A Revisit on the Laws Governing Waste Management in Perhentian Island

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ABSTRACT

Waste management on small islands presents unique challenges because of their distinct physical, economic and social structures. These challenges worsen due to uncontrolled tourist entry to Perhentian Island, which significantly increases the amount of solid waste. The objective of this article is to examine the issues faced by the islanders, resort operators, and homestay owners of Perhentian Island. The aim is to ensure sustainable waste management and maintain the island's good reputation as a tourist attraction. This study is carried out using a qualitative approach, in which data are obtained from various primary and secondary sources, including online articles, journals, newspaper articles, websites, and other periodicals. The findings show that the current waste management system is inadequate, characterised by a lack of system monitoring and fragmented recycling efforts. The results suggest that implementing a systematic handling process with full monitoring by the local authority and expanding recycling programs are vital for maintaining the island's reputation as a top-tier tourist destination. Furthermore, improving these systems is essential to achieving Sustainable Development Goals 14 and 15, which focus on the conservation of marine resources and the protection of terrestrial ecosystems.

Keywords: Local Authority, Sustainable Tourism, Waste Management, Perhentian Island, Sustainable Development Goals (SDG)

INTRODUCTION

Perhentian Island, located off the coast of Terengganu, Malaysia, is well-known for its pristine beaches, marine biodiversity, and flourishing tourism industry. However, the rapid growth of tourism and local development has intensified waste management challenges, raising concerns about environmental sustainability and the adequacy of existing legal frameworks. Waste management is an essential service for maintaining environmental and public health, but it becomes more complex on small islands such as Perhentian Island. Perhentian Island consists of two main islands, Perhentian Besar and Perhentian Kecil, along with five other inhabited islands. Small inhabited islands are largely exposed to waste management issues due to their isolation and limited infrastructure. Based on the report by the marine conservation NGO Reef Check Malaysia (RCM) (2022), the top three methods of handling solid waste on islands are transporting it to a mainland landfill, open burning, and burying it on the island. However, the approach taken is usually inadequate and unsystematic. On Perhentian Island, waste is managed by the Besut District Council, which has awarded an annual contract to a contractor to collect trash and send it to the landfill in Besut (Majid and Hwee, 2007). The trash will be collected directly from resort operators across the island, whereas for the villagers, a centralised area near the sea is designated for waste, and they will collect it there. For instance, there is no garbage truck service provided in Kampung Nelayan, and residents and hostel operators place their waste at a designated spot near the beach, where garbage boats collect it and transfer it to the mainland for disposal via garbage trucks (Tharim et al., 2024). However, this landfill is nearing capacity, and daily waste inflows from tourism activities continue to strain its operations. The landfill site is almost full but still needs to collect waste daily, including waste from chalet operators and resorts on Perhentian Island. A

2022 investigative report highlighted that mismanaged rubbish, including plastic bags and uncollected larger waste items, remains a visible issue in Perhentian Kecil, reflecting systematic weaknesses in enforcement and infrastructure (Daniele, 2022). More recent initiatives, such as the 2024 Habitat Foundation-supported project, introduced recycling and monitoring systems, collecting over 1,300 kg of waste and improving local capacity for sustainable tourism practices (The Habitat Foundation, 2024). Despite these efforts, the island still faces significant challenges in establishing a systematic, legally enforced waste management framework. This study revisits the laws governing waste management on Perhentian Island, focusing on gaps in current practices and the urgent need for coordinated legal and institutional responses to ensure the long-term sustainability of waste management on the island.

LITERATURE REVIEW

Waste Management within the Islands in Malaysia

Economic development and population growth lead to increased solid waste in certain areas. Waste production is estimated at 2.01 billion tons per year, and this amount continues to increase. Globally, each individual produces roughly 0.74 kilograms (1.63 pounds) of municipal solid waste per day (Dzul Hadzwan Husaini et al., 2026). It is predicted that waste generation will rise by 73% by 2050, and to date, only 77% of the world's solid trash is handled; 33% is thrown in the open, 37% is landfilled, 19% is recycled and composted, and 11% is burnt (Abdulkarim Hasan Rashed, 2026).

The integration of islands into global trade systems during industrialisation has enabled their populations to enjoy improved living standards, but it often leads to increased consumption, greater dependence on imports, and considerable strain on ecosystems due to resource depletion and rising waste production (Simron J Singh et al., 2023). Solid waste is generated not only by municipal, industrial, and other activities but also by tourism activities. In the tourism sector, an increase in the number of tourists leads to increased solid waste production. Solid waste and all kinds of waste materials generated by human activity refer to materials that are useless and not needed. Solid waste, especially municipal solid waste such as food waste, packaging materials such as bottles, plastic, paper boxes, cans, cardboard, and so on, but not including hazardous chemical waste (Hashim, M., Ismail, R., & Khalid, K., 2011). According to Saat, S. A., & Saputra, J. (2019), tourism activities become the main contributor to economic activity in Malaysia. The government has made efforts to attract more tourists to Malaysia, especially to the famous resort. However, the government’s efforts have indirectly caused a negative impact on the environment of the tourism area. Litter and uncontrolled waste disposal have become the primary sources of pollution in resort areas, especially in small island resorts in Malaysia.

Small islands face challenges in implementing waste reduction practices because they rely on imported goods, over which they have little control regarding waste management. This can be reflected in a recent study from Bum-Bum Island, Sabah, where a shift toward consumption-based development has drastically exacerbated plastic pollution due to heavy reliance on imports and a lack of sustainable product alternatives (Mapa et al., 2024). The limited land availability and financial resources contribute to excessive waste production, which surpasses the island's capacity. Additionally, the complex resale market for recyclables on the mainland exacerbates the already challenging solid waste management situation. As a result, municipal governments on remote islands, with few landfill options, resort to open dumps and open-pit burning of solid waste. In essence, the solid waste situation in small islands is terrible (Wang, K. C. M., et al., 2021).

Saat, S. A. (2017) stated that the main problems in waste management in small islands are, firstly, pollution of groundwater, surface water, and marine environment from land-based sources such as solid wastes, and domestic sewage, which endangers human health and can degrade habitats such as coral reefs and tourist attractions such as beaches. As a consequence, small islands are prone to disease spread and the destruction of fisheries, which can have a negative impact on the economy. Secondly, the lack of solid waste disposal facilities and sites: gullies and the marine environment are still used as disposal sites by some small islands due to land shortages and insufficient capacity to collect garbage for centralised disposal. Thirdly, there is a lack of facilities for the storage and management of hazardous wastes. Lastly, ineffective regulations: some small islands have spent considerable time and financial resources developing regulations; however, they have not been very effective in many cases due to inadequate institutional and human resource capacities to enforce them.

