







# A multicriteria approach to assessing the sustainability of community-based ecotourism in Central Vietnam

Tien Dung Nguyen <sup>a</sup> , Ha Dung Hoang <sup>a,b</sup> \* , Tan Quang Nguyen <sup>c</sup> , Ubukata Fumikazu <sup>c</sup> ,  
 Thao Phuong Thi Vo <sup>d</sup> , Chung Van Nguyen <sup>a</sup> 

<sup>a</sup> University of Agriculture and Forestry, Hue University, 102 Phung Hung street, Hue city, Vietnam

<sup>b</sup> Centre for Climate Change Study in Central Vietnam, 102 Phung Hung street, Hue city, Vietnam

<sup>c</sup> Graduate School of Environmental and Life Science, Okayama University, Okayama, 700-8530, Japan

<sup>d</sup> The women's Union of Thua Thien Hue Province, Vietnam

\* Corresponding author. Emails: [hoangdungha@hueuni.edu.vn](mailto:hoangdungha@hueuni.edu.vn), [hoangdungha@huaf.edu.vn](mailto:hoangdungha@huaf.edu.vn).

## ABSTRACT

Nature exploration, or ecotourism, has been an essential part of tourism, and today takes on a much broader meaning beyond tourism that includes conserving nature and culture and improving people's lives, especially in the indigenous community. Community-based ecotourism (CBET) has specific benefits closely related to the sustainability of natural ecosystems and community development. CBET can be defined as nature-based tourism, helping shape the types of tourism services, planning and developing destinations provided by communities directly. CBET is supposed to be a sustainable alternative to mass tourism by its potential benefits in Vietnam. The study aims to evaluate the sustainability of four CBET destinations in Central Vietnam through a sustainable ecotourism index (SEI) formed by applying the Analytic Hierarchy Process (AHP) method. Based on the literature review, local people, and experts' recommendations, a set of fourteen criteria categorized into five groups reflecting the critical attributes of the sustainable CBET that include environmental conservation, economic benefits, community participation, cultural preservation, and empowerment are analyzed. The raw data is obtained from in-depth interviews with 21 experts and 42 households. After normalizing, the results indicate that out of four CBET destinations, one is identified as high sustainability ( $SEI > 4.2$ ), two are neutral ( $3.4 < SEI < 4.2$ ), and one is lower than ( $SEI < 3.4$ ). These findings provide implications for extending the AHP theory in tourism and policy implications toward sustainable development in future tourism.

## KEYWORDS

Community-based ecotourism, Central Vietnam, sustainable ecotourism index (SEI), Analytic Hierarchy Process (AHP)



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**DOI** 10.30852/sb.2022.1938

**RECEIVED** 3 June 2022

**PUBLISHED (HTML)** 19 October 2022

**PUBLISHED (PDF)** 19 October 2022

**CITATION** Nguyen, T. D., Hoang, H. D., Nguyen, T. Q., Fumikazu, U., Vo, T., & Nguyen, C. V. (2022). A multicriteria approach to assessing the sustainability of community-based ecotourism in Central Vietnam. *APN Science Bulletin*, 12(1), 123 – 140. doi: 10.30852/sb.2022.1938

## HIGHLIGHTS

- The criteria for assessing the sustainability of Community-Based Ecotourism (CBET) models are identified.
- The sustainability of coastal CBET models is higher than that of mountainous models.
- CBET's sustainability assessment needs stakeholder engagement.

### 1. INTRODUCTION

Thanks to technological advancements and improvements in mass media, tourism has continuously become one of the world's largest and fastest-growing economic sectors over the past decades. According to the United Nations World Tourism Organization (UNWTO, 2020), tourism is a mammoth industry that generated an estimated USD 1,481 billion in 2019. International tourist arrivals have increased from 25 million globally in 1950 to 278 million in 1980 and 1,460 million in 2019. Percy (2009) argued that, for instance, tourism activities lead to severe environmental degradation, while local cultures are also disrupted. The development of tourism infrastructures such as resorts, jetties, walkways, artificial lagoons, artificial beaches, and groins led to the loss of habitat, wildlife disturbance, reduced coral growth (Gladstone, Curley, & Shokri, 2013) and the harassment of wild animals in national parks (Himberg, 2006). In addition, tourism has not continuously operated in the interests of local people, resulting in an inauthentic representation (Tan, Fumikazu, & Dinh, 2019) and cultural alienation of ethnic minorities (Cuong, 2020), causing conflict between host and tourist.

There is a need for a new approach to tourism that ensures tourism policies should no longer concentrate on economic and technical necessities alone; but rather emphasize the demand for an unspoiled environment (Fennell, 2005) and considers the needs, concerns, and welfare of local communities (Scheyvens, 1999). Community-based

ecotourism (CBET) emerged as the most appropriate alternative in that situation. As opposed to conventional mass tourism, the CBET can be defined as tourism owned and/or managed by communities and intended to deliver wider community benefits (Goodwin & Santilli, 2009). The CBET projects would strengthen institutions designed to enhance local participation and promote the popular majority's economic, social, and cultural well-being. It also seeks to strike a balanced and harmonious approach between economic development, environmental conservation, and cultural preservation (Brohman, 1996). Similarly, the CBET is certainly an effective way of implementing policy coordination, avoiding conflicts between different actors in tourism, and obtaining synergies based on the exchange of knowledge, analysis, and ability among all community members (Kibicho, 2008).

In Vietnam, CBET initiatives or ecotourism have been integrated into tourism development and poverty alleviation programs designed by the Vietnamese government since the late 1990s. The "eco" or "green" or "community-based" terms were initially introduced in the workshop on "Building ecotourism development strategy" in 1999, which emphasized, "this is a type of tourism that based on nature and indigenous culture, associated with environmental education, contributing to conservation and sustainable development efforts, with the active participation of the local community" (Ba et al., 2009, p. 84). The terms are gradually mentioned in the Tourism Law 2017 and the latest, National strategy for sustainable

tourism development to 2020 and vision to 2030. With the diversity of natural resources penetrated by “commercialization and mass-tourism outfits” and the richness of cultural heritage, the Vietnamese government expects favourable opportunities for CBET development (Lam, 2002).

