Time Series Analysis of Tourism Object Sanitation during COVID-19 in Banjarbaru City

Imam Santoso, Muhammad Irfa'ir, Rahmawati, Syarifudin A, Erminawati

Department of Evironmental Health, Poltekkes Kemenkes, Banjarmasin, 70714, South Kalimantan, Indonesia
imamsantoso165@gmail.com

Abstract. Monitoring methods for cleanliness in clean public areas are being implemented to protect public health from disease transmission and related health hazards. Lake Seran Tourism Object is a Banjarbaru City attraction. This study assessed the sanitation development of the Seran Lake Tourism location in Banjarbaru City during the COVID-19 pandemic. This study used descriptive and observational methods. Tourist object assessment forms were used to monitor and evaluate all variables. This study collects data through guided interviews, observation, and documentation. This analysis used the Time Series Semi Average Method. According to the survey, Lake Seran's sanitation ranking as a tourist destination has declined over time. The 2020 sanitation value was 936 points (76%), which dropped to 622 points (49.3%) in 2021 and 484 points (39.1%) in 2022. So, the average sanitation value from 2020 to 2022 was 54.8%. This average suggests Lake Seran's environmental sanitation is Unhealthy. Tourist attraction managers and the municipal administration are expected to work together to prevent disease transmission during the COVID-19 pandemic. Visitors will also be closely monitored to ensure they follow health regulations.

Keywords: Sanitation, Lake Attractions, Time Series.

1 Introduction

Banjarbaru is a municipality situated inside the South Kalimantan Province, comprising one of the thirteen cities and regencies in the region. It boasts a wealth of tourism potential, encompassing both natural and man-made attractions that are highly captivating and worthy of exploration. One of the notable tourist locations is the Seran Lake tourist attraction, renowned for its affordability and the opportunity it offers to experience the pristine beauty of the lake's natural surroundings. Seran Lake encompasses an approximate area of 5 hectares, once utilized as a diamond mining site under the ownership of PT. Galuh Cempaka. Mining operations have ceased, however, the ownership of this land will remain under the company's control until the year 2034. The inundation of this area with water, resulting from the abandonment of mining operations, has given rise to the formation of a lake. This body of water, known as Lake Seran, has garnered significant attention from tourists due to its natural attributes, thereby establishing itself

as a popular destination. The distance between Seran Lake and the city center is approximately 3 kilometers, allowing for a margin of error. This distance can be covered by utilizing transportation options like as motorcycle taxis or private vehicles, including both motorcycles and cars.

From March 2020 through 2021, a global pandemic of the COVID-19 disease occurred, affecting many regions across the globe. Indonesia, as a whole, is currently facing numerous challenges in various regions, including the city of Banjarbaru, which is also grappling with difficulties in its tourism sector. It is imperative for individuals to adhere to the fundamental health protocols, which encompass the utilization of face masks, regular hand hygiene, and the practice of physical distancing. The Banjarbaru City Government has implemented measures to restrict tourist attractions, resulting in their closure and cessation of operations, in order to mitigate the transmission of COVID-19 infections. According to the data obtained from the Banjarbaru City COVID-19 Task Force on October 16, 2021, the total number of individuals who tested positive for COVID-19 was 8,970. Out of these instances, 8,586 individuals have successfully recovered, while 367 individuals unfortunately succumbed to the disease [1, 2]

Seran Lake, as a public space, possesses the capacity to serve as a conduit for the transmission of diseases, environmental contamination, and other health-related issues. Public spaces, in essence, serve as venues for individuals or communities to convene and engage in various activities, both individually and collectively [3, 4]. The implementation of sanitary monitoring or inspection in clean public spaces serves to safeguard public health by mitigating the potential risks associated with disease transmission and other health-related issues. [5–7] There exists a notable association between sanitation circumstances and the COVID-19 pandemic, encompassing the financial resources necessary for upholding environmental sanitation, the provision of sanitation facilities, and the auxiliary amenities at tourist destinations.

