Sustainable Fashion Innovation Design for Marine Litter

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Abstract. With the progress of world civilization, marine debris has become a worldwide problem. The article analyzes the current situation, hazards and preventive methods of marine litter. Through the design of re-splicing, assembling, reclaiming and recycling marine litter, the environmental pollution problems caused by marine litter can be alleviated. It is expected that people's awareness of environmental ecology will be awakened by mitigation design attempts.

1. Overview

According to the definition of UNEP (United Nations Environment Programme), marine litter refers to “persistent, man-made or processed solid waste in the marine and coastal environment” [1]. Marine litter mainly includes three-quarters of plastic waste, shopping bags, fishing nets and other plastic waste. The main sources of marine litter are land sources and ocean sources, of which land sources are the main source. Land-sourced waste comes from the litter discharged by tourists and coastal residents, waste water dumped by industry, and land litter drawn into the sea by storms or inland rivers. Sea-source litter mainly comes from maritime activities such as shipping and fishing. Except for uncollected waste or litter, the rest comes from loopholes in waste collection itself. When litter is stacked in the open air, it will be blown away by the wind or washed away by rain, and then flows into the ocean through groundwater or blown into the ocean by the wind.

In recent years, with the rapid economic development, marine litter is increasing with the development of tourism, industry, fashion and other industries in coastal cities. The ocean has long been regarded by human society as a place where waste is dumped or discharged, and the harm of marine debris cannot be underestimated. First, the most intuitive is visual pollution. Seriously affect the ocean landscape. When enjoying the ocean views, plastic bottles, fast food boxes, plastic bags, fishing nets and other marine litter rippling with the waves seriously affect the ocean views and visual experience. Second, it threatens the composition of marine life. When marine organisms mistakenly swallow the harmful plastic products attached to the litter as food, the plastic products will not be digested and decomposed, and will cause stomach upset, abnormal behavior, decreased fertility and even death. The death of marine life eventually leads to the disruption of the marine ecosystem. The largest plastic waste in the ocean is discarded fishing nets. Under the influence of ocean currents, when marine life encounters fishing nets, it will entangle and drown thousands of seals, sea lions and dolphins. Third, it causes a safety hazard to maritime activities. During the voyage, marine litter affects navigation safety by entangles the ship's propellers, etc. In recent years, people are gradually realizing that marine litter has become a global problem that needs to be solved urgently.

2. Analysis of marine litter control
In recent years, humans have produced more than 8.3 billion tons of plastic waste. Of the 300 million tons of plastic produced globally every year, only 9% of plastic waste is recycled and the rest is either incinerated or discharged into the ocean. Marine litter has become a worldwide problem. The problem. Since the 21st century, not only has deterioration of ecological environment due to problems such as marine pollution, resource depletion, and climate abnormalities, but also all industries are on the verge of being unsustainable. It was not until the 1970s that the International Institute for Environment and Development (IIED) first proposed the term "sustainability" [2]. Affected by the energy crisis, the environmental awareness of the fashion industry was born in the 1970s [3]. American designer Victor Papanek once pointed out in his book "Designing for the Real World" that "designers must have the courage to assume social responsibilities instead of pursuing commercial interests " [4]. Sun Ruizhe, chairman of the China National Textile and Apparel Council, introduced at the 2019 Climate Innovation • Fashion Summit that the textile and apparel industry has become the world's second most polluting industry after the petroleum industry [5]. The fashion industry has begun to transform from traditional industrial processes that cause pollution to now seeking new sustainable designs. The new regulations of the British Designers Association point out that “designers have the responsibility to make their work as little as possible to cause direct or indirect harm to the ecological environment, which will directly affect various organisms, endangered plants and animals, the atmosphere, Rivers and oceans". Modern designers have taken up social responsibilities and focused on designing sustainable fashion and innovative designs, seeking the combination of marine litter prevention and sustainable fashion and innovative designs.

