



APPLICATION OF GARRET RANKING TECHNIQUE FOR ANALYSIS THE BENEFITS OF LAKES RESTORATION IN COIMBATORE CITY

Dr. R. Manikandan¹, S. Bhuvaneshvari²

¹Assistant Professor, Department of Economics, Bharathiar University, Coimbatore.

²Ph.D. Research Scholar, Department of Economics, Bharathiar University, Coimbatore.

ABSTRACT

Lakes is one of the most important freshwater ecosystems, it was directly or indirectly ensuring a range of benefits and services to human well-being, in that recreational benefits are one of the key ecosystem services that can be enhanced by lake restoration. Lake recreational benefits to visitors are enjoying the nature with family and friends, good place for relaxation, enjoy the aesthetic view, boating rides, various benefits and facilities are available in the lakes. The Periyakulam/Ukkadam lake and Valukaulam lake in Coimbatore city have been chosen for this study. The convenience sampling technique was adopted to confirm the sample size of visitors, and selected the 150 sample visitors from Ukkadam lake and 100 sample visitors from Valankulam. This study analyzes the after lake restoration, visitors preference for benefits and facilities available in the lakes, and factors affects the visitors to enjoy the recreational benefits of lakes. The Garrett's Ranking technique was used for analyse the visitor's preferences. The study found out that visitors are given the first preference for spending weekend time for visiting lakes with friends and family and they feel lake was good place for relaxation, taking photos in different view of lakes and enjoy the aesthetic view of lake. Therefore, the Lake restoration was more benefited to visitors for enjoy the recreational benefits of lakes, although the visitors are feel some disturbance. The Corporation City Municipal Corporation should take necessary steps for proper maintenance and parking facilities, etc., it will help to increase visitation rate and visitors continuously enjoy the recreational benefits from lakes.

KEYWORDS: Lakes, Restoration, Visitors, Ranking, Recreation, Benefits.

1. INTRODUCTION

Freshwater plays a vital role in support for environment, society, and economy. Lakes are one of the main sources of freshwater resources and it provides various ecosystem services such as freshwater, fish, recharging groundwater, control the flood and habitats for other aquatic life (Bhuvaneshvari and Manikandan, 2022). The Millennium Ecosystem Assessment, 2005 classified the ecosystem services into 4 categories such as Provisioning, Regulating, Supporting and Cultural services. The recreation is comes under the cultural services and one of the direct use value of lake ecosystem services. The Lake recreation activities are promoted with well-planned methods, it can generate revenue for maintenance of Lake and improve the facilities for visitors. In Coimbatore city, 8 lakes are restored under the Smart City Mission, in that 5 lakes are open for public use to enjoy the recreational benefits and services. In this study, 2 largest lakes Periyakulam/Ukkadam lake and Valankulam lake have been selected. In lake restoration process, the Coimbatore City Municipal Corporation develop the lake front area with construction of children park, walking path, sitting places, boat house, selfie spots "I love Kovai" in Ukkadam lake and "Love" word status in Valankulam lake, floating bridges, etc., all these facilities are attracted the visitors so, they are regularly visit the lakes with family and friends enjoy the recreational benefits of lakes, during holidays and weekend times lakes are fully crowded with visitors. Hence, this study analyzes the lake restoration benefits and facilities available in the lakes, and identify the factors trouble for visitors.

2. REVIEW OF LITERATURE

Manikandan and Bhuvaneshvari (2022) discussed the causes and consequence of urban lakes pollution in Coimbatore city. The focus group discussion was adopted for collected the information with fishermen, farmers, and household in around the lake. The study point out the visitors are regularly visit the lakes, the visitors activities are affect the aquatic life such as throwing plastic bags, bottles, and other wastes are mixed into lakes, and sewage water from household in and around the lakes are directly discharge into lakes, the fishermen are highly affect due to lake pollution and the study suggested to Government should make awareness to people about the economic value of lake, usefulness and implement the proper method to control wastewater discharge into lakes.



Destia and Bersisa (2019) analysed the recreational value of lake Ziway by using Travel cost method. The 223 Local visitors are randomly selected and truncated Poisson model was used for estimated the recreational value of lake. The study found out the on-site recreational benefits was 3353.64 birr/visit/person/year and annual on – site recreational benefits 118,698,734.16 birr. The visitor’s marital status, family size, mode of transportation, type of visit, distance and travel cost are significant factors affects the visitation rate.

Jala and Nandagiri (2015) evaluated the economic value of recreational use at pilikula lake. In this study, 500 sample visitors are selected, the travel cost method and contingent valuation method was used for ecosystem valuation. The consumer surplus was Rs. 17,857/day, the net recreational benefits estimated by travel cost method was Rs. 238, the willingness to pay estimated from Contingent valuation method Rs. Rs. 36.75 for improving extra facilities in lake.