Waste management presents unique challenges, especially in developing-world tourist destinations. Even though uncontrolled tourism and associated development may significantly increase municipal rubbish, wealthy tourists demand high aesthetic and hygienic standards to be satisfied with their visit to the island. Local governments often lack the capacity to manage waste sustainably, and islanders' knowledge of the need for waste segregation, recycling, and other measures may be insufficient (Shuhud et al., 2022). According to Agamuthu, P., & Herat, S. (2014), prioritising waste management initiatives that actively engage residents is crucial. Efforts to raise awareness should be maximised by conducting campaigns in the native language. The success of waste management in Small Island Developing States (SIDS) relies heavily on community involvement, rather than relying on sophisticated technologies imported from other countries. In many instances, residents of SIDS may not be able to afford the upkeep of advanced technologies, even if the initial capital expenses are covered through grants or low-interest loans.

On Pangkor Island, the primary challenge in waste management is the community's lack of priority for environmental cleanliness, among both residents and tourists. Observations reveal scattered solid waste along the tourist-frequented beaches and residential areas. The situation worsens as the number of tourists increases, especially during school holidays. This indicates that tourists visiting Pangkor Island, including local tourists, tend to dispose of waste indiscriminately. Several community representatives have expressed dissatisfaction with the insufficient number of waste bins, which is believed to contribute to a culture of indiscriminate disposal of solid waste in various places and in areas where it is not appropriate (Nor, F. I., et al., 2016). Apart from that, Mardhiah, A. (2022) states that the incinerator built on Pangkor Island provides an advantage by significantly reducing waste volume, by up to 80% to 90%, thereby underscoring its importance for areas with limited land space, such as Pangkor Island. Thus, this has resolved the issue of the disposal site's full capacity. Incinerators help achieve sustainability goals by swiftly eliminating harmful germs and pathogens, and they can operate seamlessly in all weather conditions year-round.

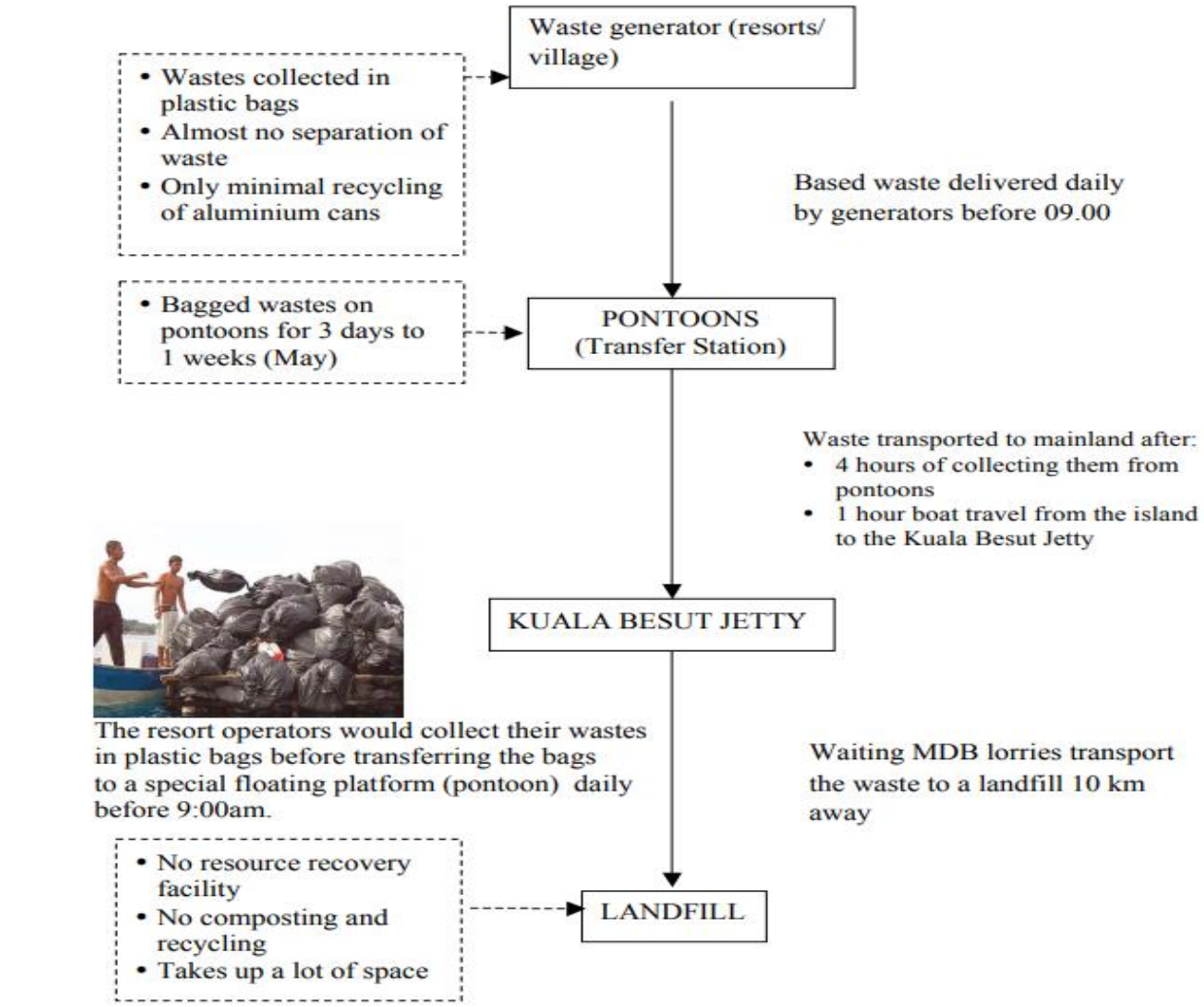
Kapas Island and Pulau Perhentian exemplify the unsustainable reliance of Malaysia’s small inhabited islands on mainland disposal systems. Both islands transport their solid waste to mainland landfills, yet face persistent logistical and financial barriers. In Kapas, bulky items such as furniture, mattresses, and appliances often accumulate due to the lack of suitable transport facilities, leading to improper disposal or abandonment within resorts and island interiors (Aisyaha & Saputrab, 2019). Similarly, Pulau Perhentian suffers from irregular waste collection schedules, high transport costs, and poor contract management, resulting in waste piling up and contributing to a 2020 pollution index of 30.88% (Reef Check Malaysia & Ocean Conservancy, 2022). Recycling remains fragmented, with only about 20% of resorts participating, despite initiatives such as Fuze Ecoteer’s wire-mesh bins for waste separation (Reef Check Malaysia & Ocean Conservancy, 2022). In both cases, reliance on mainland disposal is increasingly untenable, as transportation costs are prohibitive and mainland landfill capacity is already strained. These islands highlight the urgent need for localised waste management solutions, such as composting, recycling, and improved sewage treatment, to reduce reliance on mainland landfills and safeguard fragile coastal ecosystems.

