

Guidelines for Green and Low-Carbon Consumption at World Heritage Sites

International Bamboo and Rattan Organization (INBAR)



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Cover photo: Bamboo corridor and outdoor deck at National (Chishui) Demonstration Bamboo Industrial Park in Chishui city, Guizhou province. Credit: Li Yanxia.

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About UNESCO

Established in 1984, UNESCO Regional Office for East Asia is one such regional focal point connecting five Northeast Asian countries: The Democratic People's Republic of Korea (DPRK), Japan, Mongolia, the People's Republic of China (PRC) and the Republic of Korea (ROK). Altogether, these countries encompass about 1/5 of the world's population, around 25% of global economic output, and over 5,000 years of rich history and culture. UNESCO Regional Office for East Asia works to find and implement innovative solutions in social, cultural, environmental and economic dimensions, assisting countries to achieve their national development priorities and commitments on the 2030 Agenda for Sustainable Development. It is dedicated to UNESCO's universal mandates in all its fields of competence: education, culture, social and human sciences, natural sciences, and communication and information.

In the five countries it serves, UNESCO Regional Office for East Asia has helped:

- Build capacities of key decision-making institutions;
- Strengthen policies, standards, and practices in UNESCO's areas of work;
- Promote cooperation between countries within and outside the sub-region;
- Make a lasting impact on people's lives.



Workshop held as part of the Bamboo for Carbon Neutrality in Rural Areas Project. Credit: Wang Xianghong.

About INBAR

Established in 1997, the International Bamboo and Rattan Organization (INBAR) is an intergovernmental organization that promotes environmentally sustainable development using bamboo and rattan. INBAR's mission is to improve the well-being of producers and users of bamboo and rattan within the context of a sustainable bamboo and rattan resource base, by consolidating, coordinating and supporting strategic and adaptive research and development.

It is currently made up of 50 Member States across the developing areas of Africa, Asia and the Americas. In addition to its Secretariat Headquarters in China, INBAR has five Regional Offices in Cameroon, Ecuador, Ethiopia, Ghana and India. INBAR was recognized as an Observer to the UN General Assembly in 2017 which makes it possible for INBAR to speak for bamboo and rattan at the UN platforms.

Bamboo, the fast-growing grass plant, and rattan, the spiky climbing palm, can be important nature-based solutions to a number of pressing global challenges, for poverty alleviation, green trade, climate change mitigation and adaptation, resilient construction, plastic substitution and environmental protection.



A vibrant exhibition featuring products created during the Decent Employment Workshop within the Bamboo for Carbon Neutrality in Rural Areas Project. Credit: Wang Xianghong.

WHAT IS GREEN AND LOW-CARBON CONSUMPTION?

Definition

In 2021, the State Council of China issued guidelines for accelerating the development of a green, low-carbon and circular economic development system to promote green ideals in planning, design, investment, construction, production, circulation, livelihoods, and consumption in a holistic way throughout the entire process of the economic development. Efforts should be made to ensure that development is based on the efficient use of resources, strict implementation of environmental protection measures, and effective control of greenhouse gas emissions. China will pursue high-quality development and better protection for the ecological environment in a coordinated way, establish and improve the economic system for green, low-carbon and circular development, and ensure that carbon peaking and carbon neutrality are achieved so as to advance China's green development to a new level.

“Green,” “Low-carbon,” “Circular” and “Sustainable” are now key words for describing the comprehensive green transformation of economic and social development. Residents' consumption includes eight categories: food, tobacco and alcohol; clothing; housing; daily necessities and services; transportation and communication; education, culture and recreation; medical care; and other supplies and services, which cover various aspects of daily life concerning clothing, food, housing, transportation, travel, daily necessities entertainment, and more. Promoting green, low-carbon and sustainable consumption plays an important part in building a green, low-carbon and circular economy.

In 1994, the United Nations Environment Programme (UNEP) defined sustainable consumption as “the use of services and related products, which respond to basic needs and bring a better quality of life while minimizing the use of natural resources and toxic materials as well as the emissions of

waste and pollutants over the life cycle of the service or product so as not to jeopardize the needs of future generations.” In 1987, UK defined green consumption as “not using commodities that endanger the health of consumers and others; not using goods that consume a lot of resources during production, use and disposal; not using commodities that are unnecessarily consumed due to excessive packaging exceeding the value of the commodities themselves, or the short life span; not using commodities derived from rare animals or natural resources; not using commodities that are produced with acts of animal cruelty or unnecessary deprivation; not using commodities that adversely affect other countries, especially developing countries.”

