

Assessment of Carrying Capacity for Sustainable Tourism: A Case Study of Gulmarg (J & K)

Dr. Mohamad Hidayat Ullah^{1*}, Dr. Venu Trivedi²

¹*Guest Faculty in Geography Department. SKP Govt. P.G. Lead College Dewas M.P.

²Prof. & Head Department of Geography. SKP Govt. P.G. Lead College, Dewas, M.P

***Corresponding Authors:** Dr. Mohamad Hidayat Ullah, Dr. Mohamad Hidayat Ullah, Guest Faculty in Geography Department. SKP Govt. P.G. Lead

Abstract: The growth and development of tourism depends upon effective and well managed carrying capacity of tourist centers. Although it is a complex phenomenon and needs sound infrastructural development in the tourist centers, it indicates sustainability of tourism in particular tourist region. The present paper aims to measure carrying capacity in a beautiful tourist destination of Kashmir valley i.e. in Gulmarg.

Keywords: carrying capacity estimation, sustainability physical and real carrying capacity, Gulmarg.

1. INTRODUCTION

A Fundamental issue in tourism development is carrying capacity of tourist centers. It is a biological origin and is closely related to the notion of sustained yield. Because tourism is reliant on nonrenewable resource and tourist flow is always increasing, the quick and uncontrolled exploitation and usage of these resources raises the danger of resource degradation and cause of environmental problems. As a result, long-term solutions are required¹. The objective of sustainable tourism development is to maximize the long-term use of tourist resources while minimizing detrimental effects on the natural, cultural, and economic environments². The aim of carrying capacity developed in the context of establishing sustainable tourism in order to prevent saturation levels that endanger both natural and cultural systems. It has gained a lot of attention and is typically seen as one of the most effective techniques to preserve a tourist area physically, socially, culturally, and environmentally by establishing upper visitor numbers permitted to access^{3,4}, especially that each tourist destination, as well as the associated activities, has a limited ability to attract travelers. The majority of tourism activities in Gulmarg are related to the exploitation of natural resources, such as logging of trees, primarily Abiespindrow and Cedrusdeodara, for the construction of tourist huts, the Gulmarg gondola, and large hotels, soil erosion from horse riding on natural trails and skiing on the slopes, vegetation trampling from camping, and an uncontrolled flow of visitors. The fast yet unplanned extraction and usage of these resources raises the danger of their losing their ability to rebound, compromising the essential functioning of ecosystems in tourism zones. Several tourism-related factors may be recognized as having an influence on these resources, the most important of which is the amount of tourists^{5,6}.

Managing and reframing tourism development in present tourist destinations is a significant factor of this study, which aims to estimate the tourism carrying capacity of tourist destinations depending on the physical, biological and environmental conditions of the study area. The major contribution of this research is to render two examples of how the theoretical idea of carrying capacity might be implemented in practice to aid in the management of natural and historical resources in future planning. In addition, the results were equated with the existent tourists' numbers visiting Gulmarg during the period from 2000 to 2019, (Table 1).

To fulfil these objectives, the following research questions were formulated.

1. What should be the maximum number of tourist allowed enter Gulmarg?
2. Is Gulmarg bears carrying capacity exceeded or is it still within its range?

