



Editorial

Building a better plant world through mutual learning: An introduction to a special issue on plant diversity and conservation in the Belt & Road Countries

Plants play important roles in international trade and cultural exchange. Mention of the Silk Road instantly conjures images of plants and plant products, from the tea of China (Lagarde, 2017), to pepper, flax, spices, grapes, and pomegranates of South and Central Asia (Xi, 2017). In 2015, when China officially launched the Belt and Road Initiative (BRI), biodiversity conservation was repeatedly emphasized in joint communiqués of the Leaders' Roundtable of the Belt and Road Forum for International Cooperation. However, our knowledge of both plant diversity and conservation in the Belt and Road Countries is limited, which hampers our planning and implementation on the eco-friendly infrastructural projects as promoted by the BRI. To promote regional cooperation and knowledge sharing on plant diversity and conservation, in September 2018, the Kunming Institute of Botany (KIB), under the sponsorship of Chinese Academy of Sciences (CAS), organized an international workshop entitled “International Workshop on Plant Diversity and Conservation of the One Belt and One Road Countries.” This special issue of *Plant Diversity* presents some of the outcomes of the workshop.

This special issue contains seven papers that focus on one of three major themes: inventories of plant diversity, plant evolution and conservation, and sustainable use of plant diversity. These papers represent the rich diversity of less investigated regions and ecosystems, such as Myanmar, the desert of Jordan, eastern Africa, the Himalayas, and Central Asia. The authors of these articles address issues that include the lack of and/or insufficient knowledge of plant diversity, the historical evolution of plant diversity, and the utilization and conservation of plant resources.

1. Inventory and information synthesis on plant diversity

Myanmar, which contains a portion of the Indo-Burma biodiversity hotspot, is recognized as one of the most biodiverse countries in the world. However, surveys and monitoring are still lacking for many areas (Ministry of Environmental Conservation and Forestry, 2014). In coordination with the Chinese Academy of Sciences and the Forest Research Institute of Myanmar, over the past few years the Southeast Asia Biodiversity Research Institute's joint biodiversity expeditions to northern and western Myanmar have made a number of discoveries. In this special issue, Ding et al. (2019) summarize their new contributions to the flora

of Myanmar. One newly recorded family, Polyosmaceae, along with 13 newly recorded genera and five new species are introduced. These findings are important for filling in gaps in our knowledge about this important biodiversity hotspot. Furthermore, these findings will contribute to the conservation and sustainable management of an ecosystem that is undergoing climate and socioeconomic change.

Kandel et al. (2019) analysed previous studies to assess plant diversity of the Kanchenjunga Landscape in the Eastern Himalayas. The history of botanical surveys in this region dates back to the 1840s by Sir J.D. Hooker of the East India Company, and the first documented study was published by Sir Archibald Campbell on the traditional knowledge of the Lepchas of Sikkim on plant species. To date, a total of 5189 seeds plant species from 1548 genera and 216 families have been recorded, including 3860 dicots, 1315 monocots and 23 gymnosperms. Orchidaceae is the most species rich family and Asteraceae comprise the highest number of endemic species in Kangchenjunga. Forty-four species are threatened and 182 species are endemic. The Kangchenjunga Landscape Conservation and Development Initiative, promoted by the governments of Bhutan, India, and Nepal is a timely and progressive approach for the conservation and sustainable development of this biodiverse and culturally rich landscape.

Tiwari et al. (2019) reviewed previous research to provide a synoptic view on the diversity and distribution patterns of endemic flowering plants in Nepal. Approximately 7000 flowering plants are claimed in Nepal, yet intensive botanical work is required to confirm this number and complete the Flora of Nepal. Tiwari et al. conclude that 312 flowering plants belonging to 46 families and 126 genera are endemic to Nepal, and that the highest endemism occurs at an elevation range between 3800 m and 4200 m. Rapid warming at high elevation along with increased human interventions such as deforestation puts increasing pressure on efforts to conserve the rich biodiversity of Nepal.

Kherissat and Al-Esawi (2019) carried out the first floristic study to Wadi Hassan in the northeast desert of Jordan, and prepared the plant diversity list consisting of 206 species belonging to 138 genera and 35 families. Compositae, Cruciferae, Leguminosae, Boraginaceae, Caryophyllaceae, and Gramineae, represent 60% of the total plant families in the Wadi Hassan. The flora of the area is characterized mainly by Saharo-Arabian, Irano-Turanian, and Mediterranean elements. This study provides base line data to the least studied desert of Jordan. The authors recommend extending this study with more detailed surveys.

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2. The historical evolution of plant diversity

Fossils are one of the secret keys to unlocking the mysterious history of our planet. Without fossil evidence, the geological climate and vegetation of Kazakhstan—now steppe and desert—would be nearly impossible to imagine. Svetlana et al. (2019) studied the carpology and palynology of the Kumyrstas flora from a coal-bearing Zhilanchik suite for the early Miocene period. The pollen spectra revealed that during the early Miocene period angiosperms were dominant in the region and there was a high diversity of broadleaved summer-green plants. This study also shows for the first time that during the early Miocene taxa such as *Tubela*, *Alnus*, *Actinidia*, *Rubus* were present in this region.

3. Conservation and sustainable use of plant diversity

The interplay of climate variation and human intervention is one of the important drivers for change in biodiversity. Although livestock grazing and rainfall variation have increased in East Africa, the impact of these factors on herbaceous plant communities remains poorly understood. Ondier et al. (2019) experimentally assessed the impact of rainfall and grazing on herb communities by monitoring grazing activity and manipulating rainfall for two years in savannah of Lambwe, Kenya. Interestingly, grazing suppressed the dominant species of herb communities and led to higher plant diversity. In contrast, rainfall did not affect the dominance or the diversity of savannah plots. Manipulated rainfall did not influence savannah plots that were not grazed but did, however, affect plots that were grazed; furthermore, when rainfall was reduced in these grazed savannah plots, plant diversity decreased.

Medicinal plants are of great importance both in traditional cultures, which use these plants for daily health care, and in the broader population, who may use products derived from medicinal plants to treat disease. Crude drug adulteration is a common phenomenon globally and is considered troublesome because adulterants may cause adverse effects and reduce the therapeutic efficacy of active ingredients. To solve the problem of adulterants of *Kaempferia* species, the popular Ayurvedic drug for rheumatic diseases, contusions, fracture and sprain, Basak et al. (2019) developed a rapid molecular diagnostic method. Eight plastid loci were assessed, and the combination of *matK*, *rbcl*, and *trnH-psbA* was found to be the most effective to discriminate the *Kaempferia* species from their adulterants.

According to latest statistics from the second Belt and Road Forum for International Cooperation held in April, 2019, more than 150 countries and international organizations have signed agreements on Belt and Road cooperation with China. From the Eurasian continent to Africa, the Americas and Oceania, Belt and Road cooperation has opened up new spaces for mutual learning and knowledge sharing between China and other countries. This

special issue is a starting point for botanists and conservationists to build a better plant world through the BRI. Therefore, we would like to express our gratitude to the authors for their contributions and the editors of *Plant Diversity* for their efforts. Thanks go to the Bureau of International Cooperation and the Strategic Priority Research Program (XDA2005000) of Chinese Academy of Sciences for support and funding.

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