Since 2001, China has been promoting green consumption in many ways, such as encouraging consumers to choose green products that are unpolluted or conducive to public health, calling attention to the collection and proper disposal of waste to avoid environmental pollution, and driving changes in consumption patterns that value nature and health, which underline the importance of environmental protection and promote resources and energy conservation to achieve a convenient, comfortable life and sustainable consumption as well.

Shaping a green mindset and promoting green consumption constitute integral parts in the pursuit of high-quality economic development and are of great significance to achieving the goal of carbon peaking and carbon neutrality.¹ In the “Implementation Plan for Promoting Green Consumption” jointly released by the National Development and Reform Commission of China and other relevant government authorities in 2022, green consumption was defined as the behaviors of various consumers to put green and low-carbon concepts in practice across the entire process of consumption activities.² Green consumption not only includes the purchase of green products, but also involves the recycling of materials, effective use of energy,

¹“Green Consumption for Dual Carbon Goals: Definition, Interaction Mechanism and Suggested Measures”, China Development Gateway, http://cn.chinagate.cn/news/2022-03/10/content_78097759.htm.

²“Implementation Plan for Promoting Green Consumption”, National Development and Reform Commission of China.



A close-up of woven bamboo handicrafts. Credit: Wang Xianghong.



Left: Bamboo woven and carving handicrafts, which are intangible cultural heritage, as gifts or tourist souvenirs. Credit: Li Yanxia. Top right: Bamboo lamps. Credit: Li Yanxia. Bottom right: China Green Product Logo.

protection of the living environment, and wildlife conservation. The international community has widely acknowledged that green consumption goes beyond mere consumption—it covers a broad range of connotations including Reducing pollution and saving resources, reevaluating products for green purchasing, reusing goods multiple times for optimal utilization, recycling waste after sorting and classification, and rescuing nature for a shared world for all.

Low-carbon consumption is an essential part of green consumption and an important measure that countries put in place to address climate change. The term “low carbon economy” was first used in the 2003 British Energy White Paper “Our energy future — creating a low carbon economy.” To contribute to building a low-carbon economy, low-carbon consumption requires efforts to reduce high-carbon consumption and luxury consumption while meeting the needs of residents to improve their quality of life so as to achieve a win-win outcome of higher living standards and lower carbon emissions. In the pattern of low-carbon consumption, consumers should stick to the low-carbon mindset and behave in a scientific, responsible and healthy manner in consumption. In other words, low-carbon consumption helps solve the problem

of unsustainable consumption from the perspective of carbon emission reduction.

In recent years, China has attached great importance to green consumption and issued 101 policy documents related to green life. Among them, 26 documents were issued by the Central Committee of the Communist Party of China and the State Council, mainly including notices, opinions and plans for promoting green consumption. The remaining 75 documents were issued by different ministries and commissions, pinpointing specific measures and actions to implement national decisions. Overall, China’s institutional framework for promoting green consumption has taken shape. In terms of promotional measures, China has proactively spearheaded several green consumption initiatives (e.g. the China Green Product Certification, Energy Conservation Certification, China Ecolabelling Certification, China Environmental Labelling Program, green supply chains, shared bicycles), accumulating valuable experience in fostering green lifestyles and consumption patterns. Meanwhile, the public environmental awareness, engagement and rights protection capacity have significantly improved, and there is growing aspiration for a higher quality of life, which constitute the social foundation for green consumption.

Constraints on green consumption

From the consumer perspective, the following constraints are seen in promoting green consumption:

1

The supply of green products is insufficient. Whether it is green food, energy-saving products, green buildings, public transportation or Environmental Labelling certified products, the scale of production remains small, and thus they are far from becoming mainstream products for daily use. Therefore, economies of scale concerning production of relevant products for sustainable consumption can hardly be achieved.³

2

Consumer income is yet to be increased. Green products have less negative impact on the environment, which is attributed to continuous innovation in manufacturing resources and processes. To this end, manufacturers need to invest a large amount of money. Therefore, high manufacturing costs lead to higher prices of green products.

