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# Heritage Conservation and Environmental Sustainability: Towards Sustainable Heritage Villages.

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**ABSTRACT:** Heritage villages are a national wealth because of the cultural, economic and social values they carry, which can be considered a witness to a distinguished era in the life of any village. Especially in the tourism industry because of the economic returns it achieves. However, this cultural heritage is exposed to many factors that contribute to its deterioration. Clearly, it is reasonable to assume that the adaptive reuse and improved energy performance of heritage villages can play a critical role in environmental sustainability. The research deals with several points, which are the concept of sustainable heritage villages, the dimensions of sustainable rural development, from these concepts and principles, we derive criteria for measuring the environmental sustainability of heritage villages.

**KEYWORDS:** Conservation, heritage village, environmental planning, cultural heritage, sustainable development.

## I. INTRODUCTION

The concept of rural heritage has acquired a new relevance integrating its multiple components: the landscapes (carved out over centuries by people living off the land and using its available natural resources); the settlements (built following traditional techniques, materials and beliefs); the products (adapted to local conditions and needs); the techniques, tools and know-how ('that have made creative activity possible and which remain essential for maintaining, restoring, changing and modernising' its outputs, in accordance with 'the design logic and aesthetic of the buildings/environment/ landscape as a whole' [CEMAT 2003]).

Rural areas have often experienced a deepening crisis as a result of the effects of globalisation, economic cycles, new production practices, and sociological and cultural changes, all of which have forced local development to adopt multifunctional approaches and economic diversification. These processes have been comparably common in "lagging rural regions", which characteristically lack the critical mass to be able to compete and suffer from the decline of traditional activities and a marked peripheralisation. Consequently, growth within these communities is highly dependent on their capacity for adaptive and innovative strategies, which can allow its development, overcoming the centre-periphery models. By these means, rural areas can become "locations for the stimulation of new socio-economic activity", through diversification: leisure, rural tourism, catering establishments, biodiversity conservation, housing expansion, and utilization of the natural and cultural heritage. Also, the reinterpretation of other traditional uses of heritage such as agriculture, agribusiness, crafts, and quality products, among others, is possible.

## II. RELATED WORK

Sustainable rural development are the substantially researched fields in the contemporary rural sociology. Many scholars have concerned various dimensions of sustainability, in particular ecological and social sustainability related to for example rural livelihoods, landscapes and social inclusion[1]; but we can find less but growing interest to consider culture as a fourth pillar of sustainable development. The focus of this research is foremost the cultural dimension in the context of rural restructuring and rural sustainability[2], more specifically cultural heritage.

Conservation and upgrading of traditional rural buildings to contemporary uses is important to support the aspects of sustainable development, reduce energy consumption and preserve traditional heritage identity[3]. users of naturally ventilated traditional buildings expressed higher thermal comfort satisfaction over users of contemporary residential buildings with air conditioners, traditional buildings have better thermal performance and energy efficiency than modern ones because of their design featuring climate responsive solutions that can manage the effect and the change of outdoor temperature better than modern buildings[4].

Traditional rural buildings were established as a reaction to climate, culture, and social requirements in order to create comfortable indoor spaces with lower energy consumption and use of natural resources[5]. mentioned that traditional solutions of architecture have turned out to be a central approach for sustainable and vernacular architecture, most of these solutions are recognized as passive design concepts. Passive design strategies were combined in buildings to modify indoor thermal settings with no or bare consumption of energy[6]. the best residential type is the rural house for its “harmonization between architectural identity and energy efficiency” because of passive design solutions that included traditional. Finally, the research assumes that ecological sustainability, as one of the modern trends of architectural and urban thought, achieves a positive relationship between buildings, the environment and heritage, while achieving diversification of production, low cost, and preservation and sustainability of heritage[7].

### III. METHODOLOGY

In developed countries, new concepts and methods were born that were not familiar before Preserving heritage villages, and one of these concepts is "preservation sustainable environment", as it reflects the interest of the sectors urban development issues in light of environmental protection, Reducing energy consumption, optimizing the use of natural resources, Relying more on renewable energy sources Urbanization consumes huge amounts of natural resources, in addition to the production of large quantities of Household waste that upsets the balance of ecosystems in the range the ocean, and below we get acquainted with the factors to achieve Environmental sustainability in heritage villages, affordable and clean energy, Conserving natural resources, Efficient use of water resources, Climate change and rural heritage, sustainable use of terrestrial and inland freshwater ecosystems, Waste recycling and reuse, Sustainable use of building materials compatible with the rural environment.

