Mongolian Journal of Biological Sciences 2005 Vol. 5(2): 43-48

Comments on the Red Data Book of endangered plant species of Mongolia

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Abstract

A more detailed categorization is proposed for the future Red Data Book of endangered plant species of Mongolia. While the most recent Red Data Book for Mongolia has its own scale, a future edition should adopt the international categorisation of the International Union for the Conservation of Nature (IUCN). As a basis for a more detailed assessment of the degree to which plants are endangered, research on the flora of Mongolia should be intensified by elaborating monographs of all 16 phyto-geographical regions. So far, such monographs have been published for four phyto-geographical regions: Khovsgol, Khentii, Khangai, and Eastern Mongolia. The responsibility of Mongolia for the global conservation of a given species should be assessed. Mongolia is responsible for those species which have their main distribution in Mongolia or for which Mongolia is part of the range center.

Key words: conservation, endangered plant species, Mongolia, Red Data Book,

Introduction

The Red Data Book is an important instrument for the protection of species and their habitats (Collar, 1996). To obtain a Red Data Book that is comparable with those of other countries it is essential to use well-defined criteria for the inclusion of species. Compiling a Red Data Book of endangered plant species is particularly difficult for Mongolia because the country has a huge geographical diversity. Furthermore, the large area of Mongolia makes it difficult to get a complete picture of threats to the native flora and their distribution and frequency (Gubanov, 1996; Grubov, 2001). Despite these difficulties, Red Data Books of endangered species of Mongolia have been produced (Mongolian Red Data Book, 1987; Shiirevdamba *et al.*, 1997). Though the second edition has been considerably improved in comparison with the first one, further improvements are necessary to meet the standard of countries with a more extensive knowledge of their flora and a longer tradition of compiling Red Data Books.

More densely populated countries, such as Germany, started compiling Red Data Books of endangered species earlier than Mongolia because the higher human population and earlier industrialization resulted in more drastic environmental changes, compared to sparsely populated countries such as Mongolia (Rauschert *et al*., 1978; Korneck & Sukopp, 1988). While the first German Red Data Book included well-known groups of organisms, such as vascular plants, birds or mammals, nowadays such lists are available for numerous groups including fungi, lichens and bryophytes, as well as selected groups of algae or invertebrates (BfN, 1996, 1998). Furthermore, Red Data Books of habitat types and plant associations have been published (Preising, 1990−2003; Von Drachenfels, 1996).

Though the German Red Data Books contain much more detailed information than the Mongolian Red Data Book, it is questionable whether the German system for compiling these books should be applied to Mongolia. This is because categories used in these Red Data Books are unique to Germany and are different from those used in most other countries. A unique system of estimating the degree of threat may be justified in a country with a long-lasting tradition in nature conservation, such as Germany. However, in Shiirevdamba *et al.*'s (1997) Mongolian Red Data Book categories used differed from the international system employed by most other countries of the world (IUCN, 2001). It is doubtful whether this is advantageous. Therefore, we compare the categories presently used in Mongolia with the international system proposed by the International Union for the Conservation of Nature (IUCN) and offer suggestions how a future Red List of Mongolia's endangered plant species could be improved.

International Red List categories as proposed by the IUCN

Fifteen years ago the IUCN started to develop categories to evaluate the degree to which a species is endangered (Mace & Lande, 1991). The categories of Mace & Lande (1991) have been repeatedly reworked until the most recent version in 2001. According to the IUCN (2001) species should be grouped in to one of the following nine categories:

- extinct
- extinct in the wild
- critically endangered
- endangered
- vulnerable
- near threatened
- least concern
- data deficient
- not evaluated

The last four categories are used to supply additional information on non-threatened species. The category "extinct in the wild" is generally more useful in the classification of animals than of plants, since cases of extinct plant species that survive in culture are much more rare than of extinct animal species that survive in zoological gardens. The categories "critically endangered", "endangered" and "vulnerable" represent graduations of extinction risk.

Red List categories presently used in Mongolia

Shiirevdamba *et al.* (1997) distinguish two categories, *viz*. "very rare" and "rare". These categories are adopted from the nomenclature of the Mongolian Law on Natural Plants and the Law on Hunting. "Very rare" species in the sense of these laws may only be used for research, whereas "rare" species can be utilized for subsistence purposes. Moreover, permits may be issued for the commercial use of "rare" species.

