Digital Press Social Sciences and Humanities

Anthropocentric Study on the Role of Human Power in the Household Waste Management System of the Bajo Tribe Settlement in Boalemo, Gorontalo

Fitria Yusrifa1, Dominikus Yoeli Wilson Laia and Shoim Mardiyah

The 11th International Conference on Nusantara Philosophy

Rangga Kala Mahaswa, Taufiqurrahman (eds)

Anthropocentric Study on the Role of Human Power in the Household Waste Management System of the Bajo Tribe Settlement in Boalemo, Gorontalo

Fitria Yusrifa[1,*], Dominikus Yoeli Wilson Laia[2], and Shoim Mardiyah[3]

1 Gerakan Indonesia Mengajar Foundation, Indonesia
2 Ministry of Marine Affairs and Fisheries, Indonesia
3 Faculty of Philosophy, Universitas Gadjah Mada, Indonesia

*e-mail: fitriayusrifa@mail.ugm.ac.id

Abstract

The Bajo tribe, inhabiting the coastal area of Tilamuta in Boalemo Regency, Gorontalo, has established sea-based settlements over several decades. As a community famously referred to as the "people of the sea," the Bajo people maintain a close connection with the marine environment, relying heavily on marine resources for sustenance. Paradoxically, the management of household waste in the Bajo Boalemo settlement contradicts the purported harmonious relationship between the Bajo people and the marine ecosystem. This study aims to comprehensively investigate, identify, and analyze the human power influencing the household waste management system in the Bajo Tribe settlement in Boalemo, Gorontalo. Employing a combination of qualitative and quantitative methodologies, including in-depth interviews and literature reviews, the research delves into the present perceptions, behaviours, and attitudes of the Bajo people in Tilamuta regarding household waste management in their community. The findings reveal that a majority of Bajo residents in Tilamuta acknowledge the detrimental impact of solid inorganic waste on the marine environment, recognizing its adverse effects on the quality of life for marine biota. In contrast, they view solid organic waste, such as food scraps and losses, and liquid waste, like sewage, as environmentally friendly, leading to intentional disposal into the sea, which is, in fact, harmful to the environment. Despite awareness of the risks associated with solid inorganic waste, occasional disposal into the sea persists, underscoring a form of anthropocentrism where convenience often outweighs environmental considerations. Addressing this issue requires a pivotal role from the government, involving raising awareness, disseminating crucial information about waste and its environmental impacts, and providing suitable facilities for waste management in Tilamuta. This study underscores the necessity of proactive measures to align the Bajo people's practices with sustainable environmental stewardship.

Keywords

Bajo tribe, household waste management system, anthropocentric study, Boalemo

1 Introduction

Traditional societies have accumulated knowledge over generations regarding environmental changes, developing intricate strategies to navigate these shifts. The Bajo tribe, located across various Indonesian regions such as Wakatobi, Luwu, Kayoa, Tomini Bay, Wuring, Gorontalo, and others, represents a unique community. Thriving as traditional fishermen, they have established a distinctive ecosystem in coastal and above-water areas. In these environments, they have translated their traditional knowledge systems into values and behaviours that contribute to economic gains and community cohesion (Wani & Ariana, 2018). The Bajo Village in Tilamuta, Gorontalo spans 0.25 km2 and is home to a population of 1,762 individuals within 504 families. Bajo Tilamuta Village comprises two sub-villages: Beringin I and Beringin II, with approximately 30% of the population residing in floating houses over the sea. Unfortunately, these above-water houses experience issues with poor drainage and sewage systems. Waste disposal follows a direct route into the sea, lacking specialized sewer collection for both household and non-degradable inorganic waste.

Coastal areas hold significant importance for maritime nations, such as Indonesia, with approximately 60% of the country's total population residing in these regions (Rudiarto, Handayani, & Setyono, 2018). The coastal areas serve as hubs for various economic activities, particularly in the fisheries

and marine sectors, fostering growth and development in the region. The coast, being a complex and unique landscape, marks the intersection of land and sea (Areia, Tavares, & Costa, 2023). Given these circumstances, meticulous planning and management become imperative as the transition zone between land and sea forms a diverse and highly productive ecosystem (Andrews, 2020; Chen & Martens, 2023; Landrigan et al., 2020). However, the swift development and population surge in coastal areas have compromised the environment's carrying capacity, particularly regarding waste management. The rapid increase in population and urbanization has resulted in substantial amounts of municipal solid waste, posing threats to soil, water, plants, and human systems (Areia, Tavares, & Costa, 2023).

