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Original Research Paper

Analysis of Waste Generation in the Gili Trawangan Tourism Area, North Lombok Regency

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Abstract: Gili Trawangan is one of the small island beach tourist destinations on Lombok Island which is famous throughout the world. The beach is used by visitors to enjoy the sunset and sunrise, horse riding, cycling, diving, snorkeling, and canoeing. The problem experienced is that the characteristics of visitors that influence waste generation in the tourist area are not yet known. This study aims to identify visitor characteristics, determine the amount of waste generated and its composition by visitors in the Gili Trawangan beach tourism area. Waste data collection was carried out using direct observation techniques, interviews and document tracing. The results show that waste generation in Gili Trawangan was 0.06 kg/person/day during the high season and 0.05 kg/person/day during the low season. The amount of waste generated by visitors for vocational reasons during the peak season and for healing reasons during the low season was higher than that generated by visitors for other reasons such as filling holidays, tours and business. Visitors with various activities such as snorkeling and playing on the beach produce the highest average amount of waste compared to the amount of waste produced by visitors with other activities such as enjoying the beach, relaxing, walking, working, observing, and taking photos. The components of waste produced by visitors were dominated by kitchen waste both during the high season (52.75%) and the low season (69.91%). Other waste components that are also produced are paper, plastic film, solid plastic, metal and composites.

Keywords: Generation, visitor characteristics, waste compotition.

Introduction

Currently, West Nusa Tenggara is the "Gateway to National Tourism". This is because the province with its two large islands, namely Lombok Island and Sumbawa Island, is one of the leading tourist destinations in Indonesia. In the northern coast of Lombok Island there are small islands (gili, Sasak), among which the most well-known is Gili Indah which has 3 gili. The three gili are Gili Trawangan, Gili Meno and Gili Air. Among the three gili, Gili Trawangan is the largest gili.

Gili Trawangan is part of the Gili Indah Village area, Pemenang District, North Lombok Regency, West Nusa Tenggara, which is one of the beach tourism destinations, which is used by visitors to enjoy the beauty of the beach, sunset or sunrise, horse riding, cycling and playing on the beach sand. Biological resources such as healthy coral reef ecosystems are also an attraction for tourists to visit for snorkeling and diving (Kuswandi, 2020; Nasir, 2023; Rojabi *et al.,* 2024,).

The popularity of Gili Trawangan with its beautiful beaches and underwater ecosystem, on the one hand, can encourage the further development of the tourism sector, but on the other hand, the impact of the increasing number of visitors is a threat to environmental sustainability, and the production of tourist waste is a real threat to the sustainability of the area. The daily production of tourist waste is largely determined by the number of visitors, but the amount of waste generated (waste production per person per day) is more

determined by the characteristics of the visitors themselves, such as the origin of the visitors, the purpose or reason for visiting, and the type of visitor activities. Data on tourism waste generation and visitor characteristics are very important as a basis for determining strategies in tourism waste management (Galih & Nur, 2024). There has been no research on the generation of tourist waste and characteristics of visitors in the Gili Trawangan tourist area to date.

The impact of the increasing amount of waste not only produces a smell but also puts pressure on the relatively small island due to the increasing amount of waste from tourism activities (Firdaus & Hidayah, 2022). Apart from that, the main problem with tourism on small islands is the isolation from networks and recycling facilities on the mainland (large islands) so that waste disposal activities are more dominant than waste processing (Krisdhianto et al., 2023).

Waste management in Gili Trawangan is currently still minimal, especially in terms of waste sorting from the source. Waste sorting from the source before being collected in a temporary waste bin is an important stage in waste management. This is related to the need for data on the composition of waste types which can then be analyzed to determine the potential for reducing waste generation (Hasan et al., 2025). Based on the background of the problem above, it is necessary to conduct research with the aim of determining the amount of waste generated and its composition in the Gili Trawangan tourist area.

Materials and Methods

Time and place

This study was conducted in August to October 2024 to collect data on waste generated by visitors in two visiting seasons, namely high season and low season in the Gili Trawangan beach tourist area, Gili Indah Village, Pemenang District, North Lombok Regency. Observations were made primarily in the east coast attraction area of Gili Trawangan (Figure 1).

