

Rare and Endangered Species of Plants—The Soviet Side

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The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) brought worldwide attention to the increasing number of rare plant species that were rapidly diminishing in number and might become extinct (1). Invitations to attend this convention were sent to all countries in mid-1972. Later, a multinational plenipotentiary conference was held at the U.S. State Department from 12 February to 2 March 1973. As a result of this conference a treaty was prepared. It became a binding legal document for those countries signing it on 1 July 1975, 90 days after the tenth country ratified the convention. Even before it came into force, this document served as a stimulus for many countries to move ahead with pending legislation (2). The United States became a signatory to CITES in 1973, and the Soviet Union signed in 1974. From mid-1972 through 1973, the amount of attention devoted to rare and endangered plant species in the Soviet Union was greatly increased, particularly at the Ministry of Agriculture, the Komarov Botanical Institute in Leningrad, and the major botanical gardens, such as the Main Botanic Garden in Moscow.

The concept and practice of nature protection in the Soviet Union can be traced back to Peter the Great, whose interest was in preserving the forest resources that were being depleted during his lifetime (1672 to 1725) (3). Despite his influence on the Russian people, only six preserves (*zapovedniki*) were established in prerevolutionary times. Most preserves and all of the newly formed national parks have been established since the Revolution (4). Private land ownership was abolished in 1917 by Lenin's first decree on land. Two years later, further decrees established the Penzensk

preserve containing steppe vegetation and the Astrakhan preserve in the lower Volga River Basin. The formation of new preserves has resulted in 128 *zapovedniki*, ranging in size from a few hectares protecting relic populations of *Pinus pitysusa* to several of more than 250,000 hectares (the Wrangel Island preserve measures 795,600 hectares). Seven national parks have been established recently as part of a plan to develop 15 national parks, one in each of the republics.

Summary. In late 1972, the Soviet Union embarked on a program to identify and document plant species that are threatened with extinction. Perhaps 2000 species in the Soviet Union are in need of monitoring or protective measures, while nearly 200 may be in immediate danger of extinction. Currently, the Soviet Union has an official, national list of endangered species, and each of the 15 republics has prepared a regional list. Once a revised national list is prepared, Soviet scientists hope that the Supreme Soviet will pass a law protecting those species. A corresponding law for endangered animals was passed in 1980.

The legal impetus for conservation and protection of disappearing species is Article 18 of the new Constitution of the Union of Soviet Socialist Republics (5). It reads: "In the interests of the present and future generations, the necessary steps are taken in the U.S.S.R. to protect and make scientific, rational use of the land and its mineral and water resources, and the plant and animal kingdoms, to preserve the purity of air and water, ensure reproduction of natural wealth, and improve the human environment." Further support is found in Article 67 which states that "Citizens of the U.S.S.R. are obliged to protect nature and conserve its riches." This article provides the legal foundation for the activities of officially sanctioned organizations in environmental protection.

Since all land in the Soviet Union belongs to the state, theoretically all of it is protected. It can be argued, with the same rationale, that all of it is also vulnerable to exploitation. Despite the protected status of land, vast areas have been severely altered and natural habi-

tats destroyed. World War II devastated much of European U.S.S.R., but the relatively stable period from 1950 through 1970 allowed the Soviet Union to rebuild and greatly expand its widespread industrial, agricultural, and forestry-related activities. Results of these developments coupled with bureaucratic breakdowns and inefficiencies, are chronicled by Komarov (6) in his book *The Destruction of Nature in the Soviet Union*.

During the last 10 years, however, many positive steps have been taken concerning the protection and rational use of natural resources. The Hydrometeorological Service was given expanded responsibility for monitoring and establishing new standards for controlling or reducing air and water pollution. Likewise, considerable interest in endangered flora has spurred scientific workers to identify and verify those taxa. The Soviet Union and the United States in 1973 were in comparable positions regarding the protection of endangered plants: neither country could list

its own species in need of protection. The September 1972 session of the Supreme Soviet passed a resolution calling attention to the problems regarding nature protection in the U.S.S.R. Three months later, the Central Committee of the Communist Party and the Soviet of Ministries of the U.S.S.R. passed an enactment to strengthen nature protection and to improve the use of natural resources.

