EAS Journal of Nutrition and Food Sciences
Abbreviated Key Title:EAS J Nutr Food Sci
ISSN: 2663-1873 (Print) & ISSN: 2663-7308 (Online)
Published By East African Scholars Publisher, Kenya

Volume-5 | Issue-1 | Jan-Feb; 2023 | DOI:10.36349/easjnfs.2023.v05i01.002

OPEN ACCESS

Original Research Article

The Microplastic Existence in Ecosystem of Semi-arid Coastal Area, Kupang City: A Literature Review

Gregorius Kenang Widyantoro[1], Christina Olly Lada[1*], Kartini Lidia[1]

[1]Faculty of Medicine and Veterinary Medicine, Universitas Nusa Cendana, Lasiana, Kelapa Lima, Kupang City, East Nusa Tenggara, Indonesia

Article History
Received: 19.11.2022
Accepted: 02.01.2023
Published: 11.01.2023

Journal homepage:
https://www.easpublisher.com

Quick Response Code

Abstract: Microplastic contamination gain recognition in recent years. Microplastic is found within many parts of human tissue and thus provides potential health hazards. Although microplastic pollution ranges across the land, air, and water ecosystem, this review only exposes the existence of microplastic within the marine environment, which includes the marine territories of Kupang City, Indonesia, and its proximity. In this review, we assess any scientific literature related to microplastic issues in Kupang City. The purpose of this review article is to analyze and combine the results from the researchers who discuss the existence of microplastics and the characteristics of the microplastics studied in Kupang City. In order to achieve a comprehensive explanation, each aspect of expertise in previous research will be carried within a human health point of view. As a result, seven papers published in 2019 to 2022 referring to microplastic problems in Kupang City were found, proposing the presence of filament-shaped and black microplastics in almost all related studies.

Keyword: Microplastic, environment, coastal area.

BACKGROUND

Plastic in general brings many advantages to society. The existence of plastic allows the efficiency of the production of necessities to cut the cost of fuel distribution and buying and selling goods in everyday life. The cost of making plastic is cheap compared to other supporting materials, driving market demand and consumer interest, this can also raise the risk of public dependence on plastic [1, 2]. Plastics are a collection of synthesis and semi-synthesis materials arranged on polymer long chains. Plastics are mass-produced from fossil-based derivatives such as natural gas and petroleum. However, not all plastics are formed from fossil derivatives, other materials such as cellulose from plants can also be used [2, 3].

Microplastics are a category of plastics with a size of less than 5mm [4]. Microplastics are classified into primary and secondary microplastics by origin [5]. Primary microplastics come from direct human production and have been in the size range of less than 5mm, for example, scrubs on detergents to synthetic sands used for industrial purposes such as sandblasting [5]. While secondary microplastics are found from the results of microplastic degradation in the environment, this group of microplastics is the largest in the environment. Not all plastics can easily decompose. Additives provided by the manufacturer are able to strengthen the resistance of plastics. These additives such as bisphenol A, fire retardant, and other substances have the potential to release into the environment and pollute the surrounding ecosystem [6, 7].

In addition to its strong properties, plastic is also lightweight and has a small specific life, this is also passed down to microplastics, which allows the transfer of microplastics through the air and freshwater currents from land to sea. Microplastics in the sea also come from the residual products of marine resource utilization through nylon fishing threads, trawls, nets, and waste from tourism recreation [8-10]. In addition, the sea surface has the potential to become a land for mass degradation of plastic waste by UV rays from the sun, which can accelerate the breakdown of plastic polymer chains [5].

Indonesia is one of the countries with less effective plastic waste management along with other countries such as the Philippines, Vietnam, Thailand, Malaysia, and Myanmar [11, 12]. Based on data from the Ministry of Environment and Forestry, Indonesia

***Corresponding Author:** Christina Olly Lada
Faculty of Medicine and Veterinary Medicine, Universitas Nusa Cendana, Lasiana, Kelapa Lima, Kupang City, East Nusa Tenggara, Indonesia

has a total of 17,385,934 tons of unmanaged waste per year and 3,129,468 tons of which are plastic waste. Kupang City is the capital of East Nusa Tenggara (NTT) province. The province is an island province with a semi-arid climate. This climate has low rainfall but is not like the rainfall of a desert climate. The climate allows one of the factors of plastic degradation (UV rays) to reach the surface of the plastic easily. This promotes the rapid decomposition and breakdown of plastic polymer chains, which are later broken down into microplastics [5]. In addition, Kupang City is the district with the second most population in NTT, which also supports the accumulation of plastic waste production into the environment [13].

