

THE CONSERVATION OF RARE, THREATENED SPECIES AND TYPES OF VEGETATION IN ARMENIA

by

E. TS. GABRIELIAN*

Abstract

GABRIELIAN, E. Ts. (1981). The conservation of rare, threatened species and types of vegetation in Armenia. *Actas III Congr. OPTIMA. Anales Jard. Bot. Madrid* 37 (2): 773-778.

After giving the main geologic, geographic and climatic features of Armenia, the new botanical discoveries for the world science during the last years are enumerated. The main types of vegetation are briefly described and also the species of interest in agriculture. About 100 species are threatened with extinction, numerous national parks being created for their protection.

Resumen

GABRIELIAN, E. Ts. (1981). Conservación de especies y tipos de vegetación raros y amenazados en Armenia. *Actas III Congr. OPTIMA. Anales Jard. Bot. Madrid* 37 (2): 773-778 (En inglés).

Se da cuenta de las características geológicas, geográficas y climáticas que definen Armenia, enumerando los nuevos hallazgos florísticos. Se describen someramente los principales tipos de vegetación natural y las especies más utilizadas en agricultura. Alrededor de un centenar de especies se encuentran en peligro de extinción, existiendo numerosos parques nacionales para su conservación.

The conservation of nature, the concern for a rational utilization of its resources has developed into a serious problem of world-wide significance. The rapid growth of industry has greatly affected man's environment. This is particularly true in mountainous regions where all the disturbance processes bearing on the ecosystems are much more intense than in low-lying areas.

The mountainous regions form a sort of islands against the background of low-lying areas. Their specific natural conditions are borne out by their various types of vegetation and by the relic and endemic representatives of their fauna and flora. That is why the conservation of various mountainous regions assumes cardinal importance. In Armenia exceptional attention should be paid to the preservation of threatened species.

(*) Botanical Institute. Academy of Sciences of the Armenia. 375001, Erevan, Nalbandian 102 ap. 23, Armenia, URRS.

Armenia lies in that part of the Minor Caucasus which constitutes the volcanic Armenian highlands, at an altitude ranging from 450 to 4095 metres above the sea. The areas lying above 1000 m form 85 per cent, and those of 2000 m and upwards, 52 per cent of the total territory.

Rainfall in the various parts of the republic varies from 200 mm (at times 150) to 800 mm (seldom 900) annually. The absolute temperature minimum is -37 (to 43) °C, while the maximum is as high as $+42$ (to 44) °C. The seasons are marked by a very short spring and a prolonged autumn (sometimes extending to mid-December).

The upfolding and powerful volcanism of the highlands, the sharp contrast in altitudes, the remoteness from vast sea expanses—all these elements account for the complicated relief and climate of Armenia. Besides, the republic lies at the junction of two completely different floristic provinces: the mesophyllous Caucasian (Circumboreal region) and the woodless arid Armeno-Iranian (Irano-Turanian region). All these factors taken together have given rise to a rich variety of species (about 3.200 out of a total of 6.000 vascular plant species of the Caucasus) within the comparatively small territory of Soviet Armenia (29.965 km², equivalent to five per cent of the total area of the Caucasus). About 400 species have been described from Armenia, of which about 200 are endemics. Armenia also constitutes the extreme northern, eastern, southern or western extension of the natural range of a number of species such as *Quercus infectoria*, *Cercis griffithii*, *Sorbus luristanica*, *Physoptichis gnaphalodes*, *Anchonium elichrysofolium*, *Campanula radula*, *Scrophularia amplexicaulis*, etc. Inconceivably rare species can still be found here, in a seemingly thoroughly explored region. For instance, in recent years the following genera and species new for Armenia have among others been discovered: *Amblyopyrum muticum*, *Microcnemum coralloides*, *Chaenorhinum rubrifolium*, *Asterolinon linumstellatum*, *Corallorhiza trifida*, and some species formerly endemic to the saline wetlands of Central Anatolia: *Linum seljukorum* and *Thesium lycaonicum*, and also the Saharo-Sindian element *Citrullus colocynthis*. In Armenia one can come across a plant which had been collected before, say, once or twice somewhere in the Major Caucasus, such as *Gagea minima* or *Lychnis flos-cuculi*. Viewed from the angle of floristic findings Armenia is a magic land.