The inclusion of ecosystems in the heritage environment of the village for coexistence In the light of crisis management and the continuation of life on earth, to limit One of the negative effects and the consideration of the heritage environment as a viable organism environmentally adaptive, helping to improve productivity and public health, This underlines the importance of the need for integration and balance between the built environment and ecological principles and standards, that can be applied as a tool a strategy for the development and sustainability of the living heritage in the village under the Challenges and future changes.

Choosing some of the world heritage villages by applying the considerations of sustainable ecological development, which can be analyzed and assessed to the extent of their application to these considerations, and then test the validity of the proposed methodology to achieve the sustainability of the built environment to face future variables, as follows:

Country	Description of the evaluation system		Country	Description of the evaluation system	
USA	Leadership in Energy and Environmental Design.	LEED	GER	German Council for Sustainable Building.	DGNB
USA	American Council on Green Building.	USGBC	JAP	Comprehensive Assessment System for Built Environment. Efficiency	CASBEE
USA	International Green Construction Code.	IGCC	USA	International Well Building Institute.	IWBI
UK	Building Research Foundation Environmental Assessment.	BREEAM	QAT	Comprehensive Sustainability Assessment System.	GSAS
KSA	Saudi Green Building Council.	SGBC	EGP	Green Pyramid Rating System.	GPRS

Table 1. Approved systems for assessing sustainable ecological.

	Policies		Policies
1	Conserving natural resources.	7	Sustainable Use of Terrestrial and Inland Freshwater Ecosystems.
2	Efficient use of water resources.	8	Affordable and Clean Energy.
3	Climate change and rural heritage.	9	Preparing Environmental Impact assessment Studies.
4	Waste recycling and reuse.	10	Reducing carbon emissions and global warming.
5	Sustainable use of building materials.	11	Stimulating Sustainable Transport.
6	Integration of human activity and the ecological environment.	12	Reducing the ecological footprint of human activity.

Table 2. The most important policies to achieve sustainable ecological.

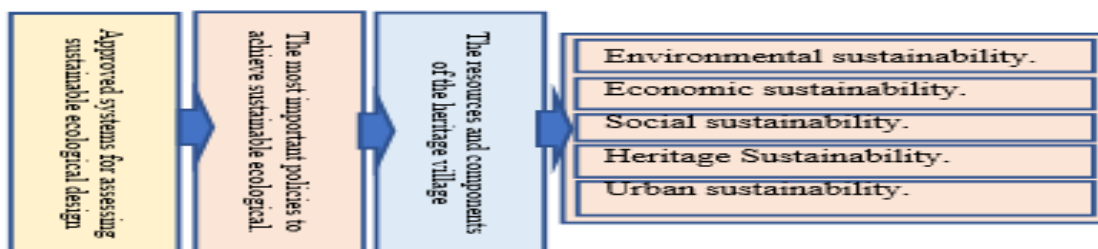


Fig. 1. Research Methodology.


1	village	Hahoe Village-Indong, Korea	Pillars of sustainable ecological development of the heritage village.																			
			LEED	USGBC	IGCC	BREEAM	SGBC	DGNB	IWBI	CASBEE	heritage	society	economy	the environment								
Geographical location		Founded in the 14th-15th centuries, Hahoe and Yangdong are seen as the two most representative historic clan villages in the Republic of Korea. Their layout and location - sheltered by forested mountains and facing out onto a river and open agricultural fields.	<b>Policies for Ecological Sustainability of the Village.</b>																			
Tangible heritage resources		They include the residences of the head families, together with substantial timber framed houses of other clan members, also pavilions, study halls, Confucian academies for learning, and clusters of one storey mud-walled, thatched-roofed houses, formerly for commoners.																				
Intangible heritage resources		It is exceptional reflections of the social and cultural systems of the Joseon Dynasty, of the particularly distinctive system of clan villages that is specific to this area, and of the way these evolved over five centuries.																				
																						
●	strong effect	■											above average effect	*	medium effect	○	weak effect					
Conserving natural resources.																			●	*	■	●
Efficient use of water resources.																			●	■	*	●
Climate change and rural heritage.																			●	*	■	■
Waste recycling and reuse.																			●	●	●	●
Sustainable use of building materials.																			●	○	■	■
sustainable use of terrestrial and inland freshwater ecosystems.																			■	■	*	●
affordable and clean energy.																			*	■	●	●
Preparing Environmental Impact assessment Studies.																			■	*	*	●
Stimulating Sustainable Transport.									■	■	●	●										
Reducing carbon emissions and global warming.									●	■	*	●										
Reducing the ecological footprint of human activity.									●	●	■	●										
Integration of human activity and the ecological environment.									*	●	●	●										

Table 3. A case study of Hahoe Village-Indong, Korea.


