



One Country One Priority Product • Case Study Series

Highlights

China: Geographical Indications Environment & Sustainability – an innovative open science solution to trace the geographical origin of special agricultural products

China has rich geographical and biological diversity, and cultural resources, which have enriched people’s lives for centuries. The GIES tool extends beyond basic scientific research and focuses on ecological natural products by using open science, a true game changer in bridging the science, technology and innovation gaps. Understanding the ecological environment where the quality geographical products are produced is not only necessary to ensure environmental sustainability, but also to maximize product values by providing guidance related to the quality of the product and productivity improvement.

Key issue: insufficient scientific data on SAP production environment

While China is abundant in SAPs, totalling more than 2 000 geographical indications (GI) products, how to capitalize on the socioeconomic benefits of SAPs while achieving environmental sustainability is challenging. The main issues are (1) the products are not technically geolocated and traceable; (2) the special geographical, biological and social systems from which the SAPs originate are not distinguishable nor recognized by consumers; and (3) the intellectual properties and brands of these SAP products have not been established nor protected.

Solutions: assessing and monitoring the geographical origin of special agricultural products by open science

To address the technical challenges, IGSNRR/CAS, the largest institute



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covering geography and natural resources in China, developed an innovative methodology named GIES, which is a scientific and technological tool that assesses and monitors the environmental sustainability of the geographical areas where SAPs originate. It aims at balancing environmental protection and economic development of GI products and potential GI products (e.g. geographically specific products and geographic traditional civilization products).³

Background

Although the origins, uses and histories of many SAPs have been recognized and recorded, such knowledge has often remained qualitative. Scientific parameters, and interpretation

- Geographical Indications Environment & Sustainability (GIES) is an innovative tool, which uses open science¹ to trace the geographical origin of a specific special agricultural product (SAP)² by assessing and monitoring the quality of the local environment where the product grows. It connects the specific SAP, the local productive environment, the local SAP producer groups and consumers in traceable and publicly accessible manners.
- The Institute of Geographic Sciences and Natural Resources Research, Chinese Academy of Sciences (IGSNRR/CAS) developed GIES in collaboration with other stakeholders and launched the Decade Initiative on Geographical Indications Environment & Sustainability (GIES) 2021–2030. As of May 2023, a total of 17 GIES good practice cases with SAPs originating from diverse geographical, biological and social environments have been identified in 11 provinces of China.
- Multidimensional benefits are generated by GIES for SAP producers and consumers. After scientific assessment, local producers can obtain a QR code for each SAP produced from a scientifically defined geographic area. With the code, consumers can figure out the origin of a specific SAP product, along with the unique features of the product and the quality of the environment where it is produced. The QR code makes it possible to charge premium prices for the SAPs and for local SAPs producer groups to attain higher returns. It also provides strong incentives for local SAPs producers to protect the production environment sustainably.
- The GIES methodology can be widely applied to SAPs, as long as they are associated with unique geographical features, irrespective of agroecological zones, and is proven effective to improve the livelihoods of local communities of SAPs.

1 For more information about open science, please access <https://www.unesco.org/en/open-science>.
 2 Special agricultural products (SAPs) are agricultural products with unique qualities and special characteristics associated with geographical locations, farming practices and cultural heritages.
 3 More information is available at <https://www.fao.org/one-country-one-priority-product/asia-pacific/good-practices/detail/geographical-indications-for-environment-sustainability/en>.

of the quality of certain geographical products and their environment have to date not been codified.

It is important to achieve a balance between economic growth and environmental protection. Quality geographical products can possibly connect effectively two key values, a healthy ecosystem and socioeconomic development. When people understand the nature of such products and the scientific knowledge behind it, they can attain a greater appreciation of the importance of healthy ecosystems and recognize the need to develop protective methodologies for them. Such knowledge forms the basis for improving product quality, output and productivity with increased added value. By connecting producers and consumers in the agricultural value chain, quality geographical products can attain brand recognition and a good market reputation, benefiting the society at large.

Implementation

In 2021, the GIES initiative was launched by IGSNRR/CAS in cooperation with partner institutions. It aims to trace and monitor a product's geographical, ecological environment for consumers and protect the intellectual property for the producers of SAPs and GI products. The approach of GIES is multidisciplinary and participatory through collaborative efforts of multistakeholders and partners. This bottom-up approach complements the procedure for attaining GI, which is a top-down methodology.