2   Methodology

The research design employed in this study is a correlational descriptive design, which incorporates an observational approach [8, 9]. The data was gathered by conducting an examination of the object of interest, assigning a numerical value and weight to calculate a sanitation score. Upon completion of the assessment in its entirety, the overall sanitation value will be acquired. The overall sanitation value was transformed into the ultimate value through the process of categorization.

The study was conducted at Seran Lake, located in Banjarbaru City. The observation period was conducted in three assessments: in 2020 and 2021, as reported in a research study, and in 2022. The primary aims of conducting comprehensive sanitation inspections on tourist attractions encompass the assessment of several aspects, such as the geographical positioning of public areas, the condition of sanitation facilities, and the presence of supplementary components.

The data collection instrument employed in this study was a pre-tested questionnaire. This approach was chosen to determine if any modifications were necessary to align

with the research aims. The experiment was conducted to assess the validity and relia-bility of the instrument in order to evaluate the quality of the study items. The obtained inspection result data were subjected to descriptive analysis using the Semi Average Time Series Analysis Method. Subsequently, the data were processed and presented in narrative form and frequency distribution tables using a computer software.

3   Research Results and Discussion

3.1   Environment

Lake Seran is a region renowned for its diamond mining operations, which are under the ownership and management of PT. Galuh Cempaka. Mining operations have ceased, however, the ownership of the former mining land remains with a mining cor-poration until the year 2034. The corporation transformed the previous mining site into a tourist destination known as Seran Lake due to its inundation with water. Accessing the Seran Lake tourist site is rather convenient due to its close proximity to the city center, around ± 3 kilometres.

Field observations revealed that the yard and parking space designated for both two-wheeled and four-wheeled vehicles exhibited a lack of overgrown grass and maintained a satisfactory level of cleanliness. The findings of the evaluation of the Environmental Sanitation variable are presented in Table 1.

Table 1. Results *of Assessment of Environmental Sanitation Conditions.*

No	Observation Year	Sanitary Value	Percentage (%)	Category
1	Year of 2020	320 point	100%	Healthy
2	Year of 2021	224 point	70%	Healthy
3	Year of 2022	192 point	60%	Not Healthy

The findings from the observations conducted on Environmental Sanitation through-out three distinct time periods indicated a decline in the sanitation value. In March 2020, an incident of Covid-19 occurred, resulting in a decline in visitor footfall across multi-ple destinations [10, 11], including Lake Seran. Based on municipal government pol-icy, it is anticipated that the Covid-19 situation would persist throughout 2021, neces-sitating the implementation of limits on tourist trips. Furthermore, it is noteworthy that the pandemic status of this global health crisis remains unchanged.

The decrease in tourist visits has a substantial negative effect on ticket income, thereby impacting the financial resources allocated for the maintenance of tourist at-tractions, including both physical upkeep and monthly operational expenses.

In accordance with the environmental sanitation conditions observed at the Jikomal-amo-Ternate Tourism Object [12, 13], it is evident that the building sanitation fails to satisfy the specified standards. This inadequacy encompasses various aspects, namely building construction, building materials, and humidity levels. The pre-Covid-19 era witnessed substandard sanitation conditions that were detrimental to public health, highlighting the significance of maintaining proper sanitation practices.

3.2   Sanitation Facilities

Clean water. Access to clean water is a fundamental necessity for human well-being and public health. In terms of sanitation facilities, namely clean water facilities that were adequately accessible, the physical attributes of the water fulfill the necessary criteria, including clarity, absence of odor, and absence of color [14]. In addition to the presence of an adequate number of water taps, with a minimum need of one faucet per every 20-meter radius [15, 16].

