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Problems and Countermeasures in the Recycling Treatment of Coastal Solid Waste

Renyue Yu

Yunnan Agricultural University, Kunming, Yunnan, China.

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*Corresponding author: Renyue Yu, Yunnan Agricultural University, Kunming, Yunnan, China.

Abstract

In recent years, the problem of marine pollution has become more prominent, which seriously affects the sustainable development of the society and human survival. Based on this, it is necessary to focus on the problem of marine pollution, clarify the types of pollution and response measures, and lay the environmental foundation for sustainable social development. This work mainly selected the treatment of coastal solid waste as the research object, and then analyzed the effective ideas and measures of its resource treatment, so as to change the traditional solid waste treatment mode, realize the green development of the island, and realized the transformation of resources into treasure. In the process of research, this work first analyzed the significance of coastal solid waste recycling treatment, then studied the current main treatment measures, and finally clarified the problem of coastal solid waste recycling treatment based on this, so as to find scientific measures to solve the problem, and make suggestions for the treatment of coastal solid waste in China.

Keywords

Coastal solid waste, Incineration, Landfill, Resource treatment

1. Introduction

In China, it actively promotes the construction of marine potestatem, requires all regions to earnestly implement the strategic deployment of caring about the ocean and learning about the ocean, finds new growth points of marine economy, and achieves the recycling treatment of waste.With the idea of turning waste into treasure and developing circular economic, it should coordinate marine construction and management to create a good marine ecological environment. The treatment of coastal solid waste in the construction of marine potestatem should not be underestimated [1]. At present, people mainly focus on the control of marine ecological pollution based on the idea of resource treatment. Take multiple measures simultaneously will bring about the effectiveness of coastal solid waste resource treatment, and truly realize the comprehensive remediation of coastal solid waste.

2. Current Status of Coastal Solid Waste Treatment

In order to achieve the resource treatment of coastal solid waste, the concept of island and solid waste must be made clear. Islands are naturally formed land area surrounded by water on all sides and higher than the water surface at the high tide. There are more than 200,000 islands in the world, with a total area of 9999.635km^2, accounting for 6.6% of the total land area. The island is an important basis for coastal economic development, national defense construction and ecological construction. The island and its surrounding water environment has a unique ecological resources and tourism resources. Coastal solid waste specifically corresponds to the persistent, man-made or processed solid waste in the coastal environment. Marine garbage affects the marine landscape, threatens the safety of navigation, and affects the health of the marine ecology, which has negative

effects on the marine economy [2]. In recent years, the large-scale development and construction of islands has led to an increase in the production of island solid waste, and unreasonable behaviors such as random discarding and landfill have led to the pollution of island soil and water bodies. Due to the remote geographical location, the transportation is not convenient, and the solid waste transfer and treatment is more difficult. Therefore, the research on the resource treatment of coastal solid waste is of practical necessity and contemporary significance.

3. Management Process of Coastal Solid Waste in China

At present, there are roughly three kinds of island solid waste disposal in China. One is the extensive treatment of the island, which landfills and incinerates the island solid waste directly. The second is the classification of solid waste collection and comprehensive treatment. The third is to compress solid waste material and ship it to the mainland area for treatment. The whole management process of solid waste includes collection, transport, and end treatment [3].

3.1 Collection and transport of solid waste

Solid waste collection is the primary and important part of the solid waste management system. Insufficient collection will affect the normal operation of the subsequent transfer and treatment process. Due to the lack of solid waste collection facilities in some islands, the producers pile up the solid waste at will or burn it locally, which seriously endangers the ecological environment of the island and the health of residents. The cost of collection and transfer generally accounts for a high proportion of the total cost of solid waste management because of the remote geographical location. For example, the cost of solid waste collection in Malaysia Islands accounts for 75% of the total municipal expenditure. Many islands are unable to provide sufficient collection and transportation costs, so solid waste can only be stacked on the spot. Numerous studies have shown that organized classification collection can reduce the cost of garbage collection and transport. In addition, solid waste must be shipped to the mainland for disposal on some islands because of difficulties in locating landfills or saturated landfills. Wanshan Islands is the first area in China to treat solid waste off the island, which abandons the original landfill and incineration in the island and avoids the potential environmental pollution in the process of solid waste treatment. The biggest obstacle to the treatment of offshore islands is the high transportation cost, 1500-2000 yuan of 1t solid waste in Wanshan Islands. In the peak tourist season and typhoon season, the production of island solid waste is high, and the collection and transfer should also consider the increase of sanitation personnel and transport vehicles [4]. In general, the production of solid waste is the highest in summer, so it needs at least 17% employed sanitation workers more than that of other seasons, and garbage trucks are used twice as often as in winter. Taking Wailingding Island and Dongao Island as an example, the output of solid waste in August reached the highest in the whole year. Due to the limited sanitation workers and facilities, solid waste on the island could not be collected and transported in time, and the phenomenon of stacking is serious. The effective collection of solid waste from islands requires not only complete infrastructure, but also the cooperation of local residents and tourists. In Mauritius, rural areas collects at least once a week, and urban areas collects at least three times a week, but 12% waste is still dumped on land and in bodies of water.

