

UNDP/GEF-YSLME

**Research Progress Report on Developing Regulatory  
Measures for Marine Litter Management  
in Weihai City of PR China**

——Weihai Marine Litter Management Incentive Policies and Suggestions

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April 2019

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## Introduction

Weihai city is prosperous due to the sea, and the sea is the advantage of the city. With the continuous deepening of the development and utilization of the sea, the quantity of marine litter is increasing rapidly, and the management of marine litter faces severe challenges. Results of marine litter monitoring in Weihai Xiaoshi Dao from 2009 to 2017 showed that the average quantity of marine litter on the beach of Xiaoshi Dao was 27 063 ind.·km<sup>-2</sup>, and the average mass was 3428.33 kg · km<sup>-2</sup>. For 2017, the average quantity of marine litter on the beach was 57 000 ind.·km<sup>-2</sup>, and the average mass was 2606.8 kg · km<sup>-2</sup>. The highest quantity of beach litter in Xiaoshi Dao was plastics, and human coastal activities were the main litter source. In response to such a large threat to marine environment, Weihai City has done a lot of work in the prevention and control of marine litter. In 2016, it became a “partner city” with New York City for marine litter prevention and control. However, these jobs were basically leaded by the government, and public participation was less. The public is both a direct victim of marine litter pollution and a direct beneficiary of marine litter management. And meanwhile, it is also a participant in marine litter management. The “public” is generally regarded as an individualized citizen, which is defined in a narrow scale by ignoring the grouped public, such as the public institutions, enterprises and other social organizations. However, the grouped public is also one of the main forces in marine environmental protection. The relative researches showed that marine environmental governance is an important social undertaking. The marine litter management process can be defined as source classification - intermediate collection and transportation - end processing. And during the process, the realization of reduction, harmlessness and resource could not just depend on the strength of government departments. Therefore, the public participation governance model is necessary.

## **1. The necessity of public participation in marine litter management**

In the process of ecological environment management, "Principles of public participation" is one of the basic principles of the Environmental Law. The public includes a variety of groups, including social groups, social organizations, units or individuals. The government-leading and public-participating model of marine litter management, with the public interest as the value guidance, can maximize the efficiency of resource allocation.

### **1.1 Reinforcement of the management of marine litter sources**

Survey results indicated that the main marine litter sources in Weihai city were human coastal activities, other wastes, and shipping/fishing activities. Marine litter was detected in tourist and recreation areas, agricultural and fishery areas, port shipping areas and adjacent sea areas. The main proportion included plastics, other types, wood products, polystyrene foam, paper, metal, glass, fabric (cloth), rubber, etc. Thus, mobilizing public participation such as tourists, fishermen, farmers and related enterprises will play a key role in strengthening marine litter management.

### **1.2 Improvement of the scientific and effective in the administrative management**

For a long time, Weihai Municipal Government has attached great importance to marine environmental protection and marine litter prevention and control. The specific practices are as follows. (1) In 2007, it took the lead in implementing the Weihai Marine Environmental Protection Plan. (2) The Weihai City Marine Pollution Prevention Leading Group was established to coordinate the promotion of prevention and reduction of waste into the sea. (3) An expert working group composed of 10 experts from the fields of marine and fishery, water conservancy, urban construction, environment, universities and other fields was established to provide decision-making consultation and related suggestions for in-depth promotion of marine litter prevention cooperation. (4) The "Regulations on the Protection of Coastal Zones in Weihai City" was drafted to set the coastal litter treatment and urban landscape conservation as the important part of promoting marine litter management. For these work, information collection, expert consultation, research and demonstration activities all require adequate information and intellectual support. And detailed and timely first-hand information often comes from the public directly related to the marine environment. Thus, it is undoubtedly scientific and effective to bring together public opinions and suggestions to clarify the public's real needs for the marine environment.

### **1.3 Effective promotion of marine litter management systems and behaviors**

In recent years, Weihai has carried out a series of work to strengthen the management of marine litter. The effective promotion of these tasks requires the government departments to join the

relevant people and coastal production enterprises to participate and govern together. Thus, the environmental, economic and social problems could be taken into account, and the overall benefits of environmental, economic and social benefits would be maximized.