Publication of the Red Book

Under the leadership of Academicians E. M. Lavrenko and A. L. Takhtajan, the All-Union Botanical Society of the Academy of Sciences of the U.S.S.R. organized a committee (7) to prepare an account of the endangered plant species that need protection. The first result of this effort was the publication in 1975 of *Red Book—Native Plant Species to be Protected in the U.S.S.R.*, edited by Takhtajan (Fig. 1) (8). Material for this volume came from four primary sources:

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Fig. 1. Three recently published official lists of rare and endangered plant species and one overall treatment on nature protection in three of the European republics. They are, clockwise from upper left: *Red Book—Native Plant Species to be Protected in the U.S.S.R.* (8); *Red Data Book of the U.S.S.R.—Rare and Endangered Species of Animals and Plants* (11); *Rare and Endangered Plants of Siberia* (15); *Protection of the Most Important Botanical Objectives of the Ukraine, Belorussia, Moldavia* (29).

(i) a preliminary list of rare and endangered species prepared by L. S. Belousova and L. V. Denissova; (ii) first-hand knowledge of committee members; (iii) numerous publications; and (iv) about 100 responses from an appeal sent to various botanical institutes and departments of botany.

During the course of this work, the committee was able to determine that some species, including *Tulipa boettgeri*, *Populus cataracti*, and *Scilla scilloides*, were already extinct. They also discovered a lack of detailed information about the status of many rare species, and this made recommendations for protection difficult (8).

To qualify as one of the approximately 600 species included in the *Red Book*, a species had to meet one or more of several criteria. Protecting a species whose populations are threatened within the Soviet Union, regardless of its presence in other countries, was the first of the guidelines. Recognizing that not all rare species are threatened with extinction, the committee gave preference to those in immediate danger. Priority was also given to species of real or potential economic value. Even though they are neither rare nor yet threatened, the economically important *Adonis vernalis*, *Glycyrrhiza glabra*, and *Scorzonera tausaghyz* were singled out for protection because wild populations of these plants are rapidly declining.

Further concern was expressed over

the depletion of bulbs and rhizomes of onions, tulips, lilies, and irises, and it was recommended that these groups should be closely monitored. Grasses, sedges, and rushes were not given high priority because they lack the appeal of more showy species and are not subject to over-collecting.

So that conservation objectives would be distributed uniformly in the various regions of the Soviet Union, the committee strove to include species from all regions. It was recognized, nevertheless, that such areas as the Caucasus and Central Asia have many more endemic species than others. Introduced species and those in cultivation were generally not included, even if they were disappearing, although exceptions were made for some species of wheat, almonds, and pears.

Next, the committee recommended some fundamental measures for the conservation of endangered species. These measures include (i) protecting fully a species when it occurs within the boundaries of a *zapovednik* or *zakaznik* (9); (ii) creating permanent or temporary *zakazniki* for conserving and restoring population sizes; (iii) restricting the collecting of food, medicinal, and raw-material plants, and issuing licenses for their procurement; (iv) prohibiting the private collection and selling of rare wild plants outside the official trade network; (v) organizing qualified botanists to evaluate populations of rare and threatened

plants; (vi) introducing rare plants into cultivation in botanical gardens and eventually reintroducing them into natural habitats. Finally, the committee pointed out that publication of the *Red Book* was only the first step toward a national program for protecting rare and threatened plants.

Principles for Protection in the Soviet Union and United States

Species are proposed for protection in the Soviet Union on the basis of their rarity and level of endangerment. According to these criteria, not only do many species endemic to specific regions (such as the Caucasus, Tien Shan, and the southern part of the Far East) need protection, but so do many species whose primary ranges lie further south, in China, Korea, and Japan. Examples include *Magnolia obovata*, *Quercus dentata*, and *Osmunda regalis*. Although very common in North America and northwestern Europe, the shrub *Myrica gale* is proposed for protection, as is *Platanus orientalis*, a tree of southwestern Asia.

