



Editorial

Vital roles for ethnobotany in conservation and sustainable development



The scientific discipline of ethnobotany – the study of human interactions with plants – has applications in many fields of current global concern, including food security, climate change, biodiversity conservation and human health. Ethnobotanical studies can provide insights into the ways that societies interact locally with their environmental resources. Ethnobotanical studies have the potential to bring together and integrate local and scientific knowledge to advance the cause of achieving biocultural conservation (Gaoue et al., 2017; Prance, 2007). This Special Issue of *Plant Diversity* contains recent ethnobotanical studies that aim to contribute to determining the most useful ways ethnobotany can be used to confront human problems in the future. Specifically, this issue shows ways in which ethnobotany can contribute to the conservation of biodiversity, especially with regards to documentation and maintenance of indigenous and local knowledge of plants. The research in this issue also describes innovative practices communities have adopted to maintain their plant resources.

People have collected medicinal plants to treat various ailments since ancient times. The medicinal plants used by various ethnolinguistic groups have attracted much interest from scientists and the general public alike, and their study has become one of the most pressing topics in ethnobotany. Indigenous healers and traditional healthcare practitioners throughout the world have developed rich stores of knowledge about how to collect and use medicinal plants when providing services to communities. In this Special Issue, Xiong et al. (2020) provide a case study of a Buyi community in Lubuge Township, Luoping County, eastern Yunnan. They document 121 plant species used locally for medicinal purposes, a large proportion of which, surprisingly, has not previously been documented in the scientific literature as being of medicinal value (56 species, 46%). For a number of reasons, the ethnomedicinal knowledge of the Buyi people is at risk of disappearing and the authors advance some proposals for how this knowledge and associated plants can be better conserved.

Herbal markets play an important role in both supplying medicinal plants and in transmitting related knowledge. Palabas Uzun and Koca (2020) describe an investigation into the traditional uses of medicinal plants traded in herbal markets in Kahramanmaraş, Turkey. They found 62 taxa of plants that are traded, 26 of which are to some degree globally threatened. Commercialization often increases demand for medicinal plants, which consequently increases both threats to these medicinal plant species and their improper utilization. Consumers of medicinal

plants should be informed of correct medicinal usages and that medicinal plants are not inexhaustible.

Gu et al. (2020) investigated medicinal plant usage at Dragon Boat Festival herbal markets in Xingren and Zhenfeng counties of Qianxinan Buyi and Miao Autonomous Prefecture in Guizhou Province. This study confirmed that folk herbal markets in southwest China accurately reflect the practices of these ethnic minorities, following healthcare customs that may have existed for thousands of years. These markets are also a good reflection of local plant diversity. Qianxinan Buyi and Miao Autonomous Prefecture has extensive karst landscapes, which are being increasingly impacted by soil erosion and more exposure of bare rock. Information from this survey will be useful in supporting strategies that attempt to halt the process of rocky desertification and that protect biodiversity.

Cistanche deserticola is an important medicinal plant in traditional medicine, especially in the traditional medical systems of East Asia. It is used as a tonic and for other purposes in Traditional Chinese Medicine (TCM), Tibetan Medicine, and Mongolian Medicine. Mandakh et al. (2020), working with a combined team of Chinese and Mongolian scientists, report on the uses of *C. deserticola*-associated plant communities in Umnugobi, the southern Gobi Desert, Mongolia. They have documented the folk nomenclature based on 96 plant species in the *Cistanche* community, creating a valuable resource that will be useful for devising strategies for the conservation of plant biodiversity in Mongolia.

A desire to protect the rich store of traditional knowledge associated with medicinal plants that provide foods and drinks lies behind the ethnobotanical research of Liu et al. (2020) in Qingtian, Zhejiang Province, China. They report 129 species of plants belonging to 113 genera and 75 families that are used as herbal teas for treating no fewer than 31 named categories of ailments. They have discovered that the use of herbal teas is gradually declining and, along with it, the loss of the associated knowledge. They hope that their research will stimulate the interest of local people to protect local herbal tea plants.