The vegetation of the republic is abundant and varied, and displays a well defined altitudinal zonation. Various types of vegetation, from sagebrush or sandy semi-desert to carpet-like alpine meadows, can be seen within a small area.

Broad-leaved forest, open juniper woodlands, deciduous christ-thorn bush formation (shibliak), beard-grass steppes and subalpine tall herbaceous vegetation are widespread in the north of Armenia and in Zanghe-zoor. In central and southern Armenia, one finds halophyte, hygrophyte, halohygrophyte, psammophyte and ephemeral semi-desert vegetation with *Halanthium lateriflorum* and *H. kulpianum*; sagebrush formations, xerophitic *Lamiaceae* formations with *Stachys inflata*, *Thymus kotschyanus*, beau-

tiful *Salvia dracocephaloides*, *Teucrium polium*, *Phlomis orientalis* and others (one can draw a parallel between these groupings and the Spanish «tomillares»); phryganoid vegetation, xeromorphyc gypsophite formation, etc.

The flora of most of these formations is rich and contains a number of interesting rare species (including endemic ones) such as *Tulipa sosnovskyi*, *Tulipa confusa*, *Scilla atropatana*, *Dorema glabrum*, *Lactuca takhtajanii*, *Sorbus hajastana*, *Salsola tamamschjanae*, *Sambucus tigranii* and many more.

One fact deserves special attention: the richness and peculiarity of the floristic composition, typical of natural populations, are lacking in man-made forests and meadows. Therefore even the smallest remnants of those most interesting natural vegetation types (for example, the absolutely peculiar formation of tertiary gypsum-bearing red clays in the vicinity of Yerevan, which is exploited on a large scale) call for conservation.

Some wild-growing relatives of cultivated plants also occur: different species and forms of wild pear, apple, cherry, plum, hawthorn, cornel, grape, various berries, almond, walnut, hazel, mountain-growing wild pea, spinach, lentil, beet, etc.

The unique sites where wild wheat, *Aegilops* species, rye and barley (*Triticum urartu*, *Triticum araraticum*, *T. baeoticum*, *Secale vavilovii* etc.) grow, and where an unusual intra-specific polymorphism is observed (over 100 varieties of wheat), deserve special consideration. A number of valuable qualities of wild wheats, notably their drought resistance, precocity, high percentage of protein and raw gluten content, are of high practical importance for present and future selection. Besides their purely practical significance, the habitats of wild wheats in Armenia are also of considerable theoretical interest, throwing light on many problems concerning the systematics and phylogeny of wheat, its centres of origin, and ways of migration, the history of farming and so forth. Wild wheats represent an inestimable and quite ancient genetic fund; they grow in the surroundings of Yerevan (Shoraghbyur) on old, tertiary clays. The establishment of forest plantations in the classical sites of *Triticum urartu* and *T. araraticum*, continous irrigation, cultivation and hay making utterly disturb their natural propagation. Along with the wild wheats, interesting rare species such as *Amblyopyrum muticum*, *Actinolema macrolema*, *Phalaris paradoxa*, *Cichorium glandulosum*, *Euphorbia eriophora*, *Serratula erucifolia*, etc. are affected, and just next to them the splendid *Iris elegantissima*, *Gladiolus atroviolaceus* and others.

Although the multi-volume Flora of Armenia is not as yet completed, work on the Red Data Book of Armenia has been finalized. Preliminary estimates show that about 13 per cent of the species are threatened. About 35 species are believed to be extinct in the wild (but some may still survive in some remote inaccessible area or are preserved in cultivation). An interesting endemic of the southern Transcaucasus, the highly decorative bush *Colutea komarovii* with its pink-violet flowers, can be quoted as a case of a surviving species which, having perished in its classical habitat in the Nakhichevan ASSR and remained untraceable for half a century, was rediscovered by us, in a small population, in Armenia in

