GLOBAL TREES CAMPAIGN

BRIEF 10

How to red list a tree species

Credit: Malin Rivers/BGCI

> "Taxonomy gives species their names, conservation assessments give them a voice" P. Wilkie 2015

This brief was written by Malin Rivers, Botanic Gardens Conservation International (BGCI)

Introduction

Red list assessments help to determine which species are at greatest risk of extinction. They are used to prioritise the most threatened species for conservation action, publicise their plight and provide information needed to plan the action needed to save them.

Who is this guidance for?

Individuals working in plant conservation who are interested in undertaking a red list conservation assessment of one or more tree species. You do not have to be a specialist, but it is necessary to have relevant knowledge about the tree species in the wild (or ability to obtain this information).

The Global Trees Campaign is a partnership between:

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This brief was produced by Fauna & Flora International (FFI) as a contribution to the Global Trees Campaign

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What are red list assessments?

Red list assessments are used to determine the extinction risk for a particular species. The final assessment allows conservationists to prioritise action for the species in greatest need and also acts as a source of information to support planning of conservation on the ground.

Completing a tree red list conservation assessment involves collecting information on the status of the tree species in the wild. The best available knowledge – gathered from a range of sources, including herbarium specimens, survey reports, satellite imagery etc. - is used to determine geographical distribution (where a species occurs naturally), population (including population size, extent, trends and structure) and threats. Records from the past and present as well as projections into the future can be used. Species are then assigned a conservation category representing extinction risk (see page 7 for information on the different categories) based on this information.

There are different systems available for assessing extinction risk, but the most commonly used and most widely recognised system is the IUCN Red List of Threatened Species (www.iucnredlist.org). The IUCN Red List categories and criteria are intended to be an easily and widely understood system for calculating the risk of extinction for a range of species including plants, animals and fungi. Species assessments on national and regional red lists are also often produced using IUCN Red List categories and criteria.

Did you know?

There are about 60,000 tree species globally, but the majority of species have not had their conservation status assessed.

A new initiative, the **Global Tree Assessment**, aims to provide conservation assessments of the world's tree species by 2020.

Despite the importance of trees, many are threatened by over-exploitation and habitat destruction, as well as by pests, diseases, drought and their interaction with global climate change. In order to estimate the impact of such threats to trees there is an urgent need to conduct a complete assessment of the conservation status of the world's tree species – the Global Tree Assessment.

The Global Tree Assessment, led by BGCI and the IUCN SSC Global Tree Specialist Group, will identify those tree species that are at greatest risk of extinction. The goal of the Global Tree Assessment is to provide prioritised information to ensure that conservation efforts are directed at the right species so that no tree species becomes extinct.

Your help would be most valuable. We welcome all tree Red List assessments or information that can contribute to an assessment and we will give full acknowledgment. We aim to raise the profile of threatened trees using the best information available. **Contact us on redlist@bgci.org.**

How can this brief help you?

In this brief we will describe the major steps required to complete a red list assessment. We hope that it will help you to better plan red list assessments; including what kind of information you'll need to source, who you might need to contact or involve and when and in what order you should carry out each step.

Although we describe the general approach, we don't provide a detailed account of red listing methodology. This brief should be viewed as an introduction to red listing and we recommend that you download more detailed guidance that is listed in the references provided on Page 12.

Need an example of what a tree red list looks like?

If it's still not entirely clear what a red list assessment is – or what they look when they are finished – then we recommend browsing various assessment on www.iucnredlist.org

You can also download some of our red list publications from the Global Trees Campaign website: http://globaltrees.org/resources/resource-type/red-list/

These publications include multiple assessments for trees belonging to different taxonomic groups and for trees distributed in various regions.

Before you start

Before you start to carry out your own assessment(s), we recommend following a series of logical steps to ensure you are as prepared as possible:

STEP 1: Define the scope of your red listing project

Are you planning to red list a single species, or several species, or a whole genus? It is also important to define the geographical scale of your assessment. Are you assessing the conservation status on a global scale (across the full range of the species) or on a national scale?