Considering small islands, stakeholders assume a crucial role as primary participants in governance. In such cases, a unique approach to planning and development is essential to address the pertinent issues effectively. Solid waste is seldom taken into account in national, strategic, and long-term planning, leading to a lack of data that contributes to deficiencies in governance planning. Consequently, inadequate data undermine the reliability of strategies formulated by stakeholders (Wang, K. C. M., et al., 2021).

Issues of Waste Management in Perhentian Island

According to Saat, S. A. (2017), Perhentian Island is under the administration of the Besut District Council (BDC). Therefore, all matters regarding the solid waste management in Perhentian Island shall be administered by BDC. Currently, solid waste from the island generated by the resorts is still managed conventionally. This conventional practice involves hauling the waste to be landfilled on the mainland, at Paya Rawa landfill, 21 km away, and is considered uneconomical and will cause the fast-shrinking landfill space. The process involves the resort operators, a waste collection contractor appointed by BDC, and BDC itself. The flow chart of the process is shown in Figure 1.

Figure 1: This is the current process of waste management in Perhentian Island (Saat, S.A., 2017)



Saat, S. A., & Saputra, J. (2019) further stated that most resort operators do not recycle the waste generated by their resorts. 20% of resort operators say they can recycle only aluminium cans. The contractor appointed by the BDC will use a large boat to collect garbage from all chalets and resorts, then transport it to the Kuala Besut Jetty on the mainland. The contractors are paid by the resort operators, and the fees vary with the number of rooms in the resort. The fees are about RM100 and RM600 per year. The contractor takes about one hour to sail from the island to Kuala Besut Jetty. From the jetty, the waste will then be loaded onto the BDC truck and taken to the BDC landfill at Paya Rawa. The trash collection service is only operated during peak season, usually from mid-February to mid-September. According to Daniele (2022), during the monsoon, the contractors do not come to collect the trash. Rubbish piles up for long periods. In a worse situation, collection stops during the northeast monsoon from October to March, which is called the off-season. The trash generated during the off-season is quite low due to the limited number of tourists on the islands; therefore, the waste generated is usually burned.

The absence of reliable sanitation services in island jurisdictions compels residents and resort personnel to dispose of waste by open-air burning or burial. This vicious cycle continues even during peak visitation periods, often as a last resort when official collection remains suspended. Operators are using small vessels to dump waste onto floating pontoons offshore to reduce the aesthetic and olfactory impacts on the tourist experience, where visitors often have the mistaken impression that waste is being dumped directly into the ocean. However, such logistics are hampered by irregular collection schedules and rickety means of transportation, which lead to waterlogged garbage bags falling into the sea. When these fail, coral ecosystems are destroyed, and debris washes back onto the shore, often with documentation traceable to particular establishments. Local residents are vehement supporters of the need for pontoon infrastructure rehabilitation, whereas tourists frequently blame

worker negligence during transfers for these incidents, a systemic dysfunction compounded by the lack of regular collections outside primary residential and guest zones (Saat, S. A., & Saputra, J., 2019).

Daniele (2022) stated that the problem was not caused solely by the locals. It is also contributed to by the tourists. Before the COVID-19 pandemic, the local population of 1,800 grew by 100,000 tourists annually (Reef Check Malaysia & Ocean Conservancy, 2022). Most tourists visit during the 6 non-monsoonal months. As the island receives more tourists, more resorts and homestays are built, generating more waste. Among the issues faced by the islanders are the irregular waste collection schedules, poor drainage, and the unsuitable waste collection point. The area used by the islanders to dump rubbish is not strategic and is an eyesore, and resolving it would require high cost and energy.

The increase in the number of tourists visiting Perhentian Island generates more waste, which must be disposed of. The chosen disposal methods can have their own environmental impacts: landfills produce leachate that can contaminate water and soil, and incineration generates ash and air pollution. Poor disposal methods will harm marine environments, as many marine animals can be affected by certain types of rubbish. Before the island became popular for tourism, the islanders dealt with their waste by burning and through localised composting of decomposable materials. Most of the waste generated was from natural sources on the islands, as other materials would need to be imported from the mainland. In recent years, the lifestyles of the islanders have changed, and it has become difficult to dispose of more imported products. The waste composition in Perhentian Island is shown in Table 1 below (Saat, S. A., et al., 2019).

Table 1: The waste composition in Perhentian Island

Categories of solid waste	Weighted average (kg/day)	Weighted average (%)
Food waste	858.75	71.73
Paper	69.14	5.77
Wood	18.64	1.56
Aluminium	96.52	8.06
Plastic	60.65	5.07
Glass	32.08	2.68
Garden waste	62.45	5.13

Pulau Perhentian has a poor track record of waste management (Reef Check Malaysia & Ocean Conservancy, 2022). Cooperation among all stakeholders is necessary to solve the issue if they are ever going to rejuvenate the island as a pristine travel destination.

More recent academic work has further confirmed the severity of plastic pollution, specifically emanating from business entities on the island. A study by Kamaruddin, Ling and Loh (2024), conducted through fieldwork and interviews with business operators at Long Beach, Perhentian Island, found that plastic products are the dominant type of pollutant discharged by commercial entities into the marine environment there. The study underscores that marine protected area status has not been sufficient to shield Perhentian's coastal waters from locally generated pollution and calls for effective regulatory measures to sustain the area's development. This finding is consistent with the broader pattern observed by Reef Check Malaysia, whereby pollution at Perhentian is of local origin, comprising rubbish and sewage from land-based sources rather than marine drift, rendering domestic enforcement the most critical lever for improvement (Reef Check Malaysia & Ocean Conservancy, 2022).

At the national level, growing recognition of the urgency of island waste problems led to the launch of the Malaysia Island Waste Innovation Challenge in August 2024, organised by the United Nations Development

Programme (UNDP) in collaboration with the Ministry of Finance Malaysia. Research underpinning the challenge found that plastics and food waste account for more than 70% of waste produced on Malaysian islands, generated primarily by resorts, food establishments, and local communities, and that waste collection volumes increase more than tenfold during holiday periods (UNDP, 2024). The challenge called for community-led proposals targeting plastic pollution, food waste, water contamination, and carbon emissions, with each of the five winning projects receiving up to USD 40,000 in funding and technical advisory support from UNDP to implement their waste management initiatives (UNDP, 2025). This initiative represents a significant acknowledgement by the federal government that conventional waste governance frameworks, including the fragmented regulatory landscape under which Perhentian Island currently operates, are insufficient to address island-specific waste challenges, and that innovative, locally driven solutions must be actively cultivated and resourced.

