

PRESERVING LI ETHNIC GROUP'S HERITAGE: A STUDY OF "DOUBLE HERITAGE" TRANSFORMATION

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Abstract:

Experiments play a crucial role in high school physics education, providing a solid foundation for establishing concepts and discovering laws in physics. Experimental teaching is an essential component of the physics curriculum, as it aids students in understanding fundamental principles, developing basic skills, and cultivating scientific thinking. Relying solely on textbook knowledge and teacher lectures is insufficient for students to thoroughly grasp and comprehend physics concepts. By incorporating physics experiments, students can effectively integrate theoretical knowledge with practical exploration, facilitating the transformation of textbook knowledge into personal understanding. This article presents a specific simulated apparatus for high school physics velocity experiments, aiming to improve the accuracy and convenience of simulating physics velocity experiments through equipment enhancements.

Keywords: World Heritage, Li Ethnic Group, Traditional Settlements, Cultural Heritage, Tropical Island Tribal Habitats

1. Introduction

2. Overview of Traditional Settlements of Hainan Li Ethnic Group

2.1 The concept of traditional settlements in Li ethnic group

Generally speaking, ethnic settlements refer to ethnic villages as well as relevant production and living facilities with distinct residential characteristics and architectural forms formed by dissimilar ethnic groups as a result of differences in environmental factors, geographical locations, customs and habits, which reflect the spatial morphological characteristics of the geographical distribution of various ethnic groups. The "Hainan Tropical Rainforest and Li ethnic group Traditional Settlements" are predominantly located in the central southern part of Hainan Island, centered around Wuzhi Mountain. The terrain progressively decreases from the central mountainous area to the surrounding areas, forming a circular landform structure. Li ethnic group is an indigenous people on Hainan Island. In accordance with

archaeological materials, it can be inferred that the ancestors of the Li ethnic group settled on Hainan Island 3000 years ago during the Yin and Zhou dynasties, living a primitive matrilineal clan commune. Furthermore, the Li ethnic group is the earliest indigenous people in Hainan, predominantly living in the depths of tropical rainforest and composed of dissimilar dialects, with a history of over 3000 years^[1]. For the time being, Li ethnic group is distributed in Lingshui, Baoting, Qiongzong, Wuzhishan and other counties in Hainan Province, and the rest are scattered in Wanning, Danzhou and other cities and counties in Hainan Province. The ghetto is 17900 square kilometers. In line with the China Statistical Yearbook 2021, the population of Li ethnic groups in China is 1602104.

2.2 The characteristics of traditional settlements in Li ethnic group

2.2.1 The location selection of traditional settlements in Li ethnic group

2.2.1.1 Entering the mountains to avoid the mortal world and living in line with the dangerous terrain

More often than not, the people of Hainan Li ethnic group choose to settle in mountainous and dangerous areas. The location selection of Li ethnic group settlements requires strict safety and confidentiality. To put it another way, their settlements are mostly in the slopes or inter-mountain basins buffered by valleys, and there are dense trees around the village. The surrounding areas of the plain settlement are planted with thorny bamboo, forming a camp called "Li Village".

The long-term secluded life in the mountains has steadily formed a national culture that influences the life of Li ethnic groups. This culture also reflects the worldview and outlook on life of the Li ethnic group. The Li ethnic group has no text, but most of Li brocade describe a basic situation: in the composition, people are centered, surrounded by mountains, rivers, birds, and animals, and surrounded by closed boundaries; The outer boundary is surrounded by dense flower and fruit forests, or layers of dense forests (Fig. 1). This scene vividly depicts the traditional settlement site of the Li ethnic group^[2].



(Source: Photographed by Zheng Xiaoxue) Figure 1: Li brocade

2.2.1.2 Living in a leisurely and peaceful environment, blending with mountains and rivers

In general, the principles for selecting the location of Li ethnic group settlements can be summarized as follows: three proximity, one coolness, and two cleanliness. With regard to "three proximity", the first aspect is to live close to cultivated land. The village site is close to cultivated land for easy labor and production, and miscellaneous grains are planted in the surrounding small hills or slopes. Secondly, it is