Public toilet. A facility designated for public use, typically providing restroom facilities. In relation to sanitation amenities, namely public bathroom facilities, it is evident that the toilets exhibited cleanliness and were adequately maintained. In order to manage the disposal of waste matter, the toilet was linked to a septic tank. The tourist attraction known as Seran Lake is equipped with a total of four toilets. Specifically, there are two toilets located in the front area, adjacent to the parking lot, and an additional two toilets situated on the opposite side of the lake, specifically on a small island. However, it is worth noting that only three of these toilets are now operational. To be more precise, one toilet is functional in the parking lot area, while the remaining two toilets on the tiny island are also in working condition. In contrast, the operation of a single toilet is limited to specific occasions such as weekends (Saturday and Sunday) and extended holiday periods. The quantity of visitors during weekdays amounted to 500 individuals, while on Saturdays and Sundays it escalated to 2,000 individuals. On extended holidays, such as Eid and New Year holidays, the number of visitors surges to 10,000 individuals. According to the specified criteria, which stipulate that there should be one latrine for every 80 female tourists and one latrine for every 100 male visitors, it may be concluded that the number of toilets at the Lake Seran tourist attraction did not satisfy the aforementioned requirements [17, 18]. The toilets for female and male guests were not segregated, so failing to meet the stated criteria. The maintenance of the toilets was inadequate, since there was a lack of clear signage designating the respective men's and women's facilities at the entry, perhaps leading to instances of individuals entering the incorrect restroom. According to a study conducted by researchers, the sanitation conditions of the public toilets at the Tirta Sudamala Temple Tourism Object in Bebalang Village, Bangli Regency, fail to satisfy the necessary standard [19]

Wastewater disposal. Based on the findings derived from observations conducted at the tourist sites of Lake Seran, it can be concluded that the management of wastewater exhibits deficiencies. This is primarily attributed to the improper disposal practices observed, whereby unclean water utilized for sanitary purposes and food preparation within the vicinity of traders at tourist destinations is directly discharged into the lake or openly deposited without undergoing subsequent treatment or containment measures. According to reports provided by traders and managers, it has been indicated that the area in question remains extensive, hence enabling unrestricted disposal.

Waste disposal. According to the findings of the observations, the waste management practices in the area involved daily disposal of waste to a temporary landfill located in close proximity to the tourist destination. The landfill was characterized by a hole-like structure. At intervals of 20 meters, it was observed that one trash receptacle lacked water-tightness due to the presence of perforations, hence posing a risk of contaminating the surrounding environment. The garbage can is constructed from repurposed drums and lacks a lid. The maintenance of the landfills was found to be inadequate on the most recent inspection visit in March 2022, and no further additions are scheduled until 2022. Overall assessment results of Sanitation Facilities can be seen in table 2 below.

Table 2. Assessment Results of Sanitation Facilities

No	Observation Year	Sanitary Value	Percentage (%)	Category
1	Year of 2020	496 point	84%	Healthy
2	Year of 2021	326 point	55,4%	Not Healthy
3	Year of 2022	220 point	37,4%	Not Healthy

3.3   Supporting facilities

Counseling Facilities. Based on the results of direct observation at Lake Seran, there was only 1 poster containing an order to always maintain personal and environmental hygiene to avoid the dangers of Covid 19. This poster was located in front of the writing on Lake Seran, its size was quite large and visitors who come can definitely see it. and read the contents of the writing on the poster.

The Seran Lake tourist attraction had a loudspeaker which was used to warn body safety if an accident occurs. This loudspeaker was located at the top of the monitoring post. Its position was at the top of the crossing point for visitors and traders when using a motorized boat to cross to the island which can accommodate ± 10 people.

Information obtained from the Youth, Sports, Culture and Tourism Office of Banjarbaru City, the Seran Lake tourist spot was temporarily closed due to an accident where a swimmer died at the end of 2021 [20, 21].

During the third inspection visit in March 2022, there were no notable advancements observed in the extension facilities. In fact, it appeared that no new facilities had been added since the previous inspections, since the existing facilities remained unchanged and showed signs of age.

Health Facilities. There were no polyclinics/medical clinics at the Seran Lake tourist spot, nor were there first aid kits containing simple medicines[16, 21]

Fire Extinguisher and Work Safety. Based on the results of interviews with the person in charge of Lake Seran tourism and direct observation, there were no fire extinguishers. Since it was opened (operated) fire extinguishers and work safety facilities have never been provided [21], there was no body safety for visitors who took boats to

cross to the small island, as well as visitors who swim around Lake Seran. Also not provided by the float manager for visitors who ride boats or water bicycles in Lake Seran, so that the situation is at risk of being dangerous for visitors if something unexpected happens (drown). Overall Assessment Results of Supporting Facilities can be seen at table 3 below.