Nowadays, marine litter is called the seventh continent. For the prevention and control of marine litter, there are currently three main methods in the world:

2.1. Source Treatment
In recent years, domestic and foreign designers have gradually realized to reduce the use of design and production, and reduce the generation of marine litter from the source. Many conventions on the prevention and control of marine litter pollution, such as "United Nations Convention on the Law of the Sea", "1972 London Convention", "MARPOL Convention" and so on. Prevent and control marine litter pollution from the legal and institutional aspects, starting from the source. China's extended producer responsibility system is not yet complete, and controlling actions at source are still insufficient, but there is a good trend. Designers from various countries have tried to design sustainable and fashionable innovative designs through high-tech synthetic recyclable materials and one-piece designs, which have already led more designers to pay attention to and design sustainable innovative designs.

2.2. Salvage treatment
More and more marine conservation organizations are appealing for the people to participate in the salvage of marine litter, to restore the purity of the ocean, and also to restore the human landscape. However, this requires a lot of cost, time, energy, etc. It is not a long-term solution, but only relieves the ocean. litter pollution. What is more important is how to deal with marine litter after the marine litter is salvaged.

2.3. Sustainable and Innovative Applications
After the marine litter is salvaged, the disposal of marine litter is also a confusing question. Fashion designers focus their attention on marine litter, classify and process them experimentally, give full play to their potential usability and give them a certain visual appreciation and artistic value. Explore how to dispose marine litter through sustainable, stylish and innovative design.

3. Methods of Sustainable Fashion Innovation Design
The ever-increasing marine litter and marine pollution have severely affected our lives and even threatened the lives of marine organisms. Marine litter has also brought a lot of materials and
inspiration to designers' sustainable and innovative designs in the fashion industry. Due to the rich types of marine litter, disposable, and difficult to degrade characteristics, in recent years, fashion designers have classified marine litter according to shapes, materials, uses, etc., and re-assembled, assembled, recycled and synthesized new materials for recycling. To give them the second mission of radiant brilliance, to make marine litter sustainable fashion and innovative design.

For example: In 2005, Julie established the Kenya Marine Conservation Organization-Ocean Sole. Committed to beach environmental protection, because rubber slippers are the second largest and most difficult source of pollution in the marine environment, she encourages local women to recycle used slippers, and organizes local young adults to clean, polish, process and make them into toys and handicrafts, it also provides jobs and stable income for local low-income groups.

Outerknown is a clothing company that emphasizes sustainability and is committed to "creating a better environment for the entire planet." In 2018, the design of a watch set a precedent for Breitling: the strap uses ECONYL yarn material—an innovative material made from nylon waste recycled from the global ocean, such as fishing nets, which is turned into treasure. The watch 44 Outerknown's striking blue dial and the same blue ECONYL® NATO strap make people involuntarily think of the blue planet of the ocean and the earth—they are the area that sustainable clothing brand Outerknown and its co-founders, the legendary surfer Kelly Slater strives to protect, this watch gives more brand stories to sustainable fashion and innovative design.

In 2015, adidas became Parley's global partner, the first generation running shoes which called adidas x parley, makes a historic innovation on the craft level. The confiscated deep-sea fishing nets illegally set up by poaching boats were made into woven materials and used on the surface of the shoes to perfectly combine marine litter with sustainable fashion design. In 2018, adidas and the marine nonprofit organization Parley for the Oceans worked hand in hand to infuse the mission of marine protection into the design of shoes and apparel, adopting Parley Ocean Plastic™ marine recycled plastics. While advancing the progress of its own brand, ensure that the burden on the environment is reduced as much as possible. Adidas first launched the UltraBOOST x Parley series of running shoes. The laces, heel webbing, heel lining, heel lining, and insole outer skin are all made of recycled materials. The adidas Parley series conveys the concept of sustainable environmental protection, hoping to awaken the public's collective awareness of marine pollution and inspire positive effects.

In 2019, PRADA teamed up with fabric maker Aquafil to launch ECONYL® recycled nylon, a unique new material that brings sustainability to PRADA’s classic packaging designs. Through the collection of marine waste plastics, fishing nets and textile fiber waste, recycling and purification of production. ECONYL recycled nylon can be recycled indefinitely by means of depolymerization and repolymerization without affecting the quality of the material, while effectively reducing the global warming impact of the production of petroleum-based Nylon.