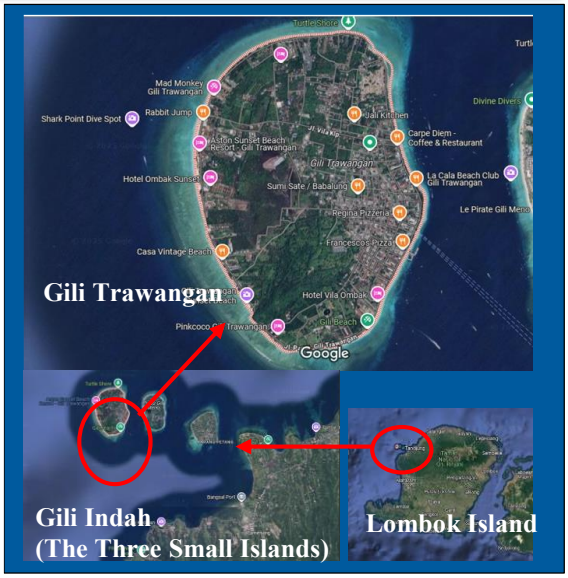

Figure 1. Map of Gili Trawangan, North Lombok

Procedures for collecting tourism waste data

Visitor waste data was obtained through direct observation and in-depth interviews with visitors as respondents using a questionnaire guide adapted from Aisha *et al*. (2021); Maulidia *et al*. (2024). Waste data was taken from 30 respondents in the low season and 30 respondents in the high season. The data targeted in the deep interview are the number of personnel accompanying the respondent, the type and size (weight and volume) of waste brought by the respondent and the type and size of waste disposed of (in the waste collection site or anywhere) by the respondent. Supporting information collected from the respondent is the respondent's origin and activities as well as the respondent's attitude towards the waste they produce.

Data analysis

The total weight of waste produced by each respondent (that which is brought + that which is thrown away by the respondent) on each observation day is processed to produce a waste generation figure using the following formula (Equation 1):

$$\text{Wg (kg/person/day)} = \frac{(\sum_{i=1}^{8} wi)}{(\sum_{i=1}^{8} ni) \text{ x D}} \quad \ldots\ldots (1)$$

Where,
Wg = waste generation
wi = total weight of waste on day i
ni = number of waste producers on day i
D = number of days of waste production

The total weight data for each type of waste divided by the total weight of all types of waste produced is compiled to state the composition of waste types. Classification of waste type composition refers to UN-Habitat 2021. The general flowchart of waste generation research on Gili Trawangan can be seen in Figure 2.

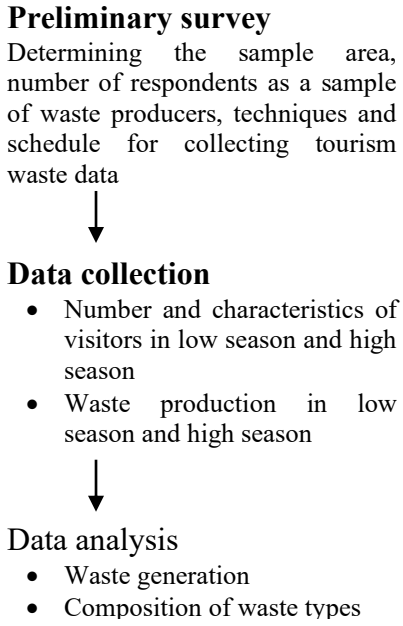

Figure 2. Work flow chart of tourism waste generation research in Gili Trawangan

Results and Discussion

Tourism waste generation in Gili Trawangan

Based on the results of collecting waste data from 30 visitors in the high season and 31 visitors in the low season, it is known that a tourist visitor to Gili Trawangan can produce waste weighing 0 to 0.535 kg/day in the high season and 0 to 0.780 kg/day in the low season (Table 1). Waste generation in the Gili Trawangan tourist area during peak season is 0.2386 kg/person/day, which comes from 0.1236 kg/person/day in the form of waste still carried by visitors and 0.1150 kg/person/day in the form of waste that has been thrown away.

Table 1. Waste generation (kg/person/day) from 30 visitors in the high season and 31 visitors in the low season in the Gili Trawangan tourist area.