close to rivers or streams, which obviously makes it easy to use water sources for irrigation of farmland and daily drinking. In addition, it can catch aquatic species to improve life. Thirdly, it is close to mountains and forests. Villages are generally built at the foot of mountains, which is beneficial for preventing typhoon attacks and drinking more mountain spring water; Backing the mountain is convenient for solving daily fuel and building materials, and can also be used for hunting to meet material and spiritual needs. The term 'one coolness' refers to the high and cool terrain with a certain slope, but does not occupy arable land. This can not only prevent moisture and humidity, but also avoid damage to houses, people, and livestock; Meanwhile, with a slope, it is possible to use rainy days to wash away the dirt and debris on the ground outside the village or in low-lying fields. Furthermore, it can use the landform and terrain to naturally ameliorate the hygiene environment inside the village. The term 'two cleanness' refers to the place where one lives, which should be 'clean'. Places where people have died or have bad legends cannot be taken into consideration. Meanwhile, the presence of wild animals should be minimized to avoid damage to crops resulted from wild pigs, monkeys, etc. The principle of selecting the location of Li ethnic group villages meets the needs of both production and living^[3].

2.2.1.3 Surrounded by trees, ecologically and naturally

The Li ethnic group settlements are generally located near mountains, rivers, and forests, mostly surrounded by tall broad-leaved forests and shrub-lands. The village's predominant fence houses are built along the slope, and the village is concentrated on the half slope. The paddy fields are also terraced along the slope. Surrounded by dense forests and abundant water sources, it meets the needs of self-sufficient production.

2.2.2 The Spatial Form of Traditional Settlements in Li Ethnic Group

The traditional settlements in Li ethnic group are comparatively simple in the aspect of composition elements. To be specific, these elements are primarily manifested as clear settlement boundaries formed by mountains, forests, streams, and rivers. Moreover, the buildings within the boundaries are primarily residential boat-shaped houses, and their peripheral layout is surrounded by village forests, barns, cattle pens, pig houses, and squatters. There are vegetable fields, rice fields and grave mounds in the periphery of the settlement, and the temple of the god of earth is set at the entrance of the settlement. The traditional settlement of Li ethnic group generally exhibits clear boundaries and comparatively free internal space^[4].

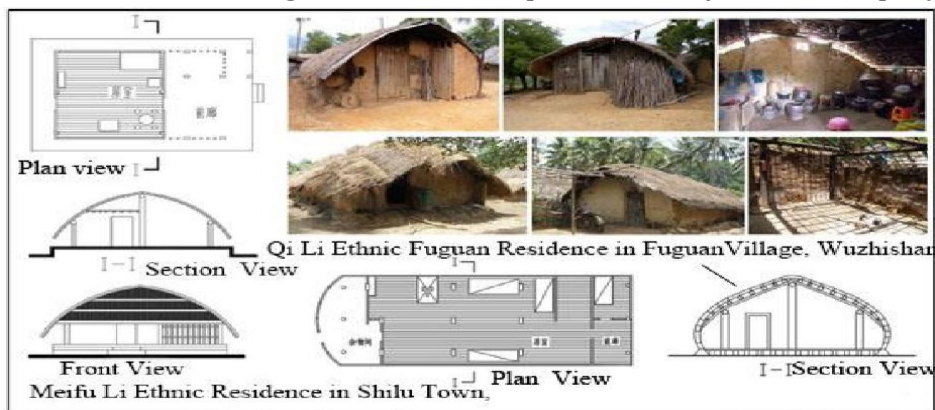
2.2.3 The Traditional Architectural Space of Li Ethnic Group

2.2.3.1 The basic composition of traditional architecture in Li ethnic group

The traditional architectural space of Li ethnic group is generally composed of three primary parts: the front eaves gallery (or vestibule), the living room, and the back eaves gallery. Specifically, a pavilion-style Li ethnic group building usually has a "courtyard" in front, which primarily serves as a transportation and transition platform from the ground to the interior. Besides, this kind of building can also as a space for daily drying of grains, household chores, and meeting and chatting with guests. In contrast, ground dwelling houses have a front eaves gallery at the entrance of the front gable, which predominantly serves as a communication space between indoor and outdoor spaces, as well as a space for leisure,

entertainment, and work. The rear eaves gallery is often used for animal husbandry, stacking debris, and other functions. As a consequence, the traditional architectural functional space of Li ethnic group is simple, only meeting basic functions such as living, sleeping, cooking, storage, and animal husbandry, and does not have functions such as toilets and showers^[5].