The existence of microplastics in the ecosystem around the people of NTT, especially maritime ecosystems, has the potential to encourage the risk of microplastic pollution in local food sources such as sea fish and sea salt.

The above explanation encourages the writing of this literature analysis. Literature analysis was carried out independently by taking studies related to microplastics with the relevant keywords "Kupang City" "Kupang" and "Microplastics", discussing the existence and implications of microplastics, from sources in the form of Google scholar, Research gate, and Undana repository.

METHODS

This article is a literature analysis. This analysis was carried out on all studies related to the keywords "microplastics" and "Kupang" found in the Google scholar search site, Repository Undana, and Research gate. After the search, 7 research found within the context of microplastic issues in Kupang City. The research analyzed by the sample processing methods done, microplastic identification techniques used, and the results of microplastic discovery, found in previous studies, will be analyzed. This literature study was carried out in one week from August 10 to 17, 2022.

RESULT

General characteristics of microplastic study:

Table 1: Characteristics and Sampling Location

Author	Year	Samples type	Dominant types of Microplastic	Microplastic's dominant color	Location
Tombus Lucas Anggara	2019	Beach sediment	Fragment	Black	*Pasir panjang, namosain (Kupang City), Oecina, Oenggae, Tiang Bendera, Nembrala, Ndana. Oeseli*
Febriani Astika Kapo	2020	Saltwater Microplastic	Fiber	Black	*Lasiana, Oesapa Besar, Oesapa Kecil, Paradiso, Kelapa Lima, Pasir Panjang*
Anna Stephanie Mengga Dapa Taka	2021	Salt	Fiber	Blue	*Kupang City*, Kupang district
Gregorius Kenang Widyantoro	2022	Saltwater Microplastic and Saltwater Fish Gut	Fiber	Black	*Oesapa, Pasir panjang, Namosain, Nun Baun Dela*
Chrisna Y Selan	2019	Saltwater Fish Gut	Fiber	Blue	*Oeba (Kupang City)*
Hazman Hiwari	2019	Saltwater Microplastic (surface)	Fragment	Black	*Oicina*, Mangrove Ecotourism, *Kupang-Rote Strait, Kuoang-Semau Strait, Kambing Island* and *Rote*
Riska Zandhi	2019	Mangrove Sediment Microplastic	Fiber	Black	*Mangrove Ekotourism Kupang* and *Rote*

All research originated from 2019 to 2022 with the form of research in the form of laboratory observations. The sample group studied included sediments (sand beach sediments [14] and mangrove sediments [15] seawater (offshore seawater [8, 16] and coastal seawater [17] fish (fish digestion) [17, 18] and salt [19]. Six of the seven studies processed samples using the Wet peroxide oxidation method and one other study conducted a multilevel sieve filtering only. Of the seven studies. All performed microplastic identification with stereo microscopes and none of them used specific identification techniques such as RAMAN and FTIR spectrophotometry [20, 21].

Table 2: General Characteristics of samples

Sample Type	**Amount of research available**	**Desc.**
Beach sediment	2	1 research specifically done in mangrove
Saltwater	3	
Salt	1	
Fish	2	all research done in saltwater fish
Observation and identification technique		
Microscope identification	7	
Raman spectophotometry	-	
FTIR spectrophotometry	-	

Characteristics of the microplastics found:

Almost all groups of samples studied (sediment, seawater and, salt) found microplastics in all their individual samples [8, 15, 16, 19, 22] while fish samples in earlier in 2019 found microplastics in only 51 percent of the total 100 fish samples [18], in line with a 2022 study that found microplastics in all samples [17].

Based on the type of microplastics, five of the seven studies found the dominance of fiber types in their observations [8, 15, 17-19], and two other studies found the predominance of fragment-type microplastics [14, 16. From the entire study, microplastics with black and blue colors were generally found.