3

Awareness of green and low-carbon consumption remains relatively weak. To some extent, residents still maintain their long-standing unsustainable consumption habits featuring excessive consumption, extravagance as well as squandering and conspicuous consumption, while healthy, environmentally friendly and moderate consumption habits have not become mainstream in everyday consumption practices. This leads to a serious waste of resources, environmental pollution and ecological degradation. All in all, the concept of green consumption is yet to be deeply planted in the minds and hearts of the people.

4

Policies and measures are inadequate. For example, fiscal and taxation policies cannot be fully implemented, the bidding mechanism is defective, market regulations are lacking, and publicity and promotion efforts are insufficient. Therefore, market players and consumers are not effectively motivated and properly guided for green consumption.

³ "Role of green consumption in promoting high-quality development", Special Policy Study on Green Transition and Sustainable Social Governance, China Council for International Cooperation on Environment and Development (CCICED).

BAMBOO FOR ACHIEVING DUAL CARBON GOALS



Bamboo pavilion at National (Chishui) Demonstration Bamboo Industrial Park in Chishui city, Guizhou province. Credit: Li Yanxia.

Characteristics of bamboo

Bamboo, which belongs to the grass family *Poaceae* and the subfamily *Bambusoideae*, is one of the fastest-growing plants in the world. There are 1642 recorded bamboo species in the world, including 1521 woody species and 121 herbaceous species (Maria Vorontsova, 2017).

China boasts some of the most abundant bamboo resources in the world, ranking first in bamboo species, bamboo forest area, bamboo stock and output. There are 837 bamboo species in China, accounting for 51% of the world's total. Bamboo forest land is widely distributed over 20 provinces in China, such as Fujian, Jiangxi, Hunan, Zhejiang, Sichuan, Guangdong, Guangxi and Anhui, covering an area of 7 million hectares. The output value of

China's bamboo industry has reached RMB 320 billion (approx. USD 44.5 billion).

Bamboo is an important forest resource. It not only produces bamboo culms and shoots as high-quality means of production and subsistence, but also provides multiple ecosystem services including soil conservation, oxygen production, carbon sequestration and carbon sink enhancement, and more. With bamboo's capacity to reduce carbon emissions and boost carbon sequestration, it is estimated that China's bamboo forests contribute to reducing 197 million tons of carbon emissions and sequestering 105 million tons of carbon every year. Moreover, carbon emissions for processing a ton of bamboo culms amount to 30 kilograms, which is 1/216 of steel production, 1/220 of aluminum production and 1/19 of plastic production.⁴ Having

⁴ "Bamboo as a Substitute for Plastic Initiative: A Solution for Global Reduction in Plastic Use," China Economic Herald.

an extensive root system and being highly adaptable, bamboo can effectively help restore degraded land. Bamboo is also a renewable resource that can be harvested every year and used as a substitute for wood, concrete and steel to make a variety of durable products.

Ways in which bamboo can help achieve dual carbon goals

The characteristics of rapid carbon accumulation and efficient carbon storage make bamboo increasingly recognized as a carbon sink and an important natural means to mitigate global warming. In response to climate change, bamboo can help achieve the dual carbon goals in the following ways:

(1) Bamboo forests as carbon sinks (carbon capture)

Bamboo is one of the fastest-growing plants in the world, capable of quickly sequestering carbon and with strong carbon absorption ability. One hectare of Moso bamboo can sequester 5.09 tons of carbon per year, which is 1.46 times that of fir in its fast-growing stage and 1.33 times that of a tropical mountain rainforest. Bamboo absorbs carbon dioxide through photosynthesis and serves as an important carbon sink. The fast growth of bamboo brings more benefits in carbon capture and storage. Overall, each hectare of bamboo forest can sequester 94–392 tons of carbon, which can be further increased through proper management. According to the latest data, China has 420 million tons of bamboo biomass, storing a total amount of 210 million tons of carbon, which accounts for 2.6% of the total forest carbon storage.