Despite presenting many efforts, the CBET programs are still facing severe problems and challenges, including pressure on the natural environment, livelihood and life quality impacts, interest conflicts amongst stakeholders, low capacity, and limited tourism skills of local communities (Hong & Saizen, 2019; Ngo, Lohmann, & Hales, 2018; Santikul et al., 2016). Besides, the number of CBET destinations rapidly grew without specific planning and unclear criteria that caused negative impacts on environmental resources and harm to host communities’ norms and identity (Tan et al., 2019; Thái, 2018). Notably, in addition to lacking a legal framework and detailed guidelines, most documents, even official reports issued by the government, do not use the term CBET or ecotourism explicitly and distinctly (Hoa, 2012). Such problems ultimately lead to an inflexible approach and unsustainable development. Although causing gaps and negative impacts on the indigenous community, evaluations of sustainability in tourism, especially emerging CBET projects in Vietnam, have not been comprehensively investigated. Given the above background, this study seeks to address gaps by answering the following questions: (1) What are the criteria for assessing the sustainability of a CBET site? and (2) What are the steps for assessing the sustainability of the CBET sites?

The analytical hierarchy process (AHP) is based on a pairwise comparison in ratio scale (Saaty, 1979). AHP method can compare each theme based on their relative importance for identifying potential zone (Saaty & Vargas, 2012). The AHP method will be applied for two reasons to achieve these goals. First, this multicriteria assessment approach helps to build decision-making issues in hierarchies that include goals, criteria, sub-criteria, and decision alternatives (Ma, Li, & Chan, 2018).

Thus, it guarantees the adequacy of criteria and data connectivity. Second, equally important, the hierarchy of AHP helps stimulate participation and interaction among the people concerned both in the formulation and the quantitatively oriented solution of their problems (Saaty, 1977). Using this method can transform subjective opinions into objective measures for the decision-maker. Thus, this method ensures transparency and objectivity for making the best decisions among multiple alternatives.

## 2. LITERATURE REVIEW

### 2.1. Sustainable tourism and community-based ecotourism initiatives

The term sustainable tourism (ST) itself emerged from the broader sustainability movement, “sustainable development”, which was thought to be first introduced in the early 1970s, and then officially popularized in the late 1980s through a report by the World Commission on Environment and Development (popularly known as the Brundtland Report) (Weaver, 2006). This report defined sustainable development as “development that meets the needs of the present without compromising the ability of future generations to meet their own needs” (World Commission on Environment and Development [WCED], 1987, p. 43). Based on this classic concept, the ST is thought of as the application of the sustainable development idea into the tourism industry, that is, “the needs of the present tourists and host regions while protecting and enhancing opportunities for the future” (UNWTO, 1998, p. 21, cited in Nguyen, Young, Johnson, and Wearing, 2019). To become popular as current, this discourse has gone through many different stages and statements depending on the specific author’s view and field, and it is still evolving. Initially, the ST field seems to be a broad conceptualization covering three issues: environment, society, and economy (Bramwell, Higham, Lane, & Miller, 2017). From here, alternative forms of tourism, such as ecotourism or CBET, were formed to achieve sustainable goals in tourism (Ruhanen, Lee Moyle,

& Moyle, 2019). However, due to its infancy, it was plagued by definitional debates, many different perspectives, and misunderstanding of the nature and orientation of this concept (Bramwell & Lane, 2013).

During the early 2000s, with technological advancements alongside broader societal trends, this period witnessed an explosion and an increasing interest in sustainability. In turn, tourism has enormously increased its sustainability engagement by developing a more sustainable product range, assembled with different sustainability criteria, such as a friendly environment or products produced by local people (Ruhanen et al., 2019). Organizations worldwide, such as the United Nations (UN) and the UNWTO, stepped in with tougher measures and sustainability criteria through global summits or congresses. Notably, one of the considerable efforts to promote sustainability in tourism during this period was the publication of the guidebook 'Indicators of Sustainable Development for Tourism Destinations' edited by the UNWTO (2004, cited in Agyeiwaah, McKercher, and Suntikul, 2017). With a length of more than 500 pages alongside 13 aspects and 40 specific criteria, this manual covers all areas of tourism towards sustainable development, from macro issues, such as governance, climate change, environmental pollution and nature conservation, to micro problems such as local livelihood, seasonality, or the authenticity of a tourist destination (Agyeiwaah et al., 2017).

It has become almost universally recognized as a truly unique desired process by academics and developers (Weaver, 2006). The ST has regularly been attached to general expectations, including environmental preservation, biodiversity, equality between stakeholders and host-guest nexus, the promotion of human welfare and local community, cultural conservation, empowerment for vulnerable groups, transparency in policy, and many others (Bramwell & Lane, 2013; Fennell, 2005; UNWTO, 2017). However, many experts have argued that achieving all sustainability criteria

is near impossible and argued that it should replace or revise for more suitable. Marzo-Navarro, Pedraja-Iglesias, and Vinzón (2015) implied that "we are overwhelmed by too many indicators". Similarly, Agyeiwaah et al. (2017) criticized it as ineffective mainly because it is simply too broad, comprehensive, and ambitious. Moreover, many indicators are inconsistent and not similar, so implementing sustainability principles is difficult. For example, economic sustainability can be measured immediately, while others, such as social and cultural aspects, may only be measured over many years (Agyeiwaah et al., 2017). Thus, it has been recognized that it should offer specific criteria based on each destination's specific context and time-related circumstances (Bramwell & Lane, 2013) rather than general ones.

Therefore, this study is based on the triple bottom line (TBL) sustainability framework (economic, environmental, and social), but with minor revisions to match the reality in Vietnam. Accordingly, this study supplements two elements to create a new research framework consisting of five main components: economic benefits, environmental conservation, cultural preservation, community participation, and empowerment (Figure 1). We argue that all five aspects will contribute to sustainability in CBET sites. In terms of measuring, such factors have been widely addressed.

First, the economic benefits are considered the priority to local communities, which should be distributed fairly (Choi & Sirakaya, 2006). CBET can bring direct and indirect economic benefits to local residents. On the one hand, it can promote local employment and income opportunities and diversify livelihoods that improve residents' quality of life (Lee, 2013; Ohe & Kurihara, 2013). On the other hand, CBET can enhance the local economy by selling local products and small shops around the destination. In this vein, economic benefits are not only for those who participate directly in the programs but also for the community as a whole.

