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Identifying, Monitoring, and Evaluating Sustainable Ecotourism Management Criteria and Indicators for Protected Areas in Türkiye: The Case of Camili Biosphere Reserve

Inci Zeynep Aydin * and Atakan Öztürk

Faculty of Forestry, Department of Forest Economic, Artvin Coruh University, Artvin 08100, Turkey
* Correspondence: iza@artvin.edu.tr; Tel.: +90-5434587614

Abstract: Although many criteria and indicator sets have been developed for sustainable ecotourism management in many countries around the world, such a set of criteria and indicators has not been developed in Türkiye yet. The aim of this study was to develop sustainable ecotourism management criteria and indicators specific to Türkiye's social, economic, and ecological differences and to investigate the possibilities of using this developed set in the sustainable management of the Camili Biosphere Reserve Area. The set that consisted of 12 criteria and 68 indicators prepared based on WTO and UNWTO criteria and indicator sets was used as a starting point. Within the scope of the Delphi method, as a result of three stages of repeated questionnaires, a set of criteria and indicators consisting of 11 criteria and 101 indicators was reached, based on the suggestions and consensus of four expert groups. In the next step, the adaptation and prioritization of the national sustainable ecotourism management criteria and indicator set for the Camili Biosphere Reserve Area were realized using the Analytical Hierarchy Process method, depending on the opinions of four local expert groups. As a result, it was concluded that the ecotourism activities carried out in the Camili Biosphere Reserve received a total score of 95.4 and that the ecotourism activities in the area were positively sustainable, with an average of 69.1%. It was determined that ecotourism activities in the Camili Biosphere Reserve are positively sustainable in terms of "level of awareness and perception of the field", "socio-economic benefits to the local people", "local participation", "financial structure", "environmental education and practices", and "visitor satisfaction" criteria. However, in order to ensure the sustainability of ecotourism activities both at the country level and at the local level, studies should be carried out with a participatory approach by establishing a balance between the expectations of the local people and the income obtained from ecotourism, by providing a central authority, and by making improvements in the financing structure.

Keywords: protected areas; sustainable ecotourism; criteria and indicators of sustainable ecotourism; Camili Biosphere Reserve

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1. Introduction

As a result of increasing urbanization and demographic problems caused by the intense industrialization process that started with the industrial revolution [1], nature was rapidly destroyed, and many environmental problems emerged as a result of deteriorating the balance of nature. Instead of pure economic development-oriented approaches [2,3], approaches based on the sustainability of rich ecosystems and areas with biodiversity have gained importance [4–6]. Especially in recent years, the concept of ecotourism—supporting the development and protection of the local people living in and near the protected area, making positive contributions to the natural and cultural values around the protected area, recognizing the sustainability of these values in the planning process of the protected areas for tourism services, and considering the protection of biodiversity—has started to take place on the agenda [7,8].

Sustainable ecotourism is a kind of technically planned, economically efficient, socially responsible, and ecologically sensitive tourism aiming for long-term development as a process [4,9,10]. In this context, it is extremely important to determine the extent to which the targeted plans are achieved in sustainable ecotourism activities in protected areas and the level of ensuring the economic, ecological, and socio-cultural sustainability of the area during such activities. Especially the classification of protected areas within themselves [9–11], problems experienced in determining and registering protected areas [12,13], and conflicts with local people in planning and implementation processes [6–15] are at the forefront of these difficulties.

At this point, criteria and indicators are widely used as a means to contribute to the measurement, monitoring, and evaluation of the sustainability of ecotourism activities in protected areas [5,15–20].

In this context, first the indicators for the sustainability of tourism were defined under 11 headings by the World Tourism Organization (WTO) in 1996 [21], then a comprehensive set of criteria and indicators that had 12 basic criteria and 140 indicator systems was created by the United Nations World Tourism Organization (UNWTO) in 2004 with the title of "Sustainable Development Indicators Guide for Tourism Destinations" [22], and following these developments, public, private, and non-governmental organizations from among 27 organizations came together in 2008 under the leadership of the Global Sustainable Tourism Council (GSTC) and determined 4 basic and 18 sub-criteria within the scope of sustainable tourism criteria [13,23,24].

Following these, although many studies were conducted to monitor the sustainability of ecotourism activities around the world [9,22,25–27], with the planned development period that started in the 1960s in Türkiye, various development plans (eighth, ninth, and tenth) and their Special Specialization Commission reports, the Türkiye National Forestry Program, the 1st Environment and Forestry Council Decisions, the 2nd Forestry and Water Council Decisions, and the 3rd Agriculture and Forestry Council reported only policies and strategies for the development and dissemination of ecotourism in protected areas in these macro-level documents [28–30].