A further policy development directly relevant to Perhentian Island emerged in November 2025, when the Ministry of Agriculture and Food Security (KPKM) announced that all visitors to Malaysia's marine parks would be required to take their rubbish back to land, effective 1 January 2026. The directive, supported by state government representatives from Terengganu, among others, was adopted following a National Advisory Council of Marine Parks and Marine Reserves meeting, and was premised on the finding that plastic pollution has caused coral reef damage, marine life deaths, and increased microplastic levels affecting human health and food security (Malay Mail, 2025). The "Take Your Rubbish Home" campaign is to commence at marine park centres on Perhentian and Redang islands in Terengganu, making Perhentian Island one of the pilot sites for this new mandatory regime. This directive marks the first time a specific, enforceable obligation has been placed on visitors themselves rather than solely on operators or local authorities to manage waste at Perhentian, and represents an important, if partial, step towards closing the enforcement gap that has long characterised waste governance on the island.

METHODOLOGY

The doctrinal legal research methodology was employed to examine and analyse the issues related to waste management in small islands, with particular attention to the relevant legal frameworks. This approach was used to investigate the Solid Waste and Public Cleansing Management Act 2007 (Act 672), as well as other pertinent statutes, including the Environmental Quality Act 1974 and the Local Government Act 1979, in the context of waste management on small islands. Doctrinal legal research deduction involves the organisation and systematisation of legal propositions, the study of legal institutions through rational deduction, and the systematic exposition of rules within a defined legal category (Jain, S. N. 1975).

FINDINGS AND DISCUSSION

Regulatory Framework in Malaysia

In Malaysia, waste management is categorised as '*sanitation*' under item 7, a matter that falls within the Concurrent List (List III) of the Federal Constitution, allowing both Federal and State governments to legislate. In 2007, Parliament passed the Solid Waste and Public Cleansing Management Act 2007 (Act 672), aimed at centralising management to improve efficiency. Before that, waste management was under the purview of local and state governments under the Local Government Act 1976 (Act 171). However, the transition from Act 171 to Act 672 has been non-uniform. With the enforcement of Act 672 in 2011, solid waste management was federalised in selected jurisdictions. As of May 2024, seven states and federal territories have adopted Act 672: Perlis, Kedah, Pahang, Negeri Sembilan, Malacca, and Johore, and the Federal Territories of Kuala Lumpur and Putrajaya, while Selangor has sent a Letter of Intent to the Ministry of Housing and Local Government (Malay Mail, 2024).

Meanwhile, Terengganu, Kelantan, Perak and Penang have yet to sign the agreement on the implementation of Act 672 and still apply the laws existing prior to the coming into force of Act 672, namely the Street, Drainage and Building Act 1974 (Act 133) and the Local Government Act 1976 (Act 171), as well as various by laws (Dahalan et al., 2019). For states not adopting Act 672, the applicable law is the Local Government Act 1976 (Act 171), which generally provides for local authority powers over sanitation, and the Environmental Quality

Act 1974 (Act 127), which defines '*waste*' to include solid waste. Section 24 of Act 127 prohibits soil pollution, while Section 29 prohibits the discharge of waste into Malaysian waters. These provisions are particularly relevant to Perhentian Island, where waste from pontoons has been observed falling into the sea (Saat & Saputra, 2019). The reason Terengganu and other states (Kelantan, Perak and Penang) have not agreed to implement Act 672 is concern that doing so would mean relinquishing their rights to collection and cleansing services (Malay Mail, 2019). This has resulted in ineffective, fragmented waste management across these states. Although it was envisaged that the federal government would implement more uniform policies and incorporate all states into Act 672, insufficient funding has remained a major obstacle.

On the other hand, the provisions in those existing applicable laws are on the general provisions only, that is provision on the construction, maintenance, repair and provision on dustbin and like receptacles in the Street, Drainage and Building Act 1974 (Act 133) and provision on the power of local authorities to establish, maintain and carry out sanitary services for dealing with all kinds of refuse in the Local Government Act 1976 (Act 171). This shows the inadequacy of the two statutes in dealing with solid waste minimisation comprehensively.

Under the Street, Drainage and Building Act 1974 (Act 133), section 133 provides that, the state authority has the power to make by-laws in respect of: (viii) the construction, maintenance and repair of cess pools, privies, septic tanks, sewage purification plant and other matters relating to the reception or disposal of sewage and the maintenance and repair of ash pits, dust bins and like receptacles. (xix) the provision of cess pools, privies, septic tanks, sewage purification plants, and other matters relating to the reception or disposal of sewage and the provision of ash pits, dust bins, and like receptacles.

Under the Local Government Act 1976 (Act 171), section 72(1)(f)(ii) provides that, a local authority shall have power to do all or any of the following things, namely: (f) to safeguard and promote the public health and to take all necessary and reasonably practicable measures (ii) for maintaining its area in a clean and sanitary condition. On the other hand section 73(1)(a)(i)(ii) provides that, a local authority may from time to time make, amend or revoke by-laws for the better carrying out of the provisions of this Act and in particular— (a) (i) to establish, maintain and compel the use of any service for the removal or destruction of, or dealing with, rubbish, litter, dead animals and all kinds of refuse and effluent and to require the owners or occupiers of any premises to effect such removal, destruction or dealing and to regulate and control the manner thereof; (ii) to keep public places clean and free from filth, rubbish, litter or refuse and to prohibit the throwing, dropping or depositing of any filth, rubbish, litter, glass, tins or other containers, papers, dead animals, waste or flushing water or other refuse, liquid or solid, on or in any stream, channel or other watercourse, and prevent any such liquid from flowing into any such place, and to regulate or prohibit the bathing or washing of persons, animals or things in any such place. This further affirmed that the above laws are not specifically for waste management; thus, they do not have specific provisions addressing solid waste management issues such as waste recovery, recycling, and minimisation.

To avoid any conflict in the provisions due to the enactment of Act 672, amendments to the Street, Drainage and Building Act 1974 (Act 133) and the Local Government Act 1976 (Act 171) are required. The Street, Drainage and Building Act 1974 (Act 133) was amended by the Street, Drainage and Building (Amendment) Act 2007 (Act A1312), which came into force on 1 September 2011 in the federal territories of Kuala Lumpur and Putrajaya, and in Perlis, Kedah, Pahang, Negeri Sembilan, Malacca, and Johore. Act A1312 provides the saving clause which state that for the avoidance of doubt, it declared that notwithstanding anything contained in this Act, any law relating to the management of solid waste and public cleansing for the time being in force in any local authority area or non-local authority area shall continue to be in force unless and until this Act and the Solid Waste and Public Cleansing Management Act 2007 are brought into operation with respect to that area. This shows that if Act 672 and Act A1312 of 2007 are not applied in a particular local authority area, existing laws on the matter remain in force. Thus, states that have yet to apply Act 672 continue to apply existing laws as discussed above.