Second, a fundamental characteristic of CBET initiatives is that the quality of the natural resources

and wild species can not only be damaged, if possible, but also may be preserved by tourism (Choi & Sirakaya, 2006). Tourism activities not only raise awareness about environmental protection for guests but also for the indigenous people, who play an important role in keeping the surrounding environment clean and sustainable. Furthermore, tourism revenue helps improve local facilities and nature conservation funds (Kiss, 2004).

Third, CBET activities encourage local people to value their cultural heritage via the cultural exchange between host and guest. This also helps the local community to improve their awareness and understanding of the different cultures of different regions. Moreover, besides the types of goods, intangible services such as cultural identity and the indigenous lifestyle of the local community become attractive features for tourists. In this sense, they can be resilient and maintain ancient cultures and traditional festivals. CBET also provides opportunities for locals to increase their social or traditional cultural identity and promote the community's social coherence (Choi & Sirakaya, 2006).

Fourth, community participation is the most important dot to destination governance, which is recognized as a central key to achieving sustainable goals (Bramwell, 2011; Hall, 2011), especially in CBET projects. Research by Gurung and Seeland (2008) has shown that community participation ensures that ecotourism activities engage and cooperate between local communities, local authorities, and tourists to meet local needs while delivering conservation benefits. Involvement of local communities contributes to tourist satisfaction and ensures continuity of ecotourism activities (Stone & Wall, 2004).

Fifth, empowering vulnerable groups, especially women, remains an essential principle of ecotourism (Honey, 2008). This principle of ecotourism supports the defense of democracy and human rights movements and leads to greater empowerment of vulnerable groups who comprise the majority of local communities (Honey, 2008). Furthermore, many advocates of social equality applauded

ecotourism due to its potential to create social benefits for improving vulnerable groups' lives and empowering local communities' rights (Scheyvens, 1999).

## 2.2. Applying the AHP method in tourism studies

The AHP is a general measurement theory and the widest application in multicriteria decision making, which Thomas Saaty developed in the 1970s. This model refers to decision-making based on several criteria, where each will be measured in a hierarchical structure according to its importance (Saaty, 1977). To identify the relative importance of several criteria, the pairwise comparisons method is often used at each level of the AHP (Ma et al., 2018). The AHP has many advantages in the decision-making process (Masroor et al., 2021) by transforming qualitative data into quantitative measurements (Saaty & Vargas, 2012). The approach has brought a wide variety of potential applications in academic fields and seems to be an effective instrument for bringing together the theory and practice of modelling (Saaty, 1979). Indeed, the AHP offers scholars a substantially different approach to addressing the problems of decision making, planning, conflict resolution, and forecasting through ratio scales in diverse areas, especially socio-economic, political, and technological fields (Saaty & Vargas, 2012). In recent years, this framework has contributed, for example, to sustainable solid waste management (Tsai, Bui, Tseng, Lim, & Tan, 2021), water quality management (Singh et al., 2021), the safety assessment of chemical plant production process (Song, Jiang, & Zheng, 2021), effective management of water resource (Masroor et al., 2021), and solutions for the development of a green bond market (Tu, Rasoulinezhad, & Sarker, 2020).

In the tourism industry, this approach is considered an essential tool in identifying sustainability in tourism destinations (Tseng et al., 2018) and forecasting tourism demand (Athanasopoulos, Ahmed, & Hyndman, 2009; Hu, Qiu, Wu, & Song, 2021). In previous documents, this method was

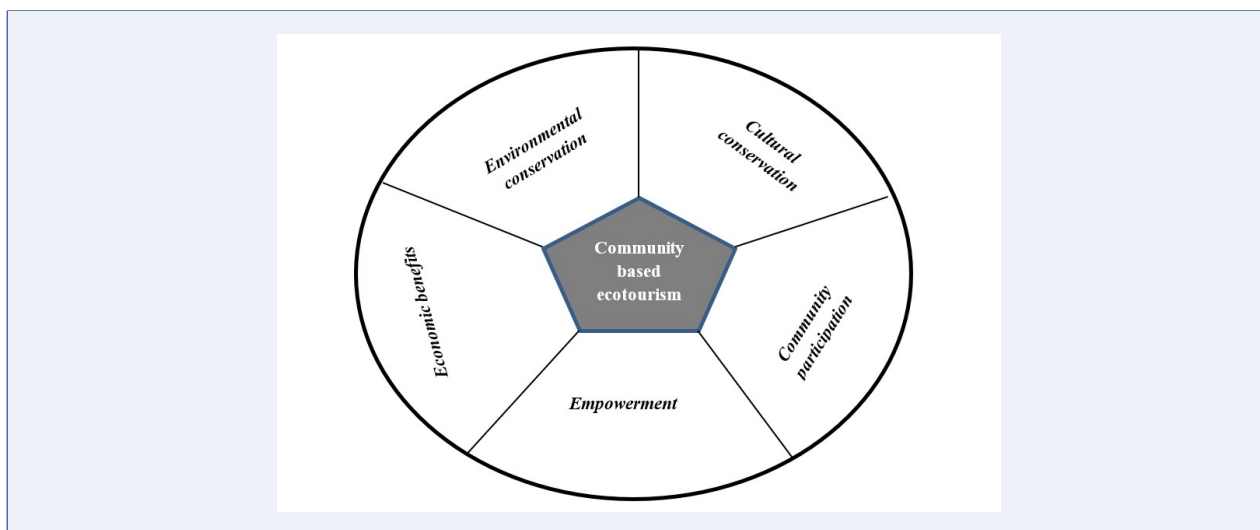


FIGURE 1. A research framework for CBET sustainability.

often combined with other packages, such as fuzzy theory (Tseng et al., 2018), SWOT analysis (Wickramasinghe & Takano, 2009), or the geographic information system (GIS) technique (Abed, Monavari, Karbasi, Farshchi, & Abedi, 2011) to quantify “equivocal concepts related to subjective human judgements in an uncertain environment” (Tseng et al., 2018). In recent decades, among different multiple criteria decision analysis (MCDA), the hierarchical process (AHP) has been an effective and widely used method in ecotourism (Chandio et al., 2013; Wong & Li, 2008). Bunruamkaew and Murayama (2012) applied the AHP method according to five criteria: landscape and nature, wildlife, topography, accessibility, and community characteristics to define ecotourism sites in Surat Thani province, Thailand. In India, research by Kumari, Behera, and Tewari (2010) applied the AHP method to identify potential ecotourism destinations based on wildlife, ecological value, ecotourism attractiveness, environmental resiliency, and ecotourism diversity. Gourabi, Ramezani, and Rad (2013) also applied AHP and GIS to ecotourism potential based on eight thematic groups, including sunny days, temperature, relative humidity, slope, direction, soil texture, water resources, and vegetation density in Iran. Nahuelhual, Carmona, Lozada, Jaramillo, and Aguayo (2013) combined GIS and participatory methods, including Delphi and AHP, to map recreation for ecotourism development at the municipal-

ity level. Dhami, Deng, Burns, and Pierskalla (2014) applied AHP to identify and map ecotourism sites in forested areas in West Virginia in the United States.