Respondens Code	Waste Generation (kg/person/day)	
	High season	Low season
1	0,038	0,098
2	0,056	0,000
3	0,018	0,028
4	0,024	0,028
5	0,263	0,003
6	0,078	0,007
7	0,104	0,003
8	0,104	0,028
9	0,037	0,006
10	0,027	0,090
11	0,000	0,277
12	0,000	0,031
13	0,021	0,014
14	0,313	0,000
15	0,032	0,266
16	0,031	0,103
17	0,036	0,021
18	0,031	0,263
19	0,024	0,061
20	0,044	0,014
21	0,017	0,026
22	0,041	0,041
23	0,024	0,031
24	0,027	0,024
25	0,051	0,017
26	0,047	0,017
27	0,352	0,024
28	0,037	0,031
29	0,010	0,017
30	0,050	0,031
31		0,024
Total	**1,937**	**1,624**
Average	**0,06**	**0,05**

Waste generation in the Gili Trawangan tourist area during peak season was 0,06 kg/person/day, which comes from 0.031 kg/person/day in the form of waste still carried by visitors and 0.029 kg/person/day in the form of waste that has been thrown away. During low season, tourist waste generation was 0,05 kg/person/day, which comes from 0,028 kg/person/day in the form of waste still carried by visitors and 0.0,022 kg/person/day in the form of waste that has been thrown away (Figure 3).

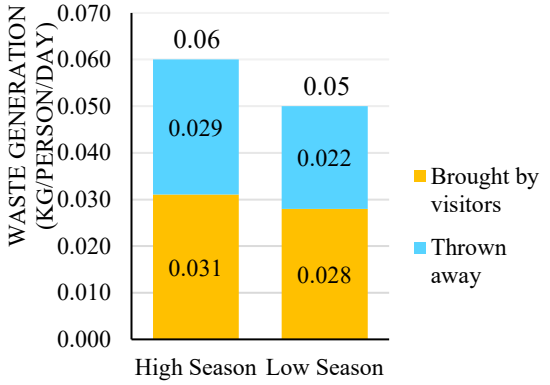

Figure 3. Waste generation in kg/person/day during high and low seasons in the Gili Trawangan tourist area

Waste generation in the Gili Trawangan tourist area, both during peak and low seasons, is still within the range of waste generation for small cities and far below the range of waste generation for large cities. Referring to SNI 19-3964-1994, the normal range of waste generation was 0.1 to 0.2 kg/person/day for small cities and 0.4 to 0.6 kg/person/day for large cities (*Rahmawati et al.*, 2021; Ermayendri & Mualim, 2023; Bagastyo *et al*. (2023).

In addition to the number of individuals, the characteristics of tourist visitors such as the origin of visitors, the mode of destination or reason for visiting and the activities of the visitors mentioned above also influence waste production in the Gili Trawangan tourist area. Waste production (kg/day) in the Gili Trawangan tourist area during the peak season is certainly much higher than during the low season. This is because the number of visitors per day during the high season is much greater than during the low season. However, waste generation, namely waste production per person per day in the Gili Trawangan tourist area during the high season was lower than in the low season. It appeared that the number of visitors only influences total waste production but does not determine the amount of waste generated or waste production generated by visitors individually.

Waste generation was more determined by visitor characteristics. The characteristics of visitors observed in this study include the origin of visitors, the purpose or reason for visitors' visits, and the types of visitor activities. Previously, Wahyudi et al. (2023); Adhikari et al. (2024); Arbulú et al. (2024) had also reported that the number of tourist waste generated may be more determined by visitor characteristics than by the number of visitors. In this study, the characteristics of visitors observed were the origin of visitors (domestic and international), the purpose or reason for visiting, and the type of visitor activities. In Gili Trawangan during the peak season, out of 30 visitors observed, 77% were domestic visitors and 23% were international visitors, while in the low season with a much smaller number of visitors, 93.55% were domestic visitors and 6.45% were abroad visitors (Figure 4).

