Sumatra Journal of Disaster, Geography and Geography Education, December, 2020, Vol. 4, No. 2, pp. 220-224
DISASTER, GEOGRAPHY, GEOGRAPHY EDUCATION http://sjdgge.ppj.unp.ac.id/index.php/Sjdgge
ISSN : 2580 - 4030 (Print) 2580 - 1775 (Online), Indonesia

IDENTIFICATION OF COASTAL WASTE IN PARIAMAN CITY

*Lailatur Rahmi[1] , Dilla Angraina[1], Rahmuliani Fitriah[2]

[1]Department of Geography – Padang State University, Indonesia
[2]Department of Historical – Padang State University, Indonesia
Email: lailaturrahmi@fis.unp.ac.id

*Corresponding Author, Received: Sep 17. 2020, Revised: Oct 12, 2020, Accepted: Nov 08. 2020

ABSTRACT: Marine Debris is a collection of solid materials left behind that intentionally or unintentionally in the sea that have an impact on threatening the sustainability and sustainability of marine ecosystems. This research is a study of identifying marine waste that is on the coast of Kota Pariaman. This study aims to identify marine waste by type and size. The collection of marine waste is carried out in a transect that is stretched to follow the coastline at the lowest tide with a distance of 100 m divided by 20 m each, each 20m each 5m x 5m each (5 meters towards the sea, 5 meters landward). Classification of waste using an LCS or litter classification system. LCS is a marine waste type coding system. This system is used for sampling carried out in its original place and immediately measures the weight and amount of waste. The method used to determine the transect is by utilizing the Geographic Information System (GIS) technology using a quantitative approach. The GIS technology can to geographically collect, manage, manipulate and visualize spatial (spatial) data related to the position of the earth's surface on the map according to the actual position of the earth's surface with coordinates. The results showed that in the coastal city of Pariaman dominated by the basket flakes with 2.67 gr (garbage Meso) or 1.52 types of garbage/m2 and 77.01 gr of beverage bottles (macro) or 0.80 type of garbage/m2.

Keywords: Marine Depris, Plasctic

This work is licensed under the Creative Commons Attribution-ShareAlike 4.0 International License

1. INTRODUCTION

Indonesia's position as the country with the second longest coastline in the world also has a record as the second-largest marine debris contributor in the world after China. Reported that the increase in marine debris will occur in the year 2025 which is all caused by anthropogenic activity. Waste problems that are now increasing as the number of people and animals are generating waste, which is increasingly dense. This bad behavior increasingly becomes because of the lack of hygiene facilities that are easily accessible by the public in the four general [1-5].

Nowadays, garbage is one of the environmental problems that has become a national problem in Indonesia [2] [6-10]. Some problems regarding the management of waste such as, unburied garbage, citizen protests about the location of waste disposal, and waste disposal is a common problem that often encountered in some cities in Indonesia is no exception The city of Pariaman. Based on data from the city statistics agency in Pariaman in 2018, residents living in the region of Pariaman amounted to 84,709 people with a total area of 73.36 km2. Based on this, the city has the highest density compared to other regions in Pariaman which is 1,300/km2. Waste management in the city of Pariaman is the responsibility of the community and the environmental agency as the process of managing waste management.

In general, when viewed from the management system based on data obtained from the Environment Agency, there are several locations of waste garbage located in the city of Pariaman every day does not reach the total capacity that can be accommodated. This indicates that there was a problem in determining the location of the point that resulted in the unoptimal disposal process from the waste source to the existing garbage shelter. So that the trash is dragged and cause pollution on the sea area. So that convention problems cause marine debris, this condition leads to reduced beauty of coastal areas, causing various diseases, affecting food networks, and reduced fish productivity Arrested, so if that is the case will have an impact on the food chain, economy and public health in the area.