Although many criteria and indicator sets have been developed for sustainable ecotourism management in many countries around the world, such a set of criteria and indicators has not yet been developed in Türkiye. The aim of this study was to develop sustainable ecotourism management criteria and indicators specific to Türkiye's social, economic, and ecological differences and to investigate the possibilities of using this developed set in the sustainable management of Camili Biosphere Reserve, which is the only biosphere reserve area in Türkiye. In this context, it is aimed to adapt and prioritize the national sustainable ecotourism management criteria and indicator set for the Camili Biosphere Reserve Area and determine the sustainability of the ecotourism activity management process in the area.

2. Introduction to The Study Area

The study area covered a total area of 25,395.4 hectares, which is also called "Macahel", with the combination of 6 villages in the basin (Camili, Düzenli, Efeler, Kayalar, Maral, and Uğur villages) bordering the Borcka District of the city of Artvin in Türkiye, declared as Türkiye's first Biosphere Reserve by UNESCO-MaB in 2007 [31] under the name of Camili Biosphere Reserve (Figure 1).

There are two nature reserves, Camili-Gorgit Nature Reserve and Camili-Efeler Nature Reserve, within the borders of the Camili Biosphere Reserve, which host a rich variety of plant and animal species and have organically certified agricultural potential. The area is very important as an ecotourism area because it is the only place where the purity of the Caucasian Bee Race (i.e., *Apis mellifera caucasica*) has remained intact. It is also among the intact forest ecosystems of not only Türkiye but almost all of Europe [32,33].

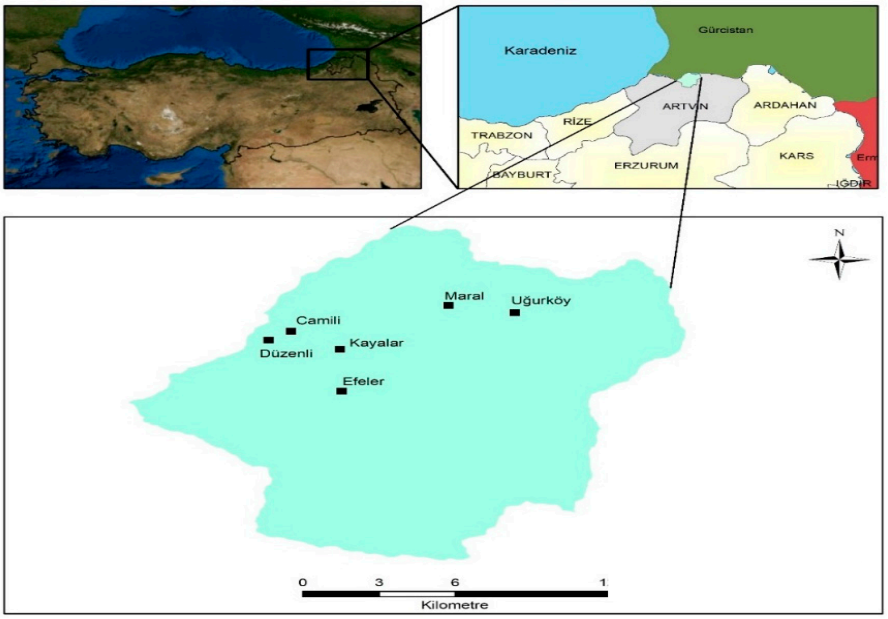

Figure 1. Camili Biosphere Reserve.

3. Materials and Methods

Questionnaires were used to achieve these determined goals. In the first step of the study, the set that consisted of 12 criteria and 68 indicators prepared by [12] based on the WTO and UNWTO criteria and indicator sets and largely overlaps with this research was used as a starting point, and depending on expert opinions, criteria and indicators specific to Turkey were used. A national criterion and indicator set consisting of 11 criteria and 101 indicators was reached by using the three-step Delphi method. The AHP Method was used in the second step, and the national sustainable ecotourism management criteria and indicator set were adapted and prioritized for the Camili Biosphere Reserve Area. In the third and final step of the study, the sustainability of ecotourism activities in the Camili Biosphere Reserve was evaluated in terms of sustainability based on the views of local interest group representatives.

