

Ecological Studies on Endangered Plant Community of Sariska Region Of Rajasthan

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ABSTRACT: Increase in development and an influx of human population means that our impact on the environment has gone up catastrophically. With increasing threats in the form of loss of habitats, degradation, overexploitation of resources and climate change, there are sufficient warning signs out there for the human race. However, even with enlightening information, there is a growing number of endangered species plants in Sariska of Rajasthan, India.

KEYWORDS: population, habitat, degradation, overexploitation, resources, climate change, endangered plants, Sariska, Rajasthan

I.INTRODUCTION

An endangered species is a species that is very likely to become extinct in the near future, either worldwide or in a particular political jurisdiction. Endangered species may be at risk due to factors such as habitat loss, poaching and invasive species. The International Union for Conservation of Nature (IUCN) Red List lists ¹the global conservation status of many species, and various other agencies assess the status of species within particular areas. Many nations have laws that protect conservation-reliant species which, for example, forbid hunting, restrict land development, or create protected areas². Some endangered species are the target of extensive conservation efforts such as captive breeding and habitat restoration. Here are some of the species of plants that fall under endangered category in Sariska³:

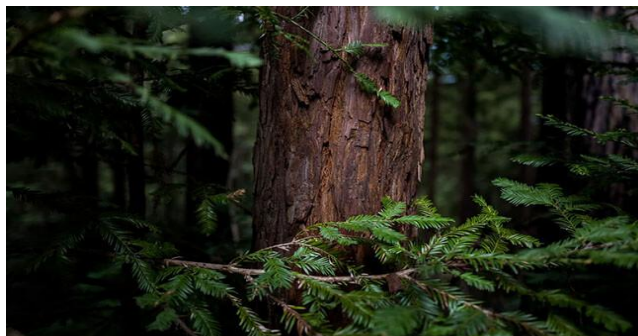
1. Malabar Mahogany

This tree is known for its durable wood which has led to a surge in demand and thus is cultivated to add on to the growing consumption of lumber.⁴



2. Musli

Also known as *Chlorophytum tuberosum* is a medicinal blooming plant that has been in the endangered plant list for some time now.⁵



3. Red Sandalwood

Sandalwood has always been a highly sought tree. The *Pterocarpus Santalinus* is a very premium type of sandalwood that has high medicinal properties and healing effects. This substance is further used for skin care as well.⁶



4. Catkin Yew

Mentotaxus yew or Catkin Yew is found in Arunachal Pradesh and is listed under this category because of the notable low reproduction rate. The original habitat of this plant has gone through severe land transformations, landing it to the endangered flora list.⁷



5. Ebony

Dark and durable, the *Diospyros celebica*, or Ebony plant, is known for producing high quality primo wood. Just like Mahogany plants, Ebony is high in demand for timber production, landing it on the endangered list.⁸



The conservation status of a species indicates the likelihood that it will become extinct. Multiple factors are considered when assessing the status of a species; e.g., such statistics as the number remaining, the overall increase or decrease in the population over time, breeding success rates, or known threats.^[4] The IUCN Red List of Threatened Species is the best-known worldwide conservation status listing and ranking system.^[5]



Over 50% of the world's species are estimated to be at risk of extinction,^[6] but the frontier between categories such as 'endangered', 'rare', or 'locally extinct' species is often difficult to draw given the general paucity of data on most of these species. This is notably the case in the world Ocean where endangered species not seen for decades may go extinct unnoticed.^[7]

Internationally, 195 countries have signed an accord to create Biodiversity Action Plans that will protect endangered and other threatened species. In the United States, such plans are usually called Species Recovery Plans.⁹

II.DISCUSSION

Though labeled a list, the IUCN Red List is a system of assessing the global conservation status of species that includes "Data Deficient" (DD) species – species for which more data and assessment is required before their situation may be determined – as well species comprehensively assessed by the IUCN's species assessment process.^[9] The species under the index include: mammals, birds, amphibians, cycads, and corals.¹⁰ Those species of "Near Threatened" (NT) and "Least Concern" (LC) status have been assessed and found to have relatively robust and healthy populations, though these may be in decline. Unlike their more general use elsewhere, the List uses the terms "endangered species" and "threatened species" with particular meanings: "Endangered" (EN) species lie between "Vulnerable" (VU) and "Critically Endangered" (CR) species. In 2012, the IUCN Red List listed 3,079 animal and 2,655 plant species as endangered (EN) worldwide.^[9]