Anthropocentric values assert that humans are superior to and distinct from nature. According to this perspective, while human life is inherently valuable, other entities, such as animals and plants, are perceived merely as resources for human exploitation. In an anthropocentric view, the primary or exclusive focus is on human interests, and the natural world is utilized for the benefit of humankind. This prioritization of human interests occurs on both practical and ethical levels. From this standpoint, humans are often seen as separate from, and even transcendent to, the natural world, which is viewed as an object for study and use (Aviste & Niemiec, 2023; Mosanya & Kwiatkowska, 2023; Mouysset, 2023).

Research on Bajo settlements and their interactions with the marine environment was conducted by Nurdin et al. in 2021. The study aimed to determine an appropriate community development approach to support economic, social, and ecological balance in the Bajo community of Torokeku Village. Additionally, another research highlighted the urgent need for environmental improvements in Bajo settlements in Kayoa, Ternate. This research proposed a comprehensive strategy for Bajo settlement management, encompassing (1) economic sustainability, including the development of home industries, fish farming, and coastal ecotourism; (2) sustainable environmental practices, such as effective waste management, sustainable fishing methods, prohibition of fish bombs, and the preservation and reforestation of mangroves; and (3) social sustainability, involving infrastructure improvement, rainwater and solar energy utilization, and the preservation of local wisdom (Rahim, Basri, & Fauzi, 2019). In response to the ongoing challenges faced by Bajo coastal settlements and marine environmental issues, our study endeavours to elucidate the current perceptions, behaviours, and attitudes of the Bajo community in the coastal area of Tilamuta regarding household waste management, employing Anthropocentrism views.

2 Methods

This study uses a blend of qualitative and quantitative methodologies, employing in-depth interviews and comprehensive literature reviews. This approach facilitates a thorough exploration of the relationship between humans and nature through the lens of Anthropocentrism Theory. It aims to provide an in-depth understanding of the Bajo community's pivotal role in managing household waste within the residential area of Bajo Boalemo. The research was conducted in Dusun Beringin I and Beringin II, Bajo Village, Tilamuta District, Boalemo Regency, Province of Gorontalo, spanning from October 2nd to 31st, 2023. The study involved nine research informants residing in Bajo's floating residences, encompassing diverse demographics such as age, gender, occupation, location, income, expenses, religion, family size, distance to waste disposal sites, and tenure in Bajo Village. The specific questions posed to the informants are detailed in the table below:

Table 1 List of interview questions

Number	Aspects	Interview Questions
1	**Perception**	Do you believe your residence has maintained a clean and trash-free environment thus far?
2	**Perception**	Do you know the difference between organic and inorganic waste?
3	**Perception**	Do you believe the government has already implemented outreach programs for environmentally friendly waste management?
4	**Perception**	Is the public allowed by the government to proactively manage waste wisely?
5	**Perception**	Do you agree that disposing of rubbish and garbage in the sea can cause pollution?

Table 1 List of interview questions

6	**Perception**	What environmental damage can be caused by throwing household waste into the sea in your opinion?
7	**Perception**	Could pollution in the sea potentially impact the quality of fish caught by fishermen?
8	**Perception**	What are your thoughts on how the community can actively participate in protecting the environment and managing waste more effectively?
9	**Perception**	Would you agree that effectively managed waste can generate revenue or yield economic benefits?
10	**Perception**	Do you agree that the number of TPS (temporary shelter) tanks in the neighbourhood can accommodate the total amount of waste that exists?
11	**Perception**	Does having a TPS tank around where you live help you in managing waste?
12	**Perception**	Is it common to see piles of rubbish outside the TPS tanks?
13	**Perception**	Do you believe that the accumulation of rubbish outside the TPS tanks disrupts the scenery and causes harm to the environment?
14	**Perception**	Do you agree that the government's waste collection vehicles from *Dinas Lingkungan Hidup* help in managing waste in your local area?
15	**Behaviour**	How has the waste in your neighbourhood been managed, both independently and collectively so far? What are your observations or perspectives on this phenomenon?
16	**Behaviour**	Have you sorted the waste according to its type?
17	**Attitude**	Could cooperation be an effective approach to managing waste in your neighbourhood? How have you contributed to this effort?
18	**Attitude**	Do you believe that traditional and religious teachings promote the maintenance of a clean environment free from rubbish? If so, how do you personally contribute to this cause?
19	**Attitude**	Do you believe that traditional and religious teachings encourage maintaining a clean environment and keeping it free of rubbish?
20	**Attitude**	Did you realize that managing waste wisely is a form of caring for the environment?

