

SUSTAINING DA SHUHUA: INTEGRATING INTANGIBLE HERITAGE INTO SUSTAINABLE TOURISM IN YU COUNTY, CHINA

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□. Introduction

Tourism plays a crucial role in preserving and revitalizing intangible cultural heritage (ICH) while contributing to sustainable economic growth (Maruyama et al., 2015). This paper centers on Da Shuhua, an ancient folk performance in Yu County, China, as a model for integrating ICH into sustainable tourism. By aligning this tradition with the United Nations Sustainable Development Goal (SDG) 12.B, this paper explores the opportunities and challenges of cultural preservation in the face of increasing tourism demand.

In recent decades, the concept of sustainability has gained significant momentum, driven by growing global concerns over resource depletion, environmental degradation, and socio-cultural disruptions (Moren T. Stone et al., 2019). Within the framework of the United Nations' 2030 Agenda for Sustainable Development, Sustainable Development Goal (SDG) 12—Responsible Consumption and Production—provides a strategic basis for promoting more equitable and efficient ways of producing and consuming goods and services. One of the key sub-goals of SDG 12 is Target 12.B. It calls for the development and implementation of tools to monitor sustainable tourism, ensuring that tourism-related activities contribute to local economies while protecting cultural heritage and the environment (One Planet Network [OPN], n.d.).

Recently, sustainable tourism has attracted more attention in both academic research and policy discussions. This reflects the increasing global emphasis on sustainability, local heritage, and community. The need for responsible consumption and production patterns is emphasized in Sustainable Development Goal (SDG) 12, which was adopted in the 2030 Agenda for Sustainable Development (UN, 2023). Under this framework, Goal 12.B specifically highlights the importance of developing and implementing tools to monitor the sustainability of tourism, measure its economic and environmental impacts, and promote cultural heritage and local products (UN, 2021). This is consistent with the efforts to integrate intangible cultural heritage into tourism planning to ensure cultural continuity, preserve living traditions, and foster local pride.

ICH consists of the practices, representations, and expressions that communities consider vital to their collective identity and social cohesion (Kurin et al., 2004). One of the most visually stunning examples of such heritage in China is Da Shuhua, a folk performance from Yu County in

Hebei Province. The show involves throwing molten iron, usually obtained from waste iron scraps, onto cold walls to create breathtaking showers of sparks (Bai et al., 2019). Traditionally associated with festive occasions, especially the Lunar New Year, Da Shuhua combines craftsmanship, ritual, and shared stories that form local memories (Nuangquan, 2015).

Da Shuhua is not just an artistic show but also a symbol of local identity, deeply rooted in the community's memory. Over time, tourism has played an important role in promoting Da Shuhua locally. However, if not managed within a clear sustainable development framework, the influx of tourists may lead to the commodification of traditions or put pressure on local resources. This paper explores how to sustainably develop and pass on Da Shuhua from one generation to the next in Yu County (Wang et al., 2024). It takes the perspective of local memory, emphasizing the continuity of intangible culture through the intergenerational transfer of knowledge, skills, and community narratives. The core of the discussion is SDG 12.B, which emphasizes the need to develop and implement monitoring tools to measure the environmental, economic, and socio-cultural aspects of tourism.

In the modern era, due to the rise of cultural tourism, this ancient performance faces both opportunities and challenges (Wang et al., 2024). It is in line with the global sustainable development agenda, especially within SDG 12 (Responsible Consumption and Production). More specifically, Target 12.B extends the focus of SDG 12 by emphasizing the development and implementation of tools to monitor the impacts of sustainable development for sustainable tourism. That is, it involves mechanisms to track how tourism affects local economies, environmental health, and cultural integrity ("Sustainable development goal 12: Target 12.B.," n.d.).

According to Indicator 12.b.1, implementing standard accounting tools to monitor the economic and environmental dimensions of tourism is crucial. This ensures that intangible heritage practices like Da Shuhua can achieve positive results, such as job creation, cultural revitalization, and community empowerment, without sacrificing authenticity or ecological well-being.

Drawing on data from the UN SDGs database, insights from the One Planet Network's sustainable tourism program, and metrics shown in the SDG Index Dashboards, this paper explores the complexities of preserving Da Shuhua in the context of Target 12.B. By assessing the challenges in intergenerational transmission, cultural commodification, and institutional support, the paper outlines strategic ways to implement robust monitoring tools that balance cultural continuity, environmental management, and tourism-driven economic opportunities.