A) Reduction in population size based on any of the following:¹¹

1. An observed, estimated, inferred or suspected population size reduction of $\geq 70\%$ over the last 10 years or three generations, whichever is the longer, where the causes of the reduction are reversible AND understood AND ceased, based on (and specifying) any of the following:

- a.direct observation
- b.an index of abundance appropriate for the taxon
- c.a decline in area of occupancy, extent of occurrence or quality of habitat
- d.actual or potential levels of exploitation
- e.the effects of introduced taxa, hybridisation, pathogens, pollutants, competitors or parasites.¹²

2. An observed, estimated, inferred or suspected population size reduction of $\geq 50\%$ occurred over the last 10 years or three generations. Whichever is the longer, where the reduction or its causes may not have ceased OR may not be understood OR may not be reversible, based on (and specifying) any of (a) to (e) under A1. 3. A population size reduction of $\geq 50\%$, projected or suspected to be met within the next 10 years or three generations, whichever is the longer (up to a maximum of 100 years), based on (and specifying) any of (b) to (e) under A1. 4. An observed, estimated, inferred, projected or suspected population size reduction of $\geq 50\%$ over any 10 year or three-generation period, whichever is longer (up to a maximum of 100 years in the future), where the time period must include both the past and the future, and where the reduction or its causes may not have ceased OR may not be understood OR may not be reversible, based on (and specifying) any of (a) to (e) under A1.¹³

B) Geographic range in the form of either B1 (extent of occurrence) OR B2 (area of occupancy) OR both:

1. Extent of occurrence estimated to be less than 5,000 km², and estimates indicating at least two of a-c.¹⁴

- a.Severely fragmented or known to exist at no more than five locations.
- b.Continuing decline, inferred, observed or projected, in any of the following:
 - i.extent of occurrence
 - ii.area of occupancy
 - iii.area, extent or quality of habitat
 - iv.number of locations or subpopulations
 - v.number of mature individuals
- c.Extreme fluctuations in any of the following:
 - i.extent of occurrence
 - ii.area of occupancy
 - iii.number of locations or subpopulations¹⁵
 - iv.number of mature individuals



2. Area of occupancy estimated to be less than 500 km², and estimates indicating at least two of a-c:¹⁶

- a. Severely fragmented or known to exist at no more than five locations.
- b. Continuing decline, inferred, observed or projected, in any of the following:
 - i. extent of occurrence
 - ii. area of occupancy
 - iii. area, extent or quality of habitat
 - iv. number of locations or subpopulations
 - v. number of mature individuals
- c. Extreme fluctuations in any of the following:
 - i. extent of occurrence
 - ii. area of occupancy
 - iii. number of locations or subpopulations
 - iv. number of mature individuals

C) Population estimated to number fewer than 2,500 mature individuals and either:¹⁷

1. An estimated continuing decline of at least 20% within five years or two generations, whichever is longer, (up to a maximum of 100 years in the future) OR 2. A continuing decline, observed, projected, or inferred, in numbers of mature individuals AND at least one of the follow (a-b):

- a. Population structure in the form of one of the following:
 - i. no subpopulation estimated to contain more than 250 mature individuals, OR
 - ii. at least 95% of older individuals in one subpopulation
- b. Extreme fluctuations in the number of older individuals

D) Population size estimated to number fewer than 250 mature individuals.

E) Quantitative analysis showing the probability of extinction in the wild is at least 20% within 20 years or five generations, whichever is the longer (up to a maximum of 100 years).¹⁸

III. RESULTS

An IUCN Red List Critically Endangered (CR or sometimes CE) species is one that has been categorized by the International Union for Conservation of Nature as facing an extremely high risk of extinction in the wild.^[1] As of 2013, of the 120,372 species currently tracked by the IUCN, there are 8,404 species that are considered to be Critically Endangered.^[2]

The IUCN Red List provides the public with information regarding the conservation status of animal, fungi, and plant species.^[3] It divides various species into seven different categories of conservation that are based on habitat range, population size, habitat, threats, etc. Each category representing a different level of global extinction risk. Species that are considered to be Critically Endangered are placed within the "threatened" category.^[4]

As the IUCN Red List does not consider a species extinct until extensive, targeted surveys have been conducted, species that are possibly extinct are still listed as Critically Endangered.¹⁹ IUCN maintains a list^[5] of "possibly extinct" and "possibly extinct in the wild" species, modelled on categories used by BirdLife International to categorize these taxa.