Apart from that, the traditional buildings of the Li ethnic group are comparatively closed, which merely depends on ventilation and lighting between door leaves and walls. Moreover, the facade design of the building is simple, without any decoration, with a square body shape, predominantly consisting of long rectangular shapes and less concave and convex shapes. Despite the fact that traditional buildings in the Li ethnic group are mostly tied with thatch and natural wood, they are closely integrated with the natural environment, which gives rise to a simple and sturdy overall shape (Fig. 2).



(Source: Drawn by Yang Dinghai)

Figure 2: Basic composition of traditional architecture in Li ethnic group

2.2.3.2 Types of traditional architecture in Li ethnic group

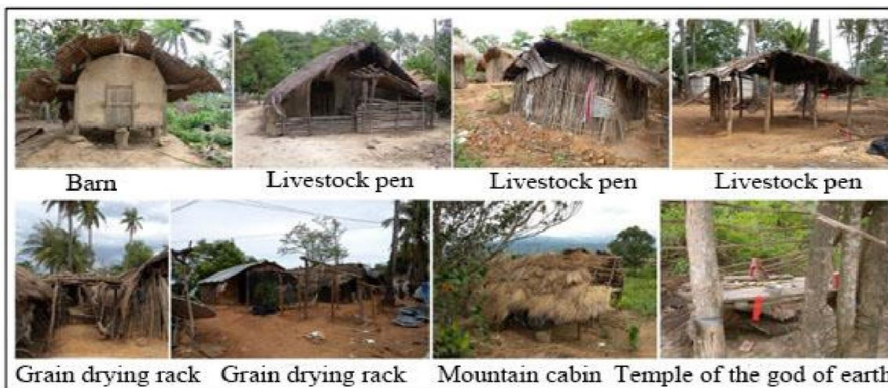
Generally speaking, Li ethnic group traditional buildings can be divided into three types on the basis of their functions, namely residential buildings, long boudoirs, and auxiliary buildings.

Traditional residential buildings: Li ethnic group includes two types of traditional residential buildings: boat-shaped houses and gold-character-shaped houses. To be specific, a boat-shaped house opens on a gable and enters longitudinally, as the roof is shaped like a half barrel, resembling a boat canopy. In comparison, a gold-character-shaped house is a building with raised eaves at the front and back, with the eaves opening and entering vertically. The roof is covered in a Han-style gold-character-shaped slope^[6].

Long boudoir: The Li ethnic group has a traditional custom where children move to "Long boudoir" when they are thirteen or four years old and do not live with their parents. The big 'Long Boudoir' lives in a small house for three to five people, while the small one only lives in one person. It is a small house where young men and women from the Li ethnic group meet and settle in love. The style of the "Long boudoir" is similar to that of a house, but it is much smaller. The interior is generally not separated, with only a small door open, and one can only bend down to enter.

Auxiliary rooms:

- a) Barns: Generally, they are concentrated or built separately in a dry and sunny area on the outskirts of the village, one household at a time, without interfering with each other, in order to prevent fire and protect food safety (Fig.3).
- b) Temple of the god of earth: It is predominantly the god of the town and village. It is mostly piled up under the dense trees at the entrance of the village with five unprocessed stones: a flat stone slab as the floor, three irregular stones as the wall, and a piece of "temple top" on the top. In the center of the temple is an idol shaped stone that looks smooth, wide at the bottom and narrow at the top^[7]. (Fig.3).
- c) Grain drying fields and racks: Multiple or individual families use branches or bamboo sheets to build a fence around a public space or their own housing to dry rice. Grain drying racks are installed next to the grain drying fields to dry rice. The grain drying rack uses wooden stick columns and is reinforced with horizontal frames to form a network (Fig.3).
- d) Livestock pens: Livestock pens are mostly open air and also have thatched roofs. Larger livestock pens are built with wooden stakes, and then fenced with thinner branches or thick vines. The entrance is made of sturdy wooden braces as corner posts, and several movable crossbars are installed as plugs. Simply use vines to weave thin wooden sticks together to form a retaining wall (Fig. 3).
- e) Mountain cabin: Li ethnic group villages are mostly located at the bottom of mountains and valleys, with less and more scattered farmland, generally far from the village. For the convenience of farming and the care of crops, Li people built a simple elevated small thatched cottage in the park as a temporary place for patrolling, resting, dining, and driving away wild animals, called mountain cabin (Fig.3).