Even though the use of the terms "very rare" and "rare" by Shiirevdamba *et al.* (1997) is understandable to refer to the terminology of the cited laws, it is misleading in the context of the definitions used for the Red List categories by IUCN (2001). This is because Red Lists in the sense of IUCN (2001) aim at assessing the degree to which species are endangered rather than rarity. Shiirevdamba *et al.* (1997) related their categories "very rare" and "rare" to the IUCN categories, which were valid at that time (IUCN, 1994). The authors stated that their category "very rare" would correspond with both "extinct" and "endangered" of IUCN (1994), while "rare" was defined as a joint category for "vulnerable" and "rare". Merging of the latter two categories is questionable, as "vulnerable" assesses the degree to which species are endangered, whereas "rare" is a measure of rarity. However, rarity does not necessarily mean that a species is declining or that a decline is to be expected in the immediate future.

Suggestions for a new Red Data Book of endangered plant species of Mongolia

To be in accordance with the overwhelming majority of national Red Data Books, a future edition of the Mongolian Red Data Book should adopt the categories of the IUCN (2001). Regional modifications of these categories, which are necessary in small countries in order to avoid an unreasonably high number of endangered species (Gärdenfors *et al.*, 2001; IUCN, 2003) are probably not needed for Mongolia. The use of only two categories made sense for the first assessment of Mongolia's endangered plant and animal species, but is too rough for a satisfactory evaluation in the long run. Including all threatened species in only two different categories inevitably leads to loss of precision, as species with different risks of extinction have to be placed in one category. In doing so, the informative value of the highest category is lessened and the urgent need for conservation of species with extremely high risk of extinction can be overlooked.

Responsibility as a criterion for the Red Data Book

So far, the Mongolian Red Data Book only supplies information about vulnerability or rarity of plant species within Mongolia. However, for nature conservation purposes it is also important to know whether the country has a special responsibility for a given species on a global scale, because a species distribution is primarily within Mongolia. Nature conservation in Mongolia should give priority to such species (Jäger & Hoffmann, 1997). In the recent Red Data Book of German plant species, responsibility was included as a separate criterion (BfN, 1996). While in BfN (1996) only a rough assessment of responsibility could be made, Welk (2002) provided a thorough evaluation of the world distribution of 99 % of the vascular plant species included in the German Red Data Book.

To improve the Mongolian Red Data Book, world distribution of Mongolian plant species should be

considered in a similar way. In many cases, this can be done by evaluating existing distribution maps (Meusel *et al.,* 1965, 1978, Hultén & Fries, 1986; Meusel & Jäger, 1992; Dulamsuren, 2004; Dulamsuren *et al.,* 2005). In other cases, the distribution still has to be studied. The following examples are given to stress that knowing the world distribution is essential for estimating how urgently a given species needs to be protected. The examples are from a case study carried out within Khentii phyto-geographical region at Khonin Nuga Research Station, in Selenge aimag. This research station is located at the western border of the Khan-Khentii Strictly Protected Area on the Eroo River, and was set up by the Center of Nature Conservation at the University of Göttingen, Germany, and the National University of Mongolia, in Ulaanbaatar (Mühlenberg *et al.*, 2000; Dulamsuren & Mühlenberg, 2003).

The study area at Khonin Nuga comprises 0.1 % of the total area of Mongolia (150 km²). Sixteen out of the 553 vascular plant species found at Khonin Nuga (Dulamsuren, 2004) are listed in the latest Red Data Book of Mongolia (Shiirevdamba *et al.,* 1997). Of the 16 endangered species that have been found at Khonin Nuga, ten species were classified as "very rare" and six as "rare" (Table 1).

Based on the world distribution as given in Table 1, Mongolia has a special responsibility for *Allium altaicum*, *Lilium dauricum*, *Rhododendron dahuricum*, *Rhodiola rosea*, *Sambucus mandschurica*, and *Stellaria dichotoma*, because Mongolia is in the center of the distributional range of these species. However, even in the case of more widely distributed species, a high responsibility for their conservation can be assigned to Mongolia. *Abies sibirica* and *Adonis sibirica* are good examples of this. Based on their Mongolian distribution, *Abies sibirica* is classified as "very rare" and *Adonis sibirica* as "rare" (Shiirevdamba *et al.*, 1997). Within Mongolia, *Abies sibirica* is restricted to Khentii and Khovsgol phyto-geographical regions, while *Adonis sibirica* has a wider distribution with occurrences in Khovsgol, Khentii, Khangai, Khovd, and Middle Khalkha (Gubanov, 1996). However, a comparison of the world distribution of the two species shows that *Abies sibirica* occurs much more frequently within its eastern European-Siberian-north Mongolian range than *Adonis sibirica*. Further examples are *A. altaicum*, and *Lycopodium complanatum*, which are both placed in the "rare" category (Shiirevdamba *et al.,* 1997). In terms of its world distribution, *A. altaicum* mainly occurs in

Table 1. World distribution of the endangered plant species found in Khonin Nuga, in Khentii phyto-geographical region.