Thapa (2013) analysed the recreational demand of fewa lake by using travel cost method. In this study 50 Nepali visitors are selected and the regression was used for data analysis. The regression results show that travel cost, income, age, education, and location are major factors determined the demand for fewa lakes recreational amenities and the consumer surplus was Rs.18.5/visitor/trip.

3. OBJECTIVES

- To analyze the benefits of lake restoration under smart city mission in Coimbatore city
- To identify the factors affects the visitors to enjoy the recreation benefits from Lakes.

4. METHODOLOGY

The Coimbatore city lake has been chosen for this study. There are nine lakes within Coimbatore city limits under the control of Coimbatore City Municipal Corporation. In 2016 the Coimbatore city was selected under the Smart City Mission for smart cities development activities and in 2017, Coimbatore City Municipal Corporation started to restore the eight lakes under Smart City Mission. The main focus of the smart city mission activities in Coimbatore is the rejuvenation of eight major lakes to improve the quality of living in the city and to integrate the lakes into the urban development. Out of the 8 lakes, 2 largest lakes Periyakulam/ Ukkadam Lake and Valankulam Lake have been selected for this study. In these 2 lakes, some of the recreational benefits are introduced in lake restoration process and after restoration the visitors are frequently visit the lakes to enjoy the recreational benefits. For this study, the convenience sampling technique was adopted to confirm the sample size of visitors from both lakes. From Ukkadam Lake 150 sample visitors and 100 sample visitors from Valankulam Lake have been selected. The Primary data and Secondary data were used for this study. The Secondary data collected from Coimbatore City Municipal Corporation, Public work Department, various reports and newspaper and the primary data was collected through direct interview the visitors with well-structured questionnaire. The Henry Garrett’s Ranking technique was applied to analyze the visitors preferences for benefits and facilities available in lakes and the factors makes a trouble to visitors for enjoy the recreation benefits of Lakes. The advantage of the Garrett’s Ranking technique is based on the visitors preferences arrange the lake restoration benefits.

5. DATA ANALYSIS AND DISCUSSION

The first stage of Henry Garrett’s Ranking technique is assessing the percent position of each rank, with percent position find out the Garrett score with helps of the following formula

$$\text{Percent position} = \frac{100 (R_{ij} - 0.5)}{N_j}$$

Where **R_{ij}** = Rank given for the ith variable by jth respondents

N_j = Number of variables ranked by jth respondents

Table 1. Calculate the percent position and Garrett Scores for ranks given by the Respondents

Rank	Percent position calculation = 100 (R _{ij} - 0.5)/N _j	Percent positions	Garrett scores
1	= 100(1 - 0.5)/10	5	82
2	= 100(2 - 0.5)/10	15	70
3	= 100(3 - 0.5)/10	25	63
4	= 100(4 - 0.5)/10	35	58
5	= 100(5 - 0.5)/10	45	52
6	= 100(6 - 0.5)/10	55	48
7	= 100(7 - 0.5)/10	65	42
8	= 100(8 - 0.5)/10	75	36
9	= 100(9 - 0.5)/10	85	29
10	= 100(10 - 0.5)/10	95	18



The Table 1 shows percent position of each rank given by the respondents and Garrett ranking conversion table helps to convert the orders of merits to Garrett Scores. Finally found out the Garrett Scores for each rank and multiply with each rank Garrett score and estimate the total score and average score. The factor having the highest mean score is considered as the most important factor.

Table 2. Garrett’s Ranking - Benefits and Facilities available in lakes

Sl. No	Benefits and Facilities	Ukkadam Lake			Valankulam lake		
		Total Score	Average score	Rank	Total Score	Average score	Rank
1.	Open, green space and fresh air	7940	52.93	5	4444	44.44	8
2.	Spending the weekend time with family and friends (Entertainment)	9651	64.34	1	6279	62.79	1
3.	Helps for Exercising /yoga and usefulness of available Exercise Equipment’s	4472	29.81	10	4184	41.84	10
4.	Walking path good for walking	6959	46.39	7	5080	50.8	4
5.	Playing area and children park	6687	44.58	9	4234	42.34	9
6.	Floating bridge	6773	45.15	8	4775	47.75	6
7.	Taking Photos	8156	54.37	3	4816	48.16	5
8.	Aesthetic view of lake in evening time	8071	53.81	4	5639	56.39	3
9.	Place for relaxation	8263	55.09	2	5763	57.63	2
10.	Boating	7793	51.95	6	4686	46.86	7

Source: primary data (2023)