In the selection of the experts who would contribute to the study, people from different expert groups were included in each step of the study. In this context, academics (A), forestry organizations (O), tourism sector NGOs and other organizations (T), and related ministries (the Ministry of Culture and Tourism and the abolished Ministry of Environment and Urbanization) (KC) to experts were included in the first step of the study; local administrators and GEF project workers (YYG), NGOs and tour operators (STO), direct income earners of Camili people (DGH), and academics (AKD) were included in the second step of the study; local administrators (YY), NGO representatives (ST), GEF project employees (GC), hostel operators with direct income (DP), and DOKA experts (DU) were included as the local interest groups in the third step of the study.

3.1. The Delphi Method

In the first step of the study, in addition to evaluating the initial criteria and the set of indicators, experts were asked to specify two criteria and indicators based on the proposed criteria, if possible. A total of 148 experts were identified, with a response rate of 39.19%, and 58 experts were included in the study. In the second step, 12 criteria and 317 indicators, which were formed according to the results of the first stage survey, were sent to the same experts, and the experts re-specified the new criteria and indicators based on the criteria, and they evaluated the relevant criteria and indicators with a 5-point Likert scale. As a result, 48 experts participated in the study, with a response rate of 82.76% from 58 experts. In the third and final step of the study, the new criteria and indicator set, consisting of 11 criteria and 109 indicators prepared according to the results of the second

step questionnaire, were sent to the same experts, and the results of the questionnaires were evaluated and shared with the experts. At this step, a response rate of 96% was achieved with the participation of 46 experts out of 48 experts (Table 1).

Table 1. The data collection process according to Delphi steps.

	Step I	**Step II**	**Step III**
Number of invitations made	148	58	48
Number of answers to the questionnaire	58	48	46
Response rate of the questionnaire (%)	39.19	82.76	96
Data collection tool	Delphi first step questionnaire	Delphi second step questionnaire	Delphi third step questionnaire
Data collection route	General opinions	5-point Likert	5-point Likert
Number of criteria/indicators	12–68	12–317	11–109

Delphi arithmetic averages of criteria and indicators were used in the first step in the analysis of Delphi questionnaire results by using the IBM SPSS Statistics 20 program, and consensus criteria were used in the other steps. In this context, the median, CAG, percentage of participation, and arithmetic mean were taken into account in the selection of consensus criteria in each of the second and third steps of the Delphi [34–38]. Moreover, factor analysis was used in the second step, and the changes in the standard deviation were used in the third step (Table 2).

In the evaluation of the Delphi second-step questionnaire, firstly, the reliability and validity of each of the criteria and indicator sets were assessed using the Kaiser-Meyer Olkin (KMO) and Barlett tests. In this respect, it was determined that the Cronbach Alpha (α) reliability coefficients were between 0.795 and 0.939, in other words, highly reliable, and the validity coefficients of each criterion were between 0.90 and 1.00, in other words, highly valid [39–41]. In addition, the results of the KMO test were greater than 0.5 and the result of the Barlett test was less than 0.05, and it was decided that the relevant criteria and indicator set were suitable for factor analysis, in which indicators that had a critical factor load less than 0.6 were eliminated (Table 2).

Considering the median (4 and 5), CAG (<1.2), percentage of participation ($\geq$80%), and arithmetic mean (>3.5) consensus values of the remaining indicators, if at least one of these consensus criteria did not meet the necessary consensus conditions, it was decided to eliminate it from the criteria and indicator set within the scope of the study. Similar to the second step in the evaluation of the Delphi third step questionnaire, the median (4 and 5), CAG (<1.2), percentage of participation ($\geq$80%), and arithmetic mean (>3.5) were evaluated as compromise criteria, as were the rate of change in the standard deviations of the indicators calculated in the previous questionnaire and the standard deviation value in the third questionnaire, with care taken to ensure that it was smaller than the standard deviation. If at least one of these reconciliation criteria did not meet the necessary reconciliation conditions, it was decided to eliminate the relevant indicator from the criteria and indicators set within the scope of the study (Table 2).

Table 2. Consensus criteria used in Delphi steps.

Delphi Steps	Criteria	Indicator	Evaluation Tools	Values
I. step	12	68	-	-
II. step	12	317	Median	4 and 5
			CAG	>1.2
			Percentage of participation	≤80%
			Arithmetic mean	<3.5
			Factor load	0.6
III. step	11	109	Median	4 and 5
			CAG	>1.2
			Percentage of participation	≤80%
			Arithmetic mean	<3.5
			Change in standard deviation	S2 > S3

3.2. The AHP Method

In this step, firstly, local expert groups and individuals were determined, and then the AHP questionnaires were applied to 17 experts from 4 expert groups. Then, a two-part questionnaire study was prepared by creating the Pairwise Comparisons Decision Matrix in the AHP Method. The 1–9-point importance scale that was developed by Saaty was preferred in the comparison of the indicators and criteria in the questionnaire [42,43], and the order of the general priority values was determined according to the overall scores of the alternatives.