The ways that plant resources are utilized depend on the availability of the resources and the level of knowledge of the people. Kathambi et al. (2020) conducted an ethnobotanical study in Tharaka-Nithi County in Kenya, where they succeeded in documenting a total of 214 plant species known to the people, distributed in 73 families and 169 genera. As with the Qingtian case described above, Vivian and colleagues hope that their research will lead to a greater appreciation of the value of local plant resources among local people. The authors highlight the needs to conserve and utilize these resources sustainably.

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The daily lives of people following traditional lifestyles are closely connected to local plant life. Zhao et al. (2020) present the results of an investigation into the knowledge of plants held by 12 Naxi communities in northwest Yunnan. They found that 161 species of plants belonging to 61 families are used for treating skin conditions. Through the use of quantitative methods, Zhao and colleagues show that this knowledge is related to the people's lifestyles, natural environment, and the meanings of the plants to the people. The study went on to show that the plants identified in Naxi communities contain chemical compounds previously reported as active agents in skin treatments.

Hematophagous invertebrates, such as mosquitoes, leeches, mites, ticks, lice and bugs, cause various health problems for humans. Nowadays, there is an urgent need to develop new insecticides and repellents to replace the synthetic chemicals that are currently in use and which can be toxic, non-degradable and have become increasingly ineffective due to mounting genetic resistance on the parts of pathogens and invertebrates. Gou et al. (2020) conducted field surveys in villages of the Bulang, Jinuo and Lahu people in Xishuangbanna Prefecture in southwest Yunnan to investigate traditional knowledge of hematophagous invertebrate control. They recorded a total of 709 use-reports, altogether mentioning a total of 32 plant species used in 71 different ways. These three ethnic groups, all living in the same area, share a degree of common understanding about the uses of plants, although each group also possesses unique knowledge. The researchers have screened the species to determine priorities for follow-up laboratory research, among which *Artemisia indica*, *Nicotiana tabacum* and *Clausena excavata*, have been selected as the most promising.

Wild fodder plants provide important livestock feed globally, especially for smallholder farmers. How fodder plants are managed can have an important influence for determining whether this resource is used sustainably, at the same time helping to find ways to conserve associated threatened herbivores. The gayal (also known as mithun) is a large semi-domesticated bovine found in Yunnan and neighboring areas of Southeast Asia. Geng et al. (2020) have assessed the nutrient values of various species found in systems of agroforestry in the Dulongjiang area of northwest Yunnan where the gayal is found. Their aim is to provide information that will be useful for achieving more sustainable use of resources of wild fodder.

The concept of biodiversity can be viewed from many perspectives, some of which are rather mysterious to the general public. It is urgent to find practical ways of gaining wider public support for the conservation of biodiversity for it to become widely achieved in practice. Qian et al. (2020) have established a quantitative scoring system to identify good candidates for flagship species, which, it is thought, will help rally local support for conservation initiatives. They propose using six criteria for identifying the best flagship species: three criteria that refer to conservation science, namely the endangered, endemic and rarity statuses of the species; and three criteria that relate to local ecosystem functioning and socio-economic and cultural values.

We are faced today with a worldwide COVID-19 pandemic. The outbreak of this disease is connected to both ecological and human systems, demonstrating the importance of paying attention to the connections between the two in dealing with issues of human survival. Similarly, humans face other crises at present that relate to both ecological and human systems, including additional serious diseases and food security. At the same time, there are benefits

derived from the ways that biodiversity regulates ecosystems, such as the assuredness of water supplies. Humanity must now quickly develop a science of survival. In the words of the Declaration of Kaua'i (Prance, 2007): "Ethnobotany can strengthen our links to the natural world. It makes it possible for us to learn from the past and from the diverse approaches to plants represented by the different human cultures that exist today. Ethnobotany is at once a vital key to preserving the diversity of plants as well as to understanding and interpreting the knowledge by which we are, and will be, enabled to deal with them effectively and sustainably throughout the world. Thus ethnobotany is the science of survival".

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