicadáceas Africanas; Extinción; Categorías IUCN; Amenaza.

INTRODUCTION

Cycads are categorized as the most threatened plant species in the world: in 2010, 303 species of cycads were assessed, and 63% were threatened to extinction (International Union of Conservation of Nature 2010). Africa is one of the centres of diversity of cycads (Hill et al., 2003). It harbours 66 species of the genus *Encephalartos* and one species of the genus *Stangeria* (Rousseau, 2012) making a total of 67 species endemic to Africa. The IUCN Red list provides vital information on the risk of extinction of all species (Lamoreux et al., 2003). This listing is based on several criteria including species biology, ecology, population size, distribution range, population dynamic, etc. (International Union of Conservation of Nature, 2010). Several factors such as illegal collection of cycads (Donaldson, 2003; Donaldson, 2008), climate change (Bamigboye, 2013), and presence of invasive species (Donaldson, 2008) are responsible for the extinction risk of cycads in Africa. Several conservation efforts have been put in place to reduce the risk of extinction of cycads in Africa.

Donaldson (2003) in his published work on cycads status, survey and conservation plan presented a IUCN report of different percentages of IUCN status of African cycads, raising concern on the rate of the rapid loss of cycads in Africa. Donaldson (2003) identified that the threatened status of cycads arises from natural rarity and decline. Cycads grow in isolated populations in nature which makes them very rare, hereby making them to require a high level of conservation and regeneration plan (Hill et al., 2003). Causes of threats identified by Donaldson (2003) include habitat destruction, over collection, traditional uses, and reproductive failure. It is hereby necessary to evaluate the current status of African cycads after about one decade to give a better picture of the trend in the conservation of African cycads.

In this study, we review the risk of extinction of these plant species to determine if there has been either any improvement in the status of cycads in Africa or not. This was made by comparing the IUCN 2014 status of African cycads with the results presented by Donaldson (2003).

MATERIALS AND METHODS

Using the 2014 version of the IUCN (International Union of Conservation of Nature) red list of threatened species, we evaluated the status of all cycads endemic to Africa. We did this by calculating the number of African cycads species in each category of the IUCN status, which includes species as Critically endangered, Vulnerable, Endangered, Extinct in the wild, Near threatened and of the Least concern. We multiplied the total number of African cycads in each category by 100 and divided it by 67, which

is the total number of cycads species in Africa, in order to get the categorical percentages. We also calculated the population trend of all cycads endemic to Africa by calculating the total number of African cycads either decreasing or stable in population trend. We multiplied each of the categories of population trend by 100, and divided them by 67 to find the exact percentage of African cycads taxa experiencing population decrease or stability using the IUCN 2014. We compared our results of the IUCN threat categories (Critically endangered, Vulnerable, Endangered, Extinct in the wild, Near threatened and Least concern) for 2014 with the result of the classification carried out by Donaldson (2003). Donaldson's classification (2003) is one decade before the current IUCN version to evaluate the threat trend of African cycads. The report presented by Donaldson (2003) was based on combined data from sources including cycads trade, permit records and study of matched photographs of cycads hotspots over a long period of time. These data were used to assess the status of cycads species endemic to Africa. Donaldson's (2003) results showed that 2.8% of African cycads were already extinct, 26% critically endangered, 12% endangered, 26% vulnerable and 16% of least concern.