2. REVIEW OF LITERATURE

The term is derived from the ecology of wildlife and is used to describe the maximum size of a population of a particular species that an area can support in the future without reducing the ability to support that species. Due to the concept that tourism cannot grow forever in one place without irreversible damage to local systems. It is outlined that carrying capacity is the level of human activity that a place may support in perpetuity while maintaining an acceptable standard of living⁷. Since the 1970s, carrying capacity has been developed as an accurate technique and numerical method for determining land use limits and controlling development for tourism management in natural and cultural environments sensitization⁸. Evaluating the carrying capacity of the Bungus Valley, an unexposed tourist realm in the Kupwara district of Jammu and Kashmir, India, it was discovered that assessing carrying capacity is a requisite tool for any tourism development if negative effects on the ecology of the natural environment due to unpaid activities are to be avoided⁹. While measuring the entire carrying capacity of Kerwa area of Bhopal, India applying tourism impingement indicators, it was all the way that Kerwa area falls under the very low hit category, as only 3% of carrying capacity is ruined due to tourism activity¹⁰. According to author, Braham Sarovar's unique mythical backdrop is one of the most appealing attractions, and a large number of pilgrims visit this destination during each sun-eclipse. According to the author, improvised supply of basic services during large events is very beneficial to the local authority for the improvement and monitoring of this site². According to preliminary estimations, the Gulmarg's ecological carrying capacity has been surpassed, since concerns with plant loss, noise pollution, soil erosion, and garbage disposal were mentioned by nearly all of the respondents⁵.

3. DATABASE AND METHODOLOGY

The researcher primarily relied on secondary data, which included various published and unpublished reports, case studies, and assessment methods used by various nations, apart from this field visits and interviews with govt. employees, tour guides, and tourists in Gulmarg, as well as 150 questionnaires distributed among the tourists in Gulmarg. This is a quantitative, applied research. It is based on Cifuentes' most extensively used method, which was further described and utilized by various other authors¹¹. As a result, this technique was used in the study to estimate the physical and real carrying capacity of Gulmarg. Moreover, because there are no research on the area required per user for the site, therefore the value of 1m² is used per person assumed.

3.1. Profile of Study Area

A vast cup – shaped meadow, lavish and green incline where the quietness is broken just the twinkle of a bovine chime. This tourist resort is a radiant mountain retreat and beguiling dwelling place for holiday makers and is genuinely viewed as the “Queen of all hill stations”. The blooms in Gulmarg are the affection list in the Kashmir and deserves the name “Meadow of Flowers”^{12,13}.

Gulmarg is located 46 km from Srinagar city, topographical 34.05°N 74.38°E. It has an average rise of 2,650 meters above mean sea level. The average temperature ranges from its minimum - 9°C in January to maximum of 31°C in the month of July^{14,15}. This is a round year destination to visit and is renowned for natural scenery, rich green field and forests, snow-topped mountains, amuse meadow. It looks to some extent like Scotland as one could image. In winter the conditions at the Gulmarg are fundamentally the same as those found in Switzerland. The picturesque magnificence of this spot has made it a well-known recording area for some Bollywood films. The most visited spot of the place is Khilanmarg, from where the Kashmir Valley and the Himalayan Range is noticeable. Another mainstream spot is Alpathar Lake, situated at the foot of the twin peaks of Apharwat (4267 meters above mean sea level) and stays solidified till late June. The main methods for arriving at these areas are by horse, aside from strolling. The slopes close Gulmarg, varying between height of 8,700 and 10,500 ft, above sea level make it the main Heli skiing resort in Asia and the most elevated ski-ing area in India. Being a well-known snow sports centre. The most famous activities here is skiing, just as the Cable Car Ride. Gulmarg Gondola, which is one of the most elevated Cable Car Project on the planet. Gulmarg is likewise home of the world's most elevated 18 opening green golf course¹³.

Gulmarg's admirers' number in the millions every year from all over the world, yet the tourist picture of the valley has never been one-sided. Its tourist landing undergoes constant and meaningless alterations. The number of tourists that have visited Gulmarg in the previous ten years.

3.2. Methods of Carrying Capacity Assessment

The greatest number of visitors that can really correlate with a certain space within a specific time period is known as physical carrying capacity (PCC). The PCC may be calculated using the formula below:

$$PCC = A \times V/a \times Rf$$

Where: A = available area for public use

V/a = area required per user (m²)

RF – Rotation Factor (the number of allowable daily visits)

Real carrying capacity (RCC):- The greatest number of visitors authorized by local environmental circumstances and management capacity without impacting tourist demand is known as the effective real carrying capacity (RCC).