2	village	TOKAJ-HOLLOKÖ HUNGARY	Pillars of sustainable ecological development of the heritage village.																			
			LEED	USGBC	IGCC	BREEAM	SGBC	DGNB	IWBI	CASBEE	heritage	society	economy	the environment								
Geographical location		Hollókő, an ethnographic-medieval village, located in Nógrád, a County in Northern Hungary (circa 100 km north-east of Budapest), along with its surrounding area, is the first historic	<b>Policies for Ecological Sustainability of the Village.</b>																			
Tangible heritage resources		The settlement has had this image since 1909. The walls of the houses were made of adobe, a stone base was built under the houses while the characteristic of the roof was shingle, rafter structure. The looks of the village together with the "palóc" architectural style have existed since 1911.																				
Intangible heritage resources		In the village there is wooden spoon vendor, pottery house, pottery workshop, arts and crafts shop, basket maker, jewelry, handmade soap, wooden toys, crochet products, key-case, pillowcases, "palóc" brandy, paintings, baskets, folk music CDs and other souvenirs.																				
																						
●	strong effect	■											above average effect	*	medium effect	○	weak effect					
Conserving natural resources.																			●	*	■	●
Efficient use of water resources.																			●	■	*	●
Climate change and rural heritage.																			●	*	■	■
Waste recycling and reuse.																			●	●	●	●
Sustainable use of building materials.																			●	○	■	■
sustainable use of terrestrial and inland freshwater ecosystems.																			■	■	*	●
affordable and clean energy.																			*	■	●	●
Preparing Environmental Impact assessment Studies.																			■	*	*	●
Stimulating Sustainable Transport.									*	*	●	■										
Reducing carbon emissions and global warming.									*	■	●	●										
Reducing the ecological footprint of human activity.									●	○	■	■										
Integration of human activity and the ecological environment.									■	■	*	●										

Table 4. A case study of Tokaj-Holloko Hyngary village.


3	village	Villages in Southern Anhui - Xidi and Hongcun	Pillars of sustainable ecological development of the heritage village.																				
			LEED	USGBC	IGCC	BREEAM	SGBC	DGNB	IMBI	CASBE	heritage	society	economy	the									
Geographical location		Xidi and Hongcun, are located in the mountainous area south of the Yangtze River in Anhui Province [3]. Its regional culture is distinct and its social organization is based on clan																					
Tangible heritage resources		The two traditional villages of Xidi and Hongcun preserve to a remarkable extent the appearance of non-urbansettlements of a type that has largely disappeared or has been transformed in the past century. Their street patterns, their architecture and decoration, and the integration of houses with comprehensive water systems are unique survivals.																					
Intangible heritage resources		the site preserves regional art, customs, cuisine, and other forms of cultural and traditional ways of life. Xidi and Hongcun are, without a doubt, ideal sites for contemporary society to seek its history, and to research traditional village culture.																					
		Policies for Ecological Sustainability of the Village.																					
												Conserving natural resources.								●	*	□	●
												Efficient use of water resources.								●	□	*	●
												Climate change and rural heritage.								●	□	*	●
												Waste recycling and reuse.								□	*	*	●
												Sustainable use of building materials.								*	*	●	□
												sustainable use of terrestrial and inland freshwater ecosystems.								*	□	●	●
												affordable and clean energy.								●	●	○	□
												Preparing Environmental Impact assessment Studies.								□	□	□	*
												Stimulating Sustainable Transport.								□	*	*	●
Reducing carbon emissions and global warming.								□	□	●	●												
Reducing the ecological footprint of human activity.								●	□	*	●												
Integration of human activity and the ecological environment.								●	●	□	●												
●	strong effect		□	above average effect		*	medium effect		○	weak effect													

Table 5. A case study of Villages in Southern Anhui - Xidi and Hongcun.