We employ a hermeneutic approach to delve into the significance encapsulated in responses aligned with the provided research queries. The data obtained from observations, interviews, and literature reviews is meticulously handled through analytical and descriptive methodologies. This method facilitates the coherence between the Bajo community's perceptions, attitudes, and behaviours in managing household waste within the floating residence of Bajo Village, while also examining its correlation with anthropocentrism.

3 Household Waste Management System of the Bajo Tribe Settlement in Boalemo, Gorontalo

3.1 The Exploration of Bajo Tilamuta Tribe Settlement in Boalemo, Gorontalo

The evolution of the era has shifted the traditional nomadic lifestyle of the Bajo tribe towards a settled existence along coastal and marine regions. Originally, the Bajo tribe dwelled on *bidoks* (boats) until the 1930s, later transitioning to *kampoh* (permanent residences). Subsequently, they constructed *babaroh* on tidal beaches – a temporary abode for resting and managing marine resources – using locally sourced

materials such as mangrove wood, thatch for roofing, and bamboo for flooring and walls. This transition has led to a decline in the reliance of the Bajo people on wooden boats for their livelihoods, as more individuals are constructing homes by the sea and embracing a more stationary lifestyle (Nurdin, Fajriah, Sari, Suwarjoyowirayatno, & Isamu, 2021; Siradjuddin, 2023; Sulaiman *et al*., 2023).

Although a significant number now reside on land, the tribe's deep-rooted connection to the sea, an integral part of their history and identity, remains steadfast (Arisaputri *et al*., 2020; Nurdin *et al*., 2021; Obie & Lahaji, 2020; Wani & Ariana, 2018). Despite residing on land for many years now, the Bajo tribe, historically and culturally rooted in seafaring resilience, has not severed ties with the sea. While their dwellings are predominantly on land, the Bajo community remains intrinsically linked to the ocean. This connection is evident as Bajo settlements persist in coastal areas or shallow waters.

Fig. 1 Satellite imagery of Bajo Village in Tilamuta

According to one of the research sources, the Bajo Tilamuta tribe settled along the Tilamuta coast in Boalemo during the Japanese colonial era, approximately in the 1940s. Initially, the Bajau individuals arriving in Tilamuta were wandering sailors originating from North Sulawesi, Central Sulawesi, and South Sulawesi. At first, these sailors resided in *tangkubu,* boat-like structures resembling wooden houses. However, due to their various activities such as fish drying and hillside farming, the Bajo sailors gradually constructed permanent homes using forest woods like *lolaro* and Javanese wood. Despite establishing residences, the nomadic lifestyle of the Bajo people in the Tilamuta coastal region persisted as they continued sailing in search of *kima*, the giant clam (bivalves), venturing as far as North Gorontalo.

Fig. 2 A floating house in Bajo Village (Source: Research Documentation)

The coastal area of Bajo Tilamuta, initially populated by a handful of Bajau sailors, gradually evolved into a thriving fishing village. With the expansion of the Boalemo Regency, the Tilamuta region, once a small village, transformed into a sub-district. Presently, Bajo Village is situated within the Tilamuta sub-district, Boalemo Regency, encompassing two sub-villages. Governed by a village head, referred to locally as *ayahanda* whose term lasts five years, Bajo Village is home to a population of 1,762 residents, residing in 504 families. This village boasts several small islands – Asiangi Island, Mohupumba Da'a Island, Mohupumba Kiki Island, and Botak Island – which, though uninhabited, have been developed for tourism purposes. The majority of Bajo Tilamuta's population consists of fishermen. Notably, the Bajo tribe, part of

the village's demographic, is now intertwined with the Gorontalo tribe through intermarriage, resulting in a blend of traditions and a lesser prevalence of typical Bajau cultural practices in the resident's daily lives.

3.2 Household Waste Management System of the Bajo Tilamuta's Floating Residence

In this study, household waste is classified into two primary categories: solid waste and liquid waste, as detailed in Table 2. Applying anthropocentrism theory, the research delves into the perceptions, behaviours, and attitudes of the Bajo community in Tilamuta Village concerning their waste management practices, encompassing both solid and liquid waste.

Table 2 Household waste categories

Household Waste		Definition
Solid Waste	Organic solid waste (garbage)	Biodegradable waste typically breaks down naturally but can produce a foul and bothersome odour if neglected, during their decomposition.
	Inorganic solid waste (rubbish)	Items that remain unchanged and don't break down can be classified as non-decomposable solid waste. Whether these materials can burn or not depends on their specific composition.
Liquid Waste		Sewage or wastewater originating from households or communities, encompassing the disposal from toilets, baths, laundry, sinks, and kitchen facilities.