3.3. Sustainability Assessment

The indicators that had normalized indicator values (w) equal to or higher than this average value were taken as the basis by taking the average of the normalized indicator values obtained in the common ranking from the prioritized indicators in the Camili Biosphere Reserve [13–44]. As a result, the sustainability of the area was evaluated according to the most important indicators for the Camili Biosphere Reserve. In total, 8 people were asked to answer the relevant questionnaire by considering the changes in ecotourism activities in the Camili Biosphere Reserve in the last five years (2015–2019).

By using Mrosek's System [45] in scoring and determining success, 1 point meant negative change, 2 points meant neutral/unbiased change, and 3 points meant positive change. That is to say, in the context of each indicator, interest group representatives were asked to give 1 point if there was a negative change, 2 points if there was no positive/negative change, and 3 points if a positive change took place. The sustainability in indicators with a success rate of 100% and a total of 138 points was decided as negative with a score of 0–46 (<33%), neutral/unbiased with a score of 47–92 (34–67%), and positive with a score between 93–138 (68–100%).

4. Results and Discussion

4.1. Findings and Discussion Regarding the Delphi Method

A national and sustainable ecotourism management criterion and indicator set that consisted of 11 criteria and 101 indicators was obtained in this step. The fact that 48 (82.76%) of the 58 experts participating in the Delphi method first-step questionnaire responded to the second-step questionnaire and then 46 (95.83%) of the 48 experts who participated in the Delphi method second-step questionnaire responded to the third-step questionnaire

was an important factor increasing the reliability of these evaluations and the criteria and indicator set obtained. It was determined that the criteria and indicators of sustainable ecotourism management put forward in the present study had similarities with various criteria and indicator sets developed for similar purposes [6,20,46]. As a matter of fact, "restriction/control of visitors in critical areas", "practices intended to mitigate environmental effects", and "zoning system and management" in the A3 criterion, in which A2, A6, A9, A11, and A12 criteria in the [12] study, which was taken as the basis of this step, were eliminated. It was seen that the indicators were included in the D1 criterion, and the "direction signs" and "brochure/booklet" indicators underwent a name change in the A4 criterion.

In addition, when the scores given by the experts to the criteria were examined collectively, the criteria given the highest priority by the experts was "D1-Conservation of natural resources and biological diversity." In the study that was conducted by [47], it was determined that the criterion of "natural resources and biodiversity" was the most important criterion in the provision and development of sustainability for all interest groups. In the study of [9,10,12,48], the criteria for "conservation of natural resources and biological diversity" and "ensuring the sustainable development of environmental resources" were at the top of the list, and these criteria were fully or partially named D1 and D5, and their criteria and contents were found to overlap. This was also emphasized in the Quebec Declaration [49]. However, although the criterion of "conservation of natural resources and biological diversity" is among the positive externalities, it is often faced with the problem of not being priced and not being tradable in the market [50].

It was determined that the criteria and indicator set specific to Türkiye largely overlapped with the criteria and indicators developed at regional or local levels in the international arena and were 100% in 5 (45%) of the 11 criteria developed in Türkiye (D2, D3, D5, D7, and D8). It was also determined that a consensus was reached (Table 3).

It was also determined by the experts that the second criterion, which was one of the newly proposed criteria and the second-most prioritized criterion, was the D2 criteria, and this criteria was followed by the D3 and D4 criteria. D2 criteria argues that human activities in a protected area must be at a threshold level because activities in a protected area can cause the degradation and destruction of the resource base, negative effects on the economy and culture of local people, and reductions in visitor satisfaction [51]. In various studies, it has been determined that there is an increase in the destruction of nature due to the lack of development of a defined carrying capacity for the area during the intense use of the relevant area and a decrease in the utilization levels of the visitors coming to the area over time due to natural destruction [4–6,14–16,52–54]. In this context, it is obvious that the D2 criteria and related indicators were among the most important criteria.

D3 and D4 criteria, which are at the top of the criteria and indicator set specific to Türkiye, and indicators based on these criteria were extremely important criteria in terms of establishing continuous and mutually trusting relations between stakeholder groups and resolving conflicts, and they were used for the management of protected areas by non-governmental organizations, local governments, local people, and area managers, etc. Although there are various projects and meetings on this issue in Türkiye, there may be conservation approaches that exclude the local people because of a lack of information, misinterpretation of information, and lack of communication [20,55–58], and the decisions taken generally remain on paper [59–61]. Moreover, indicators such as the income and the continuity of the socio-economic benefits provided to the local people have the potential to increase the commitment of the local people to ecotourism activities [5,6,23,56,62], achieve economic recovery in these segments with the sale of these products [63–66], and partially slow down the migration experienced from villages to cities [56–67].