CONVERSE teamed up with commercial recycling company First Mile to recycle plastic bottles from developing countries, creating a Polyethylene terephthalaye (PET) called Recycled Canvas that has the texture and properties of Canvas. As long as the raw material is properly collected, PET canvas material can be recycled five to six times for sustainable recycling purposes. More and more people are concerned about the disposal of marine debris, and fashion designers can also reap commercial rewards by constantly trying to make environmentally friendly products out of it, in addition to enhancing the brand’s reputation. It is also a win-win situation to carry on the sustainable fashion innovation design of the marine refuse. For the sustainable development of the ecological environment, the world is getting better and better.

4. Mitigation design of marine litter

For the follow-up treatment of marine litter salvage, individuals, organizations, and countries have provided a variety of fashion innovative design methods.

Marine refuse creates new toys and crafts to be displayed for recycling and re-use through collating, assembling, recycling, deconstructing, reassembling and graffiti processing, at the same time, it also
serves as a warning to people to pay attention to the protection of the oceans. Through this method, marine garbage can be turned into “waste” into treasure. At the same time, this method of fashion and innovative design is mostly used by individual artists, because the production of arts and crafts requires the guidance of the artists and their own aesthetic interest, individual strength is limited, to actively call more people to participate in them, together with the Marine waste into the “waste” action to the treasure. From the salvage and collection of marine refuse to the processing and processing of marine refuse to the final production of handicrafts, the promotion of personal participation will arouse more people’s resonance for the Protection of the marine environment and their participation in the production of toys and handicrafts, it also increases personal satisfaction.

Marine waste is recycled and processed into ®ECONYL materials, Econyl recycled nylon, recycled fishing nets, recycled polyester (PET) materials, Parley Ocean Plastic™ materials and other new renewable and sustainable new materials to reduce pollution to the marine environment. Fashion designers can develop new sustainable materials and explore more possibilities through high technologies such as depolymerization and repolymerization technologies, but at the same time they need continuous advancement in technology and continuous support from research and development costs, so this method is mostly for enterprises Only with the favorable support and advocacy of the country can it be realized. In recent years, marine debris has attracted great attention at home and abroad, and countries have also provided more financial, technical and personnel support. But the most fundamental treatment is to reduce the production of marine litter. Starting from everyone's awareness of protecting the environment, only when everyone participates in the protection of the marine environment can they effectively reduce marine litter and return a clear blue sky in the future.

Personal attempts of the design are as followed. After salvaging the floating bottles and fishing nets of marine litter, etc. (Figure 1), a table lamp can be created for recycling by processing such as collage, assembly, recycling, graffiti, so that marine litter will glow new vitality (Figure 2). The lampshade of this table lamp is a recycled floating bottle. The bottle body is decorated with discarded fishing nets and red, blue, yellow, green and other color graffiti. The base of the table lamp is cut from waste wood and is made of red, blue, yellow, green and other color graffiti decoration, echoing the lampshade. The socket of the table lamp is the image of a blue dolphin, hoping to awaken people's awareness of environmental ecology through attempts of the design.

5. Summary
In the 21st century, the ever-increasing marine debris and marine pollution have severely affected our lives and even threatened the marine ecological balance. Starting from the current situation of marine litter, this paper explores a road of sustainable fashion and innovative design, which is not only a fashion trend, but also the future development trend of mankind. We should not only stay after the salvage and disposal of marine litter, we should also let sustainable design run through the entire fashion design process. Of course, individuals, society, and the country are indispensable on the road to handle marine litter.
Individuals are more involved in the salvage and disposal of marine litter, and the production of various marine litter into handicrafts will increase the public's sense of participation. Everyone is a part of the earth. Sustainable design has become a consensus, and designers are also aware of their responsibilities. Many designers have taken or are taking action to carry out environmental protection publicity and practice activities, and show people sustainable fashion through different ways and means [6,7]. This also requires designers to shoulder a sense of social responsibility and design sustainable, fashionable and innovative designs of marine litter. At the same time, we should cultivate the sustainable consumption concept of consumers, so that consumers will have a sense of empathy and participation in brand stories. For example, as long as United By Blue sells a product, a pound of litter from waters such as oceans or rivers is cleared, and consumers are also willing to buy such products. Of course, the rapid development of high-tech technology also provides more possibilities for the recycling of marine litter to make new recyclable environmentally friendly materials. Nowadays, more and more countries have participated in forums on marine debris and sustainable design at home and abroad, which has attracted great attention. Only by working together can the world develop more sustainably.

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