The number of assessments will affect the time required and the overall cost of your project. If you've never done an assessment before, it may be wise to first attempt to assess one or a small number of species to help you judge the time and resources required for larger projects in the future.

STEP 2: Select taxonomically sound species

Once you have a list of target species, the very next thing to do is to check that they are all taxonomically sound (i.e. they are accepted as distinct species according to an up to date and reliable taxonomy). This is essential as there is "nothing more frustrating than doing a full red list assessment and later realising it's a synonym" S.Bachman 2016

To check the taxonomy, search for your species in a plant taxonomy database such as The Plant List (www.theplantlist.org), IPNI (www.ipni.org) or Tropicos (www.tropicos.org). If a species is newly described, they may not yet be included on these databases. If that is the case then it is good practice, upon submitting the final assessment, to attach the description of the species.

STEP 3: Find out if your species has already been red listed

It is vital to first find out whether your target species has already been or is due to be red listed. All of the species that have been globally assessed and accepted by the IUCN Red List can be searched for online (www.iucnredlist.org). Another source of conservation assessments is the National Red List (www.nationalredlist.org), which has a database of regional and national red list assessments.

A new database, ThreatSearch (available on the Botanic Gardens Conservation International website (www.bgci.org) from January 2017), provides information on all global, regional or national plant conservation assessments.

There are also several specialist groups and red list authorities that work on plant red list assessments with different taxonomic or regional focus. We recommend that you contact any relevant group(s), in order to avoid duplication of effort (see links at the end).

TOP TIP

Even if your target tree species have been red listed already, check the assessments to ensure that they are up to date. If you have additional or updated information, or if the latest assessments were carried out more than five years ago, it is good practice to reassess the species and submit an updated red list assessment

STEP 4: Red list training

Completing red list assessments to the standards required relies on prior knowledge and understanding of how to correctly assign the different IUCN Red List categories and criteria (summarised in STEP 7). The best way to familiarise yourself with these is to complete red list training; either online or by attending or organising a Red List Assessor Training Workshop.

The full online course is comprehensive and free, consists of seven modules (some optional) and is estimated to take about 10 hours in total.

Red List Assessor Training Workshops may be more appropriate if you have many interested participants and/or you are looking to develop red listing capacity on a larger-scale. This typically takes place over 3-5 days and consists of both presentations and practical sessions. Costs for running a training workshop depend on the number of people to be trained, the location of the training and how long the workshop is.

For more information on training materials and how to organise a workshop, and for access to the online courses, please refer to the IUCN Red List website (http://www.iucnredlist.org/technical-documents/red-list-training).

Carrying out assessments

You should now have:

- ✓ Defined the scope of your project
- ✓ Verified the taxonomy of your chosen species
- ✓ Checked whether your chosen species have already been assessed and whether the latest assessments are up-to-date
- ✓ Carried out red list training online or in a workshop

Armed with this knowledge you should be well positioned to collect the required information for the assessments. We recommend following these logical steps:

STEP 5: Assemble information for red list assessment

Information on your target species can be obtained in many different ways: through published literature, floras, unpublished reports (such as survey reports and inventories), botanic garden or herbarium collections and consultation with specialists or people familiar with the areas where the species occurs. Writing one or two paragraphs under each section is a good start. The information can be assembled straight into a red list word document or database (see page 10). Information is needed in five main areas:

Distribution

Record where your target species is found (e.g. in which countries and in which localities). Try to be as specific as possible. The information collected can also be used to create a map of distribution (see STEP 6). Distribution information may be found in floras, survey reports and other species descriptions. Distribution data can also be obtained from herbarium specimens which can be found in online herbaria (Reflora virtual herbarium is a great example for plants in Brazil) and other databases of biological collections (e.g. Global Biodiversity Information Facility, GBIF).