(2) Bamboo products as a carbon pool (carbon utilization and carbon storage)

Harvested bamboo can be processed into various durable bamboo products through which carbon storage and carbon utilization are achieved for a certain period of time. Calculating the carbon sequestration capacity based on the amount of carbon stored in bamboo products as carbon pools, each hectare of bamboo forest can fix approximately 70–130 tons of carbon. A life cycle assessment conducted by INBAR on key bamboo products used for construction shows that bamboo products are carbon-negative, with carbon footprints lower than that of eucalyptus plantations and significantly lower than that of concrete, PVC, steel, aluminum and many other building materials. China is the world's largest bamboo-producing country, with

a wide range of bamboo products and industries spanning primary, secondary and tertiary industries. 10 categories of bamboo products are made in China, including bamboo-based panels, building materials, daily necessities, handicrafts, paper pulp, fiber products, charcoal, vinegar, shoots, and leaf extracts. These generate tens of thousands of products widely used in many fields such as construction, transportation, packaging, furniture, decoration, textiles, papermaking, food, medicine, tourism, and health care.

(3) Emission reduction through substitution

Being a natural, green, low-carbon, environmentally friendly, renewable, biodegradable and recyclable resource, bamboo can be used as a substitute for energy- and emissions-intensive materials (e.g., plastics, concrete, steel, etc.), which creates synergies between reducing emissions and pollution. Bamboo products have lower carbon emissions than plastic products across both the production and recycling processes. Therefore, using bamboo as a substitute for plastic will help reduce carbon emissions of plastic products throughout their entire life cycle. For example, the emissions factor for PVC resin is 6.74 tons CO₂ per ton of PVC. Since bamboo products are carbon negative, if 600 million tons of bamboo are used to replace PVC products globally every year, CO₂ emissions will plunge by 4 billion tons. In addition, bamboo products can be naturally degraded after use, making it another reason to use bamboo as a substitute for plastic. Achieving a reduction in emissions will directly contribute to fulfilling global and national carbon neutrality targets.

(4) Development of a bamboo-based circular economy (emission reduction with improved efficiency)

Reducing carbon emissions can also be achieved by improving the efficiency of the bamboo supply chain and developing the circular economy. The bamboo industry chain and supply chain should be established to develop a bamboo-based circular economy and build low-carbon industry parks. Efforts should be made to improve resource efficiency, raise recycling and reuse rates, increase the use of non-fossil energy, and optimize material management and logistics so as to reduce carbon leakage in the process, which can further reduce carbon emissions throughout the entire life cycle and thus contribute to achieving the circular economy.

GREEN AND LOW-CARBON CONSUMPTION AT WORLD HERITAGE SITES

World Heritage Sites are landmarks or areas determined by the United Nations Educational, Scientific and Cultural Organization (UNESCO) World Heritage Committee in accordance with the “Convention Concerning the Protection of the World Cultural and Natural Heritage” (referred to as the “World Heritage Convention”) and inscribed on the UNESCO World Heritage List. Representing unique and irreplaceable treasures that span borders, World Heritage involves cultural relics, historic sites and natural landscapes with outstanding significance and universal value recognized by all human beings, which are categorized into natural heritage, cultural heritage, and mixed cultural and natural heritage. Properties inscribed on the World Heritage List must have “outstanding universal value” for all the peoples of the world, with identifiable and special significance geographically or historically. World Heritage property could be ancient ruins, historical buildings, cities, deserts, forests, islands, lakes, mountains or wilderness.

As of 2023, there are a total of 1199 World Heritage properties, including 933 cultural heritage properties, 227 natural heritage properties, and 39 mixed heritage properties. In terms of the number of World Heritage properties by region, Europe and North America take the first place with 565 properties, followed by Asia and the Pacific which has 289 properties. Among the States Parties, Italy has 59 inscribed properties, making it the country with the most World Heritage properties, and China comes second with 57 properties, including 39 cultural properties, 14 natural properties, 4 mixed properties, and 1 transboundary property. There are 17 World Heritage Sites in China featuring bamboo resources, bamboo elements or bamboo culture, including:

1. Mount Huangshan (1990)
2. Huanglong Scenic and Historic Interest Area (1992)
3. Jiuzhaigou Vally Scenic and Historic Interest Area (1992)
4. Wulingyuan Scenic and Historic Interest Area (1992)
5. Mountain Resort and its Outlying Temples, Chengde (1994)
6. Lushan National Park (1996)
7. Mount Emei Scenic Area, including Leshan Giant Buddha Scenic Area (1996)
8. Classical Gardens of Suzhou (1997, 2000)
9. Summer Palace, and Imperial Garden in Beijing (1998)
10. Mount Wuyi (1999)
11. Mount Qingcheng and the Dujiangyan Irrigation System (2000)
12. Imperial Tombs of the Ming and Qing Dynasties (2000, 2003, 2004)
13. Sichuan Giant Panda Sanctuaries – Wolong, Mt Siguniang and Jiajin Mountains (2006)
14. China Danxia (2010)
15. West Lake Cultural Landscape of Hangzhou (2011)
16. Hubei Shennongjia (2016)
17. Fanjingshan (2018)