### **1.3.1 Regulate inshore farming practices**

The regulation of prohibiting the newly-enclosed aquaculture was clearly stipulated in "Weihai Marine Functional Zoning" (2013-2020). And "Mudflat Aquaculture Plan in Weihai City" has been prepared, in which, the scale of near-shore aquaculture will be compressed, aquaculture enterprises are encouraged to expand to the open sea, and the operation time of aquaculture production in the land will be gradually reduced.

### **1.3.2 Strengthen the management of fishery production litter**

Weihai City has deepened the special action for comprehensive rectification of the fishery environment, and formulated and promulgated the "Environmental sanitation management regulations on the Fishing Ports of Weihai Aquaculture Farm". 20 million yuan of provincial funds has been received to carry out regulation projects in multiple sea areas, improve the quality of coastal water quality, and avoid the adverse effects of the litter on coastal marine ecology.

### **1.3.3 Strengthen marine litter cleanup**

In accordance with the principle of territorial management, Weihai City requires coastal parks, bathing beaches, scenic spots, port (docks) management departments and coastal production enterprises to be responsible for the cleanup of shore beach litter within the scope of "Be Responsible for General Sanitation in Front of the Door", implements the first responsibility system for sea surface litter disposal, and carries out special clean-up operations on seasonal and large-scale sea surface litter such as enteromorpha.

### **1.3.4 Implement remediation and restoration projects**

Weihai City has long promoted the remediation and restoration of sea area, island, and coastal zone. Accumulatively, 48 projects about the remediation and restoration of sea area, island, and coastal zone has been undertaken, nearly 3 billion yuan was invested, 75 km of damaged shoreline, 600,000 m<sup>2</sup> of beach, more than 10,000 mu of wetland have been repaired, 89,000 m<sup>2</sup> of vegetation has been restored, 275,800 m<sup>3</sup> of silt has been removed, 594,500 m<sup>3</sup> of litter has been cleaned, 25 dangerous rock masses have been rehabilitated, 20,000 m<sup>3</sup> of algae reefs have been placed, and 80,000 algae has been transplanted. The retention rate of the natural shoreline in Weihai city reaches 65.1%, of which the sandy shoreline is 255 km, accounting for one quarter of the whole coastline in Weihai city and one-third of the sandy shoreline in Shandong Province.

### **1.3.5 Strengthen beach management and protection**

"Management Measures for the Protection of Beaches in Weihai City" has been formulated in

Weihai city, in which, the principle of beach classification protection is established, and the legal responsibility for setting up land-source sewage outlets, litter dumping, litter burning and illegally sea sand mining on the beach are all clarified.

In addition, works of urban and rural sanitation integration, litter classification pilot, river comprehensive improvement project, hazardous waste disposal, and agricultural non-point source pollution control, have also been promoted in Weihai city. And all these works have achieved good marine litter control effects.

## **2. Problems in public participation in marine litter management**

### **2.1 Public participation is less efficient**

In the process of marine litter management, the public participation efficiency is mainly reflected in the strength of public participation awareness, the level of public participation and the engagement in management process.

#### **2.1.1 Participation awareness**

The problem of marine litter pollution has already attracted enough attention from the public. Most of the public is aware of the importance of marine environmental protection. The enthusiasm of public participation in environmental management is on the rise, yet has not formed a stable behavioral reflection. And the direction of public concern is mostly limited to areas of interest. Studies have shown that in China, environmental management is still considered to be the responsibility of the government and the related experts, the awareness of public independent participation is still weak and relatively passive. Thus, it is difficult to achieve effective governance effects.

#### **2.1.2 Participation level**

The basis and prerequisite for participating in marine litter management is the related knowledge and skills. At present, the overall level of public knowledge and skills on marine litter management is still low. And most public protection behaviors for the marine environment are more slogans and less practical, which caused the inequality between the awareness and action of the public. According to the results of the 2010 China Public Environmental Index Survey, nearly 90% of the public believed that environmental protection took precedence over economic development. However, the investigation of public specific behavior patterns showed that the practice rate of the public participation in environmental protection social activities was low, which led to the stay level of consciousness in in marine litter management.

