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ARTICLE

Assessment of the Tourism Potential and Carrying Capacity of Ecotourism Destinations

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Abstract

Ecotourism has become one of the areas of great interest among world economists. Therefore, several methods are used to study this area. By determining the capacity of ecotourism sites to receive tourists, analyzes were carried out to prevent damage to the ecosystem in the regulation area, its quality decrease, the deterioration of the attractiveness of the ecological environment, and the decrease in its aesthetic value, thereby increasing their economic value.

Keywords: Ecotourism, tourists, protected areas, tourist capacity, acceptable capacity,potential capacity, basic capacity.

Introduction

Ecotourists can cause various negative effects on the environment, because the increased human intervention in ecological areas leads to irreversible changes in existing ecological processes, which include the depletion of natural resources, the expansion of plant populations and habitats, the loss of forests can be cut and reflected in the reduction of high water flows [1]. The large number of tourists causes damage to the environmental ecosystem in the ecotourism zone and causes a decrease in its quality, an increase in noise or pollution, and the attractiveness of the ecotourism environment deteriorates, and the aesthetic value decreases.

Methodology

According to the World Tourism Organization, "Maximum capacity of tourism" means "at the same time it is possible to visit a tourist destination without harming the physical, economic, socio-cultural environment and without causing an unacceptable decrease in the quality of tourism" is defined as the maximum number of people". Middleton and Hawkins Chamberlain defined it as "the level of human activity that can be accommodated in an area without degrading the area, adversely affecting the resident community, or reducing visitor numbers.

Maximum capacity is the point at which a facility or attraction begins to experience discomfort due to the number of visitors.

Results and Discussion

There are several different forms of maximum capacity in tourism, including:

1. Maximum physical capacity. This is the maximum number of tourists that the region can actually accommodate. Usually this is considered to be around 1 m2 per person. "Physical maximum capacity per day (PCC) = area (m2) x visitor area (m2) x daily activity duration (hours)."
2. Economic maximum capacity [2]. This refers to the level of acceptable changes in the local economy of the tourist destination, the ability of this tourist destination to establish touristic functions without losing local activity, and the places allocated for business activities are also taken into account in this indicator. Economic maximum capacity can also be used to describe the point at which revenues from tourism development are outpaced by tourism-induced inflation.
3. Maximum social capacity [3]. This is related to the negative socio-cultural effects associated with the development of tourism. Indicators of when social maximum capacity has been exceeded, as described in the Doxey index, is a decline in the local population's acceptance of tourism in the area. Decreased visitor enjoyment and increased crime are also indicators of increased social capacity.
4. Biophysical maximum capacity. It depends on how well the natural environment can withstand the interference of tourists. Some ecological resources are renewable, but if their maximum capacity exceeds the capacity of the habitat to regenerate, it will cause great damage. Maximum environmental capacity also applies to ecological and physical parameters, resources, ecosystems and infrastructure capacity [4], [5], [6].

One of the weaknesses of determining maximum capacity is that, on a practical level, it is difficult to estimate the maximum number of visitors, as it also depends on the behavior of tourists.

Assessment of the suitability of the place for ecotourism requires the collection and study of information in order to optimally organize and manage the ecotourism area according to its suitability, minimize the impact of ecotourism activities and create

rehabilitation efficiency, conservation, protection and conservation of natural resources, in addition, effective planning and development policies are needed to realize the capacity determination of the facility [7].

Ecotourist carrying capacity is a useful concept in wildlife management and determines how many ecotourists can visit an ecotourism area.

The assessment of tourist capacity in tourism is based on the method proposed by Cifuentes in 1992, in which tourist capacity is based on the area of activity, as well as the period of tourism activity in each destination.

Table 1. Standard Areas For Ecotourism Services

No.	Types of ecotourism services	Standard area for 1 person (m2)
1.	Swimming	100
2.	Beach	50
3.	Take a walk	1000
4.	Waterfall	50
5.	Cave	20
6.	Learning about culture	25
7.	Fishing	50

You can see from the table above that for 1 person 100 m2 for swimming, 50 m2 for relaxing on beaches or seaside, 30 m2 for hiking or special things (plant study, animal watching, waterfall viewing 50 m2, 20 m2 for exploring caves, 25 m2 for cultural history, 50 m2 for fishing [8], [9].

In general, there are four steps to calculate tourist capacity. To use this method, it is important to take into account tourist flows, the size of the territory, the optimal space available for free movement of each tourist, and the time of visit. In the course of our research, we have calculated the maximum capacity of tourists who can visit "Zarafshan National Park". This research method is briefly described in Figure 1.