(Source: Photographed by Yang Dinghai)

Figure 3: Auxiliary Housing of Li Ethnic Group

2.2.4 The Characteristics of Li Ethnic Group's Traditional Architecture

- a) Low and enclosed space. In order to adapt to the warm, humid and insect infested mountain environment, the people of Li ethnic group use a closed indoor environment to resist the cold at night and the invasion of insects and animals. By reinforcing gas flow through the baking of fire, their residence can be kept dry indoors. The boat-shaped house of Li ethnic group is made of materials such as thatch, bamboo sticks, wooden sticks, and clay, with natural branches and binding as the primary connection process. This has determined the low building space and limited usage area with regard to structure. The Li ethnic group

progressively retreats into mountainous areas under the interference of the Han ethnic group. The long-term remote living environment and cultural characteristics of external vigilance have created the enclosed space characteristics of the boat-shaped house.

b) Mixed functionality. Most traditional boat-shaped houses in Li ethnic groups do not have a clear definition of indoor space, generally accommodating sleep, cooking, reception, and storage of miscellaneous items in the same indoor space.

3. The Value of Traditional Settlements of Hainan Li Ethnic Group

3.1 Historical and cultural values

In a sense, traditional settlements on Hainan Island are classic cases and epitomes that reflect Hainan's immigrant culture and local culture. Here, we can not only learn about the settlement space form and boat-shaped house architecture of the Li ethnic group, which has lasted for thousands of years, but also explore the migration history of the Han ethnic group's arduous entry into Hainan Island. Aside from that, we can also probe into the reasons for the evolution of settlement spatial forms after the Fujian, Guangdong population enters Hainan Island. The traditional settlement and architectural spatial form of the "authentic and simple" Li ethnic group on Hainan Island contain abundant historical and cultural information, which has profound research value^[8].

3.2 Architectural and cultural value

The traditional settlement of Li ethnic group is deeply imprinted with its unique development history and traditional culture. Moreover, it's a classic case and microcosm reflecting the culture of Hainan Li ethnic group. In times of low social productivity and extremely difficult basic living security, the ancestors of the Hainan Li ethnic group were able to adapt to local conditions and use materials to build traditional residential buildings that were sheltered from wind and rain, insulated from the cold, prevented from malaria and pests, resisted the invasion of wild animals, and adapted to the production and living needs of the ethnic society. Meanwhile, they also had strong ethnic characteristics, which adequately demonstrated the labor wisdom of the people of the Hainan Li ethnic group.

First and foremost, it is practical in architecture. The Li ethnic group residential buildings have both a unified and overall basic form, and are flexible and diverse, all of which exist for real life. The applicability of their functions, the rationality of their structure, the economy of their materials, and the harmony with the environment converge into a true expression of national and local characteristics. Their buildings are full of vitality and nurture emotions. The architectural character is the true expression of the realistic life attitude and values of the Li ethnic group, which is sincere, enthusiastic, kind, and simple.

Apart from that, it has abundant styles and complete functions. As real buildings, Li ethnic group residential buildings are concentrated in functionality, organic, and emotional aspects, and are highly personalized. Li ethnic group has rich traditional architectural styles. Aside from conventional housing, there are also boudoirs, barns, temple of the god of earth, corrals, etc. The various styles of residential buildings in the Hainan Li ethnic group have been created through long-term social production and life practices. Furthermore, These kinds of residential buildings are also a comprehensive result of the combined

influence and constraints of social and historical conditions and natural environment. Boat-shaped houses are a type of Li ethnic group residential architecture that is popular in the Li ethnic group residential areas of Hainan. To commemorate the ancestors of the Li ethnic group who crossed the sea, Li ethnic group compatriots built houses in the shape of boats, which are commonly referred to as boat-shaped houses on account of their resemblance to canopies. Li ethnic group boat-shaped houses resist typhoons; The overhead structure can also prevent moisture, malaria, and rain in terms of functions; The thatched roof also has satisfactory moisture-proof and thermal insulation functions; Besides, local materials can be obtained freely. Moreover, demolition and construction are also particularly convenient.