Population size and trends

Record any information on the population size of the species, its subpopulation structure and population trends. Where population counts are available – possibly sourced from survey reports or inventory data – this information should be recorded. If no count is available, then any reference to its size such as abundant, rare, scattered, widespread is valuable to record. In addition, any population trends should also be included. Is the species stable, increasing or decreasing in size? If there has been a decrease in population size, then it is important to record how large (in percentage) the decline is and over what time period did it occur. Predictions about population size into the future can also be modelled, again as a percentage and with the associated time period.

Habitat & ecology

Record brief general information on plant habit (i.e. large tree, small tree, shrub etc.), habitats in which species are found and any information on dependent species (pollinators, dispersal agents, etc.).

Threats

Gather information on the threats that are/have/will impact the species, and also threats to the habitat in which the species is found. Try and be as specific as possible, i.e. instead of "deforestation" state what is the cause of forest loss (e.g. as a result of mining, subsistence agriculture, commercial plantations etc.).

Conservation action

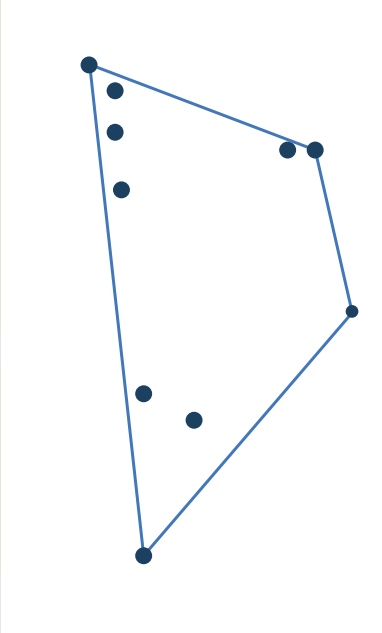
Gather information on existing conservation action as well as proposals for future conservation action. For example, is the species found in one or more protected areas; are local conservation groups working to address threats to the species and is it protected by national or international law (e.g. CITES)? Also, it is important to note if the species is conserved *ex situ* in seed banks and/or botanic gardens. This can be easily checked in BGCI's PlantSearch database (http://bit.ly/gtc_ref_10f), which holds information on which species are held in seed banks or as living plants in botanic gardens.

STEP 6: Create a map of the species

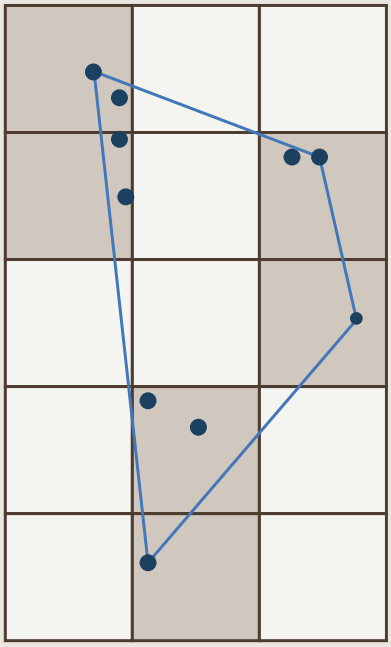
Data assembled on your target species (see STEP 5) must be accompanied by a map of the species distribution. It should represent the current known distribution of the species within its native range. The map can be created using point data or can be depicted as a polygon (see examples below). One way to produce a species map is to plot known occurrences, such as specimen or observation data, in a GIS programme (i.e. geocat.kew.org). Distribution information can also be found in floras and other taxonomic literature that can be plotted on a map.

Producing a map allows you to measure two different estimates of range needed for a red list assessment: extent of occurrence (EOO) and area of occupancy (AOO).

Extent of occurrence (EOO) is the area contained within the shortest continuous imaginary boundary which can be drawn to encompass all the occurrence of a species. It is measured by a minimum convex polygon (the smallest polygon in which no internal angle exceeds 180 degrees and which contains all the sites of occurrence). Dots represent known occurrences.