In the United States, in contrast, a species must be endangered throughout its entire range before it can qualify for protection under federal law. For example, many species of flowering plants that are common in the West Indies extend to extreme southern Florida, where they may be rare or their populations endangered. Despite this, they are not eligible for protection under the terms of the U.S. Endangered Species Act of 1973.

The Soviet Union places greater emphasis on bringing endangered plants into cultivation in botanical gardens than does the United States. The prevailing thought in the United States is that most rare species, particularly herbaceous ones, will probably not survive more than a few generations in cultivation; thus greater emphasis is placed on habitat preservation and protection.

Greater attention is given in the Soviet Union than in the United States to plants of real or potential economic importance. The conservation and protection of existing or potential wild genetic stocks of food plants are clearly given priority in plant conservation as seen in Article 6 of the RSFSR (Russian Soviet Federal Socialist Republic) Environmental Law. Until recently, no distinction was made in the United States between endangered economic species and endangered species of no known importance.

The advocates of plant protection in the Soviet Union are progressing more

slowly than their counterparts in the United States, but with greater concern for political and economic considerations. Ultimately, the Soviets may have an outstanding program for protecting vanishing species.

Development of Conservation Measures

Serious administrative problems exist within the Soviet Union concerning the protection of endangered plants. Among the many agencies responsible for the protection of plants are: the Ministry of Agriculture, the State Committee on Forestry, the Ministry of Health, the U.S.S.R. Academy of Sciences, the All-Union Society for the Protection of Nature, and the local soviets or administrative organs. As a result, interagency communication and cooperation is sometimes cumbrously slow or even nonexistent.

In 1974, a special committee of the Botanic Gardens Council of the U.S.S.R., representing the country's then 115 botanical gardens, was formed under the leadership of Academician N. V. Tsitsin, then director of the Main Botanic Garden (10). Large-scale efforts were soon under way to bring many threatened plant species into cultivation for the purposes of conservation and public education.

On 12 March 1974 the All-Union Ministry of Agriculture formed an Institute for Nature Conservation in Moscow and called for the preparation of an official book of rare and threatened animals and plants. This decision was followed on 16 October 1974 by a *prikaz* or decree by the same ministry ordering other relevant ministries and organizations to affirm their expertise, and requesting the appropriate central organs to see that current laws on the preservation of rare and endangered species of plants and animals were properly enforced.

This work was carried out by research workers in the laboratory of L. V. Denisova and L. S. Belousova. Flora and fauna proposed for inclusion were to be divided into two categories: one for taxa threatened with extinction and the second for those considered rare. Direct destruction of habitat was identified as a key factor in species becoming threatened; special preserves and nurseries were proposed as solutions.

Proposals for including plants and animals in the *Red Data Book* could be introduced by members of scientific, governmental, and public organizations or teaching departments, but the special committee of the Ministry of Agriculture made the final decisions. As a result, a



Fig. 2. "Put out the fire!" A metal sign inscribed in Georgian (top) and Russian (bottom) along a trail in the forest on Mount Kochta in the Caucasus Mountains near Bakuriani, Soviet Georgia.



Fig. 3. Five of the more lay-oriented or regional treatments of rare and endangered plants, including two illustrated plant lists and three paperbound volumes about the plants of particular nature reserves. Clockwise from upper left: *Rare Plants of the U.S.S.R.: A Handbook* (27); *They Stand in Need of Conservation—Rare and Endangered Plants of Central Siberia* (20); *Yaltinsky Mountain—Forest State Preserve* (30); *Preserved Plants of the Crimea: A Handbook* (26); *Kara-Dag Preserved: A Photoalbum* (31).