The residents of Bajo Tilamuta Village have been grappling with inadequate waste management due to the steady growth in population and settlements. The village, characterized by floating houses on the sea, presents unique challenges where residents have limited access to resources and lack the necessary knowledge to handle their waste effectively.

Fig. 3 Household waste in the Bajo floating residential area is quite a disturbing environmental problem (Source: Research Documentation)

In examining the Bajo community's solid waste management system, our observations reveal the presence of 10 waste storage tanks in Bajo Tilamuta Village, intended for 504 families. This translates to an approximate ratio of one tank per 50 families, serving as temporary repositories for solid waste disposal. Within this community, around 30% live in floating houses, totalling approximately 151 households. To cater to these floating residences, three dedicated waste storage tanks were established, but they struggle to manage the generated waste adequately. Consequently, there's an overflow of waste that exceeds these tanks' capacity, leading to improper disposal into the sea. This mismanagement has resulted in the unsightly accumulation of garbage around the designated collection points, a concern raised by all 9 surveyed respondents. Apart from being visually displeasing, this situation poses significant environmental hazards.

https://doi.org/10.29037/digitalpress.411458

Fig. 4 The Waste Storage Tanks in Bajo Tilamuta Floating Residence Area (Source: Research Documentation)

Based on the research interviews conducted, a consensus emerged that seven out of nine residents of Bajo Tilamuta Village expressed their concern about living in an environment that they perceived as unclean and littered. This perception is evident in the accumulation of various forms of waste, such as plastic packaging, bottles, and discarded clothing, underneath their floating dwellings. The absence of an effective waste management system is identified as the primary reason behind the buildup of inorganic household waste in these residential areas. Although the Bajo Tilamuta Village government allocated funds in 2018 to construct 10 rubbish bins, these efforts were insufficient in addressing the waste issue in the floating residential area. Field data collection revealed that all nine residents interviewed disagreed with the idea that the presence of Temporary Laystall Tanks (Tempat Pembuangan Sementara/TPS) in the vicinity has significantly assisted in waste management within their community.

Fig. 5 Garbage is scattered in the temporary waste storage area (Source: Research Documentation)

The management of liquid waste in the floating residential areas of the Bajo Tilamuta community lacks specialized channels, leading to the direct disposal of household waste, including faeces, urine, and wastewater, into the sea. Interviews conducted with all nine residents of Bajo Tilamuta Village revealed that this practice is common, with seven out of nine residents believing that it does not contribute to marine pollution. The drainage systems in the floating residences are directly linked to the sea without any filtration processes, a fact evident in the accompanying images. This long-standing practice has been normalized within the community, as no reported cases of diseases such as diarrhoea, dysentery, or dengue fever have been attributed to this waste disposal method since the village's inception.

Fig. 6 Population sanitation system in the Bajo Tilamuta floating settlement area connected to the sea without any filter systems (Source: Research Documentation)

Similar to liquid waste, organic solid waste like food scraps and garbage is also disposed of in the sea. Most individuals hold the belief that garbage disposal in the ocean does not lead to marine pollution, assuming it will be consumed by fish residing beneath floating shelters. Furthermore, the perception persists that household waste containing chemicals will readily decompose in the ocean, having minimal impact on the quality of fish caught by local fishermen. The prevailing notion is that only inorganic waste, like plastic packaging or used clothing, which does not easily decompose in the sea, is responsible for affecting the quality of fish and polluting the ocean. Despite this belief, eight out of nine residents in Bajo Tilamuta Village acknowledge that marine pollution can indeed influence the fish's quality caught by fishermen. Nevertheless, a higher volume of this non-decomposing inorganic waste is visibly abundant in the waters surrounding these floating residential areas, often accumulating right under the houses belonging to the village residents. RT (45), acting as the informant, reported a significant collection of packaging waste beneath the houses, originating from the pier and carried away by the strong currents during high tides.

> People throw rubbish on the pier, and seawater carries the rubbish under my house. I have warned them, but to maintain harmony between neighbours, I only warned them once or twice. As a result, the habit continued, and it was detrimental to me (Interview with Mrs. RT, 45, Fisherwoman).