RESULTS
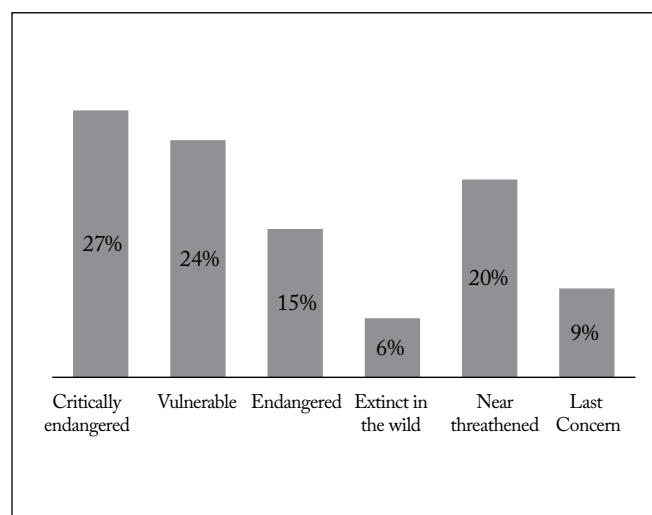
Fig. 1. Percentage of each categories of IUCN status of African cycads in the 2014 version of IUCN red list of threatened species. Categories include the percentage of African cycads that are Critically endangered, Endangered, Vulnerable, Extinct in the wild, Near threatened and Least concern.
Fig. 1. Porcentaje de cada una de las categorías de las Cícadas Africanas de acuerdo a la versión 2014 de la lista de especies amenazadas de la IUCN. Las categorías incluyen el porcentaje de las Cícadas Africanas que están críticamente amenazadas, amenazadas, vulnerables, extinguidas en condiciones naturales, próximas a ser amenazadas y de menor preocupación.
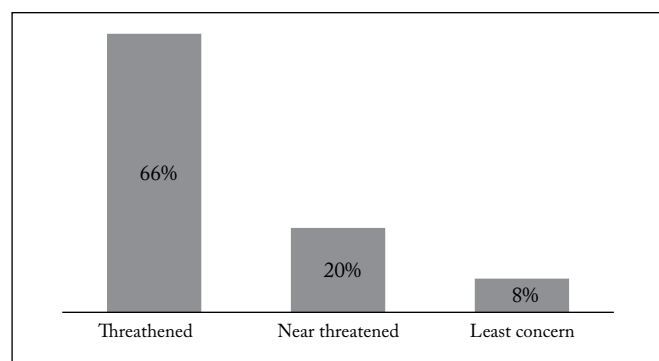
Fig. 2. Result of the percentages of African cycads that are threatened (Critically endangered, Endangered, Vulnerable), Near threatened and Least concern on the IUCN red list status 2014 version.
Fig. 2. Porcentaje de las Cicadas Africanas que están amenazadas (muy amenazadas, amenazadas, vulnerables), cerca de estar amenazadas y de menor preocupación en la versión 2014 de la lista roja de la IUCN.

Table 1. Comparing different categories of African cycads between Donaldson (2003) and IUCN (International Union of Conservation of Nature) red list 2014 version.
Tabla 1. Comparación de diferentes categorías de las Cicadas Africanas entre el informe de Donaldson (2003) y la versión 2014 de la lista roja de la IUCN (Unión Internacional de Conservación de la Naturaleza).

African cycads species	% of categories according to Donaldson (2003)	% of categories according to IUCN red list 2014 version
Extinct	2.8%	6%
Critically endangered	26%	27%
Endangered	12%	15%
Vulnerable	26%	24%
Near threatened	16%	20%

DISCUSSION AND CONCLUSION

Reviewing the status of cycads in Africa has enabled us to evaluate their current position related to risk of extinction. We detected an increase in all threatened African cycads in one decade after comparing the IUCN status of Donaldson (2003) with the 2014 version of the IUCN (Table 1). Cycads that have gone extinct have increased by 3.2%, critically endangered cycads have increased by 1%, endangered cycads have increased by 3%, vulnerable ones have decreased by 2% and the ones that are near threatened have increased by 4% (Fig. 1; Table 1). These increases might look insignificant but losing one species is losing ecosystem productivity, population distribution and genetic diversity (Mukwevho, 2014).
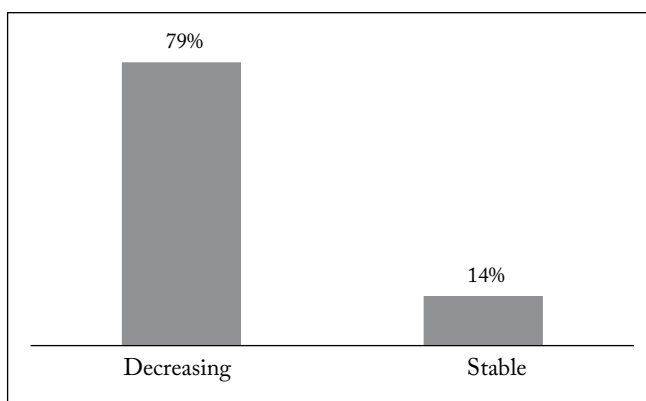
Fig. 3. Percentages of population trend in African cycads on IUCN red list 2014 version. The population trends show the percentage of African cycads species experiencing decreases in population and the ones that are stable.
Fig. 3. Porcentajes de tendencia de las poblaciones de las Cicadas Africanas en la versión 2014 de la lista roja de la IUCN. Las tendencias de las poblaciones muestran el porcentaje de las especies de Cicadas Africanas que está en disminución o se mantiene estable.

Another important aspect of this research is the population trend. Currently, a very large number of African cycads are still experiencing a decrease in population which might lead these endangered species towards extinction in the future (Fig. 3).

Much effort is needed to preserve the African cycads. We also suggest that ecological forces that have not previously been given high priority should now be given close consideration. For instance, in South Africa combating poaching and illegal collections has been the major focus of cycads conservation. But other factors such as climate change which could adversely affect these species should also be taken into consideration. If some close consideration is given to these ecological factors, it might reduce the risk of extinction of this threatened species.

ACKNOWLEDGEMENTS

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