Eco-tourism and green consumption at World Heritage Sites

As a form of green consumption, the term “ecotourism” was first introduced by the International Union for Conservation of Nature (IUCN) in 1983 and has been widely recognized around the world. Through development for over two decades, ecotourism has become a new type of tourism that promotes environmental protection, encourages people to go green, and seeks harmony between humans and nature. Ecotourism products are becoming increasingly diversified, with in-depth, experiential and distinctive products becoming more popular.⁵ It has become a major trend to spare no effort in promoting green consumption at World Heritage Sites. Meanwhile, the development of ecotourism has contributed to job creation and income growth. At present, ecotourism has become a new tool for farmers to alleviate poverty and increase income. More importantly, it acts as a new engine to drive economic transformation and upgrading

⁵ “National Ecotourism Development Plan (2016-2025),” National Development and Reform Commission of China.



Bamboo-made hotel supplies Credit: China Economic Herald, photo taken at the INBAR booth during the 2023 China International Fair for Trade in Services.

as well as boost consumption, thus considerably promoting local social and economic development.

In 2019, the mixed cultural and natural heritage properties in China received a total of 388 million tourists, accounting for 6.52% of the country's total tourist arrivals. With tourism at World Heritage Sites continuing to gain popularity, more studies are needed to learn how to manage that in an efficient and sustainable manner.

As defined by the World Tourism Organization (2004), sustainable tourism should: (1) Make optimal use of environmental resources that constitute a key element in tourism development, maintaining essential ecological processes and helping to conserve natural heritage and biodiversity; (2) respect the socio-cultural authenticity of host communities, conserve their built and living cultural heritage and traditional values, and contribute to inter-cultural understanding and tolerance; (3) ensure viable, long-term economic operations, providing socio-economic benefits to all stakeholders that are fairly distributed, including stable employment and income-earning opportunities and social services to host communities, and contributing to poverty alleviation.

Tourist activities at the World Heritage Sites bring impacts to local communities mainly related

to the environment, economy, and social culture. These impacts could be positive or negative. As new concepts such as ecotourism, sustainable tourism and responsible tourism are introduced and increasingly better understood by the public, World Heritage Sites can achieve holistic green and low-carbon development by taking measures to promote a variety of green and low-carbon consumption behaviors.

The first measure is to carry out the Clean Plate Campaign, encouraging tourists not to over-order food in restaurants and to take home unfinished food. The restaurant should offer reasonable portions and half-size servings to avoid waste.

These second is to provide eco-friendly parking lots to facilitate low-carbon development in scenic spots. Efforts should be made to encourage the use of low-carbon or zero-carbon transport, such as public transportation, electric vehicles and bicycles, powering the service facilities with clean energy such as solar energy and wind energy wherever possible, and building charging stations for electric vehicles.

The third measure is to make full use of solar energy and other types of clean energy and promote a low-carbon mindset in hotel operations. Hotels can use more bamboo products such as bamboo plates,



Left: Bamboo pens. Top right: Bamboo speaker. Top bottom: Bags with bamboo handles. Credit: Li Yanxia

cutlery, packaging, toiletries, and more, and tourists are now encouraged to bring their own tableware and toiletries. Such practices will greatly help to reduce the use of single-use plastic products.

The fourth measure is to provide low-carbon services such as paperless ticketing and intelligent and cost-effective transportation to reduce tourists' costs in ticket and travel.⁶

The fifth measure is to avoid using products with excessive packaging.

In addition, tourists can contribute to ecotourism development and green consumption through the following behaviors:

- Do not bring disposable products.
- Take away everything you bring and do not leave litter behind.
- Do not disturb wildlife, and no hunting or picking.