[3] [11-15] estimate that 10% of all newly produced plastics will find their way into the river and end up in the sea. Indonesia as the country with the second-longest coastline in the world has a record as a donor of marine debris amounted to 187.2 million tonnes per year. [4] [16-20] estimated that the increase in marine debris will occur in 2025 if it is not handled seriously and all caused by

human and animal activities. Garbage is something that is discarded because it is considered useless like its initial function, and derived from human activity. According to Law No. 18 of 2008, Garbage is the remnant of human daily activities and/or solid-form natural processes. Garbage is also interpreted as non-liquid or gas materials that are undesirable and disposed of by humans [5] [21-26]. Marine debris on the ocean Debris Survey Monitoring of NOAA [6] [27-30] has divided the types of waste into several types/types that represent all types of marine debris that are often obtained namely:

Table 1. Types of marine debris [7]

No	Types of marine debris
1	Plastics (nets, ropes, floats, pipettes, lighters, plastic bags, plastic bottles)
2	Metal/metal (beverage cans, bottle caps)
3	Glass (bulb, glass bottle)
4	Rubber
5	*Other (*Organic, clothing, fiber, paper and other)

The characteristics of marine debris are also divided by the size and location of the spread as expressed [8] [31-34] The size of garbage classified into 5 parts are:

Table 2. Characteristics of marine debris by size

No	Type	Scale	Location of distribution
1	Mega	>1 m	Sea
2	Makro	>2.5 cm – 1 m	Benthic
3	Meso	>5 mm – 2.5 cm	Coastline
4	Mikro	1 µm – 5 mm	Water surface
5	Nano	<1 µm	Invisible

Trash size classified into 5 parts, ie;

1. Mega-Debris is a size of garbage that is larger than 1 meter which is generally obtained in loose waters.
2. Macro-Debris is a size of garbage that ranges from > 2.5 cm to < 1 m. In general, this garbage is found in coastal areas in both the base and water surface.
3. Meso-Debris is a marine debris > 5 mm in size Up to < 2.5 cm. This garbage is generally found on the surface of water and mixed with sediment.
4. Micro-Debris, is a very small type of garbage with a range of sizes 0.33 to 5.0 mm. Garbage that size like this is very easily carried away by the flow, besides it is very dangerous because it can easily get into the body organs of marine organisms such as Fish and turtles.
5. Nano-Debris, a type of marine debris that is under the size of < 1 µm. Similar to Micro-debris this type of garbage is very dangerous because it can easily fit into the organ of the body of organisms.

2. METHODS

The research was conducted in Pariaman as an area with a wide area of tourism waters but has a low level of cleanliness done in July-September 2019. On a Long beach, it needs a location that meets a number of criteria, so the information doesn't. The beach segment criteria for garbage sampling are as follows.

a. can be accessed throughout the year or seasonal (for continuity monitoring)
b. Sandy or gravel
c. There are no breakwaters, jetties, docks or other buildings
d. Minimum of 100 m, and can be extended up to 1000 m aligned with water edge
e. Slope-Moderate (low-moderate 15 º-45 º) f) No Clean up activity (' clean-clean beach ') at adjacent time of sampling g) No waste management at that location H) Not a sensitive habitat, or not There are endangered species that may be disrupted due to this sampling; This information can be asked to the competent authorities in the field of conservation.

Sampling unit is placed on the location area with the above criteria, along 100 meters – 1000 m the coastline to the back of the beach. The sampling Unit is adjusted to the existing resource (time and number of officers). Place a minimum sampling unit along the 100 m. In certain areas, it could be garbage that is found very little, so the sampling unit should be enlarged, for example throughout the 500 or even up to 1000 m coastline.

3. RESULTS AND DISCUSSION

Based on the results of analysis conducted in the field

1. Determination of Transect

The Area of the transect at a minimum of 100 m aligned the coastline with a width following the beach's back limit (width is very dependent on field conditions)

2. Production of transect lines

Divide 100 meters into 5 parts, each one is 20m. Next make a minimum 5mx5m box inside each 20m column. Place the area in such a way that the point represents the Transect area.

Sumatra Journal of Disaster, Geography and Geography Education, December, 2020, Vol. 4, No. 2, pp. 220-224
DISASTER, GEOGRAPHY, GEOGRAPHY EDUCATION http://sjdgge.ppj.unp.ac.id/index.php/Sjdgge
ISSN : 2580 - 4030 (Print) 2580 - 1775 (Online), Indonesia

a. **the creation of transect lines and transmission of transect in field**

Fig 1. Transect Making in the field
Source: Primary Data Processing 2019

b. **The creation of a sampling plot in the plot of the transect by creating a 1 x 1 m2 plot of 5 randomly determined.**