3.2 End treatment of solid waste

Landfill or incineration is the end treatment link of the common traditional treatment methods of coastal solid waste. Incineration and landfill have played an important role in island solid waste management in the past due to their simple methods and low cost. With the saturation of landfill use and the increase of island population, the landfill method is gradually decreasing. From the perspective of the world, Mauritius has to seek other methods due to the rapid increase in waste production, and the life span of sanitary landfills was reduced from 19 years to 8 years. Since 2010, all solid waste on Wanshan Island has been transported to Zhuhai city for treatment due to the saturation of landfill. The degree of incineration treatment reduction is high, and the heat energy generated can also be recycled. This treatment method is more suitable for a variety of organic halogen-containing waste. However, if the incineration of solid waste is not sufficient, dioxin, polychlorinated biphenyl and other harmful carcinogens will be produced in the exhaust gas, and the ash content also has the risk of heavy metals exceeding the standard.

4. New Treatment Methods -Recycling Treatment of Solid Waste

First, compost reuse. The content of perishables in island solid waste is high, so composting can be chosen, and the waste is suitable for recycling. On average, about 45.4t of solid waste per day is used for composting in Mauritius due to the large amount of bagasse produced in sugar production. Grenada island is famous for export nutmeg, banana, cocoa and other tropical crops, which produces a lot of plant waste, and composting is common on the island. The fertilizer produced by the compost

can improve the yield and quality of agricultural products and improve the natural landscape of the island. Miyako Island uses cow dung and bagasse for compost, producing fertilizer on agricultural land to maintain soil fertility. But at the same time, the composting process will produce volatile odor substances such as methylthiol, which will affect the living environment of islanders if not controlled. The paper and plastic waste in the solid waste of many islands with tourism development is relatively high, and the recycling is also widely used. In the 52 island countries and regions in the world, 83% choose recycled metal, 65% choose recycled plastic, 56% choose recycled glass, 50% choose recycled paper, and 10% choose recycled textiles. At present, some scholars have put forward the island "zero solid waste" environmental model, that is, the island garbage is not treated by landfill and incineration, but all used for composting and recycling. The "zero solid waste" treatment mode can increase the value of island tourism and attract more tourists, which is a suitable mode for the development of island solid waste treatment. The other method is to produce bioenergy. Using solid waste to produce bio-energy (biogas, biodiesel, bioethanol) has become a hot topic in solid waste treatment at home and abroad. Many islands have landfills, which produce methane, a landfill gas, that can be used for 50 to 70 percent of energy. The main component of solid waste landfill gas in the Canary Islands is methane, with a calorific value of 8900kcal / Nm^3. The main products of combustion are carbon dioxide and water vapor, which can be used as clean combustion. Methane accounts for 88.5% of greenhouse gases produced by landfills on the island of Malta. Based on this, the government is exploiting methane gas around the area to replace fossil fuels [6]. Biodegradation of organic matter to produce ethanol, biodiesel, hydrogen and other energy sources has become the forefront of island solid waste treatment. At present, Mauritius has successfully developed bioethanol by using the solid waste of sugarcane skin, elephant grass, and coconut shell. Fiji plans to use sugarcane bagasse to make bioethanol and biodiesel. The preparation of clean energy can solve the island solid waste pollution and alleviate the problem of island energy shortage. However, at present, the technology is not mature enough. In many island regions such as Fiji, Cuba and Jamaica, the production of bioethanol from organic solid waste is still only at the research level and cannot be large-scale production.