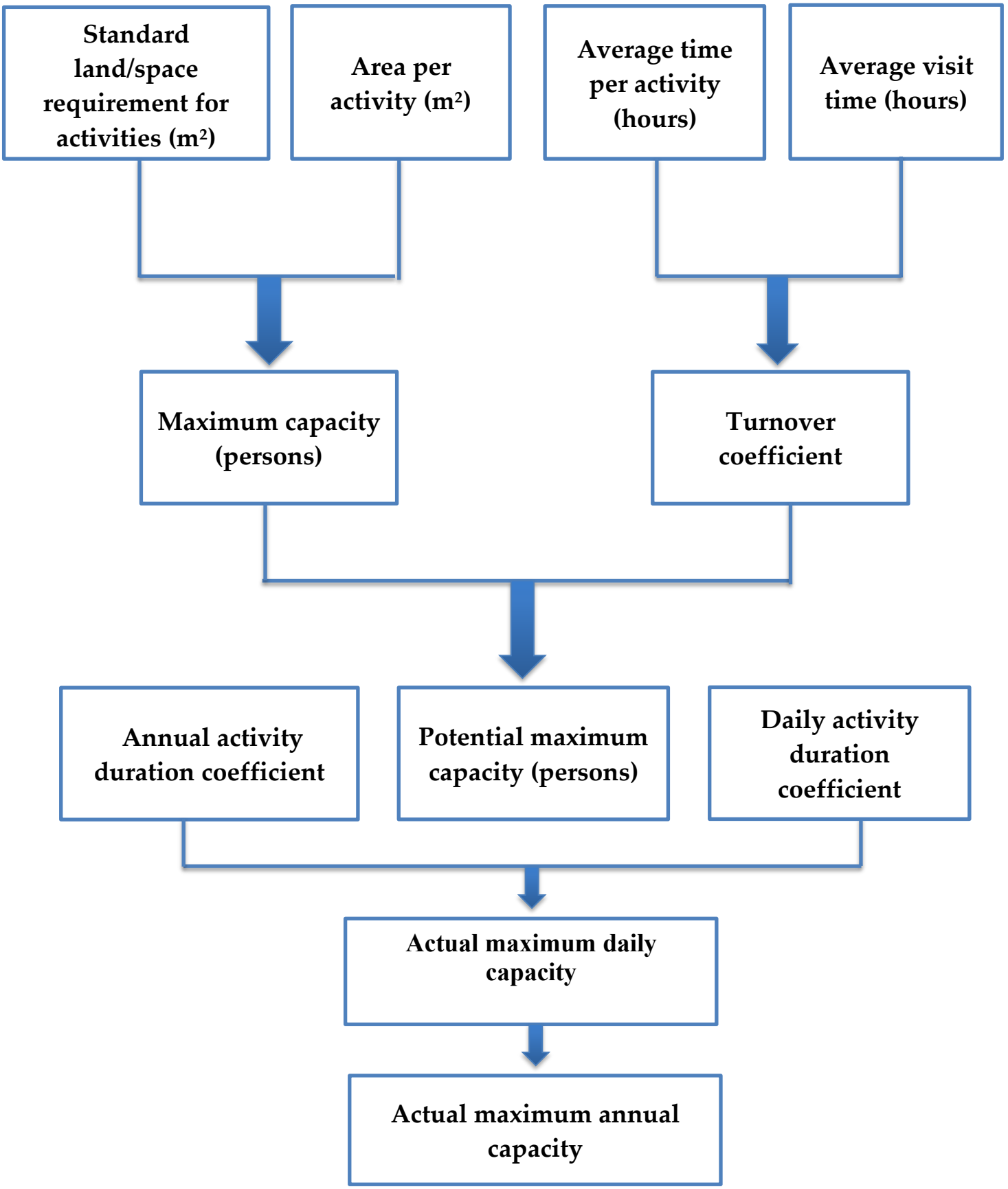

Figure 1. The basis of the tourism capacity method.

The following indicators are important for receiving tourists of the ecotourism area:

1. Standard area requirement for activity. There is a standard area requirement for certain tourism activities. The standard area is based on the need of the environment for certain types of activities, including tourism activities. A

special equation for each tourism activity is used to calculate the standard area [10].