Species[a]	**RDB**[b]	**Global distribution**[c]
Abies sibirica	very rare	Eastern Europe-Siberia-northern Mongolia[1]
Adonis sibirica	rare	Eastern Europe-Siberia-northern Mongolia[1]
Allium altaicum	rare	Central Siberia-Dahuria-northern Mongolia-Gobi[3]
Cypripedium calceolus	very rare	Circumpolar[1]
Cypripedium macranthon	very rare	Eastern Europe-Siberia-northern Mongolia-eastern Asia[1]
Lilium dauricum	very rare	North Mongolia-Eastern Asia[3]
Lycopodium clavatum	very rare	Circumpolar[1]
Lycopodium complanatum	rare	Circumpolar[1]
Mitella nuda	very rare	Siberia-northern Mongolia-eastern Asia-North America[3]
Neottianthe cucullata	very rare	Eastern Europe-Siberia-northern Mongolia[1]
Paeonia anomala	rare	Eastern Europe-Siberia-northern Mongolia[1]
Rhodiola rosea	very rare	Altai-Saikhan-northern Mongolia[2]
Rhododendron dauricum	very rare	Northern Mongolia-Eastern Asia[3]
Sambucus manshurica	very rare	Central Siberia-Dahuria-northern Mongolia-Manshuria[2]
Stellaria dichotoma	rare	Altai-central Siberia-Dahuria-northern Mongolia-Gobi-NE China[3]
Valeriana officinalis	rare	Eurasia-eastern North America[2]

[a] Nomenclature according to Gubanov (1996).

[b] Category in Mongolian Red Data Book (RDB) (Shiirevdamba *et al.* 1997).

[c] References: [1] Hultén & Fries, 1986; [2] Meusel *et al*., 1965; Meusel *et al*., 1978; Meusel & Jaeger, 1992; [3] Dulamsuren (unpubl. data).

Mongolia. In comparison, *L. complanatum*, has a very limited distribution within Mongolia (western Khentii), but occurs as a circumpolar species in the entire northern hemisphere. Therefore, Mongolia's responsibility for the protection of the following species increases in the order *L. complanatum* - *Adonis sibirica – A. altaicum*.

Obtaining a more detailed database

A precondition to using this more detailed scale would be to further improve knowledge of the Mongolian flora. In Germany, grid mapping on a 10 × 10 km scale forms the basis of assessing whether vascular plant species are endangered (Haeupler & Schönfelder, 1988; Benkert, 1996). In general, such grid mapping would also be desirable for Mongolia. However, it is not realistic to conduct such a study in a reasonable time because Mongolia is much bigger than Germany and, moreover, fewer experienced botanists are available to contribute. Planning grid mapping for Mongolia inevitably leads to the dilemma that either an unrealistically high number of grids of a reasonable size would have to be mapped or that one would have to deal with very large grids if the country is divided into a realistic number of them. Thus, the German concept of obtaining data for Red Data Books and nature conservation purposes cannot be a realistic concept for Mongolia.

Conducting the first census of vascular plant species of Mongolia, Grubov (1982) divided the country into 16 phyto-geographical regions based on an earlier classification by Junatov (1950). Grubov's classification was later used by Gubanov (1996) in the most recent checklist of Mongolian plant species. Since these 16 regions are a manageable number of subunits, they could form a good basis for a more detailed exploration of the Mongolian flora. It is safe to assume that producing a monograph of flora in each phyto-geographical region would considerably increase knowledge of Mongolian flora. For four phyto-geographical regions such monographs have already been published; Batraeva *et al.* (1976) and Ivels'kaya *et al.* (1979) compiled a flora of Khovsgol region, Byazrov *et al.* (1989) of Khangai region and Dashnyam (1974) of Eastern Mongolia. More recently, Ganbold (2000) published a flora of three phyto-geographical regions: Khovsgol, Khentii and Khangai. Twelve further monographs are needed to obtain a more complete picture of Mongolia's flora, and with them a better basis for nature conservation, including a more detailed Red Data Book of Mongolia's endangered plant species. Of course, such floras of individual phyto-geographical regions contain less information than compared to the complete grid mapping of vascular plant species. But in contrast to such grid mapping, the twelve lacking floras of phyto-geographical regions could be elaborated within a relatively short period.

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