□. Challenges

Da Shuhua faces many challenges in integrating into sustainable tourism. These include threats to cultural authenticity, environmental pressures, and insufficient intergenerational knowledge transmission (Wang et al., 2024). These issues are made worse by the increasing tourist demand and the risk of over-commercialization, which may lead to the degradation of both the tradition and the environment.

2.1 Decline in Intergenerational Transmission

2.1.1 Eroding Master-Apprentice Relationships

The survival of Da Shuhua depends on the master-apprentice model. Through this model, new practitioners learn complex skills, such as heating scrap iron to the right temperature, throwing molten metal at the right time, and ensuring the safety of the crowd. However, rural

out-migration reduces the number of local young people willing to engage in this demanding craft (Nuangquan, 2015). As a result, older artisans have few successors to teach, putting the continuity of the performance at risk. Besides techniques, the symbolic and spiritual aspects of Da Shuhua, which are related to harvest celebrations, ancestor worship, or community rites, may fade if not passed on consistently.

2.1.2 Displacement of Local Memory

Local memory embodies the emotions, beliefs, and intergenerational stories related to Da Shuhua. When fewer young people participate, they not only miss out on a show but also lose an important part of Yu County's cultural identity (Bai et al., 2019). If tourism interest in Da Shuhua grows without corresponding efforts to preserve this “invisible heritage,” the performance may turn into a purely visual show, losing its deeper community-related meaning.

2.2 Economic Pressures and the Need for Monitoring Tools

2.2.1 Risk of Over-Commercialization

The beautiful molten sparks of Da Shuhua inevitably attract tourists, which encourages more frequent or large-scale Da Shuhua events. Although this can bring income to local communities, if the performances are mainly for profit rather than community celebrations, there is a risk of cultural dilution (Cohen et al., 2009). Target 12.B emphasizes the need to monitor such impacts. It ensures that sustainable tourism metrics not only consider economic gains but also take into account the intangible cultural costs when performances lose their authenticity.

2.2.2 Measuring Environmental Footprints and Resource Use

Traditionally, Da Shuhua uses waste iron scraps, which is in line with the concept of responsible consumption (Bai et al., 2019). However, if tourist demand surges, it may cause unnecessary resource consumption or unsafe sourcing practices. Implementing standard accounting tools (Indicator 12.b.1) allows local stakeholders to assess the total iron usage, energy consumption, and emissions. This ensures that the increase in tourism does not turn the performance into an environmentally harmful activity.

2.3 Limited Institutional and Policy Support

2.3.1 Inadequate Funding for Monitoring Mechanisms

Although China's cultural heritage policies emphasize intangible heritage protection, the creation and maintenance of systematic monitoring frameworks, including data collection on tourist arrivals, local income distribution, and environmental effects, often lack local budget support. Without targeted funding or government technical assistance, communities find it difficult to comprehensively measure and manage tourism impacts as required by Target 12.B.

2.3.2 Fragmented Governance

Local governments usually prioritize infrastructure and industry development over intangible heritage protection. Cultural and tourism bureaus, as well as environmental agencies, do not always coordinate effectively, resulting in inconsistent strategies. This fragmentation makes it difficult to create cross-sectoral accounting tools that can capture how tourism interacts with environmental health, economic growth, and cultural preservation.

2.4 Safety and Environmental Concerns

2.4.1 Performer and Spectator Risks

Da Shuhua involves extreme heat and the handling of molten iron, so strict safety protocols are needed, such as protective gear, controlled performance spaces, and sufficient distance for

spectators (Nuangquan, 2015). If performances are too frequent, in venues not suitable for crowds, or without standardized risk assessments, the increasing number of tourists will increase safety risks.

2.4.2 Environmental Management

Although Da Shuhua is relatively environmentally friendly because it uses recycled iron, if performed repeatedly, it may still produce concentrated residual slag, emissions, or noise pollution (J. Huang, 2021). Monitoring and reducing these effects require indicator-based evaluation. For example, noting changes in local air quality and residue disposal methods. Data from these assessments can guide improvements in furnace design or venue setup to minimize ecological disruption.

III. Way Forward—Strategies for Integrating Da Shuhua into Sustainable Tourism

To integrate Da Shuhua with the core principles of sustainable tourism, it is essential to adopt strategies that protect its unique cultural essence while ensuring environmental protection and fair economic benefits. The following recommendations focus on comprehensive monitoring, targeted educational measures, and fair revenue-sharing mechanisms, which together can safeguard the heritage and the well-being of the community related to Da Shuhua.