2. Space for each activity. Each activity area is the actual area (m2) for the implementation of tourist activities in each direction. In addition, the information comes from direct observations in all directions.
3. Average time for activity. Average available time for movement is the average number of hours per day that each route is served. This information is based on the duration conditions of each tourist activity [11], [12].
4. Average visit time. Average visit time is the average time (hours) it takes to complete each activity. It is also based on direct observation of how long tourists spend on specific activities in each destination.Bularni aniqlashda quyidagi ko‘rsatkichlardan foydalaniladi. Rotation coefficient (RC). RC is a coefficient that compares the average tourist time for the implementation of tourist activities with the available time for the implementation of tourist activities per day.

$$\boldsymbol{RC = \frac{Time\ available\ for\ activity}{avarage\ visit\ time}} \quad (5)$$

Limiting factor 1: coefficient of duration of activity during the year (Lf1). Occurred due to seasonality throughout the year.

$$\boldsymbol{Lf1 = \frac{(100 - ((bad\ weather\ days \div 365) \times 100)}{100}} \quad (6)$$

Limiting factor 2: Coefficient of duration of daily activity (Lf2)
Coefficient that takes into account the operating time per day of the destination

$$\boldsymbol{Lf2 = \frac{(100 - ((operating\ hours \div 24) \times 100)}{100}} \quad (7)$$

Basic maximum capacity (BCC). BCC is a comparison of an area with standard area requirements for tourist-defined activities.

$$\boldsymbol{BCC = \frac{A\ space\ for\ each\ activity}{Default\ field}} \quad (8)$$

Potential maximum capacity (PCC). PCC is the value of the ability to receive potential tourists in a certain area, regardless of the time of operation. When calculating PCC, the RC coefficient and the result of BCC are taken into account.

$$\boldsymbol{PCC = BCC \times R} \quad (9)$$

Actual Maximum Capacity (RCC)
RCC is the actual value of the tourist assessment. RCC also includes a PCC value that takes into account operational time such as overtime and bad weather conditions [13]. The value of RCC reflects the maximum number of tourists allowed

from the designated area to carry out the activity. RCC value can be calculated for one day or one year.

$$RCC = PCC \times Lf1 \times Lf2 \quad (10)$$

From the time of establishment in "Zarafshan National Park" until now, only services such as watching animals, feeding, studying plants, and taking a walk in a scenic area have been offered. Based on the ecoroutes established in "Zarafshan National Park", the number of tourists who came to the park was studied

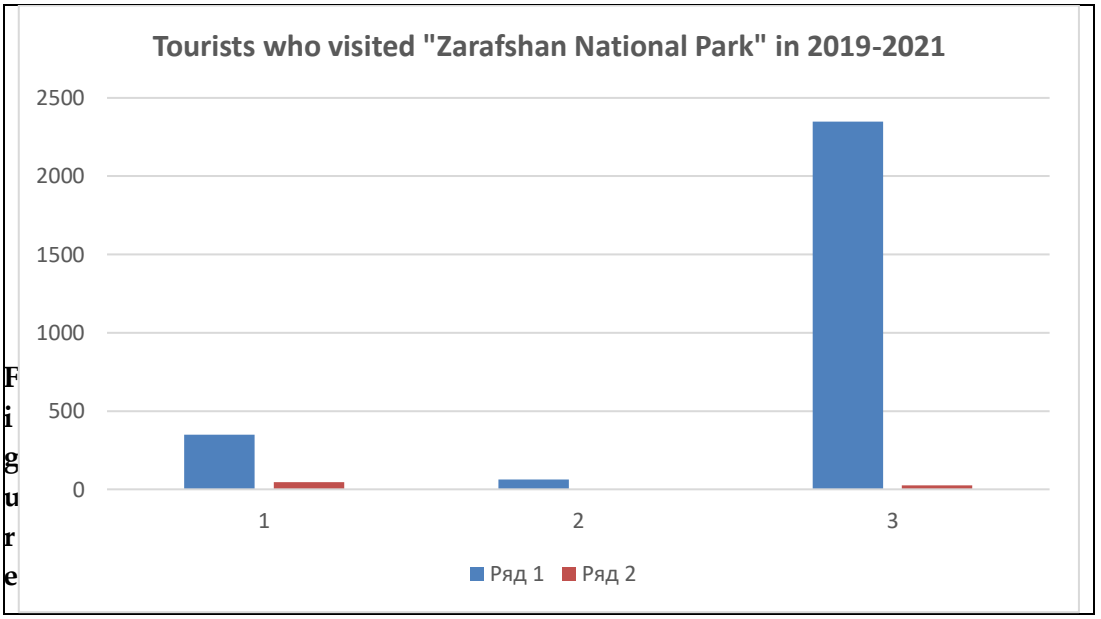

Figure 2. Tourists who visited "Zarafshan National Park" in 2019-2021.

The distribution of income from these ecotourists is as follows:

Table 2. Funds received from ecotourists who visited Zarafshan National Park in 2019-2021 (thousand soums).