#### **2.1.3 Management process engagement**

At present, the form of public participation in marine litter management in China is relatively

simple, mainly focusing on publicity and education, volunteer activities, reports of marine litter pollution, etc. Most of these forms are at the end of the marine litter management. So far, the relevant laws and regulations on marine litter control basically aim at the already existing of marine litter or caused pollution, that is, end processing participation. Thus, it would lead to the passive public participation and the positive inhibition.

## **2.2 The protection legal systems of public participation is insufficient**

In theoretical research, scholars pay more attention to the study of social, administrative, legal, and management mechanisms under government regulation, and insufficient attention to the research on the involvement of individuals, enterprises, and social organizations in marine litter management. And meanwhile, in response to the pollution prevention and control of marine litter, China has successively promulgated and formulated laws, such as "Solid Waste Pollution Prevention and Control Act", "People's Republic of China Marine Dumping Management Regulations", "Regulations on the Prevention and Control of Marine Environmental Pollutants Damage to Marine Environment", etc., and the corresponding supporting methods and policies. All the documents make requirements for public participation in marine environmental protection, but are lack of the definition of the scope of public participation, the guidelines for participation, and the corresponding safeguard measures.

## **2.3 The cooperation between government departments and enterprises is insufficient**

In the process of source classification- intermediate collection and transportation - end processing of marine litter management, enterprises play a unique advantage in terms of capital technology investment and operational efficiency improvement. However, in general, the cooperation between government departments and marine-related enterprises mainly concentrated in end processing, and maintained active and passive relationships in terms of source classification and intermediate collection and transportation. In the process of marine litter management and law enforcement, government departments have not fully integrated relevant enterprises. And the resulting inconsistencies are as follows. The flow of information between the government and enterprises is not smooth, the joint power of litter management is difficult to enhance, and the introduction of public resources into the marine litter co-management structure is difficult. All these will in turn affect the synergy between government and enterprises in environmental protection and litter management.

## **3. Public participation incentive policy proposals for marine litter management**

So far, the marine litter prevention and control work in Weihai City has achieved substantial



positive results, and successfully promoted the coordinated development of coastal zone construction, ecological protection and social culture. In view of the importance and necessity of public participation in marine litter management, and according to the actual situation of marine environmental management in Weihai City, the public participation could be incited in the following aspects to maximize the efficiency of resource allocation and promote the positive and comprehensive management of marine litter.

### **3.1 Improve incentives about laws and regulations for public participation in marine litter management**

#### **3.1.1 Improve the legal mechanism for public participation in marine litter management**

A sound legal and regulatory mechanism is an important guarantee for the public to participate in the management of marine litter. In Weihai City, the level can be deepened and the channel can be broadened for public participation on the basis of the issued regulations and methods, such as "Views on Strengthening Coastal Zone Management and Protection", "Measures for Coastal Zone Law Enforcement Inspection in Weihai City", "Rules for Coastal Zone Law Enforcement Inspection in Weihai City", "Implementation Plan of the "Partner City" for Marine Litter Prevention and Control between Weihai City, China and the United States", "Measures for Construction Waste Management in Weihai City", etc.

(1) It is necessary to formulate public/market incentive policies that include means of defining the legal status of public environmental rights, improving the marine litter information disclosure system by government departments, and improving the environmental public interest litigation systems. The amount of marine litter can be reduced and the resources can be recovered and utilized through the means and methods of adjusting economic interest mechanism. For example, we can supervise the marine litter sources (individuals and related enterprises) to better carry out the classification and resource recycling by means of litter metering charge, deposit return system, product liability extension and raw material taxation learned from foreign countries.

(2) Improve the information disclosure system for marine environment protection. The subject, content, timeliness, etc. of information disclosure will be standardized. And the environmental information that the government and related companies need to publish also will be clarified, which includes the major government projects and decisions on marine environmental management, marine ecological environment quality and marine litter monitoring data, illegal enterprises and individuals engaged in marine ecological environment protection, the pollution situation and the environmental consequences of the sea-related enterprises production, etc. In this way, the information symmetry of the effective public participation in marine litter management can be achieved.

(3) Improve the marine environmental public interest litigation system. According to the provisions of the new Environmental Protection Law about the environmental public interest litigation system, we should make the public, government departments and other environmental protection organizations as the main body of public interest litigation clearly, and establish a financial support system.