The RCC is determined by the following equation

$$RCC = PCC \times 100 - Cf1/100 \times 100 - Cf2/100 \times \dots - Cfn/100,$$

Where $Cfn = (M1 / Mt) \times 100$

Corrective or limiting factors (Cfn) are factors that have a negative influence on tourist activities and are analyzed using a limiting threshold for determining the impact level of a factor (percentage)

Where M1 = limiting magnitude of variable

Mt = total magnitude of variable

4. RESULTS

Carrying capacity estimation for Gulmarg

Physical carrying capacity. $PCC = A \times \frac{V}{a} \times RF$

The available area for visitor use is 180 km² (=180000 m²)

Area required per user = 1m²

Open period of the Protected Area= 12 hours

Average time of one visit= 6 hours

Rotation factor: Open period / Average time of one visit

Gulmarg remains open for whole day (12 hrs.) for day visitors, and average time of visit is 6 hrs.

This means theoretically, a person could make 2 visits in one day.

Thus, $PCC = 1,80,000 \times 1 \times 2 = 3,60,000$ tourists per day

From the estimation it was found that physical carrying capacity of Gulmarg is 3,60,000 visitor can visit / day. Which means in a calendar $3,60,000 \times 365 = 13,14,00,000$ tourists can visit Gulmarg per year.

Real Carrying Capacity: to investigate the primary factors that adversely pretend the tourist visit in Gulmarg, the researcher referred government employees, tour guides, and visitors in the research area indicated that the limiting factors in the area include climatic, conduction, environmental, and Socio-economic variables, which are; Cf1=excessive humidity, Cf2= Snowfall, Cf3= Noise Pollution, Cf4 = loss of greenery, Cf5 = infrastructure, Cf6 = management, Cf7= overcrowding, and Cf8= food shops were identified as the most important.

Snowfall: Gulmarg has snowfall in the months of November, December, January, February, and March.(= 150 days)

$$Cf_1 = \frac{M1}{MT}$$

$$\text{Then } \frac{150}{365} = 0.4109 = 41.09\%$$

Excessive humidity: At Gulmarg, the most humid months are July, August, and September (=5 month)

$$\text{Then } \frac{3}{12} = 0.25 = 25.00\%$$

Noise: After evaluating 150 surveys, 91 respondents said there is noise near the Gulmarg entrance (especially at market area)

$$Cf_3 = \frac{91}{150} = 0.6066 = 60.66\%$$

Loss of vegetation cover limiting factor: According to the results of a survey completed by visitors and GDA employees, 67 percent of respondents agree with this factor.

$$Cf_4 = \frac{M1}{MT} = \frac{67}{150} = 0.446 = 44.6\%$$

Infrastructure limiting factor: Tourists (local, national, and international) were given 150 questionnaires about infrastructure such as hotel accommodations, transportation, health facilities, and communication facilities. Tourists in Gulmarg were dissatisfied with the infrastructure, according to a survey of 61 people.

$$Cf_5 = \frac{M1}{MT} = \frac{61}{150} = 0.406 = 40.6\%$$

Management Limiting Factor: Landscape management, continuous water supply, energy supply, transportation, and trash management were all addressed in terms of resource consumption and management capabilities. The evaluation of Gulmarg development authority (GDA) personnel, tourism reception centre (TRC) workers, stockholders, and tourists yielded the following results. Out of 150 people surveyed, 84 said it is extremely difficult to handle during peak tourist season.

$$Cf_6 = \frac{M1}{MT} = \frac{84}{150} = 0.56 = 56.00\%$$

Overcrowded: The wonderful natural landscape of Gulmarg attracts more tourists every year, making it overcrowded during peak seasons. As a result, during peak season, there is a lot of noise and disruption (March -June). According to the data, 83 people agree with this statement.

$$Cf_7 = \frac{M1}{MT} = \frac{83}{150} = 0.553 = 55.3\%$$

Food shop: Tourists from various places and distances flock to this site who need food and refreshments. During the study, it was discovered that 74 out of 150 respondents thought the meal quality was unsatisfactory.