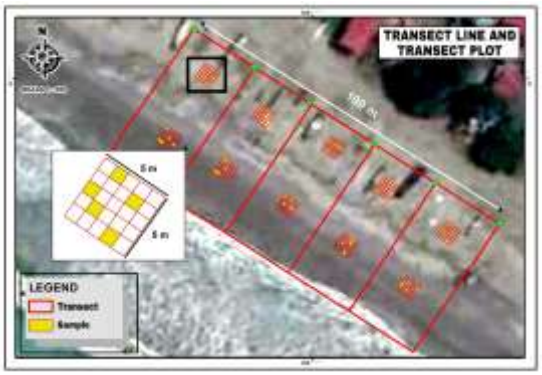

Fig 2. Sampling Plot
Source: Primary Data Processing 2019

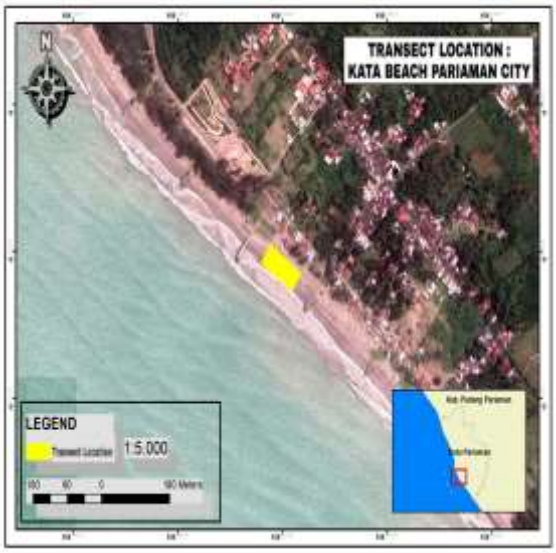

Fig 3. Coastal Waste
Source: Primary Data Processing 2019

3. Garbage calculation

Based on the results of the calculation of marine debris in the coastal city Pariaman obtained that for waste type meso most is a basket flake with 25.02% or about 1.52 quantity/m2, plastic 2.91% or about 0.96 quantity/m2, puntung cigarette 18.93% or Sekirat 0.6 amount/m2, straw 3.56%, and pen cap, shampoo amounted to 13.03% or approximately 0.12 number. m2, while for the most numerous types of macro garbage is the garbage bottle drink with 77.01% or 39.08 quantity/m2, pen cap of 0.56%, Cart Flakes 4.95%, plastic 5.24%, and straw 2.95%.

Table. 3 Calculation of coastal marine debris in Pariaman beach

code	Type	Total		Weight (gr)		Presentase (%)		Density (Jml/m2	
		Meso	Macro	Meso	Macro	Meso	Macro	Meso	Macro
Pl 11	Cigarette butts	15	8	2.02	1.11	18.93	0.56	0.6	0.32
Pl 24	Pen caps, shampoos (other plastics)	3	19	1.39	14.7	13.03	7.46	0.12	0.76
Pl 13	Cart debris	38	11	2.67	9.75	25.02	4.95	1.52	0.44
Pl 07	Plastic	24	11	0.31	10.32	2.91	5.24	0.96	0.44
Pl 04	Straw	5	11	0.38	5.77	3.56	2.93	0.2	0.44
Rb 06	Rubber bands	1	10	0.12	2.14	1.12	1.09	0.04	0.4
Tl 19	Rope	1	5	0.02	8.09	0.19	4.11	0.04	0.2
Gc 01	Bolt, nail	3		3.73	0	34.96	0.00	0.12	0
Pl 21	Plastic Band Strap	1		0.03	0	0.28	0.00	0.04	0
Pl 03	Beverage Bottles		20		77.01		39.08		0.8
Pl 16	Sheeting		5		33.12		16.81		0.2
Pl 01	Bottle Caps		6		21.54		10.93		0.24
Cl 01	Fabric		1		0.11		0.06		0.04
Rb 01	Toys		1		0.63		0.32		0.04
Rb 02	Sandals		1		5		2.54		0.04
Rb 08	Rubber material		1		2.49		1.26		0.04
Ot 05	Other ingredients (anger)		1		5.28		2.68		0.04
Total		91	111	10.67	197.06	100.00	100.00	3.64	4.44

Source: Primary Data Processing 2019

Based on the type of garbage found along with the coastal city of Pariaman, then the garbage that dominates is plastic waste, with the most garbage type of macro garbage.

4. CONCLUSION

The results showed that in the coastal city of Pariaman dominated by the basket flakes with 2.67 gr (garbage Meso) or 1.52 types of garbage/m2 and 77.01 gr of beverage bottles (macro) or 0.80 type of garbage/m^2.

