Scientists Give Advice for China's Fourth Survey of Cultural Relics

China has launched its fourth national survey of cultural relics, an effort to catalog and protect ancient sites, tombs, buildings, and artifacts of historical and artistic significance. The previous surveys in 1956, 1981, and 2007 focused on documenting the condition and ownership of relics.

To better protect cultural relics, develop their cultural value, and promote the dis- semination of Chinese culture, Dr. KOU Gang from Southwestern University of Finance and Economics, Dr. SHI Yong and Dr. GUO Kun from the University of Chinese Academy of Sciences argue that the new survey should go beyond physical attributes to capture the cultural, historical, and religious values embodied in sites like the Longmen Temple (doi: 10.1126/science.adl5907). They recommend using technologies like 3D scanning and AI to create immersive online experiences, allowing the public to engage with cultural relics virtually. Documenting intangible attributes would align with the goals of the United Nations Educational, Scientific and Cultural Organization (UNESCO) on safeguarding cultural heritage. The survey presents an opportunity to fully convey China's rich cultural legacy.

The Central Hall of China's Longmen Temple was built during the Northern Song Dynasty (960 to 1,127 CE). Photo: LI Biao

Safeguarding the "Third Pole"

The Qinghai-Xizang Plateau, also known as the "Third Pole," is a fragile ecosystem at risk. (Image by *Pixabay*)

The Qinghai-Xizang Plateau, known as the "Third Pole," plays a pivotal role in Asian ecology as the source of major rivers. However, population growth, urban expansion, tourism and other human impacts have stressed its fragile high-altitude ecosystems. To address this, China recently enacted an Ecological Protection Law emphasizing surveys, monitoring, and conservation of the plateau's biodiversity and resources. While an important step, comprehensive protection requires going beyond legal measures, argue LIU Haimeng at the Institute of Geographic Sciences and Natural Resources Research and CHEN Hao of the Institute of Tibetan Plateau Research, both under of the Chinese Academy of Sciences (doi: 10.1126/science.adl5035). They recommend China foster green

industries like eco-tourism and clean energy, increase environmental education and infrastructure for tourists, fund climate-adaptive technologies for mountain communities, and strengthen collaboration between scientists, officials, NGOs and neighboring nations to monitor ecology. Engaging stakeholders and pursuing multifaceted strategies are key to securing the future of the Third Pole and its vital benefits.

Invasive Species Found More Resilient to Extreme Weather Events Than Their Native Counterparts

A new study appeared in *Nature Ecology and Evolution* on November 6 finds that extreme weather events like heatwaves, floods, and storms may favor invasive species over their native counterparts (doi:10.1038/s41559-023-02235). Analyzing responses of over 2,000 species, researchers found non-native animals were less negatively impacted by extreme events compared to natives. Heatwaves affected both groups, but the native terrestrial and freshwater species were more vulnerable overall.

The study predicts areas like North America, Asia, and Australia may face combined threats from tolerant invasive species and intensifying extreme weather under climate change. Conservation efforts should prioritize protecting biodiversity hotspots facing these joint threats. Understanding interactions between the invasive and the extreme events is key to protecting ecosystems in a changing world.

How Rice Plants Innovatively Adapt to Low Phosphorus Soils

Rice plants have an impressive yet hidden ability to adapt and thrive when phosphorus levels in the soil run low, as revealed by a research team from the Institute of Genetics and Developmental Biology (IGDB) under the Chinese Academy of Sciences. The discovery was published in *Molecular Plant* on November 6 (doi: 10.1016/j.molp.2023.09.022).

When phosphorus becomes scarce, rice ramps up production of two key proteins, NSP1 and NSP2. These then team up to stimulate synthesis of plant hormones called strigolactones. The latter induce systematic changes in rice growth and metabolism that allow the plant to get by with less phosphorus.

Specifically, strigolactones restrain shoot branching by suppressing genes that promote tiller outgrowth. With fewer tillers to nourish, the plant's overall phosphorus requirement is reduced. In the roots, strigolactones limit lateral root formation, enabling the plant to devote more resources to elongating its main root to forage for phosphorus.

Besides modifying architecture, strigolactones also rebalance nutrient absorption. When phosphorus is scarce, they dial down genes for nitrogen uptake while cranking up ones for phosphorus acquisition. This exquisite coordination maintains optimal nutritional balance despite low phosphorus.

Excitingly, overexpressing NSP1 and NSP2 was found to enhance phosphorus absorption, root growth, shoot biomass, and grain yield in rice grown under phosphorus-deficient conditions.

Overall, this study illuminates an impressive capability of rice to completely remodel its morphology and metabolism to thrive under low phosphorus stress. Manipulating this regulatory module could potentially improve phosphorus efficiency and stress tolerance in crops.