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Editorial

Biodiversity and Conservation of Vascular Flora: A Challenge for the Survival of Humans on Earth

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In the current state of knowledge, the Earth is the only planet to host life and, therefore, to be covered by plants. The establishment of plant life on land was one of the most significant evolutionary episodes in Earth history. Here, historically, climate strongly modeled plant diversity over large spatial scales, with relatively warm and wet regions supporting currently greater numbers of species. The extraordinary biological diversity (including plant diversity) spread globally on Earth makes our planet a complex living organism, but with very delicate balances. As we know, since their appearance on Earth, humans have significantly modified nature to suit their needs. The human imprint on the global environment has now become so pronounced that it was proposed that the Earth may have entered a new geological epoch, called the Anthropocene, in which human activity is influencing the environment at global scale [1]. Human activities over millennia have resulted in an estimated 50% reduction in the biomass of total plants, relative to pre-human times [2]. Since anthropogenic activities generally produce a decline in biodiversity, many scholars think that we are currently going through the sixth mass extinction in history. Globally, 39% of all vascular plants are now threatened with extinction [3]. As biodiversity is finite in nature and forms the very basis of life on Earth, it requires urgent efforts for its knowledge and conservation. Although vascular plants play a key role in the functioning of ecosystems, updated data on the distribution and conservation status of many species are still lacking worldwide. In addition, there is increasing awareness of the phenomenon known as "plant blindness", where plants are generally overlooked by policy-makers, conservationists and the general public [4]

This Special Issue in *Diversity* on "Biodiversity and Conservation of Vascular Flora", which features six papers by 49 authors from 10 countries, attempts to fill some of these gaps.

Two research works concerned the family Orchidaceae, the second most diverse angiosperm plant family after Asteraceae, with an estimated 30,000 species worldwide [5]. Despite the popularity of orchids among botanists, there are major gaps in their knowledge in many areas of the world.

Baasanmunkh et al. [6] investigated the orchids of Mongolia, aiming to (i) update the checklist and distribution map, (ii) identify areas with high orchid species richness and (iii) assess all species in Mongolia using IUCN (International Union for Conservation of Nature) categories and criteria. By integrating herbarium investigations, literature studies and field surveys, the authors reported 26 taxa of orchids (including 24 species, 1 subspecies and 1 nothospecies), belonging to 14 genera, in 13 phytogeographical regions of Mongolia. They pointed out that Mongolian orchid species richness is low in comparison to that in neighboring countries, such as Russia (135 species) and China (1582), which might be explained by the relatively low intensity of field surveys, large size of unsettled land and harsh continental climatic conditions. The study also revealed that northern and north-eastern Mongolia have a high number of orchid species compared to that in the arid steppes and deserts in the south and southeast. Assessment of all orchid species at the national level resulted in 1, 4, 7, 11 and 2 species as critically endangered (CR), endangered (EN),

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vulnerable (VU), near threatened (NT) and data deficient (DD), respectively, according to IUCN criteria.

In Armenia, Faruk et al. [7] explored whether the current establishment of protected areas is effective at conserving orchid diversity. Authors found that 57% of protected area sites have a representation of at least one species of orchid, but some threatened species are not presented within any protected area site. The Tavush and Syunik province (located in the NW and S of Mongolia, respectively) not only held the highest species richness (>10 species), but the protected area network within also held high orchid diversity. The authors also highlighted the taxonomic problems that were the basis of their study: several species were recognized as synonyms, thereby reducing the overall species richness and diversity and/or creating uncertainty around conservation status. On the other hand, taxonomic studies as well as a globally accepted nomenclature are crucial for the recognition and conservation of vascular plant diversity [8].