The amendment has also been made on the Local Government Act 1976 (Act 171), which was amended by the Local Government (Amendment) Act 2007 (Act A1311). The amended Act came into force on 1 September 2011 in the federal territories of Kuala Lumpur and Putrajaya, and in Perlis, Kedah, Pahang, Negeri Sembilan, Malacca, and Johore. Act A1311 of 2007 also provides a saving clause similar to that in Act A1312. The 2007

amendment limited the local government's power to particular cleansing activities to ensure there is no overlapping of authority between it and the institutional bodies established under the new Act 672.

From the above, it can be inferred that the several issues that have arisen regarding how the local authority handled waste on Perhentian Island stem from the non-adoption of Act 672. They lack sufficient guidelines and policies to address waste management issues. This has resulted in ineffective waste management throughout the country. Although it was envisaged that the government would be able to implement a more uniform policy and incorporate all states into Act 672, insufficient funding appears to be a major obstacle. The waste management system requires significant financial support to ensure that it is consistent, organised, and effective. Thus, there is a need for all states to implement the law under Act 672 to achieve better, more uniform waste management and maintain the cleanliness of the country, including Perhentian Island, one of Malaysia's tourist attractions. In the event that Terengganu refuses to agree to Act 672, there is a need to improve the existing Act and Legislation by designing better strategies to motivate and educate the public on certain matters, especially Reduce, Reuse, and Recycle. Nonetheless, for the states that do not adopted Act 672, they can utilized their powers under section 72 of Act 171 to enact their own regulations in managing waste management at Pulau Perhentian.

Malaysia has devised a series of 12 four-year-long national plans collectively termed the "*Malaysia Plan*". These plans outline the strategic steps the country must undertake to achieve the status of a fully developed nation. The emphasis on sustainable waste management policies was initially introduced in the 8th Malaysia Plan (2001-2005). This plan aimed to encourage 'waste minimisation,' 'promotion of reuse,' and 'implementation of pilot recycling projects.' In 2001, the Ministry of Housing and Local Government (MHLG) reinvigorated the concept of the 3Rs (reduce, reuse, and recycle). Additionally, during the 8th Malaysia Plan, local authorities implemented various initiatives and charges to incentivise the reduction of household waste generation. The 9th Malaysia Plan (2006-2010) emphasised the importance of reducing, reusing, recovering, and recycling waste, coupled with greater adoption of environmentally friendly products. Meanwhile, the 10th Malaysia Plan (2011-2015) adopted waste recycling as a long-term strategy for municipal waste management. As of the 11th Malaysia Plan (2016-2020), the plan mentioned goals of 40% waste diversion from landfills and a 22% recycling rate. In the 12th Malaysia Plan (2021-2025), the plan emphasises the need to transition from a linear to a circular economy. The plan aims to implement integrated waste management facilities, regulate the import and export of waste, and reduce the use of single-use plastics and packaging materials. A 40% recycling rate target by 2025 has also been set.

The collection and transport of waste to disposal sites, along with the operation of certain recycling centres, fall under the direct responsibility of local authorities. They may manage these tasks internally or contract them out to private-sector service providers. At the Federal level, the Ministry of Housing and Local Government (MHLG), the Ministry of Health (MOH), and the Economic Planning Unit (EPU) provide local authorities with technical and financial support for waste management. There is a need to strike a balance between using the available resources wisely and addressing the immediate concerns of solid waste management. Accordingly, a substantial amount of money needs to be spent to achieve realistic recycling targets and reduce the amount of waste requiring disposal. Therefore, due to financial limitations, it is imperative to focus initial investments on expanding collection services, efficiently managing existing disposal sites, and constructing well-designed sanitary landfills.

The Environmental Quality (Amendment) Act 2024: A Significant Development

A significant legislative development took place in 2024 with the enactment of the Environmental Quality (Amendment) Act 2024, which came into force on 7 July 2024. This amendment to the original Environmental Quality Act of 1974 substantially increases penalties for environmental violations, reflecting Malaysia's adaptive response to evolving environmental challenges.

The EQA Amendment 2024 primarily focuses on raising penalties for various offences under the law. For serious offences such as dumping waste into Malaysian waters and discharging pollutants into land and water, the maximum fine has been raised to RM10 million, a twentyfold increase over previous penalties. The amendment also mandates imprisonment for a term not exceeding five years for offences related to the pollution of inland waters and the improper management of hazardous waste. A minimum fine of RM50,000 for inland water

pollution and RM100,000 for hazardous waste mishandling is imposed upon conviction (Environmental Quality (Amendment) Act 2024).

These enhanced penalties are particularly significant for Perhentian Island's waste management context, where waste from offshore pontoons has been observed falling into the sea, and garbage bags have been found washed up on beaches (Saat & Saputra, 2019). Under the EQA Amendment 2024, such incidents of marine pollution could now attract substantially heavier sanctions. The Department of Environment (DOE) has also been granted expanded authority to conduct unannounced inspections of premises, strengthening enforcement mechanisms that were previously inadequate in the island context (Advancedhsesolutions.com, 2025).

The amendment also introduces mandatory imprisonment for offences related to failure to comply with environmental impact assessment requirements, alongside a minimum fine of RM100,000, not exceeding RM1 million. This reinforces the legal obligation to conduct a proper environmental assessment before any development activities that may affect waste generation on the island. Despite these strengthened penalties, the effectiveness of the EQA Amendment 2024 in Terengganu is contingent on active enforcement by the DOE and cooperation with BDC, given that Act 672 has not been adopted by the state.

Malaysia's Circular Economy Blueprint for Solid Waste (2025–2035)

Malaysia has also launched its first Circular Economy Blueprint for Solid Waste (2025–2035), a comprehensive ten-year policy direction for solid waste management. This blueprint, introduced by the Ministry of Housing and Local Government (KPKT), signals a fundamental shift from the conventional linear economy model of 'take-make-dispose' towards a circular economy, emphasising the 9Rs: Refuse, Rethink, Reduce, Reuse, Repair, Refurbish, Remanufacture, Repurpose, and Recycle (MIDA, 2025).

The blueprint outlines five strategic pillars: Governance and Legislation, Guidelines and Procedures, Digitalisation and Technology, Infrastructure and Facilities, and Market Creation. It introduces key measures such as Extended Producer Responsibility (EPR), Pay-As-You-Throw schemes, Zero Waste to Landfill Certification, and the establishment of Material Recovery Facilities (Malaysian Green Technology and Climate Change Corporation, 2024). These measures directly address the gaps identified at Perhentian Island, where recycling remains fragmented, and landfill dependency is the dominant waste disposal method.