5. Two Major Problems in the Treatment of Coastal Solid Waste

5.1 Lack of effective supervision of coastal solid waste treatment

The shorelines of individual regions have not fully implemented the basic work of coastal solid waste treatment in the sea areas under their jurisdiction, and have not fully mastered the data of the distribution of garbage in the shorelines under their jurisdiction. The coastal solid waste cleaning plan and cleaning scheme have not been developed reasonably according to the formation characteristics and tidal characteristics of the coastal solid waste. In some provinces, the division of responsibility for coastal solid waste cleaning at the border is not clear, leading to the accumulation of coastal solid waste in the border area [7]. The shoreline and beach jurisdictions in some areas of China have not yet established a perfect coastal solid waste cleaning system, and the basic ledger information such as the amount, time and frequency of coastal solid waste cleaning by relevant responsible departments is not clear, and effective supervision and management of coastal solid waste treatment has not been formed.

5.2 Technical limitations of coastal solid waste treatment

Island land resources are limited, and solid waste treatment cannot provide sufficient land resources. Surrounded by the sea, the transportation is not convenient, so the solid waste collection and external transport costs are high. The development of tourism leads to the substantial increase of solid waste production on islands, and the pressure of solid waste collection, transportation and treatment is great. The end treatment technology of island solid waste is not mature enough, and it is difficult to control the persistent organic pollutants produced by incineration. Additionally, composting needs to control the odor, and the preparation of bioenergy is still under exploration. These are the technical problems that need to be solved in the recycling treatment of coastal solid waste.

6. Countermeasures of Coastal Solid Waste Recycling Treatment

6.1 Strengthen the supervision of solid waste treatment

For one thing, it should formulate a scientific implementation plan for the treatment of coastal solid waste, promote the implementation of multiple policies in one province and establish a standardized system for the disposal of coastal solid waste according to the distribution situation and distribution characteristics of coastal solid waste in each coastline area. For another, it is necessary to implement supervision responsibilities. All responsible departments shall keep a good account of coastal solid waste cleaning, clearly record basic information such as cleaning time, frequency and quantity of coastal solid waste cleaning, and establish a regular reporting and feedback system for coastal solid waste, so as to provide more accurate and detailed basic

data support for the formulation of subsequent work plans for coastal solid waste cleaning.

6.2 Improve the coastal solid waste treatment process

Coastal solid waste treatment process determines the effect of island solid waste disposal and its impact on the life quality of island residents. The optimization of island solid waste treatment process should focus on the following aspects: first, it should try to avoid the occupation of large land space; second, it should select the treatment method with a high degree of solid waste reduction, such as incineration treatment or packaging and external transport treatment; third, it should improve the solid waste treatment process, and reduce pollutant emissions, for example, exhaust gas treatment should be controlled in incineration to reduce the harm of pollutants such as nitrogen oxides and dioxins to the environment and human body, leachate produced in the composting process may cause nitrogen, phosphorus and heavy metal pollution in island water bodies, which should be discharged after treatment. What is more, it should further promote the development of island solid waste resource utilization technology to make up for the shortage of island resources, such as microbial degradation of organic solid waste to prepare clean biofuels, and combustible solid waste to produce derived fuel [8]. For example, the anaerobic biological fermentation technology can be used to convert the organic substances in the perishable garbage into biogas instead of fuel, so as to make up for the shortage of island resources. Cartons, foam boxes, plastic bottles, and glass bottles can also be used for recycling. Since it is difficult to form a market scale for recycling waste on the islands, it is suggested to ship it back to the mainland for sale. The remaining solid waste is non-recyclable plastic bags, meal paper, rubber and other combustible waste, which has good incineration disposal effect. Another example is the small biochemical reactor and the incineration treatment device. Small incineration treatment device should consider waste drying and crushing pretreatment, which cancan add auxiliary fuel to raise the incineration temperature of waste to 850 degree, so that it can ensure that organic pollutants such as dioxins will not be produced in the incineration process of plastic waste.

7. Conclusions

The per capita output of coastal solid waste is generally higher than that of mainland areas. However, due to the particularity of geographical location and climatic conditions, people have reached a consensus on the source reduction of coastal solid waste and the optimization of treatment technology in order to solve the problems of insufficient land resources, high transportation cost, increasing total amount and insufficient technology in islands. China has also made a lot of exploration in the resource treatment of coastal solid waste, and has made outstanding achievements. In the next stage, the research should focus on the improvement of the efficiency and quality of resource treatment, so as to truly solve the problem of coastal solid waste treatment.

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