Both solid and liquid waste pose equal threats to both the environment and human health. The untreated discharge of wastewater has raised significant concerns globally (Lasut, Jensen, & Shivakoti, 2008). This untreated wastewater discharge has a dual impact on the marine ecosystem. Firstly, it heightens the risk of human infectious diseases in recreational bathing areas. Secondly, it releases organic and chemical pollutants, thereby deteriorating the environment and affecting the health of marine communities and the aquatic food chain (Bonin-Font, Lalucat, Oliver-Codina, Massot-Campos, Font, & Carrasco, 2018). The release of wastewater can result in environmental degradation by causing damage to aquatic habitats and the organisms reliant on them. Such impacts manifest as alterations in habitat structure due to increased water temperature and turbidity. These changes can further disrupt the food web structure and contribute to eutrophication, a process spurred by excessive phosphorus and nitrogen inputs that fuel the overgrowth of aquatic plants, leading to oxygen depletion and harmful changes in marine fauna abundance and diversity (Holeton, Chambers, & Grace, 2011).

Microbial contamination from bacteria, viruses, and protists, commonly originating in human waste, is increasingly impacting seafood safety and the use of coastal marine areas for both commercial and recreational purposes. Exposure to this contamination occurs through consuming tainted seafood and engaging in activities in polluted marine waters (Fleming, Broad, Clement, Dewailly, Elmir, Knap, Pomponi, Smith, Gabriele, & Walsh, 2006). Concurrently, human-made chemical pollutants, like heavy metals and persistent substances such as polyaromatic hydrocarbons, are posing a rising threat by entering the marine food chain (Dewailly, Pereg, Knap, Rouja, Galvin, & Owen, 2000). Sewage-associated pathogens remain the primary cause of health issues resulting from polluted food, while occasional exposure to hazardous levels of other wastewater contaminants, such as heavy metals and nitrates, also pose risks (Holeton, Chambers, & Grace, 2011).

The management of household waste in Bajo Tilamuta Village is a collective responsibility that involves every member of the residential community. All nine residents of Bajo Tilamuta Village recognize the importance of prudent waste management as a means of demonstrating their care for the environment. Among them, four residents agree that active community participation is essential in safeguarding the

environment and practising effective waste management. BCI (43), serving as an informant, emphasizes that both residents and the government share equal responsibility in addressing the waste management challenges within Bajo Tilamuta Village.

> Waste management in Bajo is very poor, primarily due to the lack of a proper household waste dump. While society bears responsibility for the environment, it is evident that the government also plays a crucial role in improving access. This includes providing rubbish bins to each family and actively conducting outreach and implementation efforts (Interview with Mr BCI, 43, fisherman).

In an attempt to mitigate the issue, the Boalemo Regency Government, via the Environmental Office, has provided waste pickup facilities for Bajo Tilamuta Village. However, with just one waste truck operational intermittently, it proves insufficient in addressing the area's waste management problem. In addition, the government of Bajo Tilamuta Village also has rallied its residents to address the waste issue by organizing the *Jumat Bersih* which means "Clean Friday" initiative, a weekly event. However, the collected waste is burned, which leads to environmental concerns. This practice exposes the air to chemical pollutants, causing various detrimental effects on the environment and human health (Pathak, Nichter, Hardon, Moyer, Latkar, Simbaya, Pakasi, Taqueban, & Love, 2023). As per research findings, the release of black carbon through open burning has a substantial influence on the climate, accounting for 2-10% of the worldwide CO2 equivalent emissions. This effect is 2-8 times more pronounced in comparison to the CO2 equivalent emissions from methane (CH4) produced by the decomposition of equivalent amounts of biodegradable waste in landfills. (Reyna-Bensusan, Wilson, Davy, Fuller, Fowler, & Smith, 2019).

4 Anthropocentric Study on the Role of Human Power in the Household Waste Management System of the Bajo Tilamuta Tribe Settlement

Anthropocentrism views that humans possess the power to control and manage the natural world. Due to their exceptional qualities, humans are deemed deserving of a superior level of consideration in comparison to both natural and synthetic entities. Consequently, this perspective grants humans the entitlement to utilize other beings or elements as tools, solely for the advancement of human well-being (Kalpokiene & Kalpokas, 2023). Humans use their free will to manage the environment (Aviste & Niemiec, 2023; Ho, Nguyen, Nguyen, La, & Vuong, 2022). The prevailing anthropocentric viewpoint is deeply rooted in a framework that encompasses ontology (assigning special status to humans), epistemology (regarding humans as the sole founts of knowledge), and ethics (attributing the highest moral values to humans). In an anthropocentric view, the efforts made by humans for nature are considered legitimate, even though they have the potential to damage and threaten environmental sustainability.