Fig. 4. A poster, measuring 93 by 61 centimeters, sanctioned by the All-Russian Society for Nature Protection in accordance with a joint resolution concerning flora of the Moscow district's forest park belt. It is published in color and gives common names of some endangered plants that grow in Moscow's recreational areas. It reads: "It is forbidden to collect these plants." "Commerce in all species of wild-growing plants is prohibited."

second official list of protected plant species was compiled. Along with a treatment of the proposed endangered animals, this was published in *Red Data Book of U.S.S.R.* in 1978 (Fig. 1) (11). Edited by A. M. Borodin, this large-format volume (with pages measuring 22 by 28 centimeters) was printed in two colors on high-quality paper and was handsomely bound in dark red buckram. The title is embossed in Russian on the front cover and in English on the back cover. The quality of this publication is much higher than that of typical Soviet science volumes, probably because it is the official list representing the entire Soviet Union.

Animals occupy three of the four parts of this work: part 1 includes 62 species and subspecies of animals; part 2 treats 63 species and subspecies of birds; part 3 lists eight amphibians and 21 reptiles; part 4 is devoted to higher plants. This last part lists 444 species in 85 families, each with a drawing, range map, and several paragraphs of text describing the plant and its need for protection. Since the publication of these official red books, communication and collaboration have increased among the people at the various Soviet agencies and institutions working on rare and endangered species. A second edition of Takhtajan's book, incorporating observations and information supplied by specialists, was published in 1981 (12). The first edition had generated much discussion within the Soviet Union and served as a basis for scientists to confirm or deny the validity of the rarity of the species proposed for protection. The second edition will serve as a valuable data base for a revision of

the official *Red Data Book of the U.S.S.R.* which is expected to be published in 1984 or 1985.

The development of conservation measures in the United States has been comparable. The Smithsonian Institution prepared the first list of plants threatened with extinction under the Endangered Species Act of 1973. A revised edition was published in 1978. Despite the large number of species proposed for protection, however, very few have threaded the maze of bureaucratic requisites to qualify for inclusion.

The continental United States is usually estimated to contain 20,000 species of higher plants, with as many as 1200 species considered threatened (13). There are an estimated 21,000 species of higher plants in the Soviet Union (14). According to Gogina, about 2000 species are in need of constant monitoring or protective measures, while perhaps 200 species are in immediate danger of extinction. The higher estimate of plant taxa in the Soviet Union is due not to a more diverse flora, but to the narrower concepts for species definition that prevail. Subspecies and varieties recognized in China, Japan, and North America are frequently elevated to species level in the Soviet Union.

Administratively, the Soviet Union is divided into 15 Union Republics, some of which contain Autonomous Socialist Republics. All 15 republics have published lists of threatened and endangered plant species, and six republics (Moldavia, the Ukraine, Latvia, Lithuania, Kazakhstan, and Estonia) have official state *Red Data* books. The Russian Federated Republic, which extends from eastern

Europe across Siberia to the Far East, has been logically subdivided according to major floristic regions. *Rare and Endangered Plants of Siberia* was published in 1980 (15), while a comparable volume for the Soviet Far East was published in 1981 (16). Ultimately, all the republics will have state *Red Data* books in addition to the official national volume generated by the Ministry of Agriculture. The smaller Autonomous Socialist Republics also have the authority to publish their own official *Red Data* books. So far, only the North Ossetian and Daghestan Autonomous Socialist Republics have done so (16). By contrast, fewer than half of the 50 states in the United States have official lists of protected plant species.

The 121 botanical gardens in the Soviet Union are united through an All-Union Council of Botanic Gardens. Dr. Peter Lapin, vice director of the Main Botanic Garden and Corresponding Member of the Academy of Sciences, is the present head of this council. The Main Botanic Garden in Moscow is the principal botanical garden of the Soviet Union. There are 11 regional botanical gardens for the 15 republics, each coordinating several, usually smaller, gardens. For example, the principal botanical garden of Soviet Georgia and Armenia is located in Tbilisi while smaller gardens are present in Batumi, Sukhumi Ereuan, and Baku.

Each of the 11 regional botanical gardens has assumed responsibility for the study and cultivation, when feasible, of the rare and threatened species within its republic. Often one or more scientific workers are assigned to this task in each garden (17). I have seen a surprising number of rare species being successfully cultivated in Soviet botanical gardens during my five trips to the U.S.S.R. Recently, staff of the Main Botanic Garden in Moscow have coordinated a nationwide effort to determine and list the rare and threatened plant species in cultivation in botanical gardens. This work has been completed and its publication is due sometime in 1982 or 1983. Numerous journal articles and small books have also been published on endangered species. These sometimes focus on specific plant groups such as rhododendrons (18), on geographical regions (19-23), or may be of general interest (24).