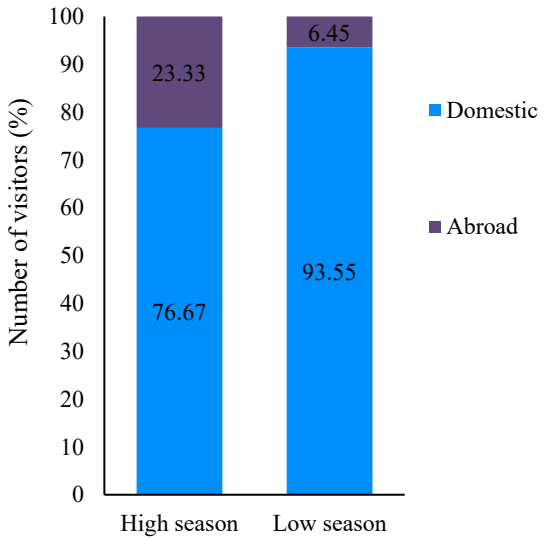

Figure 4. Number of domestic and foreign visitors during high and low seasons in Gili Trawangan

In fact, the number of foreign visitors is always greater than the number of domestic visitors, especially in coastal attraction areas, both during the high season and the low season. Thus, the comparison of the number of domestic and foreign visitors cannot be used as a basis for comparing their impact on waste generation. This is because the sample size of domestic and foreign visitors is not proportional to their numbers in the field. This is in accordance with the conclusions of research results elsewhere (Al- Muqsit et al., 2024; Atmanti et al., 2024; Steven et al., 2024), namely that to compare the influence of the characteristics of visitor origin, a balanced or proportional sample size must be used between the two, for example between

visitors from villages and cities, domestic visitors and foreign visitors and so on. The average amount of waste generated by domestic visitors is smaller than that generated by foreign visitors, both during the high season and the low season (Figure 5).

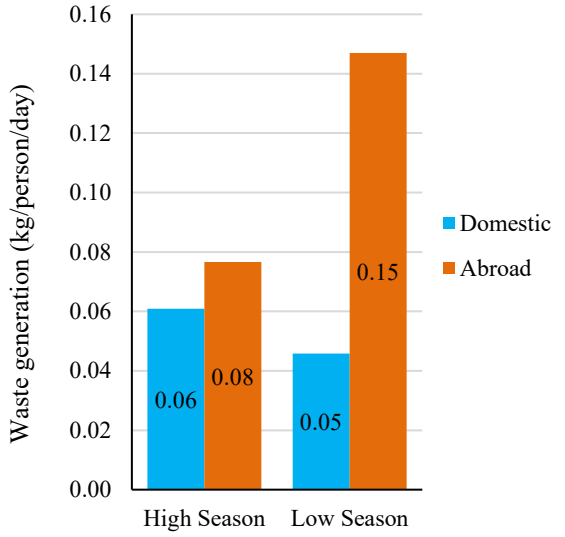

Figure 5. Average waste generation by domestic and foreign visitors during the high and low seasons in Gili Trawangan.

The purpose or reason for visiting also affects the amount of waste produced by visitors. The mode of the purpose of visitors during the peak season is to fill the holidays or vacations while in the low season, there are also quite a lot of visitors who aim for healing reasons besides the number of visitors who aim for the reason of filling the holidays remains the largest number. Another part of the number of visitors to Gili Trawangan have other purposes, namely tours, vocations and business (Figure 6).

The average waste generated by visitors according to the variety of purposes or reasons for their visit to Gili Trawangan, both during the high season and the low season, can be seen in Figure 7. Figure 7 shows that the highest average waste generation during the high season was produced by visitors who have vocational reasons i.e. 0.142 kg/person/day, while the highest average waste generation on the low season was produced by visitors who have healing purposes, that was 0.186 kg/person/day. During the high season, many people from outside Gili Trawangan visit to work as tour guides. If the number of visitors for both characteristics of reasons for visiting remains relatively constant each year, then this data can be used as a basis for determining tourism waste management strategies.

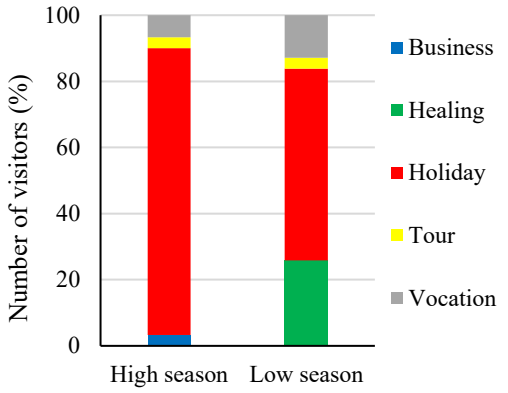

Figure 6. Mode of reasons for visitors during high season and low season in the Gili Trawangan tourist area.

