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Recycled art from plastic waste for environmental sustainability and aesthetics in Ghana

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Abstract

The study rooted in the eco-innovation theory aimed at investigating the effects of plastic waste in the Kokrobite and Bortianor communities in Accra while finding proactive ways of using recycled art from plastic waste, with post-use packages in focus to sensitize community members on the negative effects of plastic waste. Phenomenology and art studio-based research designs under the qualitative approach were adopted for the study. The study was carried out from August 2021 to July 2022. Personal interviews and focus group discussions with 72 snowball and purposively sampled study participants. The data from the study were analysed using the Interpretative Phenomenological Analysis. The study revealed that the improper management of post-used plastic items in the study areas was a major factor that contributed to environmental pollution. An artistic installation was executed using plastic waste. Visually, it enhanced the environmental aesthetics in the community while philosophically serving as a sensitization tool on the effects of plastic waste. In the quest for a solution to plastic pollution, innovation from post-used plastic items is the ultimate answer. The Ministry of Education and Ghana Education Service in collaboration with the Ministry of Environment Science Technology and Innovation and the Ministry of Tourism Arts and Culture can organize such competitions to reward students of all levels who create innovative products from plastic waste.

Keywords: environmental sustainability, environmental aesthetics, plastic pollution, recycled art

Public Interest Statement

This study discusses the negative effects of plastic waste materials that are not properly managed in the Bortianor and Kokrobite communities in Accra, Ghana from all stakeholders in the study areas. The study demonstrates how plastic waste materials that have been an environmental menace affecting fishing activities in the communities could be innovative recycled into aesthetically pleasing art installations. It agrees with the theoretical propositions in the eco-innovation theory that postulate that communities must find innovative ways of recycling waste in the environment.

Introduction

Plastic waste is currently among the major pollutants in the global community (Borrellea, 2017; Geyer et al., 2017; Zulkernain et al., 2021). Green and Whitebread (2019) posit that plastic waste provides breeding grounds for harmful disease vectors such as mosquitoes, flies, and rodents that cause various forms of water-borne diseases. Moreover, plastic wastes facilitate the spread of chronic and other types of diseases, when contaminated with various pathogens and non-biological microparticles of materials (Cregut et al., 2013; Chen et al., 2019; Galloway & Lewis, 2016; Chamas et al., 2020) as well as chemicals harmful to human health. Unfortunately, the use of plastic as a mode of packaging has steadily increased globally, and has greatly contributed to the amassment of waste in the natural environment presently (Silva et al., 2020). Coupled to this is its long duration of decomposition which can take centuries (Matjašič et al., 2021). Findings from Sharma et al.'s (2021) research on the utilization of plastic, it was discovered that packaging domineers with not less than 40% for safe storage and delivery of goods. Similarly, Evode et al. (2021) stated that approximately 40% of plastic produced is utilized in various industrial and domestic packaging universally. Notably, the physiochemical properties of plastic make it a better choice in the packaging sector (Evode et al., 2021). Undoubtedly, from the finding herein, it can be concluded that packaging has always been at the forefront in the utilization of plastic since its inception (Menzel, Broma & Heidbreder, 2021) due to its known remarkable physical and chemical characteristics. Before the inception of plastic as a mode of packaging, the materials used for packaging traditionally were mostly organic, and therefore eco-friendly. The waste generated from these traditional materials easily decomposes naturally. Plastic subsequently became an alternative material since that was perceived to be more hygienic. Due to efficiency, weight, flexibility, as well as all the other related peculiar benefits, Plastic has gained precedence with its use extending from food, and cosmetics to toxic and non-toxic chemicals (Fobil & Hogarh, 2006). Due to this current high demand for plastic materials, records available indicate that between the years 1950 and 2018, 8.3 billion metric tonnes of plastics were produced, and surprisingly, this figure keeps increasing annually (Jambeck et al., 2015; Geyer et al., 2017; Amobonye et al., 2021). Unfortunately, developing countries are noted for the mismanagement of plastic wastes (Boucher et al., 2019).