Despite such significant contributions, there is still a lack of research on the AHP method application in the CBET in Vietnam. This study aims to explore the capability of AHP for assessing the sustainability of CBET sites, and for this study, Thua Thien Hue province, Vietnam, has been taken into consideration. Through the AHP method, a useful tool including criteria of the sustainability of CBET zones will be established as a valuable tool for the decision-makers to identify suitable ecotourism locations. No such works relevant ecotourism field have been reported in the study area. Thus, this is both crucial and pioneering work in this field of study, with the potential of significantly contributing to ecotourism site development.

### 3. METHODOLOGY

This paper proposes using the AHP method to assess the sustainability of CBET sites in Central Vietnam. The specific steps in this methodology involved four steps: (1) Searching for the potential destinations, (2) identifying the goal and finding suitable criteria to use in the analysis, (3) identifying criteria priority (weight), and (4) determining and ranking the sustainability index of each destination.

### 3.1. Search for the potential ecotourism destinations

Thua Thien Hue province in Central Vietnam is renowned for the complex of Hue Ancient Capital, a UNESCO world heritage site with a range of scenic beauty destinations, such as tombs and ancient pagodas systems with extensive historical architecture (People's Committee of Thua Thien Hue province [PCTTH], 2017). Further, Thua Thien Hue is known for its famous festivals and Nha Nhac (royal music). With the diversity of traditional craft villages and the preservation of cultural and historical values, tourism (in general) and CBET (in particular) are integrated into strategies for economic development, poverty alleviation, and local livelihood improvement (PCTTH, 2021). It is not surprising that tourism has been identified as a key financial sector based on its significant contribution to GDP in recent years. The determination of the main research sites was considered based on an analysis of five criteria of CBET, including tourism activities associated with nature, cultural activities, participatory activities, etc. of local communities, bringing economic benefits and empowering vulnerable groups such as women and ethnic minorities. Based on these criteria, the study conducted consultations with experts of the Department of Tourism and some pilot trips to select appropriate destinations in ecotourism regions, including the lagoonal area, coastal area, highland and remote highland areas with four specific destinations of Hong Ha, Loc Binh, Quang Loi and Thuong Lo. The general background is described in Table 1.

The four study sites are located in different regions and have unique tourism features. Loc Binh and Quang Loi are located in coastal areas, where three local rivers merge to form the largest lagoon system in Southeast Asia (Tam Giang – Cau Hai lagoon) before emptying into the East Sea. The remaining two locations belong to the two poorest mountainous districts in this province, characterized by agricultural lifestyles of ethnic minority groups. All four areas are located in rural areas. The Thuong Lo village is considered the first CBET

model of the province since the early 2000s, followed by Quang Loi, while Hong Ha and Loc Binh have just been established in recent years. At first glance, although it was formed the earliest, income from tourism in the Thuong Lo destination appears low compared to other places, especially emerging tourist areas like Loc Binh. In short, the diversity of geographical locations, ethnic minority representation, history, and different types of services meet our objectives and guarantee equality and dialectical views.

### 3.2. Identification of criteria for the sustainability of ecotourism destinations

As noted, the province is most renowned for the UNESCO world heritage site of Hue Ancient Capital has been world heritage listed by UNESCO (PCTTH, 2017), with Thua Thien Hue known for its famous festivals and Nha Nhac (royal music).

Although various attributes in tourism, especially the ST, have been investigated previously, the complex reality and multi-goals of the CBET initiative have led to a broad range of challenges for scholarly authors (Budeanu, Miller, Moscardo, & Ooi, 2016). Based on the literature, this study provides a set of 17 criteria that represent five aspects: environmental conservation (A1), cultural preservation (A2), community participation (A3), economic benefits (A4), and empowerment (A5), as indicated in Table 2. To avoid subjective attributes to this study, the criteria were trial-tested by some local respondents and then confirmed by local authorities to obtain the final measures for guaranteeing reliability. A community-based approach to tourism recognizes the need to promote the quality of life of people, their culture and the conservation of resources (Scheyvens, 1999). The environmental issue is a crucial aspect of the tourism sector. CBET can effectively incentivise communities to take conservation action directly or indirectly (Kiss, 2004). For example, tourism incomes are very high that “people deliberately protect biodiversity to protect that income” (Kiss, 2004, p. 234). To achieve this goal, raising awareness of both the community (C1) and visitors

Feature	Hong Ha	Loc Binh	Quang Loi	Thuong Lo
Year established	2013	2013	2008	2001
Current local members	13	14	15	19
Location	Highland	Coastal	Lagoonal	Remote highland
Ethnic minority	Yes	No	No	Yes
Annual income per household (USD, 2019)	720.32	941.03	1,532.21	230.23
Main tourism types	<ul style="list-style-type: none"> <li>• Natural exploration</li> <li>• Homestays</li> <li>• Farmstays</li> <li>• Folk arts</li> </ul>	<ul style="list-style-type: none"> <li>• Natural exploration</li> <li>• Agricultural/food experiences</li> <li>• Homestays</li> </ul>	<ul style="list-style-type: none"> <li>• Fishery experiences</li> <li>• Homestays</li> <li>• Sightseeing on the lagoon</li> <li>• Outdoor activities</li> <li>• Visiting traditional craft village</li> </ul>	<ul style="list-style-type: none"> <li>• Visiting traditional craft village</li> <li>• Natural exploration</li> <li>• Homestays</li> <li>• Folk arts</li> </ul>

TABLE 1. Some primary characteristics in four case studies.