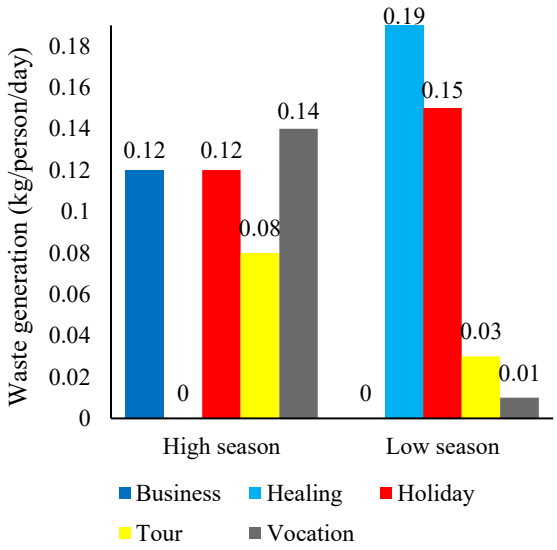

Figure 7. Average waste generation by visitors according to the variety of purposes or reasons for visiting Gili Trawangan.

If the number of visitors with both characteristics of purpose or reason for visiting is relatively the same each year, then this data can be used as a basis for determining tourism waste management strategies. Based on the results of this study, the waste management strategy is directed to anticipate the large number of vocational visitors during the peak season and anticipate the large number of healing visitors in

Gili Trawangan. In other tourist spots, visitors, especially in coastal tourist areas during the low season, are generally dominated by healing visitors, while during the high season, visitors vary from one place to another, and are not always dominated by vocational visitors, as has been reported by Amoah & Addoah (2021); Astawa (2022); Atmanti *et al*. (2024).

Other characteristics of visitors that influence the amount of waste they produce are the types of activities the visitors themselves undertake. The mode of visitor activity in the Gili Trawangan tourist area during the high season is enjoying the beauty of the beach, including enjoying the sunrise in the morning and sunset in the evening (40%) and relaxing (23%), while during the low season the majority of visitors carry out activities such as walking (29%) and also relaxing (26%). Some visitors, who are smaller in number, do other activities such as walking, snorkeling, playing, taking photos, observing and working (Figure 8).

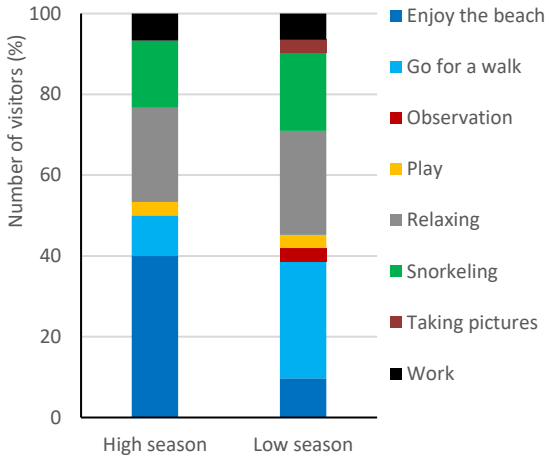

Figure 8. Mode of visitor activity during high season and low season in the Gili Trawangan tourist area.

The influence of this type of visitor activity is not absolute but depends on conditions and time (morning, afternoon or evening) (Firdaus & Hidayah, 2022; Galih & Nur, 2024). The seasons (dry and rainy) also have a big influence on the mode of activity of visitors, because with global climate change, daily weather forecasts sometimes do not match reality, even though the occurrences are incidental and sudden.

The highest average waste generation during the peak season is generated by visitors who are snorkeling (0.312 kg/person/day), while during the low season the highest waste generation is generated by visitors who are playing (0.266 kg/person/day), in addition to visitors who are snorkeling and enjoying the beach, they also generate quite high waste generation (0.193 and 0.186 kg/person/day) (Figure 9).