Table 3: List of Literature

Title	**Author**	**Year**	**Types of samples**	**Total Samples (n)**
Composition Of Microplastic On Coastal Sediments At Kupang And Rote Islands, East Nusa Tenggara	Tombus Lucas Anggara dkk.	2019	Beach sediment	8 sediment sample
Jenis Dan Kelimpahan Mikroplastik Pada Kolom Permukaan Air Di Perairan Teluk Kupang	Febriani Astika Kapo dkk.	2020	Beach surface water	10 water location
Perbedaan Kandungan Mikroplastik Pada Garam Komersial Dan Garam Sentra Lokal Pesisir Pantai Semiringkai Di Kota Kupang Dan Kabupaten Kupang	Anna Stephanie Mengga Dapa Taka dkk.	2021	Kitchen salt	10 kitchen salt sample
Hubungan Kandungan Mikroplastik Pada Air Laut Dan Mikroplastik Dalam Sistem Organ Di Perut Ikan Laut Pesisir Pantai Semiringkai Kota Kupang Tahun 2022	Gregorius Kenang Widyantoro dkk.	-	Saltwater Fish and saltwater beach	30 Fish 8 water location
Analisis Kandungan Mikroplastik Pada Ikan Kembung (Rastrelliger Kanagurta) Di Pangkalan Pendaratan Ikan (Ppi) Oeba Kupang	Chrisna Y. Selan dkk.	2019	Saltwater fish	100 *Rastregiller kanagurta* fish
Kondisi Sampah Mikroplastik Di Permukaan Air Laut Sekitar Kupang Dan Rote, Provinsi Nusa Tenggara Timur	Hazman Hiwari dkk.	2019	Seawater surface	15 seawater surface
Conditions For Sediment Coating Microplastic In Mangrove Ecosystems In Kupang And Rote, East Nusa Tenggara, Indonesia	Riska Zandhi dkk.	2019	Mangrove beach sediment	4 sediment sample

DISCUSSIONS

All research in this review uses a form of laboratory observation research that is able to explain and provide an overview of the phenomenon of microplastics in the water components of Kupang City. There is still no research established in Kupang City that digs deeper into microplastic problems with a controlled laboratory controlled setting, observing the relationship of free factors that are generally uncontrolled in the field such as temperature, exposure to UV rays, to marine life activities that contribute to the rapid slow degradation of plastic and microplastic groups (5), in general.

In addition to the form of research, the sample processing techniques are relatively the same. The identification technique of these studies involves the use of the stereo or compound microscope. This identification technique can see the shape, color, and surface of the microplastics in the sample. However, it was unable to identify the specific polymer chains composing the microplastic observed [23]. Inadequate access to facilities may also affect existing identification technique options. The use of identification techniques with RAMAN and FTIR spectroscopy is more expensive than regular observations but can help identify synthetic polymers present in specific samples and is able to avoid

misidentification of natural polymers such as colored cotton fibers and other mineral particles similar to microplastics [23]. This misidentification can also be avoided by removing organic substances at the sample processing stage using KOH (Potassium Hydroxide) or Fe(ii) solutions [4]. In addition, silica particles and other natural minerals can also affect the identification of microplastics since they could have the same appearance as transparent or tinted microplastic [4, 23].

Almost all sample components such as fish, mangrove sediments, and sea surfaces have been polluted by microplastics. Salt, which is viable in daily kitchen usage, also reveals the presence of microplastics. The existence of microplastics in the biotic and abiotic components of the coastal waters of Kupang city facilitates the hypothesis of the presence of microplastics in the surrounding waters, considering the factors of deep sea water currents [24], air movement, and weather, to the effects of upwelling waters that encourage the possibility of movement from microplastics, in addition to research discussing microplastics in the Sawu sea [10, 16] to freshwater bodies on other large islands in Indonesia [25, 26] encourages the proven existence of pollution microplastics in some Indonesian waters [27]. In addition, other studies have proven the presence of microplastic additives such as bisphenol-A which function as retardants and are found in consumption materials, including seafood [28-30].