3.3 Ecological and cultural value

It is noteworthy that each traditional settlement of the Li ethnic group expresses the understanding and profound insights of the regional population towards settlement. As evidently illustrated in their settlement architecture, the ancestors of the Li ethnic group believed that humans and nature are closely connected, especially their Natural philosophy of "poetically inhabiting". Thus, the people of the Li ethnic group choose to build villages in sunny and south-facing areas on mountain slopes and valleys, adapting to the terrain and integrating the village with nature to form a harmonious ecological environment^[9].

3.4 Tourism and economic value

The traditional settlements of the Hainan Li ethnic group display conspicuous characteristics of "authenticity and simplicity". For the traditional settlement and architectural spatial form of the Hainan Li ethnic group, its "authenticity and simplicity" represents the special historical and scientific research value of the remote region, as well as the rich and diverse humanistic and artistic value. A multitude of traditional settlements scattered throughout Hainan Island are representative of regional "genetic" diversity. These settlements also attract distinct types of tourists with their historical relics, simple local culture, beautiful rural scenery, and cultural contrast with modern society. It is particularly worth mentioning that some traditional settlements with clear characteristics often become targets for commercial development. Aside from that, traditional landscapes with humanistic functions are carriers of inheriting traditional culture. Reasonable development of humanistic resources can accelerate the development of tourism.

4. The Protection Principles and Tourism Transformation of Traditional Settlements in Hainan Li Ethnic Group

4.1 Principles for the construction of the traditional settlement protection system of Hainan Li ethnic group

4.1.1 The principle of overall protection

To some extent, the protection of settlements can be understood as the overall protection process of traditional culture. For one thing, they not only represent the development context of a specific historical region, but also have the architectural space environment reflecting the historical characteristics of the region. Overall, these settlements have a tremendously complete historical style and are existing witnesses of the history of this specific region. For another, the overall protection view is to protect the historical components of settlements as a complete system in accordance with the Charter. This is owing to a

fundamental fact that settlements not only include material landscapes, but also cultural, customary, and other cultural landscapes. Hence, the principle of overall protection must be strictly adhered to. To put it another way, we need to protect not only the buildings in the settlement, but also the natural environment around the settlement and the original living conditions of the residents. Only by starting from the original spatial form of the settlement and protecting pivotal factors such as landscape materials, node elements, spatial location, and spatial texture, can the settlement be protected comprehensively and systematically.

4.1.2 The principle of "authenticity"

We must point out that adhering to the principle of "authenticity" is the primary principle, as it involves the historical value of settlements. The "authenticity" not only involves historical material heritage such as traditional architecture in settlements, but also extends to multiple aspects such as natural and artificial environments, art and technology, religion and tradition. The principle of authenticity is an internationally recognized basic condition for the evaluation, protection, and control of cultural heritage, and is a pivotal principle for verifying world cultural heritage.

4.1.3 The principle of "continuity"

The ultimate goal of settlement protection is to provide a favorable environment and meet the needs of modern life while protecting the real historical heritage, making the settlement a vibrant organism. Furthermore, settlements are not only comfortable to live in, but also valuable intangible cultural assets such as value composition, production mode, organizational composition, interpersonal communication, customs and habits can be perfectly preserved. It should be noted that such protection work cannot be completed in a short period of time. Thus, the principle of continuous protection must be adhered to throughout the time. What's more, the protection of settlements ultimately rests with the local people themselves. In other words, they should form a spontaneous protection and management system. The best protection for settlements is to vigorously develop the economy of towns and villages, continuously ameliorate people's living environment, so as to achieve the coexistence of settlement protection and development.

4.1.4 The principle of ecology

The ecological principle requires protecting the natural environment from or minimizing human interference. As a consequence, to effectively protect the ecological environment of the original site, we should first adhere to the originality and naturalness of the settlement landscape, then protect the natural landscape such as mountains and water from being damaged. For another, it's strongly recommended that the local government avoid environmental pollution triggered by tourism. The ecological principle is not only applicable to the environmental ecological protection, but also includes the facilities that primarily exist in the natural and semi-natural states in the settlement planning and construction. This principle adequately utilizes local materials, lessens the composition of artificial landscapes, and emphasizes the model of harmonious coexistence between traditional settlement culture and nature.