Relational values about nature play a crucial role in establishing a reciprocal and meaningful connection between humans and the natural environment. These connections often revolve around concepts such as 'place-based value' or 'sense of place,' where the significance and worth are deeply embedded in the land. Many individuals form strong bonds with specific locations, believing that their cultural identity and overall well-being are intricately linked to relationships with both people and natural elements found in those places (Ghijselinck, 2023). Cultural aspects are inherently tied to the geographical conditions of a region, and historically, people have adapted to their surroundings. The conditions of a community are shaped by variations in location and environment, including factors like climate, soil quality, and the availability of resources. These factors contribute to the development of distinct cultures, leaving imprints on spatial locations that reflect the values, ideas, and needs of specific communities (Ryan, 2010). Culturally shaped environments serve as the backdrop for human development, offering a space where individuals can thrive as free and intelligent beings (Yusrifa, 2023). Culture not only contributes to the creation of a comfortable living environment, often regarded as a personal "kingdom" or territory, but it also serves as the means through which humans regulate and control their relationship with nature.

From the anthropocentric perspective, human will in managing their lives is closely tied to the elevated status of humans compared to other beings. Within this framework, humans possess the liberty to govern the functioning of nature following their desires. From an anthropocentric viewpoint, the initiatives undertaken by the residents of Bajo Tilamuta in implementing a waste management system do not conflict with anthropocentric principles. This is because the people of Bajo Tilamuta have inhabited the coastal region for decades, generating various cultural facets from their surroundings. Every action taken to address the waste issue, such as disposing of household waste directly into the sea, signifies human

dominance over nature. Nevertheless, as the highest sentient beings capable of ethical decision-making, humans can utilize their free will to avert the potential consequences of environmental pollution in the future.

Household waste management is an integral part of the community's life cycle, inseparable from the intricate relationship between humans and nature. According to research respondents, the community holds the responsibility to manage the environment in which they reside. Within the waste management system, limited access to waste dumping tanks grants individuals the freedom to choose their actions concerning household waste. Presently, burning trash or disposing of household waste directly into the sea is perceived as the most effective approach, in contrast to accumulating waste in temporary dumping facilities. The Bajo Tilamuta people have coexisted with the sea for decades, particularly those dwelling in floating settlement areas. While the authority for household waste management predominantly rests with individual families, it is noteworthy that despite anthropocentrism often being associated with negative environmental exploitation, humans possess the capability to exercise their discretion in managing waste judiciously.

In Indonesia, the issues of unsustainable waste management practices have significantly impacted the marine environment. Evidence of this is widespread, such as in Penyengat Island, and Riau Islands, where wastewater is directly discharged into the sea (Murtiono, Gunawan, Aguspriyanti, Putri, & Z, 2021). Similarly, in Mimika, Papua, anthropogenic waste is disposed of via rivers that flow into the sea, resulting in seawater being assessed as lightly to moderately polluted (Tanjung, Hamuna, & Alianto, 2019). Studies also have revealed alarming levels of plastic pollution along the Indonesian coast and marine ecosystems, notably in the form of microplastics found in fish and bivalves (Lestari & Trihadiningrum, 2019).

The *Jumat Bersih* program, a community-driven initiative in Bajo Tilamuta Village for environmentally friendly household waste management, reflects a commendable commitment to addressing waste issues. Conducted periodically by both the community and local government, it showcases a positive manifestation of human volition. To further bolster these efforts, the government needs to intensify public awareness through outreach initiatives and the provision of adequate waste management facilities. The current lack of such facilities in the Bajo Tilamuta floating residential area is a pressing concern that needs resolution. Despite this challenge, the proactive involvement of the Bajo community in organizing movements and activities aimed at marine ecosystem protection signals a potential solution to the waste predicament. This proactive engagement holds promise for achieving sustainable waste management in the floating residential area of Bajo Tilamuta.

5 Conclusions

The Bajo community, immersed in a symbiotic relationship with the sea in Tilamuta for seventy years, acknowledges the pressing need for a comprehensive and eco-conscious waste disposal system within their floating residential areas. At present, their waste management practices reflect an anthropocentric perspective, emphasizing human centrality in orchestrating environmental affairs. Despite recognizing the potential harm, the community habitually disposes of liquid and solid organic waste directly into the ocean, perceiving it as harmless. Moreover, they intentionally discard solid inorganic waste into the sea, despite knowing its harmful effects on the marine ecosystem, which sustains their livelihoods as fishermen. This study emphasizes humans often opt for simplicity despite understanding the repercussions.

The erosion of noble values within the local culture, coupled with the diminishing indigenous Bajau population due to intermarriage with other tribes, significantly shapes the perspective of the Bajo Tilamuta people concerning the sustainability of the marine ecosystem. This, in turn, contributes to a worsening scenario in waste management practices within their settlements. Additionally, the inadequate access to community sanitation facilities and the insufficient distribution of waste storage sites tailored to meet community needs serve as crucial factors influencing attitudes and actions in the waste management system of the Bajo Tilamuta floating settlement area. Recognizing the pivotal role of the government, it is imperative for authorities to actively engage in raising awareness, disseminating essential information regarding waste and its impacts, and providing appropriate facilities to address waste management and environmental concerns in Tilamuta.