№	Visitors	2019	2020	2021	Change in 2021 compared to 2019	
1	Pupils and students	1175	2650	5088,87	3913,87	increased by 4.3 times
2	Individuals and legal entities	2005	1932	19139,5	17134,5	increased 9.5 times
3	Total	3180	4582	24228,37	21048,37	7.6 times increased

From the data in the table, we can see that in 2021, due to the increase in the number of ecotourists, we can see that the income from tourists increased by 7.61 times compared to 2019.The main reason for the decrease in ecotourists in 2020 is the worldwide spread of the COVID-2019 virus. Due to the quarantine measures caused

by this disease, access to the park was closed, which in turn led to a decrease in the number of visitors and a decrease in income [14], [15]. This income is mainly used to stay in METH, as stated in paragraph 3 of the decision of the Cabinet of Ministers of the Republic of Uzbekistan No. 13 of January 8, 2018 "On some issues of regulation of stay in protected natural areas". The payment is made in the amount of 5% of the basic calculation per day for each visitor. In addition, agriculture is another source of income in Zarafshan National Park. The park has a total of 302 hectares of land for agricultural activities, and the area used for agriculture is 2117.9 hectares in 2021. million Soum income was received. That's why we analyze hiking and sightseeing in Zarafshan National Park by type of service.

Table 3 below calculates the circulation coefficient to determine the maximum capacity of tourists in Zarafshan National Park.

Table 3. Calculation Of Rotation Coefficient (Rc) For "Zarafshan National Park".

№	Types of tourist services	Time available for daily activities	Average travel time (hours)	Rotation coefficient (RC)
1.	Walking, sightseeing	8	3	2,66

According to the table, the daily working hours of "Zarafshan National Park" are 8 hours, and the average stay of 1 tourist in the park is 3 hours. Based on this, the turnover ratio for the tourist reception capacity was 2.66.

The limiting factor (Lf1 and Lf2) is a coefficient that takes into account bad weather and operating hours per year in each tourist activity. Limiting factor 1 (Lf1) takes into account the number of days of unfavorable weather in a year. Limiting factor 2 (Lf2) takes into account working hours in one day.

Table 4. Analysis Of Limiting Factors (Lf1 And Lf2) For "Zarafshan National Park".

№	Types of tourist services	Unity	Lf1	Lf2
1	Walking, sightseeing	Number of days/hours	Bad weather Day/year	Activity Hour/day
			120	8
		Notes	4 oy	8^{00} from 16^{00} to
		Coefficient	0,671	0,666

From the data in the table, we can see that the seasonality in "Zarafshan National Park" lasts 4 months, that is, 120 days. Accordingly, the 1st limiting factor was 0.671. One of the elements of the 2nd limiting factor is that the operating hours in "Zarafshan National Park" are 8 hours. Based on this, the result of limiting factor 2 gave 0.666. Based on the two limiting factor accounting books, it can be used as a key indicator to calculate the actual tourist reception capacity (RCC). The calculation of RCC is based on the area (hectares) for a specific tourism activity, as shown in Table1. Table 2.17 summarizes all calculations using the equations described above. The result of the calculation is the RCC calculation, which is a number that reflects the maximum number of tourists (people) that can visit each area for a certain tourist activity.

Table 5. The Capacity Of "Zarafshan National Park" To Receive Tourists Throughout The Year

Type of service	Walking and sightseeing
Area reserved for ecotourism (m2)	3524000
Standard area for activity (m2)	1000
Rotation coefficient	2,66
Limiting factor 1 (Lf1)	0,671
Limiting factor 2 (Lf2)	0,666
The main tourist reception capacity (person/day)	3524
Potential tourist capacity (person/day)	9373
Actual tourist reception capacity (person/day)	4189
Actual tourist reception capacity (person/year)	1026314

According to Table 5, the area of the recreation department in "Zarafshan National Park" is 352.4 hectares (3524000 m2). Ecotourism routes are organized in this area. Based on the above formulas, the main capacity of the park to receive tourists is 3524 people per day, the potential capacity is 9373 people, the actual capacity is 4189 people per day, and the actual capacity is 1026314 people per year.

Conclusions and suggestions: This RCC is a real example that explains the overall tourism carrying capacity of the environment, which can support tourism activities without adversely affecting it. RCC is a number assigned to all visitors entering a specific area of tourism activity. Thus, this number includes residents, traders, tourism-related people, as well as all people included in these areas.

By determining the capacity of ecotourism sites to receive tourists, the regulation helps to prevent damage to the ecosystem in the area, a decrease in its quality, a decrease in the attractiveness of the ecological environment, and a decrease in its aesthetic value, thereby increasing their economic value.

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