5. REFERENCES

[1] Isman. F. M,. Identification of marine debris at Kawasa Kota Beach tourism Makassar. Thesis. Faculty of Marine Sciences and fisheries. Unhas. Makassar. 2016

[2] El Zrelli. Seawater quality assessment and identification of pollution sources along the central coastal area of Gabes Gulf (SE Tunisia) : Evidence of industrial impact and implications for marine environment protection. 2018

[3] Edgren, G. Expected sconomic and demographic development in coastal zones world wide. In : World wide. In : World Coast 93. National institute for coastal and marine management coastal zone Management Center, Noordwijk, the Netderland, pp.367-370. 1993

[4] Zulfa,. N Efendi., Riani, E. Prelimenery rapid Fishing port water quality as sessment with pollution index, AES Bioflux 8, 96-106. 2016

[5] Cohen. T., Hee, S., Ambrose, R. Jejak logam di Fish dan Invertebrata tiga Lahan Basah Pesisir California. Mar. Pollut. Banteng. 42,232-242. 2001

[6] Ariza, E. Jimenez, JA. Sarda, R. Evolusi musiman dari limbah dan sampah pantai selama musim mandi di pantai Catalan. Pengelolaan sampah, 28 (12), 2604-2613. 2008

[7] Newman, S.,watkins, E., Farmer, A., ten Brink, P., Shweltzer, J.P. The Economic of Marine Litter. Spinger, Berlin, pp. 367-394. 2015

[8] Alam, P., Ahmad, K. Impact of solid waste on health and the environtment.J. Sustain.Devel. Green Econ. 2, 165-168. 2013

[9] Groenovelet, R.A., Bartelings, H., Borger, T., Bosello, F., Buisman, E., Delpiazzo, E., Ebolli, F.Fernandes, J.A., Homon, K.G., Hattam, C., Loureiro, M., Nunes P.A.L.D., Piwowarczyk, J.z Schasfoort, F.E., Simins, S.L., Walker, A.N. Economic Impact of Marine ecological Change : review and recent Contributions of the vectors project on european marine waters. Estar. Coast shelf sci. 201, 152-163. 2018

[10] de Agosto. Diario Oficial da Uniao, Poder Legislativo, Brasilia, DF, pp.3-7. N. 147, 3 ago. 2010. Secao 1. http://pesquisa.in.gov.br/imprensa/core/consulta2.action. 2010

[11] McKinsey, Ocean Conservancy. Stemming the Tide: Land-Based Strategies for a Plastic – Free Ocean. McKinsey and Company and Ocean Conservancy, United States of America. https://oceanconservancy.org/wpcontent/uploads/2017/04/full-reportstemming-the.pdf. 2015

[12] Ma, J., Hipel, K.W. Exploring social dimensions of municipal solid waste man_agement around the globe – a systematic literature review. Waste Manag. 56, 3–12. 2016

[13] Granit, J., Lymer, B.L., Olsen, S., Tengberg, A., Nomman, S., Clausen, T.J. A conceptual framework for governing and managing key flflows in a source-to-sea continuum. Water Pol. 19, 673–691. https://doi.org/10.2166/wp.2017.126. 2017

[14] Fernandino, G., Elliff, C.I., Silva, I.R. Degree of pollution by benthic litter in beaches in Slavador. Bahia. Brazil. Scientia Plena 11 031701-1. https://www.scientiaplena.org.br/sp/article/view/2398. 2015

[15] Rangel-Buitrago, N., Williams, A., Anfuso, G., Arias, M., Gracia, A. Magnitudes, sources, and management of beach litter along the Atlantico Department coastline, Caribbean coast of Colombia. Ocean Coast Manag. 138, 142–157. https://doi.org/10.1016/j.ocecoaman.2017.01.021. 2017

[16] Corraini, N.R., Lima, A.S., Bonetti, J.,Rangel-Buitrago, N. Troubles in the paradise: litter and its scenic impact on the North Santa Catarina island beaches, Brazil. Mar. pollut. Bull. 131, 572-579. https://doi.org/10.1016/j.marpolbul.2018.04.061. 2018

[17] Becherucci, M.E.,Rosenthal, A.F., Po.J.P.S. Marine debris in beaches of the Southwestern Atlantic : an assessment of their abundance and mass at different spatial scales in northern coastal Argentina. Mar. Pollut. Bull. 119 (1), 299-306. https://doi.org/10.1016/j.marpolbul.2017.04.030. 2017