#### IV. RESULTS AND ANALYSIS

In comparison to the aspects of sustainability in the study cases, we find that the second study case achieved the highest value in economic and societal sustainability, while the first study case achieved the highest value in urban and heritage sustainability, while the third study case achieved the highest value in heritage sustainability. As shown in the figure(1).By examining the extent of the application of policies to achieve ecological sustainability deduced from the approved global systems for assessing environmental sustainability, we find that the three study cases vary in the application of policies as shown in the figure(2).

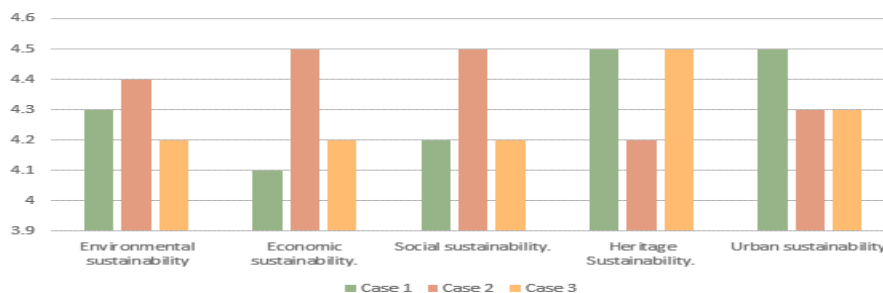


Fig. 1. The extent to which case studies achieve aspects of ecological sustainability.

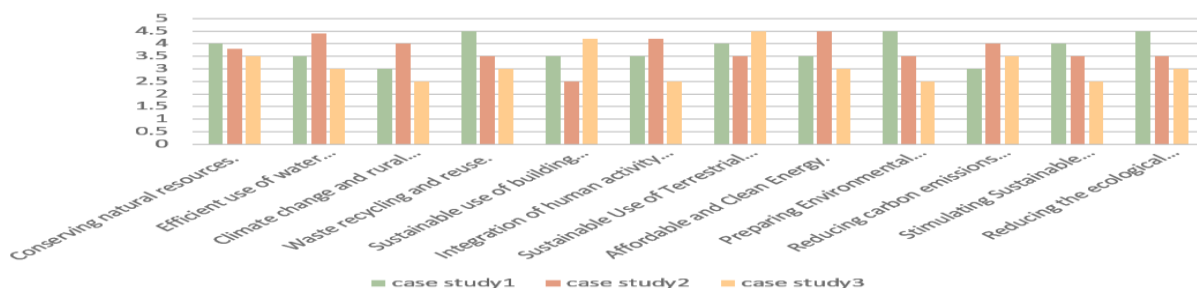


FIG. 2. THE EXTENT TO WHICH CASE STUDIES ACHIEVE ASPECTS OF ECOLOGICAL SUSTAINABILITY.



## V. CONCLUSION

Ecological sustainability helps in its environmental dimension economic and social, to address air pollution issues Infrastructure problems, the provision of healthy housing, and the lack of services and green areas, to provide sustainable architecture, urbanization and heritage.

Attention to the use of environmentally friendly building materials, and increasing the green area to eliminate heat islands and produce oxygen. Reducing the need for energy, taking into account the geographical location and climate to promote, Thermal comfort for users. Introducing new styles of architecture and urbanism that respect the environment and reduce pollutants and waste, and works to conserve resources and save Consumption, use and recycling to achieve sustainability. It is necessary to assess the ecological efficiency of buildings to reduce the impact Negative impact on the environment and heritage in the village and achieving sustainability by reducing consumption, Non-renewable resources and the enhancement of the natural environment. Activating the role of international, regional and local assessment systems to measure the built environment is compatible with ecological considerations and achieving sustainability, according to a scientific strategy to grant accreditation certificates for the efficiency of buildings. Follow the ecological approach to design, implement and operate projects, which includes consideration of its effects on the designed built environments sustainable to ensure continuity during the life cycle of buildings.

Increasing awareness among environmental and urban experts of the considerations Ecological programs and educational experiences to ensure quality The built environment and increasing operational efficiency to improve the public health of the heritage village. Inclusion of ecological sustainability considerations in spaces. The exterior and the urban surroundings of the heritage environment in the village to achieve coherence and integration Between buildings and the external environment while protecting components and components The natural ecological surroundings of urbanization. Activating the role of sustainable eco-design through planning

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