(C2) are the factors mentioned in the previous literature (Honey, 2008; SNV, 2007). In addition, reducing and minimizing the negative impacts of the tourism industry on the environment (C3) are also goals of any CBET project. From another perspective, tourism, especially in the CBET field, comprises a complex set of social and economic activities that use large amounts of local resources and involve various functions and stakeholders (Tsai et al., 2021). CBET may enhance the social attachment and opportunities for villagers to increase their social or traditional cultural identity (Choi & Sirakaya, 2006). By assessing residents’ (C4) and visitors’ (C5) perspectives on cultural education, managers can understand the residents’ perceptions of tourism impacts and how it influences their culture and life (Lee & Jan, 2019). Moreover, cultural exchange (C6) also plays an important role in a tourism destination’s cultural preservation and community norms (Cuong, 2020).

Community participation also contributes to sustainability in a destination. The participation of local communities in tourism planning (C7), especially CBET projects, is both a mandatory criterion and a tourism product (Thái, 2018). In the former, their participation ensures fairness and transparency in tourism activities (C9) and guarantees the most profit belongs to them under legal policy (C10). The latter is a way to showcase their unique culture and their hospitality, thereby promoting

more tourists (C8). To avoid the traps of many past ventures, which disempowered local communities, Scheyvens (1999) proposed four levels of empowerment in the framework: psychological, social, political and economic empowerment. This aspect is applied to emphasize the importance of local communities having a level of control over and benefit-sharing from tourism in their respective areas (Scheyvens, 1999), especially for vulnerable groups like women (C16), and poor and ethnic minority households (C17). While some authors emphasize the CBET potential in the cultural heritage of local peoples, their involvement and their environments, others mention economic benefits and profits from tourism. Economic benefit for the local community is an important aspect of CBET sustainability (Marzo-Navarro et al., 2015). Kernel (2005) has argued that the economic aspect of tourism development involves maximizing profits derived from tourism, based mainly on the tourist arrivals in specific destinations that are important for both private sectors and local community groups (C14). CBET is also implemented based on bringing economic benefits to the communities involved in tourism, especially those living in/around protected areas. This approach advocates promoting recycling and saving energy (C13) to maximize economic benefits for local communities (Weaver, 2006). Finally, supporting local economic development (C15) involves increasing the number of jobs (C11), creating a fund for environmental protection



Aspects	Criteria	Measurement	Score	Source	
A1	Environmental conservation	C1	Local community's awareness of the environment	Extremely low Low Medium	(Honey, 2008)
		C2	Tourist's awareness of the environment	High Extremely high	
		C3	Minimize impacts on the environment		
A2	Cultural preservation	C4	Cultural education for the local community	Extremely low Low	Choi and Sirakaya (2006); Lee and Jan (2019)
		C5	Cultural education for tourists	Medium High	
		C6	Cultural exchange	Extremely high	
A3	Community participation	C7	Community participation in tourism planning	Extremely low Low	(Thái, 2018)
		C8	Tourists satisfied with community participation	Medium High	
		C9	Community participation in tourism development	Extremely high	
		C10	Managing by local government		
A4	Economic benefits	C11	Increasing employment	Extremely low Low	(Marzo-Navarro et al., 2015; SNV, 2007)
		C12	Creating a fund for environmental protection	Medium High	
		C13	Reduction in energy usage	Extremely high	
		C14	Ensuring salary		
		C15	Support for local economic development		
A5	Empowerment	C16	Empowerment of women	Extremely low Low	(Agyeiwaah et al., 2017; Honey, 2008)
		C17	Empowerment of poor or ethnic groups	Medium High	
				Extremely high	

TABLE 2. The proposed hierarchical framework for sustainable aspects.

incomes (C12) and considering salaries (Tseng et al., 2018).

### 3.3. Identify criteria priority (weight)

As analyzed earlier, the AHP creates decision-making issues in hierarchies. In this study, we apply AHP to evaluate its relative value through three basic steps.

*Step 1: Identifying the goals and the criteria and organizing them into a hierarchy*

The simplest form of the customary AHP consists of three levels of goals, aspects and decision alternatives. In the study, the goal is a sustainable

ecotourism index (SEI) at the top level, followed by a second level consisting of five main criteria by which the alternatives (are case studies), located in the third level, will be sorted out (Figure 2). Such hierarchical systems have advantages in judging the importance of the elements in a given level with respect to the components in the adjacent level above (Saaty & Vargas, 2012). It also provides an overarching overview of all issues after complete structuring. After that, a set of 17 sub-criteria with five main criteria (aspects) is identified and systematically organized in a hierarchy, as shown in

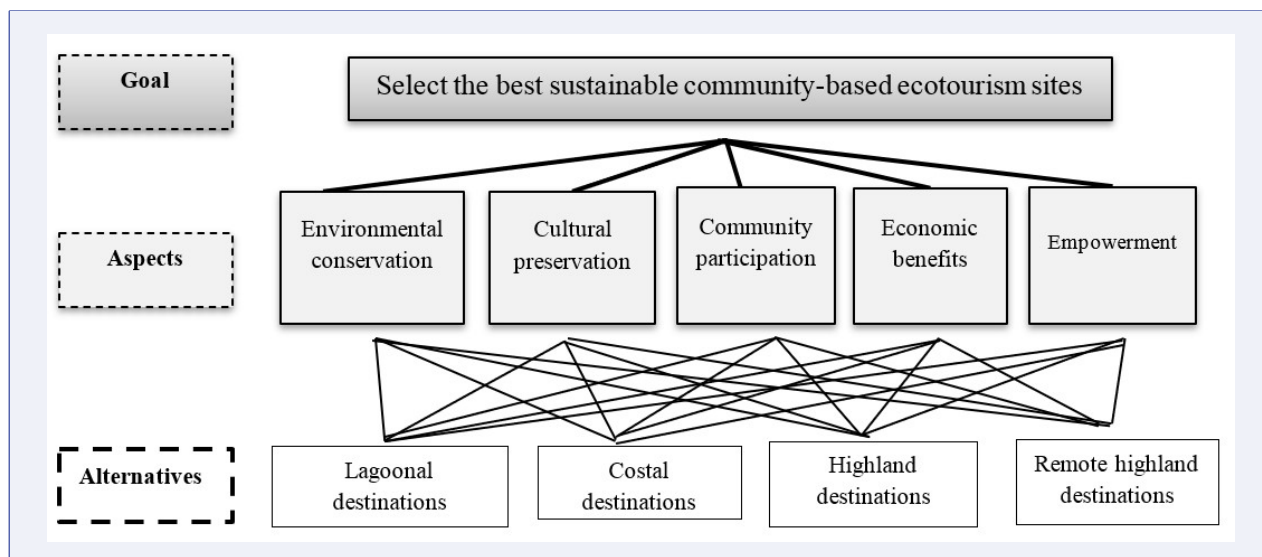


FIGURE 2. Three levels in a hierarchical structure.