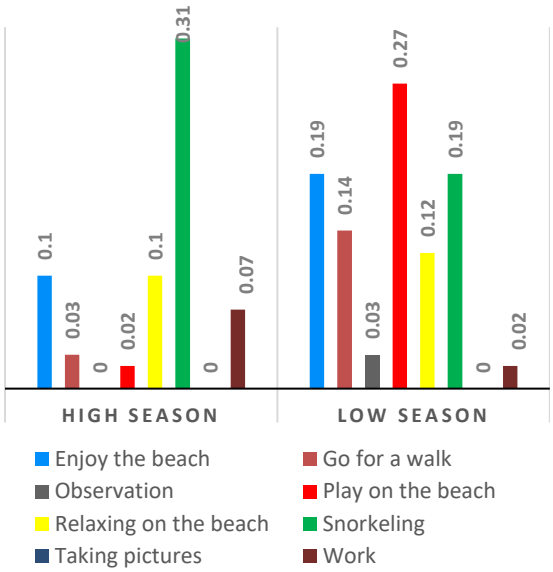

Figure 9. Tourism waste generation (kg/person/day) in Gili Trawangan according to visitor activity variations

Composition of waste types

Based on the results of collecting waste data from 30 visitors in the high season and 31 visitors in the low season, it is known that kitchen waste is the type or component of waste that is most produced, both in the high season (52.75%) and in the low season (69.91%). Other types of waste that are quite large in number are paper during peak season (29.86%) and glass during low season (23.30%). Other waste components found in the Gili Trawangan tourist area were plastic film, solid plastic, metal and composites (Figure 10). By considering the composition of the types of waste produced by tourists, the potential for reducing waste can reach more than 50% by recycling kitchen waste and paper components and reusing glass components, especially intact beverage bottles. Kitchen waste, which is mostly organic, can be processed into compost and eco enzymes (Al-Khadher et al., 2021; Mufti, 2021; Tuhumury et al., 2023;

Destiasari et al., 2024).

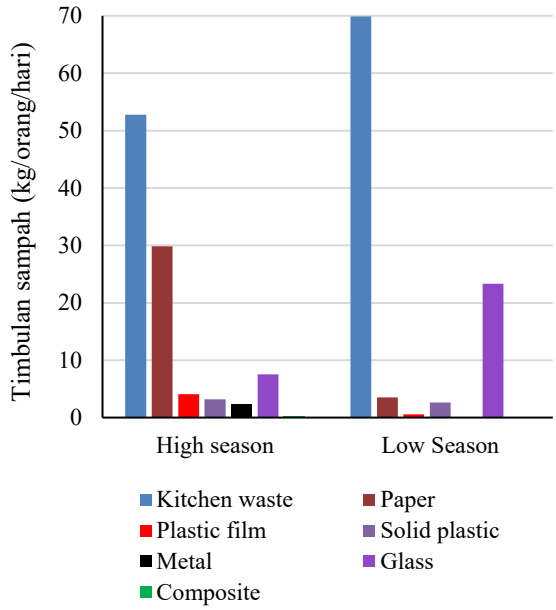

Figure 10. Composition of types of waste produced by visitors to Gili Trawangan

Paper can be processed into eco-bricks or other art materials, while beverage bottles can be reused or sold (Shofi et al., 2023; Nurhayati, A., Saepudin., Rivai, A., 2024). Processed organic waste products (kitchen waste) such as eco enzymes and processed inorganic waste products such as ecobricks and other art products can be made into very attractive souvenirs to sell (Tuhumury et al., 2023; Ernawati et al., 2024; Darunnafis et al., 2025).

Conclusion

Waste generation in Gili Trawangan was 0.06 kg/person/day during the high season and 0.05 kg/person/day during the low season. The components of waste produced by visitors were dominated by kitchen waste both during the high season (52.75%) and the low season (69.91%). Other waste components that are quite large were paper in the high season and glass in the low season.