4.1.5 The principle of cultural protection

The protection of traditional settlements in the Li ethnic group should not only concentrate on the protection of material entities, but also on cultural protection and restoration, which is intended to restore the historical and cultural traditions of the settlement, and make the settlement a part of humanistic education. While valuing the protection of settlement culture, we should simultaneously heighten the quality of residents. Under such circumstance, everyone has the excellent quality to maintain the architectural style. Meanwhile, depending on cultural learning to reinforce residents' sense of regional identity, cultural resource management can not only penetrate into all aspects of simple life, but also exist in our real life for a long time. To go a step further, it will be preferable to continue and perpetuate the development context of settlements that follow the millennium farming culture, religious customs or valuable traditional festivals, folk art and other settlements. At the methodological level, we can elevate the quality of residents through multiple methods such as historical education, folk culture education, while also allowing tourists to experience it personally^[10].

4.2 The tourism transformation of traditional settlements in Hainan Li ethnic group

4.2.1 Establish creative cultural landscapes and introduce local culture and resources.

In some sense, settlements represent a geographical landscape, a way of life, and a local culture. As a result, it is essential to sufficiently inherit and carry forward the cultural endowment of the traditional Li ethnic group settlement in Hainan, guide new industries that adapt to modern life through an "experiential" cultural tourism approach, heighten the functional chain of cultural functional industries, and build Li ethnic group traditional villages with a strong local cultural atmosphere. In terms of protecting and developing the traditional settlements of the Hainan Li ethnic group, it is also imperative to deeply explore the cultural connotations of the traditional settlements, so as to sufficiently stimulate the strong local memory and emotions of the local residents. Meanwhile, it is recommended to concentrate on Li ethnic group clan culture, ecological culture, folk culture, etc., and establish creative cultural landscapes. In such case, visitors can understand the local area through cultural experiences.

4.2.2 With the support of the government, promoting the repair and innovation of boat-shaped houses through the tourism industry.

Li ethnic group boat-shaped houses have rich resource value and are a valuable tourism resource. Nevertheless, in modern construction and urban development, boat-shaped houses have been extensively demolished or destroyed, which gives rise to a plunge in their number. The craftsmanship of boat-shaped houses construction is also facing the dilemma of being lost. In view of these phenomena, the government should vigorously invest special funds to support and use the idea of "promoting protection through development, and facilitating development through protection" to reasonably protect and develop. Under such circumstance, boat-shaped houses can be passed down from generation to generation.

4.2.3 Guide and standardize the cultural tourism industry, and take the contradiction between protection and development as the driving force.

In some degree, the traditional settlement of Hainan Li ethnic group is an organic combination of man and nature, a product of material culture and non-material culture, which includes the local farming culture, residential culture, catering culture, clan culture and other Hainan folk cultures. In the development of Hainan's cultural industry, it is a unique market potential resource. It's noteworthy that the tourism industry led by cultural values can drive and stimulate the development of related cultural and peripheral industries, which can provide a significant driving force for local economic development.

For instance, the publication of books and videos that reflect the cultural spirit and historical memory of the Hainan Li ethnic group, or relevant cultural industries such as artistic performances that showcase the folk customs of the Li ethnic group, or associated cultural supporting leisure services. Meanwhile, the development and growth of cultural tourism products have also provided a new direction for the industrial structure adjustment of the Li ethnic group settlement. Hence, we should feasibly combine the historical and cultural resource management of Hainan Li ethnic group, then turn the contradiction between protection and development as the driving force, guide and standardize the local cultural tourism industry, foster and support the development of cultural industry. Under such circumstance, we can not only make it a systematic cultural tourism market, but also make enormous contribution to the local social, cultural, and economic development.

5. Conclusion

The Li are the indigenous people of Hainan. The traditional settlement of the Li ethnic group in Hainan shows the morphological characteristics of the early Li society, and is a typical representative of the island tribal settlement in the tropical region. The traditional settlement of the Li ethnic group in Hainan is a product of a specific historical environment, carrying the unique survival emotions of the Li people, and has considerable tourism economic value in addition to unique historical and cultural value, architectural cultural value and ecological cultural value. It should be protected according to the principles of integrity, authenticity, sustainability and ecology. At the same time, it is necessary to achieve living inheritance and organic use. This is of great significance to the declaration of the world's "double heritage", as well as the protection and inheritance of Li culture, as well as the transformation and high-quality development of tourism.

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