3.1 Reinforcing Intergenerational Transmission

The long-term cultural sustainability of Da Shuhua depends on maintaining strong intergenerational connections. Concerted efforts to engage and train younger generations are crucial for preserving the technical and spiritual aspects of the performance.

3.1.1 Structured Apprenticeship Programs

Local authorities, cultural bureaus, and community leaders can work together to formalize apprenticeship programs. These programs should focus not only on the technical aspects of Da Shuhua but also on its cultural and spiritual dimensions. Offering stipends, formal certifications, and mentorship opportunities can help institutionalize traditional knowledge and arouse the interest of young people.

3.1.2 In-School Educational Integration

Incorporating Da Shuhua content into primary and secondary school curricula can help students develop an early awareness of this unique cultural form. By integrating it into broader lessons on sustainability and community identity, students can understand the close relationship between heritage preservation and responsible resource use.

3.1.3 Digital Documentation

Comprehensive digital archives, including video tutorials, interviews with senior artisans, and online repositories, can ensure that knowledge is transmitted intact even in the face of demographic changes. Future practitioners, researchers, and community members can easily access these materials, thus ensuring the continuity of Da Shuhua.

3.2 Deploying Tools to Monitor Sustainable Tourism (Target 12.B)

Effectively implementing Target 12.B of the Sustainable Development Goals requires strict tools to assess the economic, environmental, and cultural impacts of tourism. Consistent data collection and analysis can ensure that Da Shuhua meets broader sustainability targets.

3.2.1 Economic Monitoring

Revenue Tracking: Use standardized accounting systems to record income from ticket sales, merchandise, and local hospitality services. This can clarify how tourism-related funds are distributed among performers and the wider community.

Employment Data: Track newly created jobs (such as guides, craftspeople, and hospitality staff) to verify that tourism contributes to meaningful local economic empowerment.

3.2.2 Environmental Indicators

Resource Usage: Document the amount of scrap iron and energy consumed per performance. Evaluating changes in these metrics over time can show whether efficiency is improving or if overuse is occurring.

Emissions and Waste: Measure air particulates, slag disposal, and other forms of waste, and correlate these data with performance frequency. Evidence-based insights can then guide scheduling or technological upgrades to minimize environmental harm.

3.2.3 Cultural Integrity Indices

Performance Authenticity: Assess the views of artisans, local residents, and attendees to determine whether Da Shuhua remains true to its traditional roots.

Seasonal and Festive Alignment: Track how often Da Shuhua performances coincide with traditional festivals as opposed to purely commercial events. This can show any changes in cultural authenticity over time.

3.3 Fostering Sustainable Tourism

Based on the One Planet Network's Sustainable Tourism Programme, a unified management framework can preserve the essence of Da Shuhua while preventing economic or market distortions.

3.3.1 Culturally Appropriate Calendars

Coordinating Da Shuhua performances with major local festivals can help maintain the ritual significance of the tradition. At the same time, indicator-based tracking (such as performance frequency during festival seasons) can show whether the practice is still truly integrated into community life.

3.3.2 Transparent Benefit-Sharing

Adopting standardized monitoring tools as per Indicator 12.b.1 ensures that local stakeholders clearly understand how tourism revenue is allocated. Equitable profit distribution, which supports artisans, funds community initiatives, and sustains cultural events, can reduce the risk of exploitative commercialization.

3.3.3 Visitor Education

Before each performance, short educational segments or exhibits can provide background on the historical origins of Da Shuhua, highlight its resource-conscious features (such as using scrap iron), and emphasize respectful visitor behavior. Such informed participation can enhance the cultural value of the tourist experience and encourage collective protection.

3.4 Enhancing Policy and Institutional Support

Robust policy measures and institutional involvement can support the long-term development of Da Shuhua within a broader framework of cultural and environmental governance. Public agencies, private entities, and local communities need to work together to ensure effective supervision and implementation.

3.4.1 Cross-Sector Collaborations

Local policy frameworks should unite tourism offices, environmental agencies, and cultural departments under common goals, such as reducing emissions or increasing the number of trained artisans. A multi-stakeholder task force can define performance indicators and produce integrated progress reports to guide continuous improvements.