Table 3. Assessment Results of Supporting Facilities

No	Observation Year	Sanitary Value	Percentage (%)	Category
1	Year of 2020	120 point	37,5%	Not Healthy
2	Year of 2021	72 point	22,5%	Not Healthy
3	Year of 2022	72 point	22,5%	Not Healthy

3.4   Assessment Period

The evaluation of the sanitation of public spaces is conducted at least once per semester. However, because to the prevailing conditions of the Covid-19 pandemic, wherein tourism establishments are required to adhere to the "open-close" method mandated by the Banjarbaru City Government, the assessment frequency has been reduced to once year. The duration of time is one year [20]. The data for the years 2020 and 2021 was acquired from prior study, as shown by the existing literature. Moreover, it is anticipated that in the year 2022, researchers will conduct a replication of the aforementioned study in order to examine the progression of sanitary indicators compared to the preceding year (refer to Table 4).

Table 4. The evaluation of Lake Seran's tourist spots in Banjarbaru City for the years 2020, 2021, and 2022.

Observation Variable	Persentage			Average Value
	2020	2021	2022	
General	100%	70%	60%	76,6%
Sanitation Facilities	84%	55,4%	37,4%	58,9%
Supporting Facilities	37,5%	22,5%	22,5%	27,5%
Total Assessment	76%	49,3%	39,1%	54,8%

Based on data collected over a three-year period (2020-2022), it was determined that the average Sanitation Score for Lake Seran, a popular tourist destination, was 54.8%. Consequently, the site was deemed unsuitable from a health perspective.

A time series chart was constructed using the Semi Average method, depicting the average sanitation values for each observation variable as well as the average sanitation value for the period spanning from 2020 to 2022 (see Fig 1). The chart reveals a declining trend in sanitation values over the last three years, with the percentage decreasing from 76% to 39.1%. This information is summarized in Table 1. There is concern that

the devaluation of sanitation may have repercussions on the ecological well-being of the tourism destination, subsequently affecting its visitors[22, 23].
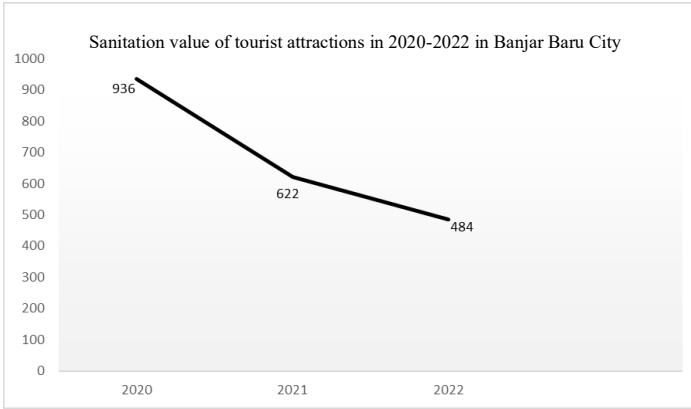

Fig. 1. Semi Average Method Time Series Analysis Graph.

According to a study conducted on Lake Kerinci Padang [11, 24], the findings indicate that the tourism items in the area fail to fulfill the necessary sanitation health standards expected of a tourist attraction. The present study reveals that the state of tourist attractions in both cities falls short of meeting the established standards for environmental sanitation (see Fig 2.).
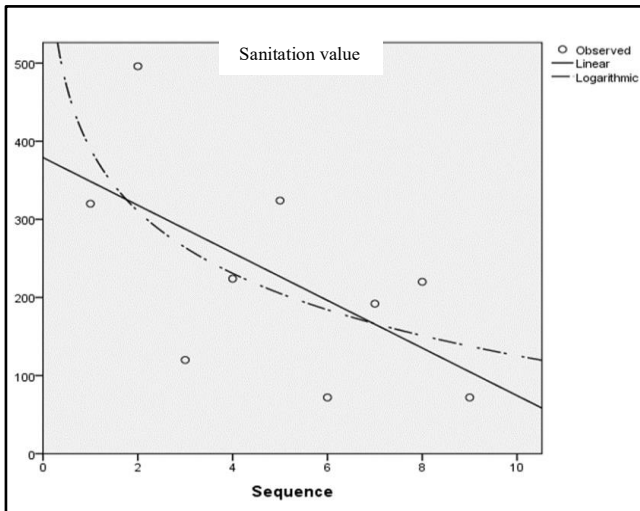
Fig. 2. Linear and Logarithmic Patterns of Tourism Object Sanitation Values 2020 – 2022 in Banjarbaru City.