$$Cf_8 = \frac{M1}{MT} = \frac{74}{150} = 0.4933 = 49.33\%$$

Therefore, effective real carrying capacity of Gulmarg is:

$$RCC = PCC \times \frac{100 - Cf_1}{100} \times \frac{100 - Cf_2}{100} \times \frac{100 - Cf_3}{100} \times \dots \times \frac{100 - Cfn}{100}$$

$$RCC = 1,80,000 \times 0.58 \times 0.75 \times 0.39 \times 0.55 \times 0.44 \times 0.59 \times 0.44 \times 0.5$$

$$RCC = 959 \text{ tourist visit per day. Or } 959 \times 365 = 3,50,035 \text{ tourist per year}$$

5. CONCLUSION

The aim of this research paper was to adumbrate the theory and practice of tourism carrying capacity assessment, as well as its importance as a management tool for the tourist sites of Gulmarg, and to emphasize the need to specify tourism development and management in Gulmarg on a more sustainable basis. The research presented a practical attempt at measuring Gulmarg's tourist potential in order to achieve this objective. With the use of calculations presented by Cifuentes, the physical and real carrying capacity of Gulmarg was estimated. The physical carry capacity of the study was

assessed to be 3, 60,000 visitors per day and 13, 14, 00,000 tourists per year, implying that the maximum number of people permitted into the study area should never exceed this range. The real carrying capacity was estimated to be 959 tourists per day and 3, 50, 035 tourists per year. However, in terms of current tourist flow, Gulmarg receives more visitors than its carrying capacity during peak tourism season, as evidenced by the average numbers of tourists that entered Gulmarg over the previous ten years (2000–2019). This signifies Gulmarg has reached its carrying capacity limit. According to tentative calculation, the Gulmarg’s ecological carrying capacity has been surpassed. As a result, in order to maintain the ecological sensitivity of the site, it is critical to analyze the carrying capacity on a regular basis in order to manage the flow of tourists.

Table1. *Tourism Trend in Kashmir Valley: (2000 to 2019)*

Years	Domestic Tourists	Foreign Tourists	Total
2000	104337	7575	111912
2001	66732	5859	72591
2002	24670	2686	27356
2003	182205	8959	191164
2004	358095	18234	376329
2005	585702	19680	605382
2006	412879	20009	432888
2007	417264	24576	441840
2008	550100	22000	572100
2009	577348	23904	601252
2010	710504	25984	736488
2011	1282360	32110	1314470
2012	1182826	37355	1220181
2013	1019574	29060	1048634
2014	1137161	27188	1164349
2015	897959	29396	927355
2016	1275586	24494	1300080
2017	1197242	31396	1228638
2018	774944	55814	830758
2019	466599	32985	499584

Source: *Department of Tourism Jammu and Kashmir (Srinagar), Tourism Police Kashmir.*

REFERENCES

- [1] Arsalan, S. M., Ahmed, T. and Wakil, A. M., The assessment of physical and real carrying capacity for the promotion of sustainable tourism in Rajshahi: a study of Padma river bank. *Advances in economics and business management*, 2018, **5**, 47-51.
- [2] Jurincic, I., Carrying capacity assessment of Slovene Istria for tourism sustainable development and planning II, 2005, **1**, 725-733.
- [3] Jangra, R. and Kaushik, S.P., Assessment of physical carrying capacity for managing sustainability at religious tourist destinations. *International journal of religious tourism and pilgrimage*, 2017, **5**, 29-38.
- [4] Moukhtar, I., Ibrahim, A. A., Seound, T. A. and Mostafa, S., Assessment of the environmental carrying capacity for protected areas: a study of Petrified Forest and Hassanahdome, the great Cairo. *Journal of environmental research, engineering and management*, 2020, **76**, 106-117
- [5] Lone, S., Jaybhaye, R. G., Asif, M., Lone, F.A. and Ganie, G.R., Capacity to absorb tourism: an assessment for sustainable tourism management of Gulmarg biosphere reserve Jammu and Kashmir. *India, International Journal of Management Studies*, 2019, **VI**, 77-82
- [6] Attallah, N.F., The estimation of physical and real carrying capacity on Egypt’s tourist site. *Journal of tourism research*, 2015 **12**, 67-85
- [7] Bishop, A., Fullerton, H and Crawford, A., Carrying capacity in regional environmental management. *Government printing office Washington D.C.* 1974.
- [8] Clark, J., Coastal zone management handbook. Boca Raton, Florida: *Crc press, Inc.* 1996.
- [9] Lone, S., Lone, A. F., and Asif, M., Carrying capacity assessment for the promotion of ecotourism in Bungus valley: a future tourist destination of J & K-India. *International journal of scientific research*, 2013, **2**, 187-188.