The existence of microplastics in maritime ecosystems has the potential to pollute food sources to processed related natural resources. Another study in 2019, found the impact of microplastics (with a nanometer size range) on the nutritional value and microbiome of shrimp and shellfish digestion through exposure to microplastics in oral food. No significant changes were obtained in the body of the sample with exposure to microplastics for 21 days, but there was a decrease in the nutritional numbers of some amino acids and fatty acids contained in the sample [31]. This study is preliminary evidence and encourages hypotheses of the influence of microplastic exposure on the nutritional value of marine products. This threatens the local maritime food sources that are the source of nutrition for the surrounding communities.

Microplastics in general are not only circulating in the marine environment, they also exist in freshwater ecosystems [25, 26], air [32], and the ground surface. Plastic availability also encourages the creation of microplastics by uncontrolled degradation resulting from irresponsible plastic disposal. In addition, the increased use of masks and disposable food wrappers and containers [33] also encourages the generation of microplastics in the environment and is at risk of entering the human body through many mechanisms, ranging from inhalation to food ingestion and consumption of drinking water exposed to microplastics [7, 11, 34]. The incidence of microplastic inhalation is more frequent than that of other pathways and has a risk of exposure to important organs such as the lungs [35].

Microplastics have been found in the human body, and some studies in recent years have found microplastics in placental tissue [21], lungs [35], digestive system, and feces [20, 36], and even in human blood [37]. The impact of the presence of microplastics in the body is not yet known for certain. Hypotheses regarding the threat of microplastic harm are associated with the risk of inflammation and secondary genotoxic effects (due to inflammatory activation by phagocytes, related to the body's defense phenomena using ROS, reactive oxygen species) to the accumulation of microplastics are thought to provide danger and even increase the harmful immune response [38, 39].

Microplastics can be inhaled and slip into the epithelium of the respiratory system utilizing diffusion, penetration into cells, as well as active uptake of epithelial cells [35, 39]. In addition, the histopathological picture of some factory workers who were exposed to acrylic particles, polyester, and nylon dust due to working in plastic processing plants, showed the presence of interstitial fibrosis and granulomatous lesions due to related materials [38]. Intake plastic can also be ingested into the human digestive tract with the same pathway as inhalation and also through the consumption of food and beverages [11, 38]. The exact mechanism that explains the way microplastics circulate in the body through the digestive tract is not yet known for certain. However, in trials with the administration of microplastic particles to test animals, it showed the presence of microplastics in Peyer's patches of the ileum which is believed to take a large part as a place for microplastic uptake in the intestinal tract [38, 40].

In addition to the two pathways above, plastic also has an impact on the body through its exposure to the dermal contact integument system (skin). Although less significant than the mechanisms of inhalation and suggestion, direct contact with the skin can cause weak inflammation and fibrous encapsulation reactions to microplastic particles, this is also observed in the use of sutura threads made from polyester and polypropylene. In addition, exposure to microplastics on the skin and epithelium can cause oxidative stress stimulation [38, 41]. The health implications of microplastics do not yet have a good consensus, because the mechanism of toxicological impacts and their effects on humans is still not known for certain [41, 42].

CONCLUSION

1. There are seven studies that discuss the issue of microplastics in Kupang city Previous studies have proven the existence of microplastics in the marine environment in Kupang City.

2. The types of microplastics discovered by previous researchers were dominated by filaments. The commonly observed color of microplastics is black.

Suggestion

1. The policy and awareness of the responsible parties have not seen the problem of microplastics as a fairly urgent issue. The attention of experts, policymakers, and the public are expected to be involved in addressing this issue.
2. It is hoped that readers will adopt a plastic waste-free lifestyle, and be more responsible for the surrounding environment.
3. Investment is needed in the form of time and interest to explore the problem of microplastics in Kupang city. For subsequent researchers, it is hoped that they will be able to find the relationship of variables that affect plastic and microplastic waste in a controlled experiential research setting with more specific identification techniques such as RAMAN or FTIR. There is an urgent need for a clear picture that could provide more evidence and explains the presence and more specific plastic that contribute to the microplastic polluting Kupang city. It's also relevant for research that could carry out and provide an overview of the existence of microplastic in other topics such as microplastics in drinking water, microplastics in urine, or microplastics and their relationship or even direct effects on the human body with samples from the local population of Kupang city.
4. Other solutions of plastic such as bioplastics from fungal hyphae can be further researched