Based on the analysis of Figure 2, it can be inferred that there is a discernible trend indicating a decline in sanitation levels. If this situation persists, it is plausible that there will be a subsequent fall in visitor numbers, perhaps resulting in a decline in tourism activity at the attraction. Ultimately, the City of Banjarbaru will experience a decline in tourist footfall, resulting in a lack of visitors to its various tourist attractions, including the renowned Lake Seran Tourism Object that has historically served as an emblem of the city. The time series graph, analyzed by the Semi Average method, reveals a discernible pattern wherein sanitation values exhibit a propensity to decline under Covid-19 conditions. This pattern may be represented by both linear and logarithmic line equations, employing the formula $Y = a + bX$ [25, 26].

4   Conclusion

The results of observations in the field show that at the beginning of 2020 general sanitation conditions were clean and well maintained. However, after Banjarbaru City declared that more people would die from Covid in 2021 and 2022, all tourist attractions were closed. As a result, environmental sanitation care decreases in value. Likewise, sanitation facilities such as the provision of clean water, public toilets, waste water disposal, rubbish disposal are not maintained and supporting facilities are not paid attention to management because there is no income for operational costs. For the future, it is hoped that the Banjarbaru City Government Health Service will carry out regular supervision in maintaining environmental sanitation at tourist attractions, so that there is no transmission and spread of disease due to poor management of environmental sanitation at tourist attractions.

References

1.   Adilah, F.N., Muthmainah, N., Skripsiana, N.S., Yuniarti, R., Rahmiati, R.: Profil Pasien Konfirmasi Covid-19 Yang Dirawat Di Rsd Idaman Banjarbaru Periode 2020-2021. Homeostasis. 6, 321–332 (2023).
2.   Wulandari, A., Rahman, F., Pujianti, N., Sari, A.R., Laily, N., Anggraini, L., Muddin, F.I., Ridwan, A.M., Anhar, V.Y., Azmiyannoor, M.: Hubungan karakteristik individu dengan pengetahuan tentang pencegahan coronavirus disease 2019 pada masyarakat di Kalimantan Selatan. J. Kesehat. Masy. Indones. 15, 42–46 (2020).
3.   Madden, D.J.: Revisiting the end of public space: Assembling the public in an urban park. City Community. 9, 187–207 (2010).
4.   Muafidah, N., Santoso, I., Darmiah: Hubungan Personal Higiene dengan Kejadian Skabies pada Santri Pondok Pesantren Al Falah Putera Kecamatan Liang Anggang Tahun 2016. Januari. 1, 7–10 (2017).
5.   Organization, W.H.: Sanitation safety planning: Manual for safe use and disposal of wastewater greywater and Excreta. World Health Organization (2015).
6.   Nwachukwu, N.C., Orji, F.A., Ugbogu, O.C.: Health care waste management–public health benefits, and the need for effective environmental regulatory surveillance in federal Republic of Nigeria. Curr. Top. public Heal. 2, 149–178 (2013).