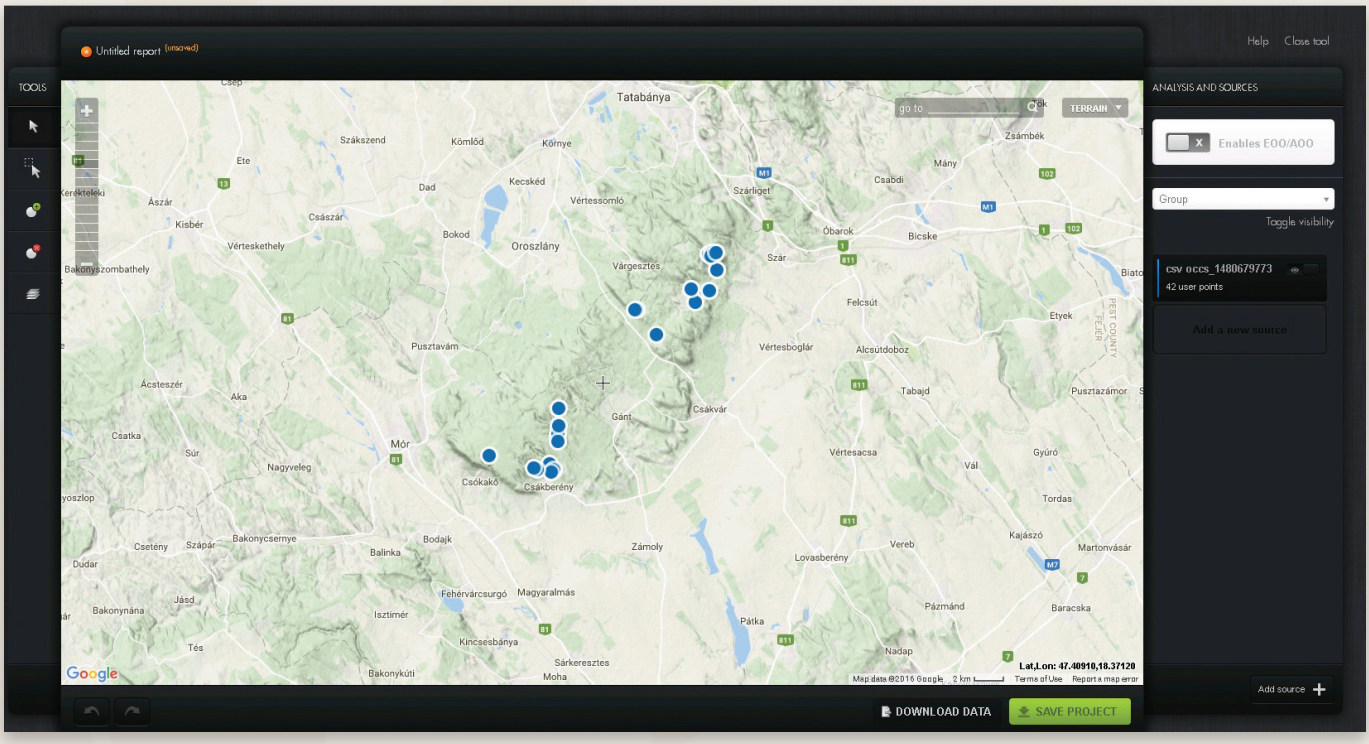


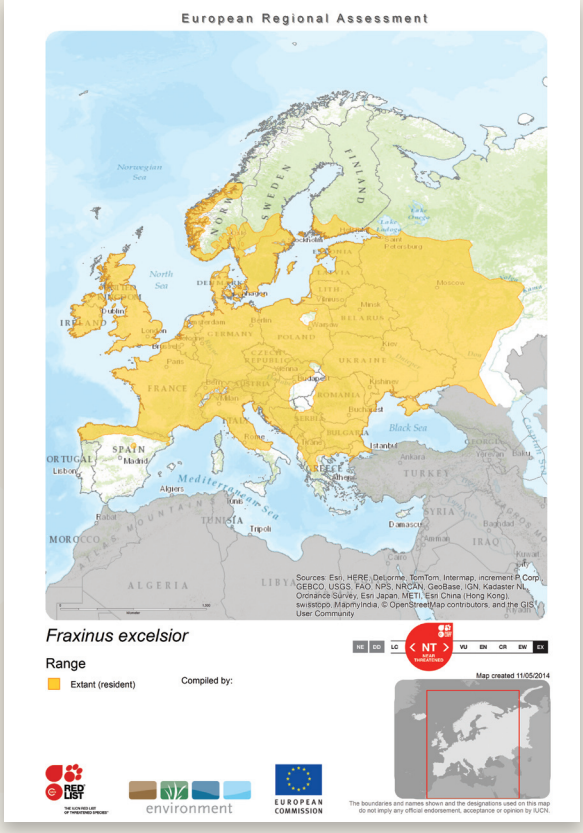
Area of occupancy (AOO) is calculated by overlaying a grid on top of the known occurrences, and measuring the area of the occupied grid cells. This measurement therefore excludes unoccupied areas (e.g. unsuitable habitat) and cases of vagrancy (e.g. areas occupied by a species outside of its natural range). It is recommended to calculate AOO using a 2x2 km grid (cell area 4 km^2).

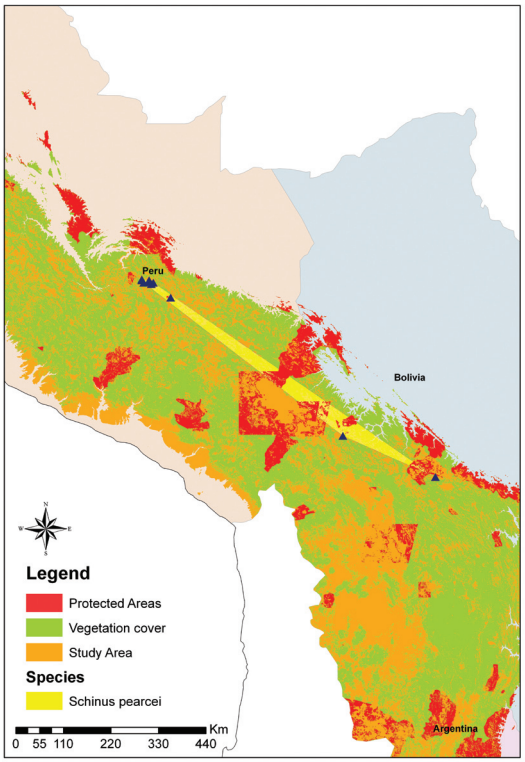


TOP TIP

Distribution maps from point data as well as estimates for EOO and AOO can be calculated using Geocat, free online software available at geocat.kew.org







Final maps produced for a red list assessment can also be overlayed with other useful information, including vegetation cover or the location of protected areas.

This will help to support conservation planning once the assessment is published.

STEP 7: Assign a red list category

Using the information collated under STEP 5 and STEP 6, your next step is to follow the IUCN **criteria** to assign a conservation **category** for your target species.

The IUCN Red List consists of nine different categories:

CR, EN and VU are the three threatened categories. Species that do not qualify for a threatened category, but are close to or likely to qualify for a threatened category in the near future, can be assigned to the category NT. LC is used for species that are assessed but are not considered threatened, including widespread species and rare but stable species. It is important to record and submit assessments for LC tree species so that we get an overall picture of the status of trees in the world. The use of the category DD may be assigned to poorly known taxa. Species not yet evaluated are classified as NE.

TOP TIP

Although some tree species are well-known with a lot of information available, finding relevant information for many others will be very difficult. It may be tempting to assign all of these poorly known species to the Data Deficient category.