3.4.2 Funding for Monitoring Technology

Establishing reliable monitoring systems, including digital platforms for data collection and environmental sensors, requires continuous investment in both hardware and training. Government grants or public-private partnerships can fund these needs, enabling local communities to maintain strict and transparent tourism supervision.

3.4.3 Periodic Evaluations

Regular evaluations, conducted by academic institutions or reliable third parties, can verify data accuracy, assess cultural authenticity, and measure environmental outcomes. Publishing these findings in accessible formats can promote accountability and build community trust in sustainable tourism processes.

3.5 Upgrading Safety Measures and Environmental Management

Integrating modern safety protocols and environmental protection measures is essential for the long-term survival of Da Shuhua. Reasonable improvements can ensure a balance between tradition and responsible practice without sacrificing authenticity.

3.5.1 Modernized Safety Protocols

Although the rustic charm of Da Shuhua is an important part of its appeal, reasonable updates, such as heat-resistant clothing for performers, strategic spectator barriers, and on-site fire suppression systems, can significantly reduce risks. Tracking accident data can provide continuous feedback for safety improvements without affecting the visual effect of the performance.

3.5.2 Sustainable Resource Usage

Optimizing furnace technology, improving ventilation, and using cleaner energy sources can strengthen the resource-conscious design of Da Shuhua. Real-time emission monitoring allows organizers to meet environmental standards and avoid overburdening local ecosystems.

3.6 Leveraging Digital Tools for Broader Dissemination

Strategically using digital platforms can expand the influence of Da Shuhua while reducing the need for frequent on-site performances. This approach balances heritage promotion and resource efficiency.

3.6.1 Virtual Showcases & E-Learning

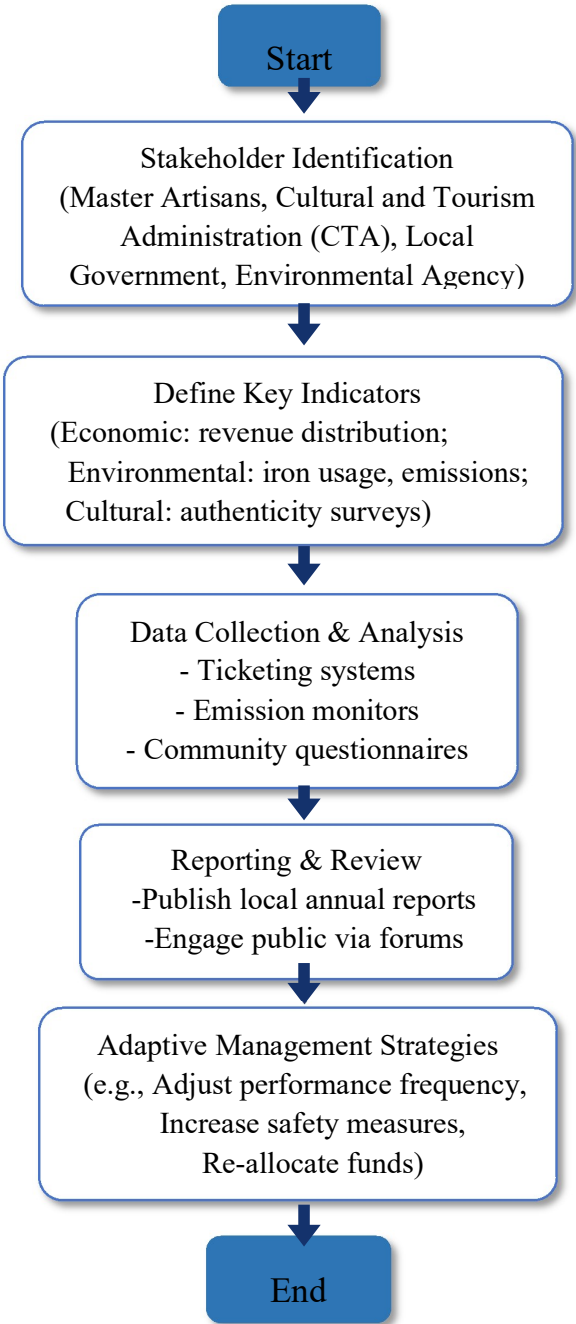
High-resolution video recordings, live broadcasts, or immersive VR experiences can introduce Da Shuhua to a global audience. Data on viewership and user engagement can provide valuable feedback for future programming, helping organizers improve their outreach efforts.