a gorge of difficult access in the district of Meghri. Another endemic wrongly considered as extinct is the very decorative *Acantholimon fedorovii*, with its cushions wholly covered with tiny white flowers, that was likewise rediscovered in Meghri last year. So far the beautiful *Sternbergia fischeriana*, *Tetradiclis tenella*, *Peucedanum zedelmeyeri*, *Nitraria schoberi*, *Tulipa sylvestris* and others have not been traced again in Armenia. About one hundred species face the immediate threat of extinction (the species of *Prangos*, *Rhizocephalus orientalis*, such stenotrophic plants as *Thesium lycaonicum*, *Microcnemum coralloides*, *Hypericum formosissimum*, *Inula seidlitzii* some of the orchid family, etc.) and about two hundred are exceedingly rare (such as *Hohenackeria exscapa*, *Pseudovesicaria digitata*, *Thlaspi zangezura*, the wonderful *Symphyandra zangezura*, *Viola caucasica* and others); many others have suffered from restriction of their natural habitats, such as the numerous irises, tulips, merenderas, etc.

Some of the relic, rare and endemic species are preserved in «sanctuaries» and reserves. Armenia counts three such «sanctuaries»: Garny (or Khosrov), Dilijan and Shikahogh (or Bartass), plus ten reserves.

The «sanctuary» of Garny (27.000 ha) lies on the southern slopes of the Guegham range girdling the southern shores of Lake Sevan. Here nearly 1.700 species grow; they represent the mountain-xerophyllous vegetation with forbs, tragacanth, open juniper woodlands and broad-leaved forest with *Juniperus excelsa* subsp. *polycarpos*, *Pistacia atlantica* subsp. *mutica*, *Rhus coriaria*, *Zyzyphus jujuba*, *Jasminum fruticans*, etc., and deciduous forests of *Quercus macranthera*, various species of *Pyrus*, *Sorbus* and so on.

The «sanctuary» of Dilijan (29.000 ha) lies in the north of Armenia and comprises beech, oak and hornbeam forest, *Corylus colurna* groves, and at the same time elements of sub-alpine tall herbaceous vegetation and a host of orchidaceous species (*Cephalanthera*, *Listera ovata*, *Gymnadenia*, *Neottia*, *Dactylorhiza*, *Galanthus* and others). Forest stands with predominating *Taxus baccata* are also found here.

The «sanctuary» of Shikahogh (10.000 ha) lies in the south-east of Armenia and comprises a large area of oak forests (*Quercus iberica* to an altitude of 1400 m, and from 1400 to 2600 m *Q. macranthera*), hornbeam forests of *Carpinus caucasica*, walnut forests, and the only beech grove in Zanghezoor. The foundation of this sanctuary redeemed the population of the exceptionally beautiful endemic *Tulipa confusa*, whose lemon yellow and fuchsine-red flowers emit a very delicate and pleasant fragrance. The population of *Galanthus transcausicus* was also restored. In addition, many other interesting and rare taxa are found here.

I should like to mention but a few of the reserves.

The Tsav plane tree grove made up of *Platanus orientalis* (120 ha) is the largest in the Caucasus. Other constituents of the grove are the endemic pear of Zanghezoor (*Pyrus zangezura*), profusely varied forms of the oriental apple-tree (*Malus orientalis*), *Periploca graeca* which is of rare occurrence in our region, etc.

The reserve of Aregouny (3.500 ha) is situated on the northern shore of Lake Sevan; it faces south and is endowed with an exceptionally inte-

resting and varied flora. It includes open juniper woodland areas with *Juniperus excelsa* subsp. *polycarpus*, and forest remains of *Quercus macranthera*, *Acer platanoides* in north-western exposure, the endemic *Sorbus hajastana*, *S. luristanica*, *S. roopiana*, *S. persica*, *S. kusnetzovii*, *S. graeca*, *Ribes biebersteinii*, *Amelanchier rotundifolia* which is quite rare in Armenia, etc. The reserve also comprises mountain steppe portions, tragacanth formations with various *Astragalus* species and huge cushions of *Onobrychis cornuta*, scree and rocks with *Iris paradoxa*, *Eremurus spectabilis*, *Tulipa julia*, *Fritillaria* species, *Convolvulus calvertii* and many more.