Importantly, the blueprint aims to support achieving a national recycling rate of 40% by 2025, though the actual figure reached 37.9% in 2024, still short of the target set under the Twelfth Malaysia Plan (MIDA, 2025). The blueprint also envisions a Circular Economy Bill to harmonise fragmented legislation across Act and non-Act states (Switch-Asia, 2025), which would be particularly impactful for states like Terengganu that have yet to adopt Act 672.

Regulatory Framework in another jurisdiction (Australia)

In Australia, several pieces of legislation enacted by State governments cover environmental aspects, including waste. The primary concept underpinning Australian environmental legislation is '*ecologically sustainable development*'. Australia's National Waste Policy, established in 2018, outlines five key principles: avoid waste; improve resource recovery; increase use of recycled material and build demand and markets for recycled products; better manage material flows to benefit human health, the environment and the economy; and improve information to support innovation, guide investment and enable informed consumer decisions (Department of Climate Change, Energy, the Environment and Water [DCCEEW], 2024).

This legislation covers environmental issues, namely biodiversity, biotechnology, chemicals, energy, environmental planning and assessment, heritage, native vegetation, natural resource management, pollution, waste, and water. The concepts and principles that form the basis of environmental legislation are largely similar, even though the specifics of the legislation may differ across jurisdictions in Australia. The primary concept that guides environmental policies, legislation, and decision-making processes is '*ecologically sustainable development*'.

As regard to the Waste Management and Resource Recovery Act 2016 (Australian Capital Territory), the objects of the Act are stated in section 8, that is, "*to manage waste according to the following hierarchy: minimize the generation of waste; maximize the recovery and re-use of resources; minimize the amount of waste that goes to landfill; and support innovation and investment in waste management; and promote responsibility for waste reduction; and promote best practice waste management*".

Regarding the Waste Reduction and Recycling Act 2011 No. 31 (Queensland), section 15 (2) of the Act provides that "*the strategy may include the following: waste avoidance, resource efficiency, resource recovery, product design, consumption, product stewardship, priority products or priority waste, standards, criteria and specifications for recycled materials and products containing recycled material, strategic waste management planning and data reporting*". Section 3 of the Act outlines its objectives as follows, promoting waste avoidance, reduction, and efficient resource recovery actions; decreasing the consumption of natural resources and limiting waste disposal by encouraging avoidance, recovery, reuse, and recycling of waste; minimizing the overall impact of waste generation and disposal; establishing a shared responsibility among government, business, industry, and the community in waste management and resource recovery; supporting and implementing national frameworks, objectives, and priorities for waste management and resource recovery.

The Environment Protection Act 1993 in South Australia is "*an Act to provide for the protection of the environment; to establish the Environment Protection Authority and define its functions and powers; and for other purposes*". Section 10 of the Act outlines its objectives, including, but not limited to, the following measures to be taken, as far as reasonably practicable: preventing, reducing, minimising, and, where feasible, eliminating harm to the environment. This involves encouraging and assisting industry, public authorities, and the community in adopting programs for pollution prevention, clean production, technologies, and resource recovery; promoting the application of the waste management hierarchy by implementing programs to encourage and assist industry, public authorities, and the community; regulating activities, products, substances, and services in an integrated, systematic, and cost-effective manner to address environmental harm caused by pollution or waste production; regulating the generation, storage, handling, treatment, transfer, transportation, receipt, or disposal of waste and other pollutants; and facilitating the circulation of materials through the waste management process and fostering a robust market for recovered resources.

The Waste Avoidance and Resource Recovery Act 2007 (No 36 of 2007) of Western Australia is "*an Act to provide for waste avoidance and resource recovery; and establish waste authority; and provide for waste services by local governments; and provide for levies on waste; and repeal the Environmental Protection (Landfill) Levy Act 1998; and provide for related and consequential matters*". The objects of the Act are stated in section 5, that is "*to contribute to sustainability and the protection of human health and the environment, in western Australia and the move towards a waste-free society by promoting the most efficient use of resources, including resource recovery and waste avoidance; and reducing environmental harm, including pollution through waste; and the consideration of resource management options against the following hierarchy- avoidance of unnecessary resource consumption; resource recovery (including reuse, reprocessing, recycling and energy recovery); and disposal*".

In December 2024, Australia's Circular Economy Ministerial Advisory Group also released its final report, '*The Circular Advantage*', presenting 14 recommendations for Australia's transition to a circular economy (Circular Economy Ministerial Advisory Group [CEMAG], 2024). Key recommendations include building a regulatory framework for product stewardship, focusing on mandatory participation and Extended Producer Responsibility (EPR); mandating corporate disclosure of resource efficiency and waste information; and providing consumers with more information about products' environmental performance and circularity. The report further emphasises that, to achieve a true circular approach, the focus must be placed higher up the waste hierarchy, prioritising waste avoidance and prevention through product and system design (CEMAG, 2024).

At the federal level, the Productivity Commission released its inquiry report, '*Australia's Circular Economy: Unlocking the Opportunities*', in 2025, recommending that governments streamline and harmonies regulations to encourage businesses to adopt innovative technologies and practices, strengthen obligations for businesses that supply products with high-risk or high-value waste streams through product stewardship, and promote circular activities and innovation through coordination programs (Productivity Commission, 2025).

Significantly, the report identified inconsistency across state-based recycling regulations as a major barrier to a circular economy; an observation that mirrors Malaysia's own challenge with the fragmented implementation of Act 672 across states.

Australian jurisdictions demonstrate a clear legislative commitment to waste reduction through their core statutes, which remain in force: the Waste Management and Resource Recovery Act 2016 (Australian Capital Territory); the Protection of the Environment Operations Act 1997 and Waste Avoidance and Resource Recovery Act 2001 (New South Wales); the Waste Reduction and Recycling Act 2011 (Queensland); the Environment Protection Act 1993 (South Australia); and the Waste Avoidance and Resource Recovery Act 2007 (Western Australia). All share a common focus on waste reduction and resource recovery (Khan et al., 2020). Several of these Acts have been further strengthened by recent amendments, reflecting the growing urgency of waste governance.

In New South Wales, two significant legislative developments have occurred. First, the government introduced the Environment Protection Legislation Amendment (Stronger Regulation and Penalties) Bill 2024, which substantially increases the maximum penalties for environmental offences and expands the Environmental Protection Authority's investigative and enforcement capabilities (COS, 2024). Second, and more significantly, NSW enacted the Protection of the Environment Legislation Amendment (FOGO Recycling) Act 2025, which commenced on 2 March 2025 and amended the Protection of the Environment Operations Act 1997. This landmark legislation makes NSW the first Australian state to mandate statewide source-separated collection of Food Organics and Garden Organics (FOGO) waste from both households and businesses (ChemLinked, 2025). Councils are required to provide households with FOGO collection services by 1 July 2030, with mandatory staged rollouts for supermarkets and hospitality businesses commencing 1 July 2026. Penalties for non-compliance can reach AUD 500,000 (Veolia ANZ, 2026). This mandate directly targets diverting organic waste from landfills and supports the national target of halving organic waste sent to landfills by 2030.