3.6.2 Community Storytelling Platforms

Local residents can create online exhibitions featuring behind-the-scenes footage, in-depth interviews with senior artisans, and stories about the evolution of Da Shuhua. These platforms can arouse collective pride, reveal social and cultural aspects, and guide visitors to engage in an informed and respectful way before they visit the site.

By integrating these strategies, stakeholders can develop a sustainable tourism model that strengthens the cultural heritage of Da Shuhua while ensuring fair economic participation and environmental resilience. These measures, taken together, can protect the practice of Da Shuhua from commercial pressures and demographic changes, demonstrating how thoughtful policies, education, and technological support can sustain intangible cultural heritage in an evolving socio-economic context.

Table 1: Flowchart for Implementing Tools under SDG 12.B in Da Shuhua



Explanatory Steps:

Stakeholder Identification: Involves all relevant parties to ensure inclusive decision-making.

Defining Indicators: Clearly determines what data to track, such as visitor numbers, environmental impact, and cultural satisfaction.

Collecting Data: Relies on technology (software, sensors) or manual records to ensure consistent measurement.

Reporting & Review: Maintains transparency, builds community trust, and points out areas for improvement.

Adaptive Management: Data-driven insights lead to practical changes that protect both authenticity and sustainability.

Figure 1: Proposed Tools for Implementing Target 12.B in Da Shuhua

Tool Type	Examples/Methods	Intended Outcome
Economic Accounting	1. E-ticketing & revenue software 2. Local profit distribution audits	Greater financial transparency; ensures fair returns to artisans
Environmental Monitoring	1. Slag disposal database 2. Furnace emission sensors	Data-based approach to mitigate pollution, regulate resource usage
Cultural Integrity	1. Authenticity & satisfaction surveys 2. Frequency alignment logs	Measures how closely folk performances adhere to traditional festivals
Risk & Safety Management	1. Incident-reporting apps 2. Mandatory safety gear regulations	Minimizes hazards for performers & visitors, fostering public trust

□. Conclusion

Da Shuhua serves as a prime example of how intangible cultural heritage can prosper when integrated into sustainable tourism. By capitalizing on technological advancements, community-led initiatives, and policy support, Yu County can ensure the continuity of this unique tradition while promoting local economic growth. This study highlights the significance of aligning cultural tourism practices with global sustainability goals, offering a replicable model for other heritage-rich regions.

The sustainability and continued relevance of Da Shuhua in Yu County, China, embody the broader challenges and opportunities inherent in linking intangible cultural heritage with sustainable tourism objectives. Under the umbrella of SDG 12.B, which calls for developing and implementing tools to monitor sustainable development impacts for sustainable tourism, Da Shuhua represents a test case for achieving a balance among the following aspects:

4.1 Cultural Authenticity

Preserving the spiritual and historical essence of Da Shuhua through formal apprenticeship and educational programs. This ensures that the deep-seated cultural values and symbolic meanings associated with the performance are passed down through generations, maintaining its authenticity and connection to the local community.

4.2 Economic Growth

Generating income and creating jobs through well-thought-out tourism initiatives, as measured by robust accounting tools. By carefully managing tourism-related economic activities, local communities can benefit from the popularity of Da Shuhua while also safeguarding the long-term viability of the cultural heritage.

4.3 Environmental Stewardship

Maintaining a minimal resource footprint by upcycling scrap iron, improving furnace technology, and implementing standard checks on emissions and waste. This approach not only aligns with the principles of sustainable development but also helps to protect the local environment, ensuring that Da Shuhua can be enjoyed for generations to come.

4.4 Local Ownership

Empowering community members with the knowledge, technology, and revenue-sharing frameworks necessary to guide the future of Da Shuhua. By involving local people in the decision-making processes related to the cultural heritage and tourism development, a sense of ownership and pride is fostered, leading to more sustainable and community-centered development.

By integrating standardized monitoring indicators for economic, environmental, and cultural impacts, stakeholders can identify emerging threats, such as over-commercialization or environmental strain, in a timely manner. This allows for proactive adjustments to protect the integrity of the tradition. In this way, Da Shuhua not only persists as a captivating folk performance but also becomes a model for how intangible heritage can thrive under data-informed sustainable tourism. Ultimately, the synergy of tradition, accountability, and community-driven governance will ensure that the sparks of molten iron continue to light up the night skies of Yu County, resonate with the local memory, and reflect the global pursuit of responsible development.

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