However, the use of the Data Deficient category is discouraged. Instead, assessments can often be completed on best available knowledge. Make sure both published and unpublished reference material is consulted, contact relevant experts and try to find information relevant to the habitat (e.g. landcover changes) in addition to specific threats to the species. Based on the available knowledge, a category can often be assigned. Try and assign "Data Deficient" only where the data are so uncertain that both a threatened and not threatened category may be plausible.

In order to assess whether a species belongs to a threatened category (CR, EN, VU), available information (collected under STEPS 5 and 6) should be evaluated against five criteria: A) Population reduction; B) Geographic range; C) Small population size and decline; D) Very small or restricted population; and E) Quantitative analysis. Each criterion includes several sub-criteria and contains quantitative thresholds used to define whether a species is CR, EN or VU. A summary sheet on the IUCN categories and criteria is provided on Page 8. Note it is essential to refer to the full guidance when assigning final red list categories (see http://bit.ly/gtc_ref_10a).

TOP TIP

Species can be assessed to a red list category based on any one of the five available criteria (they don't have to meet all five criteria). If, however, the species qualifies for a threatened category by meeting more than one criterion (e.g. a reduction of populations size (criterion A) as well as small and fragmented geographic range (criterion B) then all criteria should be included and referenced to in the final assessment.

Summary of IUCN Categories and Criteria, reproduced with permission from **www.iucnredlist.org**

A. Population size reduction. Population reduction (measured over the longer of 10 years or 3 generations) based on any of A1 to A4

	Critically Endangered	Endangered	Vulnerable
A1	≥ 90%	≥ 70%	≥ 50%
A2, A3 & A4	≥ 80%	≥ 50%	≥ 30%

A1 Population reduction observed, estimated, inferred, or suspected in the past where the causes of the reduction are clearly reversible AND understood AND have ceased.

A2 Population reduction observed, estimated, inferred, or suspected in the past where the causes of reduction may not have ceased OR may not be understood OR may not be reversible.

A3 Population reduction projected, inferred or suspected to be met in the future (up to a maximum of 100 years) *[(a) cannot be used for A3]*.

A4 An observed, estimated, inferred, projected or suspected population reduction where the time period must include both the past and the future (up to a max. of 100 years in future), and where the causes of reduction may not have ceased OR may not be understood OR may not be reversible.

based on any of the following:

(a) direct observation *[except A3]*

(b) an index of abundance appropriate to the taxon

(c) a decline in area of occupancy (AOO), extent of occurrence (EOO) and/or habitat quality

(d) actual or potential levels of exploitation

(e) effects of introduced taxa, hybridization, pathogens, pollutants, competitors or parasites.

B. Geographic range in the form of either B1 (extent of occurrence) AND/OR B2 (area of occupancy)

	Critically Endangered	Endangered	Vulnerable
B1. Extent of occurrence (EOO)	< 100 km²	< 5,000 km²	< 20,000 km²
B2. Area of occupancy (AOO)	< 10 km²	< 500 km²	< 2,000 km²
AND at least 2 of the following 3 conditions:			
(a) Severely fragmented **OR** Number of locations	= 1	≤ 5	≤ 10
(b) Continuing decline observed, estimated, inferred or projected in any of: **(i)** extent of occurrence; **(ii)** area of occupancy; **(iii)** area, extent and/or quality of habitat; **(iv)** number of locations or subpopulations; **(v)** number of mature individuals			
(c) Extreme fluctuations in any of: **(i)** extent of occurrence; **(ii)** area of occupancy; **(iii)** number of locations or subpopulations; **(iv)** number of mature individuals			