### **3.1.2 Improve the administrative mechanism for public participation in marine litter management**

(1) At present, "top-down" environmental governance system in China is changing, and the "bottom-up" green reform is spreading. In view of this, the transformation of marine litter control system should be carried out based on the existing marine litter control plan of Weihai City. The marine environmental stakeholders such as markets, companies, individuals and other related organizations should be organized to participate in marine litter management with government organizations. And at the same time, an equal dialogue between the executive branch and the public will be achieved. Finally, the way of marine environmental management is gradually diversified and a new pattern of diversified marine environmental management will be formed.

(2) Improve the hearing system for marine environmental management. This requires the corresponding hearing of the marine environment administrative decision-making to be held, the composition of the hearing representative to be defined, and a direct communication channel between the government department and the public to be established. At the same time, a legal protection platform is expected to be established for the public to express their own appeals and safeguard their own rights and interests by means of questionnaire survey, forum, and expert consultation about marine litter management.

### **3.1.3 Improve the long-term mechanism for enterprises to participate in marine litter management**

(1) Strengthen collaboration between government departments and marine-related enterprises. The government departments should make clear the responsibilities of relevant product manufacturers in the process of inspection, supervision and enforcement, incorporate enterprises in various industries into the process of marine environmental protection and litter management, improve the terminal harmless treatment industry for marine litter, and assist in the matching development of production enterprises and terminal recycling industry, and enhance collaboration between more enterprises and government departments in marine environmental protection and litter management.

(2) Improve the dialogue and consultation mechanism, information flow mechanism and incentive compensation mechanism between government departments and enterprises, and

strengthen the synergy for marine litter management between government departments and enterprises to maximize the efficiency of public resource allocation.

### **3.2 Improve incentives about the social mechanism for public participation in marine litter management**

#### **3.2.1 Improve marine environmental protection literacy of the public**

The marine environmental protection awareness of public can be Cultivated and enhanced by the education in the marine environment. For different public groups, education can be divided into basic education, higher education and professional technical guidance education. Student groups in the public can be educated at the basic level and a higher level, so as to enhance their awareness of ecological crisis and marine environmental protection, and create preconditions for the formation of public ecological literacy. For enterprises and institutions and other social organizations in the public, it is necessary to organize and level the corresponding professional and technical courses to improve their practical ability of marine environmental protection and litter management.

#### **3.2.2 Expand the channels for public participation in marine litter management**

By improving the mechanism construction of public participation in marine litter management, government departments can provide multiple ways for the public to participate in marine litter management at multiple levels and in an all-round way. For example, through convening major project symposiums, census suggestions for marine pollution sources, marine garbage transfer and recycling volunteers, etc., and publicly exchange various social, scientific and financial issues that need to be faced with marine waste management, and raise public awareness. Participate in the enthusiasm and effectiveness of waste management. The government departments can face up to and communicate with the public about various social, scientific and financial problems that marine litter management needs to face through convening symposiums on major projects, suggestions collection for marine pollution sources census, conscription meetings of volunteers for marine litter transfer and recycling, etc. Thus, the positivity and effectiveness of public participation in litter management are expected to be improved. In addition, a special advisory expert group for marine litter management decisions is suggested to be set up, resident experts to be employed, and a channel for public suggestions to be opened, so as to realize the transformation of public participation in marine litter management from "formal participation" to "substantial and scientific participation".

#### **3.2.3 Establish a collaborative governance mechanism between government departments and enterprises**

A collaborative governance mechanism between government departments and enterprises is expected to be established to incorporate enterprises from various industries into the body of marine litter management. The government departments should organize related experts from enterprises to

jointly prepare the "Marine Litter Management Industry Cooperation Plan". The files will define the collaborative way between government and enterprises, and their respective areas of responsibility and economic interests during the process of source classification, prevention and control - intermediate collection and transportation - terminal treatment of marine litter. At the same time, the government management departments, production enterprises and recycling industries will be equipped with marine litter management links to form an effective industrial chain system.