Table 2.

Step 2: Comparing pairwise criteria

First, a 9-point scale is used to identify the relative importance of each attribute, as introduced by Saaty and Vargas (2012) (see Table 3). Data was collected using semi-structural questionnaires by two groups. To maximize the efficiency of the group decision-making process using the AHP survey, purposeful sampling was used to identify key informants and local experts in both the private and public sectors. Specifically, two tourism professionals from Hue University (top 10 ranking in Vietnam), two from the department of tourism, two from the department of rural development of Thua Thien Hue province, four district managers and eleven local key informants were interviewed. The team of experts conducted their comparative assessments for each pair of aspects. The inputs were analyzed to determine the relative priority of each aspect. Concurrently, they also proposed views concerning adding or removing some criteria in the general aspect set.

The judgement matrix forms are illustrated in Table 4. Each matrix is denoted with the equation  $W = (C_{ij})_{m \times n}$ , where  $C_{ij}$  denotes the weighting given to criterion  $C_i$  and criterion  $C_j$  for target  $W$  (Ma et al., 2018).

Next, the validity of the judgement matrices was examined by a consistency test as Saaty’s

Scale	Definition
1	Equal importance
3	Moderate importance
5	Essential importance
7	Demonstrated importance
9	Extreme importance
2,4,6,8	Intermediate values between the two adjacent judgements
Reciprocals of above nonzero	Reciprocal values for inverse comparison

TABLE 3. The fundamental scale and its definition. Source: Saaty (1977).

W	$C_1$	...	$C_j$	...	$C_n$
$C_1$	$C_{11}$	...	$C_{1j}$	...	$C_{1n}$
...	...	...	...	...	...
$C_i$	$C_{i1}$	...	$C_{ij}$	...	$C_{in}$
...	...	...	...	...	...
$C_m$	$C_{m1}$	...	$C_{mj}$	...	$C_{mn}$

TABLE 4. General forms of judgment matrices.

suggestions that includes three most important indexes: the Random Index (RI), Consistency Ratio (CR), and a Consistency Index (CI). As suggested by Saaty and Vargas (2012), the values of the RI are available in Table 5. The CI value is calculated based on  $\lambda_{max}$  (Equation (1)), as illustrated in Equation (2). Meanwhile, the CR index measures how far a decision maker’s judgements are from perfect consistency (Kim, Park, & Choi, 2017), which is calculated as Equation (3). The judgements are consistent and acceptable if the CR value is less

than 0.1. Conversely, if the CR is more than 0.1, it indicates an inconsistent judgement (Kim et al., 2017). In those cases, it will be revised until it meets the requirement.

$$\lambda_{max} = \frac{1}{n} \sum_{i=1}^n \left\{ \frac{\sum_{j=1}^n a_{ij} * w_j}{w_i} \right\} \tag{1}$$

Where:  $\lambda_{max}$  indicates the principal eigenvector,  $n$  is the matrix size,  $a_{ij}$  denotes an element of the pairwise comparison matrix, and  $w_j$  and  $w_i$  represent the  $j^{th}$  and  $i^{th}$  element of values of eigenvector, respectively.

$$CI = \frac{\lambda_{max} - n}{n - 1} \tag{2}$$

$$CR = \frac{CI}{RI} \tag{3}$$

Where: CI is the consistency data of the judgement matrices; RI is the average random consistency index; CR is the consistency ratio.

*Step 3: Calculating weights of indicators at each level*

After passing consistency tests, the weight of each aspect ( $W_i$ ) in the matrix will be calculated as a mathematical formula, as Equation (4) shown below.

$$W_i = \frac{\sum_{j=1}^n b_{ij}}{\sum_{i=1}^n \cdot \sum_{j=1}^n b_{ij}} \tag{4}$$

Where:  $\sum_{i=1}^n W_i = 1$ ;  $W_i$  denotes the weight vector of  $i^{th}$  aspect;  $n$  is the number of weighted aspects, and  $b_{ij}$  is the importance of aspect  $b_i$  relative to aspect  $b_j$ .

### 3.4. Determining the sustainability index of each destination

To determine the sustainable ecotourism index of each tourist destination, the study carried out three steps: (1) definition of the sustainable ecotourism index, (2) data collection, and (3) data analysis.

#### 3.4.1. Sustainable Ecotourism Index (SEI)

After obtaining the weights of indicators at each level, the SEI is calculated as Equation (5). The SEI provides a single numeric value and categorizes

sustainability in a tourism destination. The study synchronizes and sorts them according to five levels corresponding to the level of sustainability of each tourist destination (Table 6).

$$SI = \sum_{i=1}^n W_i * U_i \tag{5}$$

Where: SEI is the sustainable ecotourism index;  $W_i$  normalized weight of  $i^{th}$  aspect; and the rated quality  $U_i$  based on the value of  $i^{th}$  aspect.

Sustainability level	SEI	Sustainability score
Extremely high (level 1)	4.2 – 5	5
High (level 2)	3.4 – 4.2	4
Medium (level 3)	2.6 – 3.4	3
Low (level 4)	1.8 – 2.6	2
Extremely low (level 5)	1 – 1.8	1

TABLE 6. Sustainability index hierarchy.

#### 3.4.2. Data collection

The data were conducted through a household survey participating in ecotourism sites. The study selected 61 households at four ecotourism sites, including 13 households in Hong Ha, 14 in Quang Loi, 15 in Loc Binh and 19 in Thuong Lo. A structured questionnaire covers five sustainability aspects, including environmental conservation, cultural conservation, community participation, economic benefits and empowerment, and 17 corresponding criteria. The criteria scale is designed according to a 5-point Likert scale corresponding to 5 levels of sustainability: 1 – extremely low, 2 – low, 3 – medium, 4 – high, and 5 – extremely high. After revising based on experts’ perspectives, a final semi-structural questionnaire was developed. An empirical survey was officially conducted in four case studies with participants from 61 households. Each interview took around 90 minutes.