C. Small population size and decline

	Critically Endangered	Endangered	Vulnerable
Number of mature individuals	< 250	< 2,500	< 10,000
AND at least one of C1 or C2			
C1. An observed, estimated or projected continuing decline of at least (up to a max. of 100 years in future):	25% in 3 years or 1 generation (whichever is longer)	20% in 5 years or 2 generations (whichever is longer)	10% in 10 years or 3 generations (whichever is longer)
C2. An observed, estimated, projected or inferred continuing decline AND at least 1 of the following 3 conditions:			
(a) **(i)** Number of mature individuals in each subpopulation	≤ 50	≤ 250	≤ 1,000
(a) **(ii)** % of mature individuals in one subpopulation =	90–100%	95–100%	100%
(b) Extreme fluctuations in the number of mature individuals			

D. Very small or restricted population

	Critically Endangered	Endangered	Vulnerable
D. Number of mature individuals	< 50	< 250	**D1.** < 1,000
D2. *Only applies to the VU category* Restricted area of occupancy or number of locations with a plausible future threat that could drive the taxon to CR or EX in a very short time.	-	-	**D2.** typically: AOO < 20 km² or number of locations ≤ 5

E. Quantitative Analysis

	Critically Endangered	Endangered	Vulnerable
Indicating the probability of extinction in the wild to be:	≥ 50% in 10 years or 3 generations, whichever is longer (100 years max.)	≥ 20% in 20 years or 5 generations, whichever is longer (100 years max.)	≥ 10% in 100 years

Who assigns the conservation category?

Assigning a conservation category can be carried out by the same person that assembled the information in STEP 5 and/or made the map in STEP 6.

However, sometimes the assignment of a red list category is carried out in a workshop setting (after the supporting information has been prepared). This allows for multiple experts (e.g. taxonomists and ecologists) to comment on each assessment in turn and ensure that the information is as accurate as possible. This is often the case when key information is assembled and a preliminary map is made by volunteers or by people not directly familiar with the species.

However, workshops are expensive, and more often this consultation stage is done online, via email, skype, or various online portals. Online consultation can greatly reduce costs. Taxa assessed using workshops can cost up to US$440 (possibly more), whereas desk-based assessments can be done for much less.

Red listing workshop in Fiji. Credit: Malin Rivers/BGCI

Submitting and publishing assessments

Once you have assembled data, created a map and assigned a red list category to your target species, your next step will be to follow procedures for submitting your assessment to the relevant authority. This will be the IUCN Red List Unit (redlist@iucn.org) for global assessments or appropriate national or regional organizations for regional or national assessments.

Before red list assessments are sent to IUCN they need to be uploaded to the IUCN Species Information Service (SIS) (a central database storing all assessments). If you want access to this database, then contact the IUCN Red List Unit who will grant access to people doing global red list assessments. To help you prepare assessments in the right format, a word document (http://bit.ly/gtc_ref_10c) is also available to show the information required for entry to the SIS database (https://sis.iucnsis.org/).

All assessments need to record the "Assessor(s)" (the person(s) who assessed the species). Finally, remember that all assessments also need to include a map of the species distribution (STEP 6).

Once an assessment is complete in SIS, the IUCN Red List Unit should be notified that you are ready to submit your assessment. They will then make sure it is reviewed independently, often by the IUCN/SSC Global Tree Specialist Group or other relevant specialist groups, and once approved the assessment is published on the IUCN Red List, in the next update.

For non-global assessments, it is important to work with appropriate national or regional organisations and follow their procedures. In this way your information can support national or regional initiative. Once a national red list is published, it can be sent to the National Red List (www.nationalredlist.org).

What Next?

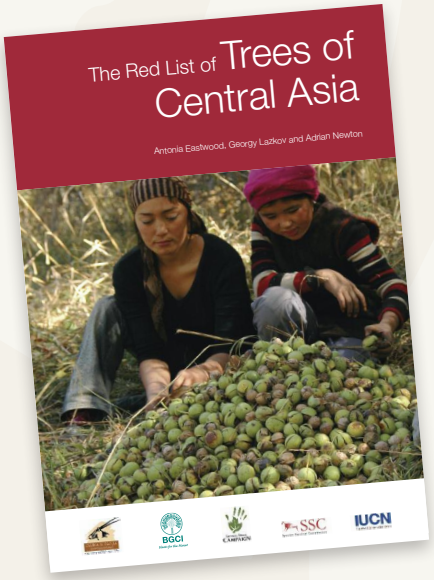
Completing and publishing your red list assessment is a major achievement; however, a threatened red list category does not automatically mean a species will be conserved.