In Queensland, the Waste Reduction and Recycling Act 2011 was further amended by the Waste Reduction and Recycling and Other Legislation Amendment Act 2023 (WRROLA Act), which came into effect on 2 June 2023. This amendment formally introduces the circular economy concept into Queensland's waste legislation, promoting waste avoidance and minimising the impacts of waste on the environment and human health (COS, 2024). It also prohibits the outdoor release of lighter-than-air balloons from 1 September 2023 and sets an end date of 1 January 2026 for the exemption of single-use plastics integrated into products, expanding the existing ban (COS, 2024).

Based on the above, it can be seen that Australia has more developed laws and regulations regarding waste management than Malaysia. Not only do the existing state Acts share a common waste-reduction objective, but they are also continuously strengthened by federal action plans, ministerial advisory group reports, and targeted state-level amendments addressing organic waste, single-use plastics, and enforcement. This stands in sharp contrast to Malaysia, where states like Terengganu have yet to adopt the national framework under Act 672, resulting in fragmented and inadequate solid waste governance, particularly in environmentally sensitive areas such as Perhentian Island.

Waste Management in Norfolk Island, Australia

Norfolk Island is located in the Pacific Ocean and lies between Australia, New Zealand, and New Caledonia. As a small island, Norfolk Island faces energy issues as well as waste management and disposal challenges (Malik, A., & Quintal, D., 2017). The significant challenge Norfolk Island faces in waste management is the considerable distance. Due to the unacceptable threat a landfill site poses to groundwater, which is the primary water source for the island, Norfolk Island's domestic and commercial waste is presently sent to landfill or recycling facilities on the mainland. Limited sea freight alternatives necessitate transporting waste by air, making it a highly costly endeavour, even with Commonwealth subsidies, at approximately $1,400 per tonne (Skatssoon, J., 2023). Furthermore, the primary laws utilised by Norfolk Island are the Waste Management Act 2003 and the Waste Management Regulation 2004, which primarily focus on waste management and the imposition of a levy on the imported waste. Therefore, it shows that imposing a levy on imported waste is an exemplary feature of the law.

Norfolk Island's Waste Management Act 2003

Provision	Laws
Section 8(1)	***Levies may be imposed*** *"A levy at the prescribed rate may be imposed, except in the case of mail, on each cubic metre or tonne of goods of a specified type — "* *(a) imported by sea; or* *(b) imported by air; or* *(c) imported in bags."*
Section 10 (1)	***Waste Disposal Fees*** *"A person must pay the applicable prescribed waste disposal fee in respect of prescribed types, categories or classes of waste."*

Norfolk Island's Waste Management Regulation 2004

Provision	Laws
Regulation 3	***Imposition of levy*** *"A levy is imposed upon all goods imported into Norfolk Island, other than — (a) mail; and* *(b) personal effects accompanying a passenger arriving by air upon which no air freight or import duty is paid or payable; and* *(ba) a coffin or similar receptacle containing the body of a deceased person, or an urn or other container containing the ashes of a deceased person; and at the rate of —* *(c) if imported by sea - $32 per cubic metre or per tonne which ever is the greater; and* *(d) if imported by air - $0.26 per kilogram."*

Previously, the Administration of Norfolk Island (ANI) managed the collection and disposal of waste at the Waste Management Centre. Residents must deliver their waste to the centre, where it is then gathered and transported to a cliff at Headstone for incineration. The resulting residue is subsequently disposed of in the ocean. This disposal of residual waste leads to water pollution, threatening marine life around the island. Addressing this waste management issue requires a financial investment to bring the system in line with mainland Australia's standards. Unfortunately, the Norfolk Island government lacks the necessary financial resources for upgrading the waste management facility, given the ongoing economic depression. In response to the challenges of high energy costs and waste disposal, Norfolk islanders have devised innovative solutions by actively recycling and reusing existing resources.

The Norfolk Island Regional Council ('the Council') has opted to shift its focus towards composting and circular economy initiatives. They employed an aerobic composting system for green, food, and organic waste, utilising technology developed by the New Zealand-based waste solutions company Global Waste Solutions. The '*HotRot*' system utilises high temperatures to transform putrescible organic waste into nutrient-rich compost, which is either sold back to the community or utilised in Council parks and gardens. Operating on Norfolk Island since 2020, it now effectively manages all organic waste generated on the island, including butcher's waste, animal carcasses, food scraps, cardboard, paper, green waste, and untreated timber. This composting system operates 24 hours a day within a sealed system designed to eliminate methane gas (Skatssoon, J., 2023).

The Norfolk Island Regional Council's adoption of the '*HotRot*' aerobic composting system represents a scientifically grounded and economically sound approach to organic waste management on a remote island. Research on on-site organic waste treatment options for remote islands shows that composting plants provide significant environmental and economic benefits compared with exporting waste to the mainland. Aerobic composting is recognised as a financially and ecologically sustainable solid waste management method, capable of converting organic waste into useful resources for the community. The '*HotRot*' technology of aerobic composting is a self-heating, bio-decomposition process that reduces waste volume by 40-50% and eliminates pathogens through the heat generated during the thermophilic phase. This process does not produce methane as a byproduct, hence avoiding the greenhouse accumulation related to landfill disposal of organic waste (Castellani et al., 2023; Abbad & Flayeh, 2024)

An agreement entered into between the Council and Revolve Your World, a small northern NSW-based waste management start-up, with the objective of managing recyclable waste and turning it into products such as glass and aggregate, has created a seriously inspiring project on pristine Norfolk Island. The material recycling facility underwent an upgrade and has been operating for just a few months through a collaboration of organisations. This remarkable teamwork, backed by the Council, has yielded astonishing outcomes in diverting waste from landfills during the initial months of its operation.

According to the Australian Minister for Regional Department, Local Government and Territories, The Hon Kristy McBain MP, in a media release (2022, August 2), the Australian Government is also contributing up to $3.2 million to critical recycling and waste infrastructure projects on Norfolk Island. The funding represents a significant step in addressing the substantial waste infrastructure gaps on Norfolk Island. Additionally, it plays a crucial role in empowering the community to take the lead in managing their waste and recycling through innovative and sustainable practices. The government is committed to transforming the challenges of waste management in remote locations into opportunities by empowering the community to minimise waste, enhance recycling efforts, introduce circularity in waste management, and enhance the overall health of Norfolk Island's exceptional natural environment.