Advocating the combination of science, technology, engineering and communication, GIES promotes (1) open science on the geographical information system, remote sensing, big data, internet of things (IoT) technologies of physical and human geography; (2) a standard management of agriculture products; and (3) traceability of the products enabled by IoT.

Traceability links original geographic environment data to the products, communities, companies and consumers. The products and their associated geographical areas that have passed the GIES scientific assessment are referred to as GIES cases. For each GIES case, a traceable QR code is created that contains environmental parameters and data connecting consumers, producers and products, thereby certifying the origin of the products.

The approach of GIES includes the following activities:

(1) Monitoring the ecological environment related to the geographical habitat and product development is conducted using comprehensive geographical science and technology. Information communication and data transmission are also enabled reliably and practically by operationalizing technologies, such as artificial intelligence, IoT, cloud computing and big data.

Physical geographic data, such as air, soil, water, terrain, boundary, land use and natural ecology data, are collected from satellite imaging and field monitoring. By using information communication and data transmission technology, environmental factors related to natural ecology (wind speed and direction, temperature, humidity, air pressure, light, rainfall, soil temperature and moisture, PM2.5 and PM10, vegetation visible light, vegetation, height, phonology, etc) are accurately measured and transmitted.

(2) Product quality is analysed for appearance, sensory characteristics, chemical compositions and nutritional components, among other parameters.

(3) The dataset is managed and published under the auspices of the Global Change Research Data Publishing and Repository (GCdataPR), which is a member of the World Data System (WDS). Intellectual property is protected. The *Digital Journal of Global Change Data Repository* makes all the data available publicly, and relevant research papers are available openly in *The Journal of Global Change Data & Discovery*. Both journals are accessible at <https://www.geodoi.ac.cn/weben/>.

Impact

As of May 2023, a total 17 GIES cases had been prepared and more are expected. Some examples are (1) Yanchi Tan Sheep Arid Grassland Case (Ningxia Hui Autonomous Region, China); (2) Baoshan Arabica Coffee Dry-Hot Valley Case (Yunnan province, China); (3) Rice Permanent Farmland in Lanjia Case (Jilin province, China); (4) Fengxian Burdock Ancient Yellow River Flooding Area Case (Jiangsu province, China); and (5) Yangxian Black Rice Crested Ibis (*Nipponia nippon*) Habitat Case (Shaanxi province, China).

As the cases are openly made available and accessible from the

above-mentioned website, information on the quality of the geographical products can be disseminated transparently to consumers, academia and research experts, policymakers and business community. By preventing information asymmetry, there is greater opportunities for consensus building and implementing concerted efforts that are in harmony with balanced development. The various methodologies applied are also being recorded, so that unified guidelines can be prepared.

The GIES good practice cases have been discussed and promoted in a series of events, including products expos, forums, festivals and training workshops. This effort has generated high demand for GIES products and improved local farmers' livelihoods significantly. More than 600 000 local farmers have increased their income based on the 14 GIES cases during 2021–2022.

Key resources

- Liu, C., Gong, K., Liu, Y. H., Liao, X. H., Wang, Z. B., He, C. C., Luo, H., et al. 2021. An innovative solution on geographical indications for environment & sustainability (GIES). *Journal of Global Change Data & Discovery*, 5(3): 237–248.
- Liu, Y. H. 2021. Action on quality geographical products for environment and sustainability—Keynote speech at GIES Forum of CIFTIS 2021. *Journal of Global Change Data & Discovery*, 5(3): 227–229.

OCOP case studies on GIES good practice cases:

- Geographical Indications Environment & Sustainability (GIES): An innovative initiative to promote scientific research for balanced development (fao.org)
- Development of GI-protected Baoshan Arabica coffee in Xinzhai village, Baoshan city, Yunnan province of China (fao.org)
- Protection of crested ibis (*Nipponia nippon*) habitat with organic black rice in Caoba Village, Yang county, Shaanxi Province of China (fao.org)

For more information:

Regional Knowledge Platform on One Country One Priority Product (OCOP) in Asia and the Pacific

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