Table 3. The ranking of Delphi's third step final set criteria according to the importance.

A Delphi's First Step: Initial Set Criteria		D Delphi's Third Step: Final Set Criteria		N	Mean
Code	**Criterion**	**Code**	**Criterion**		
A1	Conservation of natural resources and biodiversity	D1	Conservation of natural resources and biological diversity	46	4.85
A2	Quality and quantity of environmental resources	D2	Carrying Capacity	46	4.63
A3	Environmental management practices	D3	Local participation	46	4.54
A4	Provision of environmental learning and training opportunities	D4	Socio-economic benefits provided to the local people	46	4.52
A5	Protection of cultural resources	D5	Environmental management and applications	46	4.43
A6	The quality and quantity of cultural resources	D6	Environmental education and practices	46	4.43
A7	Local participation	D7	Current status of cultural resources/assets	46	4.37
A8	Socio-economic benefits to local people	D8	Financial structure	46	4.37
A9	Public awareness	D9	Visitor satisfaction	46	4.28
A10	Consumer/tourist satisfaction	D10	Institutional capacity/framework	46	4.28
A11	Management of ecotourism experience	D11	Awareness and perception level of the field	46	4.28
A12	Institutional framework/capacity				

In the studies conducted by [6,65,68], the other suggested criteria for monitoring sustainable ecotourism management in protected areas were reported to be "educational awareness", "conservation of soil and water resources", "visitor and local people satisfaction", "economic benefits to local people", "preservation of cultural heritage and diversity", "protection of hygiene and touristic safety", "institutional capacity", and "financial structure", and these criteria partially or completely overlapped with the D3, D5, D8, D9, D10, and D11 criteria in this study. It was also seen that the criteria of "protection of cultural heritage and diversity" and "protection of hygiene and touristic safety" in the relevant studies were included as indicators in the criteria D7 and D9 in this study. In the study that was conducted by [20,52,54], it was reported that the criteria of "visitor safety", "environmental education and awareness", "environmental management and practices", and "local participation" came to the forefront, and these criteria were D3, D5, D6, and D9 criteria in this study, partially or completely.

Also, although it had the lowest average of the criteria and indicators specific to Türkiye as determined by the experts, the "D11—awareness and perception level of the field" criterion was one of the newly proposed criteria within the scope of the study (Table 3). The D11 criterion was likely to rank at the bottom of the sustainable management of protected areas in Türkiye because of the lack of awareness of this concept. Moreover, different groups of people may have different opinions on the management of the

protected area, and these differences may be important for monitoring the sustainable ecotourism management of a protected area. It was also reported in various studies that the D11 Criterion can be used as an effective tool in monitoring sustainable ecotourism management [6,9,23,54,66,69].

4.2. Findings and Discussion of Opinions on the AHP Method

The Consistency Rate (CR) values of each criterion were calculated in the statistical analysis about the prioritization of the criteria and the indicators specific to Camili Biosphere Reserve, and it was understood that the pairwise comparison matrix of all criteria was consistent (Table 4).

Table 4. The statistical analysis of the priority criteria for Camili Biosphere Reserve.

No	Criteria	W	λmax	RG	CI	CR
E1	Conservation of natural resources and biodiversity	0.162	11.012	1.51	0.0012	0.00012
E2	Level of awareness and perception of the field	0.113	9.038	1.32	0.0047	0.0035
E3	Environmental management and applications	0.106	9.038	1.45	0.0047	0.0033
E4	Carrying capacity	0.091	6.126	1.24	0.0250	0.0200
E5	Environmental education and practices	0.087	15.07	1.59	0.0053	0.0033
E6	Current status of cultural resources/assets	0.087	7.064	1.32	0.0110	0.0081
E7	Local participation	0.083	5.063	1.12	0.0160	0.0142
E8	Socio-economic benefits to local people	0.073	11.38	1.51	0.0380	0.0253
E9	Financial structure	0.073	6.018	1.24	0.0040	0.0029
E10	Institutional capacity/framework	0.072	16.18	1.59	0.0120	0.0076
E11	Visitor satisfaction	0.053	7.132	1.32	0.0219	0.0166

Moreover, the change in the ranking of the criteria as a result of adapting the sustainable ecotourism management criteria and indicator set that were specific to Türkiye to the Camili Biosphere Reserve is given in Table 5.