- [10] Sharma, R., Evaluating total carrying capacity of tourism using impact indicators, *Global J. Environ. Sci. Manage*, 2016, **2**, 187-196.
- [11] Cifuentes, A., Determinacion de capacidad de carga turistica en areas protegidas. Turiabacostarica: *catie Cambridg, UK iucn*, 1992.
- [12] Arora, R.C., Kashmir; the land of celestial charms; history and geography. *Gulshan books, Srinagar, Kashmir* 2005.
- [13] Hurra, M.H. and Trivedi, V., Environmental impact of tourism in Gulmarg Resort (J & K). *Journal of research and development – a multidisciplinary international level refereed journal*, 2016, **6**, 1-6
- [14] Kuchay, N. A and Bhat, M.S., Tourist flow and tourism potential regions of Gulmarg in Kashmir Himalayas., *Global journal of human and social science research*, 2013, **13**, 28-35
- [15] Mitra, S., Jammu and Kashmir: Travel Gides. *Eicher good earth limited*. 2013, 30-36

ACKNOWLEDGEMENT

I am highly indebted to acknowledge the service rendered by tourists, local people, businessmen, labours, department of tourism Jammu and Kashmir, J&K tourist police, Jammu and Kashmir pollution control board without whose help this work wouldn't have come true.

AUTHORS' BIOGRAPHY



Dr. Mohamad Hidayat Ullah, presently working as guest faculty in Department of Geography, Shri Krishnajirao Pawar Government Post Graduate College Dewas (M.P.). I have done M.Sc. form Punjabi University Patiala, Punjab, M.Phil. and Ph.D. from Devi Ahilya Vishvavidyalaya Indore. Published 10 research papers in established research journals of geography, and attended and participated in 14 National, International, conferences/ seminars, 4 works shops and 2 FDPs also worked as a guest faculty in BFGI Bathinda Punjab.



Dr. Venu Trivedi, Prof. and Head, Department of Geography, Shri Krishnajirao Pawar Government Post Graduate College Dewas (M.P.). Educated at Indore, M.A. 1st class (University topper) and Ph.D. from Devi Ahilya University, Indore. She is an expert member, Board of studies, Geography in Sarojini Naidu Govt. Girls Post Graduate College (Nutan College), Bhopal, Devi Ahilya University, Indore and Holkar Science College (Autonomous) Indore. She is a registered Ph.D. Guide of Devi Ahilya University, Indore and 8 Ph.D. Research scholars and 78 M.Phil research scholars awarded degree under her guidance. She has published 40 research papers in established geographical journals and 4 books on Practical Geography, Geography of Marketing and environment and social concerns. She was the chairperson Board of studies geography of Devi Ahilya University, Indore. She has organized 6 national conferences/ webinar on various issues of Geography. She has completed Minor Research Project of UGC Bhopal in 2008.

Citation: Dr. Mohamad Hidayat Ullah & Dr. Venu Trivedi. "Assessment of Carrying Capacity for Sustainable Tourism: A Case Study of Gulmarg (J & K)" *International Journal of Research in Geography (IJRG)* vol 8, no. 1, 2022, pp. 9-14. doi: <https://doi.org/10.20431/2454-8685.0801002>.

Copyright: © 2022 Authors. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.