#### 3.4.3. Data analysis

Data was analyzed by Microsoft Excel version 16.0. The characteristics of ecotourism sites and sustainability criteria were performed using descriptive statistics. The weighting of the criteria was done through pairwise criteria according to the AHP process. Actual data and weights were

Matrix size	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
RI	0	0	0.52	0.89	1.11	1.25	1.35	1.4	1.45	1.49	1.52	1.54	1.56	1.58	1.59

TABLE 5. Average random consistency index according to matrix size. Source: Saaty and Vargas (2012).

combined to calculate the ecotourism sustainability index of destinations and ranking.

#### 4. RESULTS

##### 4.1. Weighting aspects of sustainable ecotourism from AHP analysis results

In this study, the AHP method supports three main results. First, it converts the responses (countable or uncountable) into AHP numbers that can compare between attributes (aspects) (Table 7). Then, an interrelationship matrix of the aspects is generated, and the weights of each aspect ( $W_i$ ) are determined (Table 8). Accordingly, environmental conservation (A1) is determined to be the highest weight (0.28), followed by economic benefits (A4=0.22), community participation (A3=0.20), and empowerment (A5=0.13). The CI and RI values are 0.02 and 1.11, respectively. The CR value is calculated as 0.002, lower than the 0.1 threshold, which indicates that this judgement matrix is consistent and acceptable.

##### 4.2. Descriptive sustainable ecotourism indicators in destinations

Regarding environmental conservation, the analysis results in Table 9 show that lagoon and coastal tourist destinations have high and very high scores, while tourist destinations in mountainous areas have medium to high scores. Notably, some indicators of tourists’ awareness of the environment or reduction of environmental impacts in the mountainous regions are at low to moderate levels, respectively (2.85 and 2.95).

##### 4.3. Ranking the sustainability level of tourist destinations

After obtaining the weight of aspects, the SEI is calculated to identify the sustainability level in each tourism destination. The results indicate that the sustainability level differs between tourism destinations, as shown in Table 10. Overall, respondents

evaluated that Quang Loi is ranked as the region with the most sustainable tourism with an SEI score of 4.25, followed by Loc Binh (3.90) and Thuong Lo (3.46). Meanwhile, Hong Ha is considered less sustainable ( $SEI < 3.4$ ). Notably, this result illustrates significant gaps between the relative sustainable values of each aspect separately. Accordingly, the environment perspective (A1) has the highest SEI, ranging from 1.4 to 2.33. In contrast, the indicators of empowerment for the local community (A5) are the lowest, not exceeding the 0.92 threshold. This means that respondents consider five factors to be of unequal importance in contributing to the sustainable value. We will analyze the issues intensively in the next section.

#### 5. DISCUSSION

The sustainability of CBET in Thua Thien Hue province was assessed through 5 criteria with corresponding weights, including Environmental Conservation at 0.28, Economic Benefit at 0.22, Community Participation at 0.20, Cultural Conservation at 0.17, and Empowerment to Vulnerable Groups at 0.13. Based on the AHP method, 4 points representing CBET activities are ranked for sustainability, Quang Loi: very sustainable ( $S=4.25$ ), Loc Binh: highly sustainable ( $S=3.90$ ), Thuong Lo ( $S=3.46$ ), and Hong Ha: medium sustainability ( $S=3.23$ ).

Based on the hierarchical analysis process, our research has evaluated the sustainability of CBET sites based on five aspects with weights from high to low, respectively, including environmental conservation, economic benefits, participation, cultural preservation, and empowerment. Research results show that the role of environmental protection and economic benefits from tourism is more important than other factors. The cause of this situation is that after prioritizing economic development, the ecotourism sites at the study site have been strongly affected by environmental pollution; therefore, the criteria for environmental protec-

	Environmental conservation	Cultural preservation	Community participation	Economic benefits	Empowerment
Environmental conservation	1.00	1.60	1.73	1.49	1.74
Cultural preservation	0.62	1.00	0.65	0.68	1.74
Community participation	0.58	1.55	1.00	0.69	1.69
Economic benefits	0.67	1.48	1.45	1.00	1.40
Empowerment	0.58	0.58	0.59	0.71	1.00
Total	3.45	6.21	5.42	4.57	7.57

TABLE 7. Crisp values for aspects.

	Environmental conservation	Cultural preservation	Community participation	Economic benefits	Empowerment	The weight ( $W_i$ )
Environmental conservation	0.29	0.36	0.32	0.33	0.23	0.28
Cultural preservation	0.18	0.16	0.12	0.15	0.23	0.17
Community participation	0.17	0.25	0.18	0.15	0.22	0.20
Economic benefits	0.19	0.24	0.27	0.22	0.19	0.22
Empowerment	0.17	0.09	0.11	0.16	0.13	0.13
$\lambda_{max} = 5.08$						
CI = 0.02						
RI = 1.11 (n=5)						
CR = 0.018 (<0.1)						

TABLE 8. Inter-relationship matrix of the aspects.

tion are assessed as the most important by people and experts. Besides, the living standard of local people in CBET is low, so economic factors are considered necessary. This result differs from some studies by Tan et al. (2019), where economics is the leading factor, and by Lee and Jan (2019), where culture is an essential factor. This study's findings support Gladstone et al. (2013) and Kiss (2004) when the environment is the most crucial factor in ecotourism.