It was determined that D1 and D2 criteria, which were in first place in the national criteria and indicator set, were also included as priority criteria (E1 and E4) in the Camili Biosphere Reserve. The E1 criterion, which was the most prioritized criterion by the relevant experts in the Camili Biosphere Reserve, also overlapped with the results of similar studies [14,70,71]. To realize the sustainable management of ecotourism activities in protected areas, it is not surprising that the E1 criterion, which had an important share in international agreements, included plant and animal species to attract the attention of visitors and was the main component of ecotourism with the highest average in Camili Biosphere Reserve.

Table 5. Listing the criteria prioritized in the Camili Biosphere Reserve.

D (Ranking of Türkiye-Specific Criteria)		E (Priority Criteria Specific to Camili Biosphere Reserve)		Changes in Criteria	
Code	**Criteria**	**Code**	**Criteria**	**Code**	**Change**
D1	Conservation of natural resources and biological diversity	E1	Conservation of natural resources and biodiversity	D1	—
D2	Carrying capacity	E2	Level of awareness and perception of the field	D2	↓
D3	Local participation	E3	Environmental management and applications	D3	⇓
D4	Socio-economic benefits provided to the local people	E4	Carrying capacity	D4	⇓
D5	Environmental management and applications	E5	Environmental education and practices	D5	↑
D6	Environmental education and practices	E6	Current status of cultural resources/assets	D6	⇑
D7	Current status of cultural resources/assets	E7	Local participation	D7	⇑
D8	Financial structure	E8	Socio-economic benefits to local people	D8	⇓
D9	Visitor satisfaction	E9	Financial structure	D9	⇓
D10	Institutional capacity/framework	E10	Institutional capacity/framework	D10	—
D11	Awareness and perception level of the field	E11	Visitor satisfaction	D11	⇑

It was determined that criterion D11, which was in the last place in the national criteria and indicator set, was the second criterion in the Camili Biosphere Reserve as the E2 criterion. In some international studies, determinations were made on the importance and necessity of the E2 criterion [4,9,12,55,68]. Despite the high education and awareness levels of the local people in the Camili Biosphere Reserve, it is possible that awareness of the areas suitable for ecotourism activities has not yet been created by the local stakeholders, especially the local people, and the resulting lack of experience in ecotourism activities was highlighted in the Camili area.

It was determined that the D5 criterion, which was in the middle of the national criteria and indicator set, was in the same place as the E3 criterion, especially in the Camili Biosphere Reserve. It is not surprising that it ranks first. Generally, there may be losses in the landscape and recreation values as a result of the waste problem, soil erosion, and erosion of the carrying capacity in ecotourism areas in protected areas (e.g., inadequate or no intervention in forest areas) [50], and their activities can cause negative externalities. In this context, the disposal of solid waste to the environment in a protected area, the absence of environmentally friendly practices, and the presence of resource values damaged by visitors also have the potential to disrupt the positive effects of ecotourism activities in the relevant protected area. In this context, the E3 criterion will most likely be among the priority criteria identified by local experts, especially for the Camili Biosphere Reserve.

Again, although D3 and D4 criteria, which were priority criteria in the criteria specific to Türkiye, were also included as priority criteria in the Camili Biosphere Reserve, it was determined that they were in the middle of the ranking (E7 and E8). In this context, it can be argued that these relevant criteria are in the middle rank, providing a certain level of success because they also provide sufficient socio-economic benefits, in particular for the Camili Biosphere Reserve. Similarly, in some previous studies conducted in the Camili Biosphere Reserve [57,72–74], an increase was detected in the number of entrepreneurs with the participation of local people in ecotourism, local economic development, and the welfare of local people. It was also determined that the number of permanent residents in the area increased when compared to previous years, and visitor satisfaction can be achieved. Moreover, the main purpose of the local people participating in ecotourism activities in protected areas was to gain socio-economic benefits [6,14,75–77].

4.3. Findings and Discussion on the Criteria for Evaluating the Sustainability of Camili Biosphere Reserve

It was also determined that the second criteria, in which the most positive sustainable changes were experienced, was the "E2–2.7 OGP" criteria and was closer to neutral than positive but closer to positive. In this context, the positive approach of the residents of the area to ecotourism and the high level of education of the people of the Camili Biosphere Reserve [56,57,77–79] had direct effects on monitoring the changes occurring in the Camili Biosphere Reserve and measuring its sustainability.