The Norfolk Island Regional Council has shifted towards composting and circular economy initiatives. They employ an aerobic '*HotRot*' composting system for organic waste, developed by New Zealand-based Global Waste Solutions, which has been in operation since 2020 and now manages all organic waste generated on the island (Skatssoon, 2023). An agreement with Revolve Your World has enabled the island to process both hard and soft plastics internally, convert waste into glass aggregates, and divert fabric waste from landfills. The model achieved a remarkable 72% diversion rate from landfill (Regional Development Australia, 2023). The Australian Government contributed up to AUD 3.2 million for critical recycling and waste infrastructure projects on Norfolk Island (Australian Government, 2022). Substantial community support for keeping the island clean has been identified as a crucial factor in the model's success, as waste segregation occurs at the household level and residents actively participate in the system (Skatssoon, 2023).

Norfolk Island's experience demonstrates that with adequate community support, government funding, and circular economy innovation, even the most geographically isolated small islands can achieve sustainable waste management. This model is directly instructive for Perhentian Island, where composting of food waste, the dominant waste category, could substantially reduce the cost and environmental impact of transporting waste to the mainland. The parallel is further reinforced by Australia's 2024 National Waste Policy Action Plan and the FOGO Recycling Act 2025 in New South Wales, both of which prioritise diverting organic waste from landfill at the national and state levels; a policy direction that Malaysia should similarly adopt through enforceable legislation applicable to island communities such as Perhentian.

CONCLUSION AND RECOMMENDATIONS

Perhentian Island is known for its beautiful physical uniqueness and extraordinary marine ecosystem. The island is one of Malaysia's most famous tourist attractions. However, given its unique social, economic, and environmental features, waste management has become uncontrollable and worrying, resulting in pollution and affecting the entire ecosystem. Even worse, when many tourists visit the island, a large amount of waste is generated in a short time. Therefore, strategies need to be formulated to ensure the development of sustainable waste management efforts and to avoid a worst-case scenario, such as the island's closure due to uncontrolled waste management. The roles of the public and private sectors are vital in this effort to maintain the island's cleanliness and its ecosystem. All parties, including the local authority, state government, federal government, tourists, private parties, and islanders, must work together to overcome waste management issues on Perhentian Island. Without the unconditional support of all parties, the plans and actions intended to address the issues will not achieve their goals of sustainable development and a clean island.

Based on the findings, the primary challenge in preserving the cleanliness of Perhentian Island is the fragmented legal framework stemming from the Terengganu Government's failure to adopt Act 672. Because of this, reliance must be placed only on Acts 171 and 133, which lack specific provisions for recovery, recycling and minimisation. Hence, the non-adoption of Act 671 has resulted in piles of rubbish during the monsoon season,

poor maintenance of offshore pontoons, and an unsystematic approach to rubbish collection. Therefore, to preserve the cleanliness of Perhentian Island and minimise the risk of poor waste management, it is strongly recommended that Terengganu adopt Act 672 for a more systematic approach to solid waste management, or at least implement source separation, especially on Perhentian Island, as other states that have adopted Act 672 as their waste management law have. This is to educate the islanders on the importance of waste segregation. Composting, in addition to recycling, should be introduced to reduce the amount of waste disposed of in landfills. With that, there would be no unnecessary cost of transporting organic waste to the mainland for landfill disposal. There would also be no more unsightly and smelly bags of waste on fragile pontoons offshore of the beach waiting to be collected. Findings show that composting would be more sustainable than installing an incinerator on the island. However, the Terengganu government may still be able to address the waste management issues at Perhentian Island through the power vested under section 72 under Act 171.

Furthermore, due to a lack of awareness among the islanders and tourists, dumping solid waste in landfills has long been the preferred method of disposal rather than reusing or recycling it. Since practising separation at the source is not compulsory in Terengganu, as the State does not implement Act 672, there is no clear understanding that an effective waste management system will not only maintain cleanliness but also reduce the burden on the local authority. If waste is managed systematically, less will be collected, and fewer resources will be required to collect and transport it to landfills. Although the EQA Amendment Act 2024 has provided a clear provision for mandatory imprisonment for offences related to failure to observe environmental impact assessment requirements, including a minimum fine of RM100,000 and a maximum of RM1 million, this provision remains ineffective without reference to and guidelines under Act 672. In order for Terengganu to achieve the goals of the 12th Malaysian Plan and the Circular Economy Blueprint (2025 – 2035), the State of Terengganu must make a drastic move towards the acceptance of Act 672 in its entirety to ensure that waste management is centralised, uniform, and with clear guidelines for waste minimisation.

Apart from that, as the waste composition on Perhentian Island is dominated by food waste, it is suggested that the 3Rs Measures be promoted extensively and intensively. The objective of 3Rs actions is to encourage 3Rs activities such as reducing, reusing, and recycling. The concept of the 3Rs must be introduced as the most applicable approach to waste management, alongside the enforcement of regulations to ensure compliance. Promoting recycling through interactive, engaging activities and offering incentives or prizes can encourage islanders and tourists to get involved.

In addition, it is recommended to make it compulsory for all resort and homestay owners across the Island to provide clearly labelled bins for different types of recyclables, such as paper, plastic, glass, and metal, at their premises to encourage recycling. The bins should be placed in all visible locations, and a penalty will be imposed on resort or homestay owners who fail to comply with this requirement. Other than that, the local authority must actively support initiatives to promote reducing, reusing, and recycling waste. This is because public awareness of waste management on Perhentian Island remains very low and needs improvement.

The main concern is to highlight the extent of the waste management problem and the benefits of minimising, separating, and recycling waste. The success of a recycling program relies heavily on community participation and support. Regular communication, education, and collaboration with local stakeholders will contribute to the sustainability and success of the recycling program on the island. With the implementation of the 3Rs, there will be less waste to collect and transport to the mainland for final disposal. Thus, there will be no trash piling up during the monsoon season, since the trash collector will not come to collect waste then.

Apart from that, it is also suggested that Terengganu implement a technology system, such as "*HotRot*", developed in New Zealand and implemented on Norfolk Island, to utilise high temperatures to convert putrescible organic waste into nutrient-rich compost. Furthermore, this system operates 24 hours a day, as it is capable of processing organic materials such as food scraps, butcher's waste, animal waste, paper, green waste, and untreated timber. For this system to be implemented, the State of Terengganu must adopt Act 672 and seek technical and financial support from the Federal Agencies, as the State clearly needs the funds to come out with the solutions and an effective mechanism to ensure waste management in Perhentian Island is sustainable to safeguard the ecosystem of the Perhentian Island.

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