This study shows that the lagoon and coastal tourism models are extremely high and high sustainable CBET destinations with SEI indexes of 4.25 and 3.90, respectively. This can be due to the following reasons: First, the lagoon and coastal tourist spots are close to the city centres and urban areas, so they attract more frequent visitors than other ecotourism destinations in the distance. This brings economic benefits to tourists. Secondly, environmental protection awareness in these communities

is higher because many projects on environmental protection and ecosystem conservation associated with improving local livelihoods have been implemented in this area before. Experiencing severe environmental pollution in the past has helped the local community in the lagoon and the coastal regions have a higher sense of environmental protection than other communities (Hoang, Momtaz, & Schreider, 2020; Uy et al., 2021). Third, tourism activities in the lagoon area are well organized with authorities, community organizations, and people. In lagoon areas, Fishery associations (FAs) are well-organized community organizations. When these organizations are involved in community-based tourism, they have helped develop community-based tourism sustainably. Our findings are consistent with studies by Tan et al. (2019) and Uy et al. (2021) when community participation is a tourist attraction. Another study suggested that the high awareness of environmental protection of

Aspects	Criteria	Sustainable tourism score by indicators in destinations			
		Highland (Hong Ha) N = 13	Inner lagoon (Quang Loi) N = 14	Lagoon and coastal (Log Binh) N = 15	Remote highland (Thuong Lo) N = 19
Environmental conservation	Local community's awareness of the environment	3.38	4.00	4.60	3.79
	Tourist's awareness of the environment	2.85	4.29	4.53	3.74
	Minimize impacts on the environment	3.08	4.07	4.20	2.95
Cultural preservation	Cultural education for the local community	3.31	4.36	4.53	3.79
	Cultural education for tourists	3.38	4.33	4.47	3.79
Community participation	Community participation in tourism planning	2.92	4.17	4.00	3.74
	Tourist's satisfaction with community participation	3.38	4.17	4.40	3.58
	Community participation in tourism development	3.08	3.67	4.80	3.47
Economic benefits	Managing by local government	3.23	4.00	4.47	3.11
	Increasing employment	3.46	4.00	4.73	3.32
	Creating a fund for environmental protection	2.54	3.11	3.20	2.16
	Supporting local economic development	2.77	3.22	3.60	2.79
Empowerment	Empowerment for women	3.92	4.43	4.87	4.05
	Empowerment for poor or ethnic groups	4.08	2.50	3.00	4.16

TABLE 9. Description of sustainable ecotourism indicators in destinations.

tourists and the community has brought sustainability to tourism in China (Stone & Wall, 2004), Sri Lanka (Wickramasinghe & Takano, 2009), and Japan (Tang, 2021).

Tourism in mountainous locations, including highland and remote highland, has medium and high ecotourism sustainability with SEI indexes of 3.23 and 3.46, respectively. There are several reasons for this problem. Firstly, the difficult traffic is why the number of tourists to these destinations is complex. Second, limited management and organizational skills could have made the operating time of these tourist attractions infrequent. Third, ecotourism sites in mountainous areas are under environmental pressure due to waste and spontaneous business development, which may cause environmental and landscape changes. Finally, people in mountainous areas often prioritize short-term livelihoods due to economic and daily life difficulties. They often prioritize livelihood activities with quick income to ensure food security for their families and communities, such as hired labour.

## 6. CONCLUSION AND RECOMMENDATIONS

Community-based ecotourism receives excellent attention from the authorities, residents, experts, and tourists at the research sites. This tourism model can actively promote the sustainability of natural ecosystems associated with economic and social development for local communities. The CBET is suitable for many locations, from mountainous areas to coastal plains in Central Vietnam.

From the research results, it is necessary to maintain and strengthen the sustainability criteria groups on environmental sustainability, community participation, and economic benefit for CBET destinations with very high and high points of sustainability. In addition, it is necessary to diversify more activities to develop the local culture further and create opportunities for disadvantaged groups in the community to participate in tourism activities. For CBET destinations that are at an average level, more investment is needed to complete

Aspects (weigh)	Criteria	The sustainable ecotourism index (SEI)			
		Inner lagoon (Loc Binh) N = 15	Coastal (Quang Loi) N = 14	Remote highland (Thuong Lo) N = 19	Highland (Hong Ha) N = 13
Environmental conservation (0.28)	Local community's awareness of the environment	0.43	0.37	0.35	0.32
	Tourist's awareness of the environment	0.42	0.40	0.35	0.27
	Minimize impacts on the environment	0.39	0.38	0.28	0.29
Cultural preservation (0.17)	SEI <sub>1</sub>	1.24	1.15	0.98	0.87
	Cultural education for local community	0.39	0.37	0.32	0.28
	Cultural education for tourists	0.38	0.37	0.32	0.29
Community participation (0.20)	SEI <sub>2</sub>	0.77	0.74	0.64	0.57
	Community participation in tourism planning	0.20	0.21	0.19	0.15
	Tourists satisfied with community participation	0.22	0.21	0.18	0.17
	Community participation in tourism development	0.24	0.18	0.17	0.15
	Managing by local government	0.22	0.20	0.16	0.16
Economic benefits (0.22)	SEI <sub>3</sub>	0.88	0.80	0.70	0.63
	Increasing employment	0.35	0.29	0.24	0.25
	Creating a fund for environmental protection	0.23	0.23	0.16	0.19
	Supporting local economic development	0.26	0.24	0.20	0.20
Empowerment (0.13)	SEI <sub>4</sub>	0.85	0.76	0.61	0.64
	Empowerment for women	0.32	0.29	0.26	0.25
	Empowerment for poor or ethnic groups	0.20	0.16	0.27	0.27
Goal Rank	SEI <sub>5</sub>	0.51	0.45	0.53	0.52
		4.25	3.90	3.46	3.23
Sustainability level		1	2	3	4
		Extremely high	High	High	Medium

TABLE 10. Ranking the sustainability level of tourist destinations.

CBET criteria, especially activities aimed at raising awareness for tourists and the community about environmental protection and improving quality services to attract visitors to experience more, bring economic benefits to participants as well as develop the local economy.

This study's results suggest that many policies need specific activities in selecting potential ecotourism sites to avoid rampant development, lack of management, and waste of state and community resources. In particular, CBETs are lacking in

management and communication skills. These are important factors for maintaining and developing CBET in the future. Therefore, the Department of Tourism and local authorities need to organize training courses and capacity building for the people. These training courses need to apply participatory training methods so that people can easily understand and absorb knowledge. Learners also need to visit and study successful CBET models in Vietnam.

In addition, there should be specific plans and guidelines to support CBET sites to carry out activities aimed at developing criteria of sustainable tourist destinations, with special attention to environmental conservation, bringing about economic benefits to the community, and increasing the community's participation in ecotourism activities.

## 7. ACKNOWLEDGEMENT

This work was supported by the Asia-Pacific Network for Global Change Research (APN) through project CBA2019-02MY-Hoang. The authors also acknowledge the partial support of the University of Agriculture and Forestry, Hue University, under the Strategic Research Group Program, Grant No. NCM.DHNL.2021.05.

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