REFERENCES

1. Welden, N. A., & Lusher, A. L. (2017). Impacts of changing ocean circulation on the distribution of marine microplastic litter. *Integrated environmental assessment and management*, *13*(3), 483-487.
2. Plastics Europe Market Research Group (PEMRG). (2021). Conversio Market & Strategy GmbH. Plastics - the Facts 2021, 1–34. Available from: https://plasticseurope.org/
3. Plastics Division: life cycle of a plastic product [Internet]. [cited 2022 Aug 18]. Available from: https://web.archive.org/web/20100317004747/http://www.americanchemistry.com/s_plastics/doc.asp?CID=1571&DID=5972
4. Marine Debris Program N. (2015). Laboratory Methods for the Analysis of Microplastics in the Marine Environment: Recommendations for quantifying synthetic particles in waters and sediments.
5. GESAMP Joint Group of Experts on the Scientific Aspects of Marine Environmental Protection. (2015). Sources, fate and effects of microplastics in the marine environment: a global assessment". Reports Stud GESAMP [Internet], 90(April), 96. Available from: issn: 1020-4873%5Cnhttp://ec.europa.eu/environment/marine/good-environmental-status/descriptor-10/pdf/GESAMP_microplastics full study.pdf
6. Hirai, H., Takada, H., Ogata, Y., Yamashita, R., Mizukawa, K., Saha, M., ... & Ward, M. W. (2011). Organic micropollutants in marine plastics debris from the open ocean and remote and urban beaches. *Marine pollution bulletin*, *62*(8), 1683-1692. Available from: https://pubmed.ncbi.nlm.nih.gov/21719036/
7. Sharma, S., & Chatterjee, S. (2017). Microplastic pollution, a threat to marine ecosystem and human health: a short review. *Environmental Science and Pollution Research*, *24*(27), 21530-21547.
8. Kapo, F. A., Toruan, L. N., & Paulus, C. A. (2020). Jenis dan Kelimpahan Mikroplastik Pada Kolom Permukaan Air di Perairan Teluk Kupang. *Jurnal Bahari Papadak*, *1*(1), 10-21. Available from: http://ejurnal.undana.ac.id/index.php/JBP/article/view/2585
9. Eriksen, M., Lebreton, L. C., Carson, H. S., Thiel, M., Moore, C. J., Borerro, J. C., ... & Reisser, J. (2014). Plastic pollution in the world's oceans: more than 5 trillion plastic pieces weighing over 250,000 tons afloat at sea. *PloS one*, *9*(12), e111913.
10. Pranowo, W. (2015). *Lintasan sampah mikro plastik di kawasan konservasi perairan Nasional Laut Sawu, Nusa Tenggara Timur*.
11. Cox, K. D., Covernton, G. A., Davies, H. L., Dower, J. F., Juanes, F., & Dudas, S. E. (2019). Human consumption of microplastics. *Environmental science & technology*, *53*(12), 7068-7074. Available from: https://pubs.acs.org/doi/abs/10.1021/acs.est.9b01517
12. Jambeck, J. R., Geyer, R., Wilcox, C., Siegler, T. R., Perryman, M., Andrady, A., ... & Law, K. L. (2015). Plastic waste inputs from land into the ocean. *Science*, *347*(6223), 768-771.
13. Llorca, M., Álvarez-Muñoz, D., Ábalos, M., Rodríguez-Mozaz, S., Santos, L. H., León, V. M., ... & Farré, M. (2020). Microplastics in Mediterranean coastal area: Toxicity and impact for the environment and human health. *Trends in Environmental Analytical Chemistry*, *27*, e00090.
14. Anggara, T. L., Yuliadi, L. P., Ihsan, Y. N., & Ismail, M. R. (2019). Composition of Microplastics Of Coastal Sediments In Kupang and Rote Isalnd, East Nusa Tenggara. *Omni-Akuatika*, *15*(2), 98-105. Available from: http://ojs.omniakuatika.net/index.php/joa/article/view/707
15. Zandhi, R., Yuliadi, L. P., Ismail, M. R., & Yuniarti, M. S. (2019). Conditions for sediment coating microplastic in mangrove ecosystems in