Many management meetings have been held in Camili Biosphere Reserve since Camili Biosphere Reserve was declared as Türkiye's first and only biosphere reserve, carrying out activities in Camili that include many components, from policy to planning, from education to awareness, from implementation to monitoring, financial and technical support of the people of Camili, carrying out studies for the establishment of an official management structure of the Camili under the leadership of UNESCO, and the UNESCO Turkish National Commission with the preparation of a book taking into account the land use, traditional, cultural, and socio-economic life of the Camili Biosphere Reserve from the past to the present, contributing to the positive increase in knowledge, awareness, and attitudes of the residents of the area.

However, it was determined that the least positive sustainable changes in the field were experienced in the "E10–1.6 OGP" and "E4–1.5 OGP" criteria. It was determined that the E10 and E4 criteria caused a change between negative and neutral in the area, and although these changes were close to neutral or in the middle of neutral, they were not in a positive enough course within the scope of sustainable ecotourism activities. Despite the absence of periodic inspections by independent organizations in the Camili Biosphere Reserve, the problem of legislation regarding the area, the diversity of authority among institutional organizations, the absence of laws protecting the area, the lack of principles to protect the area by the stakeholders, the area being Türkiye's first and only biosphere reserve, and the lack of a management structure make it possible to experience these problems in the Camili. It is thought-provoking that even the meetings on the Camili Biosphere Reserve were only held in 2019, and even the legal status has not yet been fully determined. For this reason, it is important to focus on efforts to make the criteria with negative changes in the Camili Biosphere Reserve positive or at least neutral.

The statistical analysis of the sustainability assessment of the area according to the most important indicators for Camili Biosphere Reserve is given under this title (Table 6).

Table 6. Sustainability assessment of Camili Biosphere Reserve according to relevant stakeholders.

Criteria	Number of Indicators	Iowest Score	Highest Score	Relevant Stakeholders											
				YY		ST		GÇ		DP		DU		General	
				TGP	OGP	TGP	OGP	TGP	OGP	TGP	OGP	TGP	OGP	TGP	OGP
E1	5	5	15	11	2.2	9	1.8	9	1.8	8	1.6	5	1	8.4	1.7
E2	4	4	12	12	3	10	2.5	10	2.5	9	2.3	12	3	11	2.7
E3	4	4	12	9	2.3	6	1.5	7	1.8	7	1.8	11	2.8	8	2
E4	2	2	6	4	2	3	1.5	3	1.5	3	1.5	2	1	3	1.5
E5	9	9	27	23	2.6	14	1.6	18	2	15	1.7	26	2.9	19	2.1
E6	3	3	9	8	2.7	6	2	6	2	5	1.7	7	2.3	6.4	2.1
E7	2	2	6	4	2	3	1.5	4	2	3	1.5	4	2	3.6	1.8
E8	5	5	15	15	3	13	2.6	15	3	14	2.8	15	3	14	2.9
E9	3	3	9	7	2.3	4	1.3	6	2	3	1	7	2.3	5.4	1.8
E10	7	7	21	12	1.7	9	1.3	11	1.6	9	1.3	15	2.1	11	1.6
E11	2	2	6	6	3	4	2	5	2.5	5	2.5	6	3	5.2	2.6
Gen.	46	46	138	111	2.4	81	1.8	94	2	81	1.8	110	2.4	95.4	2.1
Success Rate * (%)			100	80.43	-	58.7	-	68.12	-	58.7	-	79.71	-	69.1	-

YY: Local administrators; ST: NGO representatives; GÇ: GEF project employees; DP: Hostel operators with direct income; DU: DOKA experts; TGP: Total indicator score (the sum of the scores given to the indicators in the relevant criteria/criteria); OGP: Average indicator score (ratio of TGP's to the number of indicators in the relevant criteria); * Success Rate, ıt represents the percentage ratio of the overall indicator score to the overall highest achievement score (138).

Also, the "carrying capacity", a newly recognized concept in Türkiye constituting the first pillar of the study as a new criterion defined by experts in the process of determining the criteria and indicator set for sustainable ecotourism management in Türkiye's protected areas, was evaluated in the study because it has recently gained importance all over the world; and as a result, the lack of conceptual understanding of the criterion and the inadequacy of the studies on this criterion in the literature caused that the sustainability of the Camili Biosphere Reserve was located in the middle of the negative and neutral. Moreover, it was observed in the study of [80] that the rate of sustainable ecotourism development slows down because of the density of the carrying capacity of the relevant areas, and as a result, sustainability changes negatively when there is no visitor restriction on the ecotourism activities in the relevant areas.