- Do not use open flames.
- Do not disturb the life of local communities.
- Keep quiet and do not use record players or speakers.
- Follow instructions of the local tourism authorities and keep fire safety in mind.
- Organize educational activities to get closer to nature, such as sketching, bird-watching, visiting farms, and playing group games.
- Use reusable containers such as lunch boxes and water bottles, and reduce the use of disposable tissues or plastic tableware.
- Eat more fresh food instead of canned or other packaged food.
- Make food and drinks by yourself whenever possible, such as sandwiches, desserts, juice, tea, etc.

⁶ "Green Consumption in Low-Carbon Tourism," Green China.

Using green products to reduce plastic waste and cut carbon emissions at World Heritage Sites

In 2021, as China's "Targeted Poverty Alleviation" strategy was shifted to "Rural Revitalization" during the 14th Five-Year Plan period, intangible cultural heritage, as a precious cultural resource, began to play an increasingly important role in rural development. Intangible cultural heritage can not only provide opportunities for employment and new businesses so as to retain talents for rural development, but also foster new industries through inheritance and innovation, offering a new path for rural economic and social development. As a fast-growing plant, bamboo can be harvested within a relatively short timeframe and is well known for its high strength and good resilience. Therefore, many research institutes and enterprises have begun to develop and produce bamboo products to replace plastic products, which can contribute to environmental protection while meeting public demand.

Plastics are hard to degrade and seriously pollute the planet. On 7 November 2022, INBAR and China jointly launched the Bamboo as a Substitute for Plastic (BASP) Initiative, seeking to substitute plastic products with green, low-carbon, renewable and biodegradable bamboo products so as to reduce plastic pollution. The BASP Initiative undoubtedly opens a new path for green and low-carbon consumption. In October 2023, China's National Development and Reform Commission, Ministry of Industry and Information Technology, Ministry of Finance and National Forestry and Grassland Administration jointly issued a three-year action plan to promote the use of bamboo as a substitute for plastic. On 7 November 2023, INBAR and China jointly released the Global Action Plan for Bamboo as a Substitute for Plastic (2023–2030), calling for joint efforts in the international community to reduce plastic pollution and address climate change.

To promote green and low-carbon consumption at World Heritage Sites, the following actions can be taken to facilitate the use of bamboo as a substitute for plastic:

Low-carbon and environmentally friendly bamboo materials and products should be used for infrastructure and service facilities at World Heritage Sites wherever possible. For example, outdoor bamboo flooring and bamboo scrimber can be used for pedestrian paths and fences, bamboo panels

can be used for signboards, and woven bamboo products can be made into decorative lampshades, which are not only beautiful and but also environmentally friendly.

Carbon emissions from the construction industry account for 40% of global emissions. For example, production of one ton of cement emits 0.8 tons of CO₂. In contrast, bamboo is an incredible building material for green, low-carbon, and energy-saving construction supplies and also offers a real connection to nature. In many countries such as Ecuador, Viet Nam and Ethiopia, bamboo has been frequently used in the main structure of small public buildings like restaurants. In addition, engineered bamboo can serve many functions, as composite building material or interior and exterior design and renovation material. At scenic spots including World Heritage Sites, bamboo structures can be used in public constructions and facilities or country-style constructions, such as rest stops, seats and parking sheds.

A large amount of single-use plastics is used every year, generating a huge volume of plastic waste and polluting the environment. Apart from macroplastics that are visible to the naked eye, the harm of microplastic particles cannot be underestimated, as they may enter the human body throughout the food chain, threatening human health. In China, nearly 46 billion plastic straws are consumed every year, generating approximately 30,000 tons of plastic waste. In addition, many other disposable plastic products such as plates, cutlery and packaging bags are widely used, causing huge plastic pollution. World Heritage Sites attract a large number of tourists who consume many single-use products in hotels and restaurants. Hence, biodegradable bamboo products should be used as much as possible to reduce the use of single-use plastic products.

Many World Heritage Sites not only have unparalleled and unique natural environment, but also boast a number of intangible cultural heritage elements, especially in the domain of traditional craftsmanship, which can well be transformed into environmentally friendly gifts and souvenirs. For example, creative products, such as crafts using bamboo weaving, bamboo carving, and bamboo engraving skills, all of which are elements inscribed on the List of Intangible Cultural Heritage, are increasingly favored by tourists, as they adopt a function beyond simple holders of cherished memories and also convey cultural values that can be passed from generation to generation.



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