Kupang and Rote, East Nusa Tenggara, Indonesia. *World News of Natural Sciences*, *27*, 50-58.
16. Hiwari, H., Purba, N. P., Ihsan, Y. N., Yuliadi, L. P., & Mulyani, P. G. (2019). Kondisi sampah mikroplastik di permukaan air laut sekitar Kupang dan Rote, Provinsi Nusa Tenggara Timur. *Pros sem nas masy biodiv indon*, *5*(2), 165-171.
17. Widyantoro Gregorius Kenang. (2022). Correlation Between Microplastic Disperse In Sea And Microplastic Contained Within Fish's Gut Organ System Of Semi-Arid Coastal Beach, Kupang City 2022.
18. Selan, C. Y. (2022). *Analisis Kandungan Mikroplastik Pada Ikan Kembung (Rastrelliger Kanagurta) Di Pangkalan Pendaratan Ikan (Ppi) Oeba Kupang.*
19. Taka, A. (2021). *Perbedaan Kandungan Mikroplastik Pada Garam Komersial Dan Garam Sentra Lokal Pesisir Pantai Semiringkai Di Kupang City Dan Kabupaten Kupang.*
20. Ibrahim, Y. S., Tuan Anuar, S., Azmi, A. A., Wan Mohd Khalik, W. M. A., Lehata, S., Hamzah, S. R., ... & Lee, Y. Y. (2021). Detection of microplastics in human colectomy specimens. *JGH open*, *5*(1), 116-121.
21. Ragusa, A., Svelato, A., Santacroce, C., Catalano, P., Notarstefano, V., & Carnevali, O. (2021). Plasticenta: First evidence of microplastics in human placenta. Vol. 146, Environment International. Elsevier Ltd.
22. Anggara, T. L., Yuliadi, L. P., Ihsan, Y. N., & Ismail, M. R. (2019). Composition of Microplastics Of Coastal Sediments In Kupang and Rote Isalnd, East Nusa Tenggara. *Omni-Akuatika*, *15*(2), 98-105.
23. Shim, W. J., Hong, S. H., & Eo, S. E. (2016). Identification methods in microplastic analysis: a review.
24. Kane, I. A., Clare, M. A., Miramontes, E., Wogelius, R., Rothwell, J. J., Garreau, P., & Pohl, F. (2020). Seafloor microplastic hotspots controlled by deep-sea circulation. *Science*, *368*(6495), 1140-1145.
25. Basri, K., Syaputra, E. M., & Handayani, S. (2021). Microplastic Pollution in Waters and its Impact on Health and Environment in Indonesia: A Review. *Journal of Public Health for Tropical and Coastal Region*, *4*(2), 63-77.
26. Sulistyo, E. N., Rahmawati, S., Putri, R. A., Arya, N., & Eryan, Y. A. (2020). Identification of the existence and type of microplastic in code river fish, special region of Yogyakarta. *EKSAKTA: Journal of Sciences and Data Analysis*, 85-91. Available from: https://journal.uii.ac.id/Eksakta/article/view/14502
27. Sari, G. L., Kasasiah, A., Utami, M. R., & Trihadiningrum, Y. (2021). Microplastics contamination in the aquatic environment of Indonesia: A comprehensive review. *Journal of Ecological Engineering*, *22*(10), 127-140.
28. Barboza, L. G. A., Cunha, S. C., Monteiro, C., Fernandes, J. O., & Guilhermino, L. (2020). Bisphenol A and its analogs in muscle and liver of fish from the North East Atlantic Ocean in relation to microplastic contamination. Exposure and risk to human consumers. *Journal of hazardous materials*, *393*, 122419.
29. Kang, J. H., Aasi, D., & Katayama, Y. (2007). Bisphenol A in the aquatic environment and its endocrine-disruptive effects on aquatic organisms. *Critical reviews in toxicology*, *37*(7), 607-625. Available from: https://pubmed.ncbi.nlm.nih.gov/17674214/
30. Repossi, A., Farabegoli, F., Gazzotti, T., Zironi, E., & Pagliuca, G. (2016). Bisphenol A in edible part of seafood. *Italian journal of food safety*, *5*(2). Available from: /pmc/articles/PMC5076740/
31. Chae, Y., Kim, D., Choi, M. J., Cho, Y., & An, Y. J. (2019). Impact of nano-sized plastic on the nutritional value and gut microbiota of whiteleg shrimp Litopenaeus vannamei via dietary exposure. *Environment international*, *130*, 104848.
32. Horton, A. A., & Dixon, S. J. (2018). Microplastics: An introduction to environmental transport processes. *Wiley Interdisciplinary Reviews: Water*, *5*(2), e1268. Available from: https://onlinelibrary.wiley.com/doi/full/10.1002/wat2.1268
33. Fadare, O. O., & Okoffo, E. D. (2020). Covid-19 face masks: A potential source of microplastic fibers in the environment. *The Science of the total environment*, *737*, 140279. Available from: /pmc/articles/PMC7297173/
34. Zhang, Q., Xu, E. G., Li, J., Chen, Q., Ma, L., Zeng, E. Y., & Shi, H. (2020). A review of microplastics in table salt, drinking water, and air: direct human exposure. *Environmental Science & Technology*, *54*(7), 3740-3751. Available from: https://pubs.acs.org/doi/abs/10.1021/acs.est.9b04535
35. Jenner, L. C., Rotchell, J. M., Bennett, R. T., Cowen, M., Tentzeris, V., & Sadofsky, L. R. (2022). Detection of microplastics in human lung tissue using μFTIR spectroscopy. *Science of The Total Environment*, *831*, 154907.
36. Schwabl, P., Köppel, S., Königshofer, P., Bucsics, T., Trauner, M., Reiberger, T., & Liebmann, B. (2019). Detection of various microplastics in human stool: a prospective case series. *Annals of internal medicine*, *171*(7), 453-457. Available from: https://pubmed.ncbi.nlm.nih.gov/31476765/
37. Leslie, H. A., Van Velzen, M. J., Brandsma, S. H., Vethaak, A. D., Garcia-Vallejo, J. J., & Lamoree, M. H. (2022). Discovery and quantification of plastic particle pollution in human blood. *Environment international*, *163*, 107199. Available from:

https://linkinghub.elsevier.com/retrieve/pii/S0160412022001258

38. Pironti, C., Ricciardi, M., Motta, O., Miele, Y., Proto, A., & Montano, L. (2021). Microplastics in the Environment: Intake through the Food Web, Human Exposure and Toxicological Effects. *Toxics*, *9*(9), 224.
39. Vallabani, N. V., & Karlsson, H. L. (2022). Primary and secondary genotoxicity of nanoparticles: establishing a co-culture protocol for assessing micronucleus using flow cytometry. *Frontiers in Toxicology*, 28.
40. Wright, S. L., & Kelly, F. J. (2017). Plastic and human health: a micro issue?. *Environmental science & technology*, *51*(12), 6634-6647. Available from: https://pubs.acs.org/doi/abs/10.1021/acs.est.7b00423
41. Braeuning, A. (2019). Uptake of microplastics and related health effects: a critical discussion of Deng et al., Scientific reports 7: 46687, 2017. *Archives of toxicology*, *93*(1), 219-220. Available from: https://pubmed.ncbi.nlm.nih.gov/30470843/
42. Stock, V., Böhmert, L., Lisicki, E., Block, R., Cara-Carmona, J., Pack, L. K., ... & Lampen, A. (2019). Uptake and effects of orally ingested polystyrene microplastic particles in vitro and in vivo. *Archives of toxicology*, *93*(7), 1817-1833. Available from: https://pubmed.ncbi.nlm.nih.gov/31139862/

Cite This Article: Gregorius Kenang Widyantoro, Christina Olly Lada, Kartini Lidia (2023). The Microplastic Existence in Ecosystem of Semi-arid Coastal Area, Kupang City: a Literature Review. *EAS J Nutr Food Sci*, *5*(1), 13-19.