[18] Krelling, A.P., Williams, A.T., Turra, A. Differences in perception and reaction of tourist groups to beach marine debris that can influence a loss of tourism revenue in coastal areas. Mar.Policy 85, 87-99. https://doi.org/10.1016/j.marpol.2017.08.021. 2017

[19] Wessel, C., Swanson, K., Weatheral, T., Cebrian, J. Accumulation and distribution of marine debris on barrier island across the northern Gulf of Mexico. Mar. Pollut. Bull. 139, 14-22. https://doi.org/10.1016/ j.marpolbul.2018.12.023. 2019
[20] Silva, I.R.,Bittencourt, A.C.S.P., Dias, J.A., Souza Folho, J.R. Quanlidade recreacional e capacidade de carga das praias domlitoral norte do estate da bahia, Brasil. Rev. Gestao Costeira Integr. 12 (2), 131-146. https://doi.org/10.5894/rcgi297. 2012
[21] Gandra, T.B.R., Bonnetti, J., Scherer, M.E.G. Onde Astao Os Dados Para O Planejemento Especial Marinho (PEM). Analise de repositories de dados geoespaciais para a geracao de descritores para o PEM no Sul do Brasil.desenvolv. meio Ambiente 44.405-421. https://doi.org/10.5380/dma.v44i0.54987. 2012
[22] Kon, A. Subsidios teoricos e metodologicos ao olanejamento economico public. EAESP, Sao Paulo. https://bibliotecadigital.fgv.br /dspace/bitstream/handle/10438/3207/P00172 -1.pdf. 2005
[23] Sinir. Planos municipais de gestao integrada de residuos solidos. http://www.sinir.gov.br/ web/guest/2.planos-municipais-de-gestao-integrada-de-residuos-solidos. 2015
[24] Riani, E,. Sudarso, Y., Cordova, M.R. Heavy metals effecton unviable larvae of dicrodentipes simpsoni (Diptera: crironomidae), a case study from Seguling dam, Indonesia. AACL. Bioflux 7, 76-84. 2014
[25] Poonam, T,. Tanushree, B., Sukalyan, C. Water quality indices important tools for water quality assessment: a review , int, J.Adv. chem. I, 15-28. 2013
[26] Iñiguez, M.E., Conesa, J.A., Fullana, A. Marine debris occurrence and treatment: a review. Renew. Sustain. Energy Rev. 64, 394 402.https://doi.org/10.1016/j.rser.2016.06.03. 2016
[27] Pramitaningrum, E. Development Models to monitor trash in Yogyakarta City with approaches Bayesian Network, Undergraduate Thesis, Faculty of Engineering University The University of Glasgow. 2013
[28] Zulkarnaen. Identifikasi Sampah Laut (Marine Debris) Di Pantai Bodia Kecamatan Galesong, Pantai Karama Kecamatan Galesong Utara, Dan Pantai Mandi Kecamatan Galesong Selatan Kabupaten Takalar. Skripsi. Fakultas Ilmu Kelautan dan Perikanan. Unhas. Makassar. 2017
[29] Cauwenberghe, L.V., M. Claessens, M.B. Vandegehuchte, J. Mees, C.R. Janssen. Assessment of marine debris on the Belgian Continental Shelf. Marine Pollution Bulletin, 73: 161-169. 2013
[30] Jambeck R., J., Roland G., Chris W., Theodore R., S., Miriam P., Anthony A., Ramani N. and Kara L. Plastic Was Inputs From Land Into The Ocean. Journal Science Vol. 347, Issue 6223. 768-771. 2015
[31] Stevenson C. Plastic Debris in the Calofornia Marine Ecosystem. A Summary of Current Research, Solution Strategies and Data Gaps. University of Southern California Sea Grant. Synthetic Report. California Ocean Science Trust, Oakland, CA. 2011
[32] [NOAA] National Oceanic and Atmospheric Administration. Programmatic Environmental Assessment (PEA) for the NOAA Marine Debris Program (MDP). Maryland (US): NOAA. 168 p. 2013
[33] NOAA. Marine Debris Monitoring and Assessment: Recommendations for Monitoring Debris Trends in the Marine Environment, NOAA Marine Debris Program National Oceanic and Atmospheric Administration U.S. Department of Commerce Technical Memorandum NOS-OR&R46. 2003
[34] Lippiatt S., Opfer, S. and Arthur, C. Marine Debris and Monitoring Assesment. NOAA. Rockville, USA. 2013