### **3.3 Improve the financial incentives for public participation in marine litter management**

#### **3.3.1 Special fund incentive**

Weihai City will be supported by the special funds from government in terms of marine litter prevention and control, such as provincial funds for fishery production waste management, sea island coastal zone rehabilitation project fund, river comprehensive improvement project fund, etc. This financial support is a means used by government agencies to regulate social distribution and production. It is suggested to formulate positive incentive and negative penalty schemes for government funds, and classify government funds to support different marine litter treatment processes, respectively, such as marine litter source classification funds, transfer funds, disposal funds, recovery funds, etc. And furthermore, different subsidies for marine litter reduction and treatment can be offered according to the relevant provisions of the "Renewable Energy Law". For example, waste incineration power generation enterprises can be subsidized at a price of 0.25 yuan per kilowatt.

#### **3.3.2 Support incentive**

So far, Weihai has been continuously promoting the construction of waste disposal capacity, and has realized the harmless disposal of medical waste in the city. It is suggested to fully support the development of marine litter recycling industry. It can refer to the "Resource Recovery Industry Plan" issued by Taipei city to formulate the "Resource Recovery Industry Regulations" in line with the actual situation of Weihai city, carry out the regulation and qualification examination of recycling enterprises in Weihai city, support the development of the industry with the management mode of special fund dedicated ledger through financing incentives, tax reductions, financial subsidies, etc., and provide guidance and business support to the enterprise through the "Marine Litter Management Decision Advisory Group".

#### **3.3.3 Waste monetization**

Researches on the value of marine waste are expected to be carried out in Weihai City, following the model of "plastic bank" in Canada. An equivalence table between various marine litter and daily payments for electricity, water, telephone, gas, insurance, etc. should also be created. A special

"marine waste bank" department is expected to be opened up to sell marine litter as raw materials to the corresponding manufacturing industry, with a view to the successful trial operation of "monetize marine waste".

### **3.4 Improve public opinion propaganda incentives for public participation in marine litter management**

#### **3.4.1 Give play to the role of public opinion propaganda in marine litter management**

Public opinion is an important force to promote marine environmental governance. Weihai city has achieved certain results in publicity work on strengthening public marine awareness and environmental protection, and systematically publicized the achievements in marine litter prevention and control. It is suggested that the government environmental protection department establish a long-term cooperative relationship with the mass media industry. (1) To expand the influence of marine environmental law enforcement and the effect of social publicity through advanced modern network and media means. Different publicity methods, such as instruction manuals, public service advertisements, promotional videos, documentaries, short videos, etc., are set up for different levels of the public. (2) Build public opinion media into a special channel for equal communication and dialogue among stakeholders in Marine environmental governance. Strengthen the credit construction of government departments through public opinion publicity, and reach a consensus on the environmental interests of the public. (3) For the behaviors of destroying the marine ecological environment and hindering the work of marine litter management, the related organizations and individuals will give public exposure and criticism to warn the public to exercise self-discipline by using the supervision function of public opinion of modern media.

#### **3.4.2 Establish a big data platform for the disclosure of marine litter monitoring information**

Since 2007, the status of marine litter has been listed in "Marine Environment Status Bulletin in China" as one of the contents. Thus, the data of marine litter monitoring in Weihai City have been able to support the construction of "Weihai Marine Litter Monitoring Information Big Data Platform". The platform will integrate marine litter management achievements, public participation, and the contribution rate of different levels of the public to the management achievements in Weihai city, and add an information disclosure section to facilitate citizens to inquire, supervise and use environmental information.

#### **3.4.3 Establish a dedicated media channel for corporate culture**

Government departments related to marine environmental governance may use material incentives and spiritual rewards to encourage relevant production enterprises and recycling enterprises to participate in marine litter management, and gradually infiltrate the awareness of marine environmental protection into the daily operation of enterprises. And in the meanwhile,

government departments should encourage enterprises to incorporate marine environmental protection concepts into the product design process, and build up a special media channel for corporate culture promotion including newspapers, magazines, radio and television, websites, WeChat, Weibo, etc. in combination with enterprises and the mass media industry. The channel should meet the following functions. (1) The function of matching the contribution rate of enterprises' participation in marine litter management and the efforts of corporate culture publicity. (2) Relevant enterprises can collect design drafts of corporate culture publicity through the channels, and expand the breadth and depth of their own corporate culture publicity. (3) Enterprises promote their green products and advocate the public for a green lifestyle in the sales and publicity process. (4) Enterprises can find the upstream or downstream industries suitable for each other, and spontaneously form an industrial chain system supporting the marine litter treatment.