To be defined as Critically Endangered in the Red List, a species must meet any of the following criteria (A–E) ("3G/10Y" signifies three generations or ten years—whichever is longer—over a maximum of 100 years; "MI" signifies Mature Individuals).^[6]

A: Population Size Reduction

1. The rate of reduction is measured either over a 10 year span or across three different generations within that species.
2. The cause for this decline must also be known.
3. If the reasons for population reduction no longer occur and can be reversed, the population needs to have been reduced by at least 90%
4. If not, then the population needs to have been reduced by at least 80%²⁰



B: Reduction Across a Geographic Range

1. This reduction must occur over less than 100 km² OR the area of occupancy is less than 10 km².
 1. Severe habitat fragmentation or existing at just one location
 2. Decline in extent of occurrence, area of occupancy, area/extent/quality of habitat, number of locations/subpopulations, or amount of MI.
 3. Extreme fluctuations in extent of occurrence, area of occupancy, number of locations/subpopulations, or amount of MI.²¹

C: Population Decline

1. The population must decline to less than 250 MI and either:
 1. A decline of 25% over 3G/10Y
 2. Extreme fluctuations, or over 90% of MI in a single subpopulation, or no more than 50 MI in any one subpopulation.

D: Population Size Reduction

1. The population size must be reduced to numbers of less than 50 MI.

E: Probability of Extinction²²

1. There must be at least a 50% probability of going extinct in the wild within over 3G/10Y

IV. CONCLUSIONS

The Endangered Species Act of 1973 (ESA or "The Act"; 16 U.S.C. § 1531 et seq.) is the primary law in the United States for protecting and conserving imperiled species. Designed to protect critically imperiled species from extinction as a "consequence of economic growth and development untempered by adequate concern and conservation", the ESA was signed into law by President Richard Nixon on December 28, 1973. The Supreme Court of the United States described it as "the most comprehensive legislation for the preservation of endangered species enacted by any nation".^[1] The purposes of the ESA are two-fold: to prevent extinction and to recover species to the point where the law's protections are not needed. It therefore "protect[s] species and the ecosystems upon which they depend" through different mechanisms. For example, section 4 requires the agencies overseeing the Act to designate imperiled species as threatened or endangered. Section 9 prohibits unlawful 'take,' of such species, which means to "harass, harm, hunt..." Section 7 directs federal agencies to use their authorities to help conserve listed species. The Act also serves as the enacting legislation to carry out the provisions outlined in The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES).^[2] The Supreme Court found that "the plain intent of Congress in enacting" the ESA "was to halt and reverse the trend toward species extinction, whatever the cost."^[1] The Act is administered by two federal agencies, the United States Fish and Wildlife Service (FWS) and the National Marine Fisheries Service (NMFS).^[3] FWS and NMFS have been delegated by the Act with the authority to promulgate any rules and guidelines within the Code of Federal Regulations (CFR) to implement its provisions.²³

Section 10 may also allow activities that can unintentionally impact protected species. A common activity might be construction where these species live. More than half of habitat for listed species is on non-federal property.^[22] Under section 10, impacted parties can apply for an incidental take permit (ITP). An application for an ITP requires a Habitat Conservation Plan (HCP).^[22] HCPs must minimize and mitigate the impacts of the activity. HCPs can be established to provide protections for both listed and non-listed species. Such non-listed species include species that have been proposed for listing. Hundreds of HCPs have been created. However, the effectiveness of the HCP program remains unknown.²⁰

If activities may unintentionally take a protected species, an incidental take permit can be issued. The applicant submits an application with an habitat conservation plan (HCP). If approved by the agency (FWS or NMFS) they are issued an Incidental Take Permit (ITP). The permit allows a certain number of the species to be "taken." The Services have a "No Surprises" policy for HCPs. Once an ITP is granted, the Services cannot require applicants to spend more money or set aside additional land or pay more.^[16]

To receive the benefit of the permit the applicant must comply with all the requirements of the HCP. Because the permit is issued by a federal agency to a private party, it is a federal action. Other federal laws will apply such as the National Environmental Policy Act (NEPA) and Administrative Procedure Act (APA). A notice of the permit application action must be published in the Federal Register and a public comment period of 30 to 90 days offered.^[19]



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