As macrophyte communities are fundamental for the functioning of many river ecosystems but are also particularly sensitive to anthropogenic influences, Germ et al. [9] investigated the diversity of these taxa in the Ljubljanica River (Slovenia) and its relationship with environmental parameters. The authors, who conducted their study by comparing the collected data set in 2019 with survey data from the year 2004, found a decrease in the overall presence and abundance of *Potamogeton natans* L. and in the frequency of occurrence of *Myriophyllum spicatum* L. (both native species to Slovenia) and an increase in the presence and abundance of the invasive alien species *Elodea canadensis* Michx. These results confirm the problem of the spread of alien plants in European water bodies [10]. The authors also stated that the species richness and diversity of macrophytes decreased with distance from the source, an increase in pH and alterations in the riverbed structure due to interference in the riverine ecosystem in the lower part of the Ljubljanica River and its catchment.

Hurtado-Reveles et al. [11] focused their attention on the importance of local studies of vascular plant communities for their conservation and management. The authors, who conducted their study on Sierra de los Cardos in the municipality of Susticacán (Mexico), stated that oak and pine forests were characterized by high diversity and endemism, despite a small surface, as compared to grasslands, nopaleras, chaparral and rock outcrop vegetation. As the forests of the high regions in Mexico (included study area) are disappearing rapidly, mainly due to the development of agriculture and livestock, the results of this study can guide local policy-makers to the protection of these forest communities. Hopefully, the political decision-makers, especially in megadiverse countries, such as Mexico, understand the great value in the biodiversity of this territory and acquire an awareness aimed at long-term sustainable development [12].

Stinca et al. [13,14] investigated the vascular flora of Italy, a country with a long tradition of floristic studies, in order to update the distribution of taxa, to make a synthesis on the current floristic knowledge in Italy and to analyze the floristic similarities between the 20 Italian administrative regions. The authors, who based their study on field surveys, herbaria and literature analysis, highlighted Italy's primacy compared to other European floras concerning the current richness in the native vascular flora and endemics. Currently, the Italian vascular flora comprises 7547 native taxa (of which 1598 are Italian endemics; i.e., 21.17% of total native taxa) and 1603 exotic taxa at a national level. In accordance with previous Italian studies [15], the authors also pointed to an increase in exotic species, mainly spread by fields and artificial green areas. The multivariate analysis of updated floristic data on a regional scale showed a clear distribution along the latitudinal gradient, in accordance with the natural geographical location of the regions in Italy. This pattern of plant distribution was not affected by the introduction of alien species. These results are surprising because one would expect a greater similarity between the alien floras of each region. In fact, it is known that non-native taxa can promote homogenization in living systems all over the world [16]. The authors stated that only 310 native taxa (4.11%) are common to all regions, while 2141 (28.37%) exclusively present in a single administrative

Italian region. Almost half of the 2141 native taxa (i.e., 1026 taxa) are classified as regional endemic, with a restricted range and, therefore, worthy of protection.

Focusing on endemic taxa, Baasanmunkh et al. [17] provided an updated checklist for Mongolia. The study carried out using previous literature data, herbarium specimens and field observations, recognized a total of 102 taxa (including 95 species, five subspecies and two nothospecies), with Fabaceae (29 taxa) and *Astragalus* (16 taxa) the most endemic taxa rich. Authors found that about 70% of the endemic taxa are distributed in western and central Mongolia and 65% grow in the mountainous regions at an altitude range of 1700 to 3350 m. These results agree with previous studies on endemic species richness–elevation relationships that mountain isolation promotes speciation and endemism [18].

Historically, the efforts of systematic botanists around the world have been aimed at elucidating the taxonomy of vascular plants for their recognition. However, in recent years, the frequent changes in the taxonomy and nomenclature of some systematic groups, largely determined by molecular studies (sometimes based on preliminary results or not consistent with morphological studies), have made recognition more difficult from a wide audience and, therefore, compromised their conservation. As is known, the discovery of new plant species or the identification of those already described is essential for ecological monitoring and, thereby, especially for biodiversity conservation [19]. However, fundings for these studies are increasingly scarce and some authors have also highlighted the lack of botanists able to identify plants [20]. All these deleterious processes must be stopped. Particularly, it is essential that policy-makers allocate more funding for the study of vascular plant diversity and for the training of young systematic botanists. Probably, this is the first challenge to win for the survival of humans on Earth.

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