7. Paleologos, E.K., O'Kelly, B.C., Tang, C.-S., Cornell, K., Rodríguez-Chueca, J., Abuel-Naga, H., Koda, E., Farid, A., Vaverková, M.D., Kostarelos, K.: Post Covid-19 water and waste water management to protect public health and geoenvironment. Environ. Geotech. 8, 193–207 (2020).
8. Hidayat, A.A.: Quantitative paradigm health research methods. Surabaya Heal. books Publ. (2015).
9. Siedlecki, S.L.: Understanding descriptive research designs and methods. Clin. Nurse Spec. 34, 8–12 (2020).
10. Nagaj, R., Žuromskaitė, B.: Tourism in the Era of Covid-19 and Its Impact on the Environment. Energies. 14, 2000 (2021).
11. Wahyuni, R., Syamsir, S.: Local Government's Integrity and Strategy in Tourism Development Based on Creative Economy in Kerinci Regency. In: Proceedings of the 1st Tidar International Conference on Advancing Local Wisdom Towards Global Megatrends, TIC 2020, 21-22 October 2020, Magelang, Jawa Tengah, Indonesia (2021).
12. Ubadiyah, F.: Development of Beach Tourism in Teluk Gosong Village, Pulau Laut Timur District, Kotabaru Regency. Enrich. J. Manag. 12, 3616–3627 (2022).
13. Heston, P.C., Kotib, M.: Ternate City Tourism Analysis (Case Study Of Jikomalamo Beach). Int. J. Tour. Hosp. Asia Pasific. 5, 1–19 (2022).
14. Shmeis, R.M.A.: Water chemistry and microbiology. In: Comprehensive analytical chemistry. pp. 1–56. Elsevier (2018).
15. Karwot, J., Ober, J.: Safety management of water economy. Case study of the water and sewerage company. Manag. Syst. Prod. Eng. 27, 189–196 (2019).
16. Irianti, S., Prasetyoputra, P., Dharmayanti, I., Azhar, K., Hidayangsih, P.S.: The role of drinking water source, sanitation, and solid waste management in reducing childhood stunting in Indonesia. IOP Conf. Ser. Earth Environ. Sci. 344, (2019). https://doi.org/10.1088/1755-1315/344/1/012009.
17. Caesarina, H.M., Hirsan, F.P.: Danau Seran, a pit lake in an ex-mining area as an opportunity for sustainable tourism. In: IOP Conference Series: Earth and Environmental Science. p. 12026. IOP Publishing (2020).
18. Do Subuh, R., SOAMOLE, F.: Fasilitas Sanitasi Pada Objek Wisata Jiko Malamo. ETNOHISTORI J. Ilm. Kebud. dan Kesejarahan. 7, 1–9 (2020).
19. Depantara, G.A., Mahayana, I.M.B.: Tinjauan Keadaan Fasilitas Sanitasi Obyek Wisata Pura Tirta Sudamala Kelurahan Bebalang, Kabupaten Bangli Tahun 2017. J. Kesehat. Lingkung. 9, (2019).
20. Inggita, J., Satrya, I.D.G., Anshori, M.Y.: Implementation of CHSE (Cleanliness, Health, Safety, Environment Sustainability) to Gain Consumer Trust at Primebiz Hotel Surabaya. Adv. Glob. Econ. Bus. J. 3, 70–79 (2022).
21. Amelia, V., Prasetyo, D.: Sertifikasi CHSE (Cleanliness, Health, Safety, & Environment) terhadap Objek Wisata sebagai Wujud Pemenuhan Hak Wisatawan. J. Manaj. Perhotelan Dan Pariwisata. 5, 92–99 (2022).
22. Vanclay, F.: Conceptualising social impacts. Environ. Impact Assess. Rev. 22, 183–211 (2002).
23. Ranasinghe, R., Karunarathne, A., Herath, J.: After corona (COVID-19) impacts on global poverty and recovery of tourism based service economies: An appraisal. Int.

J. Tour. Hosp. 1, 52–64 (2021).

24. Amoah, I.D., Singh, G., Stenström, T.A., Reddy, P.: Detection and quantification of soil-transmitted helminths in environmental samples: A review of current state-of-the-art and future perspectives. Acta Trop. 169, 187–201 (2017).

25. Dahlan, M.S.: Statistik untuk kedokteran dan kesehatan. Penerbit Salemba (2011).

26. Suhaid, D.N., Sulistiani, R.P., Manungkalit, E.M., Pabeno, Y., Sada, M., Pratiwi, A.I., Wardani, D.W.K.K., Prasetyo, B., Adriana, N.P., Aningsih, B.S.D.: Pengantar Promosi Kesehatan. Pradina Pustaka (2022).