References

Andrews, E. A. (2020). Legal and Policy Challenges for Future Marsh Preservation in the Chesapeake Bay Region. *Wetlands*. https://doi.org/10.1007/s13157-020-01389-z

Areia, N. P., Tavares, A. O., & Costa, P. J. M. (2023). Public perception and preferences for coastal risk management: Evidence from a convergent parallel mixed-methods study. *Science of the Total Environment*, *882*(January), 163440. https://doi.org/10.1016/j.scitotenv.2023.163440

Arisaputri, S. B. N., Budimawan, B., Selamat, M. B., Lampe, M., Naping, H., & Rukmana, D. (2020). Changes in Bajo community settlement patterns case study of Bone Regency. *IOP Conference Series: Earth and Environmental Science*, *564*(1). https://doi.org/10.1088/1755-1315/564/1/012071

Aviste, R. P., & Niemiec, C. P. (2023). Antecedents of environmental values and pro-environmental behaviour intentions: A self-determination theory approach. *Journal of Environmental Psychology*, *88*(April), 102023. https://doi.org/10.1016/j.jenvp.2023.102023

Bonin-Font, F., Lalucat, J., Oliver-Codina, G., Massot-Campos, M., Font, E. G., Carrasco, P. L. N. (2018). Evaluating the impact of sewage discharges on the marine environment with a lightweight AUV. *Marine Pollution Bulletin*, *135*, 714-722. https://doi.org/10.1016/j.marpolbul.2018.07.071

Chen, M., & Martens, P. (2023). Environmental Concern and Public Attitudes Toward Marine Life in Coastal China. *Anthrozoos*, *36*(1), 117–136. https://doi.org/10.1080/08927936.2022.2101247

Dewailly, E., Pereg, D., Knap, A. Y., Rouja, P., Galvin, J., Owen, R. (2008). *Exposure and effects of seafood borne contaminants in maritime populations*. Elsevier Science Publishers: New York, NY.

Ghijselinck, D. (2023). Relational values of nature: Outgrowing anthropocentrism by enriching human-nature relationships? *Journal for Nature Conservation*, *73*(March), 126386. https://doi.org/10.1016/j.jnc.2023.126386

Fleming, L. E., Broad, K., Clement, A., Dewailly, E., Elmir, S., Knap, A., Pomponi, S. A., Smith, S., Gabriele, H. S., Walsh, P. (2006). Oceans and human health: Emerging public health risks in the marine environment. *Marine Pollution Bulletin*, *53*, 545-560. https://doi.org/10.1016/j.marpolbul.2006.08.012

Ho, M. T., Nguyen, T. H. T., Nguyen, M. H., La, V. P., & Vuong, Q. H. (2022). Good ethics cannot stop me from exploiting: The good and bad of anthropocentric attitudes in a game environment. *Ambio*, *51*(11), 2294–2307. https://doi.org/10.1007/s13280-022-01742-y

Holeton, C., Chambers, P. A., Grace, L. (2011). Wastewater release and its impacts on Canadian waters. *Canadian Journal of Fisheries and Aquatic Sciences*, *68*, 1836-1859. https://doi.org/10.1139/F2011-096

Kalpokiene, J., & Kalpokas, I. (2023). Creative encounters of a posthuman kind – anthropocentric law, artificial intelligence, and art. *Technology in Society*, *72*(September 2022), 102197. https://doi.org/10.1016/j.techsoc.2023.102197

Landrigan, P. J., Stegeman, J. J., Fleming, L. E., Allemand, D., Anderson, D. M., Backer, L. C., … Rampal, P. (2020). Human health and ocean pollution. *Annals of Global Health*, *86*(1), 1–64. https://doi.org/10.5334/aogh.2831

Lasut, M. T., Jensen, K. R., Shivakoti, G. (2008). Analysis of constraints and potentials for wastewater management in the coastal city of Manado, North Sulawesi, Indonesia. *Journal of Environmental Management*, *88*, 1141-1150. https://doi.org/10.1016/j.jenvman.2007.06.011

Lestari, P., Trihadiningrum, Y. (2019). The impact of improper solid waste management to plastic pollution in Indonesian coast and marine environment. *Marine Pollution Bulletin*, *149*, 110505. https://doi.org/10.1016/j.marpolbul.2019.110505