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References

Adhikari, S., Dangi, M. B., Cohen, R. R. H., Dangi, S. J., Rijal, S., Neupane, M., & Ashooh, S. (2024). Solid waste management in rural touristic areas in the Himalaya – A case of Ghandruk, Nepal. Habitat International. 143(102994): 1-9. https://doi.org/10.1016/j.habitatint.2023.102994

Aisha, R., Yuriandala, Y., Purnama, H., 2021, Analsis timbulan dan komposisi sampah di kwasan pantai Goa Cemara, Kabupaten Bantul, Daerah Istimewa Yogyakarta, *Open Science and Tecnology*, 01(02): 196.207. https://doi.org/10.33292/ost.vol1no2.2021.29

Al-Khadher, S. A. A., Abdul Kadir, A., Al-Gheethi, A. A. S., & Azhari, N. W, 2021, Takakura composting method for food wastes from small and medium industries with indigenous compost. *Environmental Science and Pollution Researc*h, 28(46), 65513–65524. https://doi.org/10.1007/s11356-021-15011-0.

Al Muqsit, F., Setiadi, R. & Lo, A. (2024). Waste management in heritage tourism area: Perspectives from visitors and waste management operators. *The Journal of Indonesia Sustainable Development Planning*. 5(1): 15-26. https://doi.org/10.46456/jisdep.v5i1.524

Amoah, A., & Addoah, T. (2021). Does environmental knowledge drive pro-environmental behaviour in developing countries? Evidence from households in Ghana. *Environment, Development and Sustainability*. 23(2), 2719–2738. https://doi.org/10.1007/s10668-020-00698-x

Arbulú, I., Rey-Maquieira, J. & Sastre, F. (2024). The impact of tourism and seasonality on different types of municipal solid waste (MSW) generation: The case of Ibiza. *Heliyon*. 10(13):1-13. https://doi.org/10.1016/j.heliyon.2024.e33894

Astawa, P. (2022). Seasonal waste management in the southern coasts of Bali, Indonesia. *The Journal of Indonesia Sustainable Development Planning*. 3(1), 95–100. https://doi.org/10.46456/jisdep.v3i1.266

Atmanti, H.D., Mahendra, F.N. & Tambunan, A.C. (2024). Correlation of waste management and tourist visits at tourist destinations in Indonesia. *International Journal of Economic, Business and Innovation Research*. 3(05): 985-998. https://doi.org/10.63922/ijebir.v3i05

Bagastyo, A. Y., Anggrainy, A. D., & Liang, M.S.M.W.H. (2023). Assessment of attitude and participation level among the households and local merchants toward single-use plastic waste management: A case study in Balikpapan Municipality, Indonesia. Case Studies in Chemical and Environmental Engineering, 7(100361), 1–8. https://doi.org/10.1016/j.cscee.2023.100361

Darunnafis, M.K., Lestari, I. & Suripto, 2025, Penggalangan bank sampah dan pengolahannya menjadi produk seni, eco-brick dan eco-Enzime di Desa Gunung Rajak, Lombok Timur, JPMPIPA, 8(1);127-133. https://doi.org/10.29303/jpmpi.v8i1.10869

Destiasari, A., Sumiyati, S. & Istirokhatun, T., 2024. Review Metode Kompos Aerob: Windrow, Takakura dan Composter Bag, *Jurnal Ilmu Lingkungan*, 22(2), 355-364. https://doi.org/10.14710/jil.22.2.355-364

Ermayendri, D. & Mualim, D., 2023, Analisis timbulan sampah di Kota Bengkulu, *Jurnal Mitra Raflesia*, 5(2): 1-9. https://doi.org/10.51712/mitraraflesia.v15i2.312

Ernawati, Suripto, Kamali, S.R., Astrini Widianti, A., Rahayu, R.N. & Rasyid, L.M.F., 2024, Sosialisasi pengolahan sampah di kawasan wisata mangrove Lembar Selatan Lombok Barat, JPMPIPA, 7(3): 816-821. https://doi.org/10.29303/jpmpi.v7i3.9056

Firdaus, E. & Hidayah, E.N., 2022, Timbulan sampah pada Tempat Pembuangan Sampah Sementara (TPS) yang akan menerapkan Reduse, Reuse, recycle (TPS 3R) di Kelurahan Wonorejo Kota Surabaya, *Jurnal Envirous*, 3(1):83-88. https://doi.org/10.33005/envirous.v3i1.70