Educating the Public

An impressive public education program regarding rare and endangered species has been instituted at several levels in the Soviet Union. Most of the pre-

serves and the national parks display illustrated signs or billboards pointing out the need for conservation (Fig. 2). These signs often present the more attractive or showy threatened species of that particular area. Preserves in popular tourist areas, such as the Caucasus and the Crimea, typically have more signs and may offer pamphlets elaborating species in need of protection.

Steps are being taken to incorporate more environmental topics, including the protection of rare and endangered species, into secondary school and university curricula. The first all-union higher and secondary education conference on the environment was held in 1979. Among the recommendations were the addition of special courses and the integration of pertinent topics into existing courses throughout the academic program. Students involved in officially sanctioned environmental groups within universities have on occasion patrolled city parks and highways for violators of local conservation laws.

The Society for the Protection of Nature, along with hunting and fishing organizations, also functions in the protection of the environment. These legally authorized societies have carefully defined jurisdiction to police and patrol their specific areas of interest. Society members are trained as a secondary environmental force (*druzina*) and are empowered to arrest anyone in seeming violation of the law.

In a further attempt to reach lay audiences, scientists have produced inexpensive, nontechnical books (Fig. 3). Examples include *Protect Green Wonders* (25), a small 77-page booklet costing 22 kopecks (about 35 cents U.S.) for the Republic of Moldavia, and the 96-page *Preserved Plants of the Crimea: A Handbook* (26). On a national scale, the *Rare Plants of the U.S.S.R.* (27) utilizes color plates and maps to augment the text and an attractive color dust jacket. Even packets of postcards depicting protected plants are sold at kiosks in hotels and tourist centers.

Large, engaging, colored wall posters are being produced in some regions, featuring accurate illustrations of the species most likely to be encountered by nonspecialists (Fig. 4). A particularly attractive poster was printed in 1977 for the greater Moscow region, an area under severe environmental pressures. On summer weekends, many Muscovites journey into the surrounding countryside for pleasant family outings. Some bring back illegally collected plants while others buy them, also illegally, from roadside entrepreneurs. Presenting flowers to

friends and relatives remains a popular custom in the Soviet Union.

Even though great strides have been made in identifying plant species to be protected by national law in the Soviet Union, the Supreme Soviet has yet to act on legislation regarding flora. A law was passed at the 3rd session of the 10th Supreme Soviet of the U.S.S.R. on 25 June 1980 on the Protection and Utilization of the Animal Kingdom (28).

Conclusion

The United States and the Soviet Union have used contrasting approaches to the protection of rare and endangered species of plants. The first step in the Soviet Union was the establishment of a mechanism to identify and document the endangered species. With input from botanical institutions, governmental agencies, and individuals, lists were prepared of species believed to be in need of protection. These lists are now being evaluated and revised. At the same time, a broad program of public education and awareness was instituted, to draw attention to the need to protect and preserve the vanishing elements of the country's flora. Specialists in the Soviet Union hope that once a revised list of species is published, a national law to protect endangered plants will be passed.

In contrast, the first step in the United States was passage of the Endangered Species Act. Then, various agencies and organizations embarked on a program of listing and documenting plant species that might qualify for protection. Since the law was enacted 9 years ago, 63 species have qualified for and benefit from protection by this law.

The U.S. House of Representatives on 8 June 1982 and the U.S. Senate on 9 June 1982 passed bills amending and reauthorizing the Endangered Species Act of 1973 for three additional years despite intense lobbying against the act by well-funded groups representing major national and international industries. Thus, the United States and the Soviet Union are progressing on many fronts to conserve and protect rare and endangered species and to educate their peoples on the importance of maintaining what may be our most important world resource—the great species diversity of plants and animals.

References and Notes

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