Mosanya, M., & Kwiatkowska, A. (2023). New Ecological Paradigm and third culture kids: Multicultural identity

configurations, global mindset and values as predictors of environmental worldviews. *International Journal of Psychology*, *58*(2), 103–115. https://doi.org/10.1002/ijop.12887

Mouysset, L. (2023). On diversity of human-nature relationships in environmental sciences and its implications for the management of ecological crisis. *History and Philosophy of the Life Sciences*, *45*(2), 1–20. https://doi.org/10.1007/s40656-023-00575-6

Murtiono, H., Gunawan, I. G. N. A., Aguspriyanti, C. D., Putri, T. N., & Z, R. N. D. P. (2021). Analisis Sistem Sanitasi Dasar di Permukiman Pesisir Pulau Penyengat. *Journal of Architectural Design and Development* (JAD), (Vol 2 No 2 (2021): JAD), 187–194. Retrieved from https://journal.uib.ac.id/index.php/jad/article/view/6347/2113

Nurdin, I. N., Fajriah, Sari, S. F., Suwarjoyowirayatno, & Isamu, K. T. (2021). Coastal Area Management through the Eco blue Sea concept in the settlement of tribe Bajo, Torokeku Village. *IOP Conference Series: Earth and Environmental Science*, *869*(1). https://doi.org/10.1088/1755-1315/869/1/012012

Obie, M., & Lahaji. (2020). Coastal and marine resource policies and the loss of ethnic identity of the Bajo tribe. *Academic Journal of Interdisciplinary Studies*, *9*(3), 147–155. https://doi.org/10.36941/ajis-2020-0050

Pathak, G., Nichter, M., Hardon, A., Moyer, E., Latkar, A., Simbaya, J., Pakasi, D., Taqueban, E., Love, J. (2023). Plastic pollution and the open burning of plastic wastes. *Global Environmental Change*, *80*. 102648. https://doi.org/10.1016/j.gloenvcha.2023.102648

Rahim, M., Basri, A., & Fauzi, H. (2019). Identification of construction system and arrangement of bajo tribe settlement based on local wisdom and environmentally friendly. *International Journal of GEOMATE*, *17*(64), 261–266. https://doi.org/10.21660/2019.64.ICEE4.

Rudiarto, I., Handayani, W., Setyono, J. S. (2018). A Regional Perspective on Urbanization and Climate-Related Disasters in the Northern Coastal Region of Central Java, Indonesia. *Land*, 7(34), 1-15. https://doi.org/10.3390/land7010034

Reyna-Bensusan, N., Wilson, D. C., Davy, P. M., Fuller, G. W., Fowler, G. D., Smith, S. R. (2019). Experimental measurements of black carbon emission factors to estimate the global impact of uncontrolled burning of waste. *Atmospheric Environment*, *213*. 629-639. https://doi.org/10.1016/j.atmosenv.2019.06.047

Ryan, M. (2010). *Cultural Studies: A Practical Introduction*. United Kingdom: John Wiley and Sons Ltd.

Siradjuddin, Z. (2023). Innovation on Mutual Cooperation Culture (Gotong Royong) Implementation for House Development. *International Review for Spatial Planning and Sustainable Development*, *11*(3), 172–191. https://doi.org/10.14246/irspsd.11.3_172

Sulaiman, U., Wilkins, D. E., Rahmawati, R., Subair, S., Bakri, W., Suban, A., … Obie, M. (2023). Contribution of Local Wisdom of the Bajo Tribe to Preserve Indonesia's Mangrove Forests. *Academic Journal of Interdisciplinary Studies*, *12*(3), 264. https://doi.org/10.36941/ajis-2023-0076

Tanjung, R. H. R., Hamuna, B., & Alianto. (2019). Konsentrasi Surfaktan dan Minyak di Perairan Depapre, Kabupaten Jayapura, Provinsi Papua. *Buletin Oseanografi Marina*, 8(1), 49–54. https://doi.org/10.14710/buloma.v8i1.22264

Wani, K. A., & Ariana, L. (2018). Impact of climate change on indigenous people and adaptive capacity of bajo tribe, Indonesia. *Environmental Claims Journal*, *30*(4), 302–313. https://doi.org/10.1080/10406026.2018.1504380

Yusrifa, F. (2023). *Kajian Ketahanan Energi Wilayah Terhadap Relasi Sosial dan Budaya Pada Masyarakat dalam Menyikapi Pengembangan Energi Panas Bumi Di Lahendong, Tomohon, Sulawesi Utara*. Thesis. Universitas Gadjah Mada.