As a result, the score that was reached as a result of scoring the selected indicators in terms of sustainability in the Camili Biosphere Reserve was 95.4, which corresponds to a success rate of 69.1% and an average score of 2.1 when associated with the highest overall score that can be obtained. This shows that there are positive changes in the ecotourism activities in the area and the sustainable management of the area in general. However, although the sustainability change of 2.1 in the indicators for the Camili Biosphere Reserve was positive, it was also evident that it was not in a positive enough course within the scope of sustainable ecotourism activities. In this context, criteria are important for the sustainable protection, development, monitoring, and utilization of human and physical facilities and assets in the sustainable management of ecotourism activities in the Camili Biosphere Reserve and other protected areas.

This section may be divided into subheadings. It should provide a concise and precise description of the experimental results, their interpretation, and the experimental conclusions that can be drawn.

5. Conclusions

Criteria and indicators are used to monitor the sustainability of ecotourism activities in protected areas. However, scientific studies in Türkiye, aiming to develop criteria and indicator sets for similar purposes with a holistic approach are inadequate. The purpose of the present study was to develop a set of criteria and indicators to ensure the sustainable management of ecotourism activities in protected areas of Türkiye, adapt this set of criteria and indicators to the Camili Biosphere Reserve Area, and determine the sustainability of the management process of ecotourism in the Area.

Questionnaires were used to achieve these determined goals. In the first stage of the research, a national criterion and indicator set consisting of 11 criteria and 101 indicators was developed using the three-stage Delphi method. The AHP Method was used in the second stage, and the national sustainable ecotourism management criteria and indicator set were adapted and prioritized for the Camili Biosphere Reserve Area. In the last stage, ecotourism activities in the Camili Biosphere Reserve were evaluated in terms of sustainability based on the views of local interest group representatives.

It was determined that the criteria and indicators set at the national level largely overlap with the criteria and indicators developed at the international, regional, or local levels. In addition, the composition of experts from different sectors and fields of knowledge and expertise made it possible to propose a wide range of indicators. In this sense, it can be said that the set of criteria and indicators determined at the national level has the quality of a guiding base that can contribute to and be used by the decision makers in determining, monitoring, and planning the sustainability of ecotourism activities carried out in the protected areas of Türkiye.

As a result of the evaluation of the sustainability of ecotourism in Camili Biosphere Reserve, it was determined that there were positive changes in the sustainable management of the area, with a total score of 95.4 (a 69.1% success rate) and an average score of 2.1. However, it was also determined that the sustainability of ecotourism activities in the area is not at the desired level. Therefore, it shows that ecotourism in our country faces both opportunities and threats for protected areas. Particularly, the lack of proper planning in the study area and the inadequacy of monitoring policies are among the important constraints that will lead to a decrease in sustainability. In this context, the importance of criteria and indicators in the protection, development, monitoring, and utilization of sustainable management of ecotourism activities in both the Camili Biosphere Reserve and the protected areas in Türkiye was presented. However, the relevant indicators should be expressed in numbers, such as units or ratios, to guide practitioners in a more beneficial way.

The time-consuming process was an important limitation in this study because of the scope of the study subject. In addition, the risk of eliminating high-importance indicators due to the fact that there are quite a few weaknesses in the ecotourism inventory in Türkiye and that the data collection and measurability of the indicators are difficult is also among the other important constraints. For this reason, a database must be created regarding the criteria and indicator set of sustainable ecotourism management in protected areas in Türkiye, and inventories must be prepared urgently.

As well as these, the legal, political, and institutional structure are important requirements for successful ecotourism sustainability management in Türkiye. For example, problems such as the absence of periodic inspections by independent organizations in Camili Biosphere Reserve, the diversity of authority among institutions, the absence of laws protecting the area, the lack of principles to protect the area among the stakeholders, and even the act that legal status has not been fully determined should be solved. For this reason, an interdisciplinary "central government authority" board should be established under the leadership of relevant public institutions and organizations, especially in order to eliminate the coordination and communication problems in the management processes.

If the number of visitors to a protected area is too high, the potential for damage to the values and biodiversity in the area is high due to the area's exceeding visitor capacity. Since a similar problem is observed in the protected areas of Türkiye, it is important to

determine and follow the criteria regarding this problem. Additionally, "level of awareness and perception of the field", and "carrying capacity" criteria were suggested as the new criteria by experts in the criteria and indicator set specific to Türkiye.

Despite all these constraints, it was determined that thanks to the ecotourism activities in the protected areas, there is an increase in the welfare level, the number of entrepreneurs, and the number of permanent residents of the local people in the area. So, the size of annual investments should be increased, an area-specific budget should be created, and the problem of authority diversity should be resolved in order to ensure the sustainability of ecotourism activities to be carried out both at the national level and in the Camili Biosphere Reserve Area.

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