Galih, M. P. S. dan Nur, C., 2024, Dispar KLU Catat 656.448 wisatawan kunjungi KLU selama tahun 2023. diundu 2 Maret 2025 pada https://shorturl.at/af6F6

Hasan, G., Mangangka, I.R. & Takaendengan, T., 2025, Perencanaan sistem pengelolaan sampah rumah tangga (Studi kasus: Desa Tolondadu II Kecamatan Bolaang Uki Kabupaten Bolaang Mongondow Selatan), *TEKNO*, 23(91): 553-562. https://doi.org/10.35793/jts.v23i91.61561

Krisdhianto, A., Muyasaroh, S., Defriantno, M, E., 2023, Analisis timbulan, komposisi dan potensi pengolahan sampah di kawasan wisata pantai Pulau Merah Banyuwangi, *Jurnal Biosense*, 6(1): 60-72. https://doi.org/10.36526/biosense.v6i01.2813

Kuswandi, A., 2020, Strategi pemerintah daerah dalam pembangunan pariwisata di Provinsi Nusa Tenggara Barat, *Jurnal Agregasi*, 8(2): 90-113. https://doi.org/10.34010/agregasi.v8i2.3817

Maulidia, M.W. & Haryo, R.K., 2024, Analisis timbulan dan komposisi sampah permukiman sebagai upaya minimalisasi timbulan sampah menuju zero waste di RW 5 Jambangan Surabaya, *Jurnal Teknik Sipil dan Lingkungan*, 6(2):273-281. https://doi.org/10.52005/teslink.v6i2.399

Mufti, A, A., 2021, Analisis metode pengolahan sampah organik menggunakan larva black soldier fly, *Jurnal SEOI*, 3(1): 27-32. http://dx.doi.org/10.36441/seoi.v3i1.330

Nasir, M., 2023, Gili Trawangan diserbu wisatawan, 3.500 turis berkunjung setiap hari. https://shorturl.at/SD9YI diunduh jam 13:30 WITA, tanggal 3/2/2025

Nurhayati, A., Saepudin., Rivai, A., 2024, Identifikasi faktor yang mempengaruhi pemilahan sampah untuk mendidik anak dengan metode analisis faktor, *Jurnal Basicedu* 8(5): 4148-4161. https://doi.org/10.31004/basicedu.v8i5.8880

Rahmawati, A.F., Amin, Rasminto & Syamsu, F.D., 2021, Analisis pengelolaan sampah berkelanjutan pada wilayah perkotaan di

Indonesia. *J. Bina Gogik*, 8(1): 1-12. https://doi.org/10.61290/pgsd.v8i1.289

Rojabi, S. H., Sakti, D. P. B., & Budiatiningsih, M., 2024, Analisis potensi Gili Trawangan sebagai destinasi nomad, *Jurnal Ilmiah Hospitality*, 13 (1), 105-111. https://doi.org/10.47492/jih.v13i1.3378

Shofi, N.C., Auvaria, S.W., Nengse, S. & Karami, A.A., 2023, Analisis aspek teknis pengelolaan sampah di Tempat Pengolahan Sampah Reduce, Reuse, Recycle (TPS 3R) Desa Janti Kecamatan Waru Sidoarjo, *Jurnal Teknik Sipil dan Lingkungan*, 8(1):1-8. https://doi.org/10.29244/jsil.8.1.1-8

Steven, S., Fadilah, N. & Sutoyo, P.A. (2024). The Role of the community in minimizing waste in the tourism environment at Pukan Beach, Bangka Belitung. *Journal of Community Services in Tourism*. 5(1): 84-89. https://doi.org/10.34013/mp.v5i1.1525

Tuhumury, N.C., Sangadji, D.M.D. & Ummah, A.N.A., 2023, Analisis timbulan sampah dan pemanfaatan sampah organic berbasis eco enzyme pada kawasan wisata kuliner Air Salobar, Kota Ambon, Jurnal Pengendalian Pencemaran Lingkungan, 5(2): 142-149.

Wahyudi, F., Irsan, R., Sutrisno, H., 2023, Perencanaan pengelolaan sampah di objek wisata Pulau Lemukutan Kabupaten Bengkayang, *Jurnal Teknologi Lingkungan Lahan Basah* 11(1):205-214. https://doi.org/10.26418/jtllb.v11i1.61219