The Table 2 examine the visitors enjoy the benefits and facilities available in lakes after restoration. The Ukkadam lake sample visitors given the 1st rank for spending the weekend time with family and friends enjoy to visit the lake with the highest average score of 64.34 and 2nd rank given for lake provide the space for relaxation, 3rd rank for taking photos in different views of lake, the sample respondents are given the 4th rank for enjoy the aesthetic view of lake in evening time, 5th rank for enjoy the benefits from Open, green space and fresh air, the visitors given the 6th rank for enjoy the boating riding available in lake, 7th rank for walking path, it was good for walkers are doing walking in early in the morning and evening time, 8th rank for floating bridge in lake, in Ukkadam lake floating bridge are attached with boating rides, those who go for boating rides they are allowed for the floating bridge, the sample visitors given the 9th rank for is playing area and children park, children are like to play in lake park but only few playing equipment’s are available, 10th rank for lake provide the space for doing for Exercise and Yoga and usefulness of exercise equipment’s available in lake. After restoration these benefits and facilities are available in lake and visitors are frequently visiting the lake. The Valankulam lake sample visitors are given the 1st rank for spending the weekend time with family and friends enjoy to visit the lake, 2nd rank given for lake provide the space for relaxation, 3rd rank for enjoy the aesthetic view of lake in evening time, 4th rank for walking path, it is good for walking and walkers are enjoy to walk in early morning and evening time, 5th rank for taking photo in various views and scenic spots of lake, 6th rank for floating bridge, in Valankulam lake floating bridges are separately constructed, so the visitors are enjoy to walk in floating bridge, 7th rank for boating to enjoy rides with family and friends, 8th rank for enjoy the benefits of open, green space and fresh air from lake, the sample visitors given 9th rank for playing area and children park, children are enjoy to play nut few playing equipment’s are available in lake park, 10th rank for lake provide the space for doing for exercise yoga and usefulness of exercise equipment’s available in lake. The table concludes that the both Ukkadam and Valankulam lake visitors are given 1st rank for spending the weekend time with family and friends enjoy to visit the lake and 2nd rank for lake provide the space for relaxation, visitors are like to take photos in “I Love Kovai” word statue in Ukkadam lake and Love word status in Valankulam lake, enjoy the aesthetic view, visitors are like Boating rides and floating bridges. Therefore, the Lake restoration was more benefited to visitors for enjoying the recreational benefits and facilities available in lakes.

Table 3. Calculate the percent position and Garrett Scores for ranks given by the Respondents

Rank	Percent position calculation = 100 (R _{ij} - 0.5)/N _j	Percent positions	Garrett scores
1	= 100(1 - 0.5)/6	8.33	77
2	= 100(2 - 0.5)/6	25.00	63
3	= 100(3 - 0.5)/6	41.67	54
4	= 100(4 - 0.5)/6	58.33	46
5	= 100(5 - 0.5)/6	75.00	37
6	= 100(6 - 0.5)/6	91.67	23



The Table 3 shows percent position of each rank given by the respondents and Garrett ranking conversion table helps to convert the orders of merits to Garrett Scores and Garrett Scores multiply with each rank and estimate the total score and average score of each rank. The factor having the highest average score is considered as the most important factor.

Table 4: Garrett’s Ranking - Factors disrupt the visitors to enjoy the recreation benefits of Lakes

Sl. No	Factors	Total score	Average score	Rank
1.	Lake visiting time	12949	51.80	3
2.	Lack of Maintenance	15845	63.38	1
3.	Odour from Lake	10691	42.76	5
4.	No fencing around the lake	9868	39.47	6
5.	High Boating charges	12080	48.32	4
6.	Lack of parking facilities	13567	54.27	2

Source: primary data (2023)

The table 4 reveals the ranking given by the sample visitors for factors disrupt to enjoy the recreation benefits of lake. The respondents given the first rank to the lack of maintenance because the poor maintenance is main the factor affects the visitors to enjoy the recreation benefits of Ukkadam lake and Valankulam lake. The visitors are expected the proper maintenance in and around the lake surrounding, it will increase the visitor’s visitation rate. The lack of parking facilities is second major factor disturb the visitors, because while visiting the lake they are suffer to parking the vehicles and 3rd rank for lake visiting time, the visitors requisition was extended the lake visiting time in both morning and evening. The high boating charges is the 4th major factor affected the visitors enjoy the recreational benefits of the lake. The sample visitors are feel that boating charges are too costly it was not affordable for all visitors, 5th factors is odour from lake, the visitors are feel the musky and sewage smell from lake water and 6th factor is no fencing around the lake is one of the factor the affects the visitors to enjoy recreational benefits of lake, the reason behind this visitors come with family members and children, no fencing around the lake creates the fear for parents and keep watching the children playing in the lake park. This table concludes that these are major factors are disturbing the visitors to enjoy the recreational benefits of lakes. The Coimbatore City Municipal Corporation should concentrate on these disturbance factors and improve the facilities in lake. it will help for visitors to continuously the visiting the lakes and enjoy the recreational benefits.