The reserve of Jermook (3.900 ha) lies in a fascinating corner of Armenia: Vujk (Daralageuz), of which many endemic species are described (*Cousinia daralaghezica*, *Tomanthea daralaghezica*, *Pyrethrum sosnovskyanum*, *Seseli leptocladum*, etc.). The reserve contains forests of *Quercus macranthera* with an unusual variety of species and variants of *Pyrus*, *Sorbus*, *Malus*, *Crataegus*, *Prunus*, etc. It is also the location of one of the last populations of the threatened *Smirniopsis armena*, which has been almost exterminated by massive collecting.

In addition, 25 species of trees and shrubs growing outside sanctuaries and reserves have been the object of legal protection. Up to 1 km wide belts on either bank of eight rivers in Armenia that cross woody regions are likewise conserved.

Quite recently the national park of Sevan has been set up which covers the entire basin of Lake Sevan.

However, mountain steppes, alpine and sub-alpine meadows with a total area exceeding one million hectares, which are valuable as to their floristic riches and economic importance, have been almost completely neglected for the purpose of conservation. No sanctuaries or reserves exist to secure the conservation of such typically Armenian types of vegetation as semi-deserts, phrygana, hamada, salt marshes, salt beds, alpine meadows *Rhododendron* thickets with *Allium ursinum*, *Pyrola*, *Vaccinium* etc. (at the southernmost limit of their area), etc.

Twenty years have now passed since the establishment of the sanctuaries and reserves. The living standard and the industrial production of the republic have scored all-time highs. Areas with nearly all types of natural vegetation have been converted to economic use. No corner is left in our small-sized republic where the natural phytocoenoses are preserved in their genuine virgin state and protected from man's direct or indirect influence.

Many types of vegetation (as the sandy semi-desert with *Calligonum polygonoides*, or with *Achillea tenuifolia*, or with *Capparis spinosa*, etc.) and individual plants (*Gundelia tournefortii*, *Iris elegantissima*, *Allium akaka*, *Eremurus spectabilis*, etc.) occurring in profusion until recently, have become rare nowadays.

Powerful agricultural technology pulls its way high up the plants of the mountains; still unexplored mountain steppes, where the representatives of many wild relatives of cultivated plants were growing, are tilled (it

is with good reason that Vavilov, Zhukovsky and others regarded Armenia as the land of origin of many cultivated plants!).

The foregoing causes serious concern. To conserve the gene pool of the wild-growing species of Armenia's flora, the organization of new sanctuaries and reserves is required, apart from an urgent need to intensify and implement measures aimed at strengthening the botanical establishments of Armenia.

I should also like to dwell briefly on some problems relating to the conservation of the flora and vegetation in Azerbaijan and Georgia.

Nearly 4.000 species of vascular plants grow in Azerbaijan; out of this number 400, i. e. 10 per cent, turned out to be rare and threatened. A Red Data Book for that republic is due for publication in 1982; meanwhile, next year, a Red Data Book on the flora and fauna, compiled by the republic's committee for the conservation of nature, will be published but will contain only the 145 most important plant species out of the 400.

Azerbaijan runs seven state «sanctuaries» (two of which, Zakatala and Kyzyl-Agach, have recently celebrated their semi-centennial foundation anniversary) and fourteen reserves. The establishment of three more «sanctuaries» and three national parks is planned.

Full-time research staff is affected to every «sanctuary».

Nearly 4.200 vascular plant species grow in Georgia, of which about 400 are rare and threatened. A list of the rare plants of Georgia has been published in 1977 under the title «Take care of the wild and cultivated plants of the Georgian SSR». A Red Data Book for Georgia is in print now.

Although the number of «sanctuaries» and reserves, in Georgia, is comparatively large, they do not yet cover the entire diversity of ecosystems. Like Armenia, Georgia lacks «sanctuaries» of primary steppe vegetation. The alpine flora and vegetation of the Abkhasian calcareous mountain range also needs conservation, as does that of the non-calcareous regions, the subalpine dwarf scrub, and the fir, beech and chestnut forests which are still intact in Western Georgia.