It is of high importance to proactively use the results from red lists to effectively guide, plan for and raise awareness of the need for conservation action on the ground. Potential uses for red list assessments include:

- **Helping to identify and prioritise the trees species in greatest need of conservation action in a particular region, country or landscape.**
- **Providing a basis for monitoring the status of trees in the wild (e.g. carrying out repeat surveys to see how population size, AOO, EOO etc. change over time in response to conservation action). For guidance on monitoring see GTC Brief 3.**
- **Identifying gaps in protected area networks (e.g. finding our which highly threatened species are not located within protected areas and therefore could be subject to even higher risk).**
- **Identifying knowledge gaps – which species are poorly known (e.g. Data Deficient species) and from which regions? For poorly known species, you may want to consider carrying out targeted field surveys (for guidance on how to do this, see GTC Brief 1).**
- **Facilitating education and public awareness of species conservation issues to a wide range of audiences (e.g. students, government, and businesses).**
- **Supporting and providing information for international conservation policy.**
- **Influencing funding allocations.**

Examples of how red lists can be used

A Red list of the Trees of Central Asia, published in 2009 and translated into Russian, has been used to guide local conservation efforts. The Global Trees Campaign is supporting conservation action is several nature reserves with important populations of highly threatened tree species (identified as a high priority by the Red List). Rangers are being trained to monitor, protect and reinforce the remaining populations.



The Red List of Magnoliaceae has led to important conservation work of many of the threatened magnolias in Colombia, Cuba, China and Vietnam.

Conservation efforts have been focussed on the most threatened species. Outcomes include enhanced knowledge and technical capacity of botanic garden and nature reserve staff to develop conservation measures for threatened magnolias; increased presence of target species in *ex situ* conservation collections; population reinforcement of target species *in situ* and greater involvement of local farmers in conservation activities.

Selected references and further guidance

Guidance on global red listing

IUCN (2001). IUCN Red List Categories and Criteria: Version 3.1. Prepared by the IUCN Species Survival Commission. Available at: **http://bit.ly/gtc_ref_10**

IUCN Standards and Petitions Subcommittee (2016). Guidelines for Using the IUCN Red List Categories and Criteria. Version 12. Prepared by the Standards and Petitions Subcommittee. Available at: **http://bit.ly/gtc_ref_10a**

SSC Specialist Groups and Red List Authorities Directory. Available at: **http://bit.ly/gtc_ref_10b**

Word document form for red listing. Available at: **http://bit.ly/gtc_ref_10c**

Guidance on national/regional red listing

National Red List (2016). National Red List. Available at: **http://bit.ly/gtc_ref_10d**

IUCN (2012). Guidelines for Application of IUCN Red List Criteria at Regional and National Levels: Version 4.0. Gland, Switzerland and Cambridge, UK: IUCN. iii + 41pp. Available at: **http://bit.ly/gtc_ref_10di**

Guidance on species information

Global Biodiversity Information Facility (GBIF). Available at: **http://bit.ly/gtc_ref_10e**

BGCI's PlantSearch database. Available at: **http://bit.ly/gtc_ref_10f**

BGCI's ThreatSearch database. Available at: **http://bit.ly/gtc_ref_10g**

Guidance on drawing maps and calculating range

Bachman S, Moat J, Hill AW, de la Torre J, Scott B 2011. Supporting Red List threat assessments with GeoCAT: geospatial conservation assessment tool. ZooKeys 150: 117-126. Tool available at: **http://bit.ly/gtc_ref_10h**

For more information, or to download the other briefs in this series, visit **www.globaltrees.org/practical-guidance**

Acknowledgements

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