6. CONCLUSION

The study found out that lake restoration was more benefits to visitors and enjoy the recreational benefits and facilities are available in the lakes. In lake restoration process, the selfie spot, lake view spot, children parks, sitting places, walking path are constructed in lakes and this was first time various types of boating facilities are introduced in Ukkadam and Valankulam lakes. So, the people are willing to visit the lakes for recreational benefits. The Coimbatore City Municipal Corporation took great efforts in lake restoration actions under Smart City Mission. But the visitors have identified some drawbacks in facilities available in both lakes. The Authority of Coimbatore City Municipal Corporation should consider to solve the drawbacks of facilities available in lakes, it will support to visitors continuously enjoy the recreational benefits of lakes.

REFERENCES

1. *Advisory on Conservation and Restoration of Water Bodies in Urban Areas. (2013). Central Public Health and Environmental Engineering, Ministry of Urban Development Government of India. <https://mohua.gov.in/upload/uploadfiles/files/Advisory%20on%20Urban%20Water%20Bodies.pdf>*
2. *Akhil. K.O. (2020). AN ANALYSIS OF THE CAUSES OF MIGRATION TO KERALA USING GARRETT’S SCALE. EPRA International Journal of Economic and Business Review, 8(5), 14- 18.*
3. *Ao, W., & Jamir, B. K. (2020). Application of garret ranking technique in studying the problems of bamboo cultivation: A case study of Mokochung district. Nagaland. Indian Journal of Hill Farming, 33(2), 311-315.*
4. *Approach to Waterbody Rejuvenation: A Perspective. Consortium For DEWATS Dissemination (CDD) Society. Bangaluru, India. <https://cddindia.org/wp-content/uploads/2019/04/CDD-approach-to-WBR.pdf>*
5. *Bhuvaneshvari, S., & Manikandan, R. (2022). Economic Value of Major Lakes in Coimbatore City. Shanlax International Journal of Economics, 11(1), 46-50. <https://doi.org/10.34293/economics.v11i1.5793>*
6. *Bhuvaneshvari, S., & Manikandan, R. (2022). URBAN LAKES AND ITS ECOSYSTEM SERVICES: SIGNIFICANCE, THREATS, AND CONSERVATION. EPRA International Journal of Economic Growth and Environmental Issues (EGEI), 10(9), 18-21.*
7. *Desta, Yrgalem., and Bersisa, Mekonnen. (2019). “Recreational Use Value of Lakes; An Application of Travel Cost Method; A Case of Lake Ziway.” International Journal of Environmental Sciences & Natural Resources 19(4): 0105 - 0111. DOI: 10.19080/IJESNR.2019.19.556018.*



8. *Developing Eco-Restoration Plan for Eight Lakes identified under Coimbatore Smart City Proposal.* https://smartnet.niua.org/sites/default/files/RFP_Document_Coimbatore.pdf
9. *Ecosystem services – nature’s benefits.* <https://www.nature.scot/scotlands-biodiversity/scottish-biodiversity-strategy-and-cop15/ecosystem-approach/ecosystem-services-natures-benefits>
10. *Jala and Nandagiri, L. (2015). Evaluation of economic value of Pilikula Lake using travel cost and contingent valuation methods.* *Aquatic Procedia*, 4, 1315-1321.
11. *Manikandan., R. and Bhuvaneshvari., S. (2022). A study on Causes and Consequences of urban lakes pollution in Coimbatore city.* *International Journal of Creative Research Thoughts*, 10 (6): e184 - e189. <https://ijcrt.org/papers/IJCRT22A6505.pdf>
12. *Millennium Ecosystem Assessment (2005). Ecosystems and Human Well-being: Synthesis.* Island Press, Washington, DC <https://www.millenniumassessment.org/documents/document.356.aspx.pdf>
13. *TEEB (2010). The Economics of Ecosystems and Biodiversity: Mainstreaming the Economics of Nature: A synthesis of the approach, conclusions, and recommendations of TEEB.* <https://www.teebweb.org/wpcontent/uploads/Study%20and%20Reports/Reports/Synthesis%20report/TEEB%20Synthesis%20Report%202010.pdf>
14. *Thapa, K. Arjun. 2013. “Recreational Demand for Fewa Lake: An Application of Travel Cost Method.”* *Economic Literature XI* : 54 - 49.
15. *Tienhaara, Annika., Pouta, Eija., and Lankia, Tuija., Report of an approach for valuing recreation wellbeing effects of Lake Puruvesi, Natural Resources Institute Finland (LUKE)* https://www.metsa.fi/wp-content/uploads/2020/02/Report_Approach-for-valuing-recreation-wellbeing-effects-1.pdf

Acknowledgement

Bhuvaneshvari express immense gratitude to research supervisor Dr. R. **Manikandan** for his guidance and support and also thanks to Dr. Ambedkar International Centre for being granted Dr. Ambedkar Doctoral fellowship for research works.