In Ghana, most of the concern for plastic waste management is with the urban areas than the rural areas (Yintii, Anim-Gyampo & Braimah, 2014). Available records from the city authority, Accra Metropolitan Assembly indicate that out of the over 2,500 tons of waste generated daily, only 1,125 tons representing 45 percent is collected. The remaining 55 percent, mainly plastics, remain in the system (Kortei & Quansah, 2016). The majority of these can be found in drains, streams, beaches, oceans, and open places, creating/causing a visual nuisance, soil infertility, and other environmental and health problems. Yintii et al. (2014) explain that the traditionally applied methods of dealing with wastes including burning, burying, and open space dumping have been unsuccessful, and the resulting contamination of water and land has led to growing concern over the absence of an

integrated approach to waste management in the country. Various measures have been put in place to end plastic waste and plastic pollution mostly through policy fixes such as banning plastic straws, taxing plastic bags, and recycling (Boucher et al., 2019). However, in Ghana, what has been the greatest challenge is sensitizing the public against the use and disposal and/or waste management of plastics (Owusu-Sekyere 2013). Increasing education and environmental awareness are steps needed to combat this bad practice (Yulianto & Sulistyo, 2019). Such environmental and sustainability issues facing global society demand considerable public support and awareness since they emerged and exist as a result of anthropocentric beliefs and anthropogenic activities (Adom et al., 2019). The need for effective communication, public outreach, (Moser & Dilling, 2007), and education to increase support for collective action and behavior change is perhaps most pressing in the context of anthropogenic environmental change.

Addressing such devastating effects humans have had on the planet such as the plastic waste canker requires a multidimensional approach, incorporating not only the help of scientists, but also those of engineers, politicians, and artists (Hayley, 2019). In spite of the fact that scientists have a significant role to play in environmental sustainability issues, Curtis, Reid, and Ballard (2012: 12) argued that "Scientists often find it difficult to communicate with the general public. Meanwhile, the role of the visual and performing arts is often overlooked in this regard, yet the arts have long communicated issues, influenced and educated people, and challenged dominant paradigms." The arts can synthesize and convey complex scientific information, promote new ways of looking at issues, touch people's emotions, and create a celebratory atmosphere (Curtis, Reid, & Ballard, 2012). Undeniably, art offers opportunities to communicate in a universal language which makes it accessible for a wider audience (Kindvall, 2019). This is because art can evoke emotions, cultivate empathy, capture the multi-sensorial nature of lived experience, and promote self-reflection and consciousness about complex environmental changes (Leavy, 2015; Coemans, & Hannes, 2017). There is, therefore, considerable scope to grow this area of endeavor and, potentially, have a huge impact on public attitudes (Curtis, Reid, & Ballard 2012). Artists have been using recycling as a means of transforming discarded materials into raw materials that can be used for other valuable while helping in achieving cleaner and healthier environment (Evode et al., 2021; Rorrer et al., 2019; Environmental Protection Agency, 2015). Transformation from the conventional strategy for managing post-consumer plastic to an innovative artistic form (Sharma et al., 2021), is suitable for the improvement of its lifespan to ensure sustainable development. Many contemporary artists express their individual concerns on environmental and sustainability issues through diversified creative art genres. Some artists incorporate these discarded items that are distorting the environmental aesthetics in their artistic productions to form installations, collages, and assemblages through creative recycling. These projects are often created to inform the public about environmental problems and ecological dynamics, proposing new ways for sustainability and co-existence (Lambert & Kholsa, 2000). This is an initiative encouraging public awareness about environmental and sustainability issues and how art can affect socio-cultural change. The changing of the attitudes of Ghanaians toward the use and disposal of plastics holds a greater potential in eradicating plastic waste (UNDP, 2019). Therefore, this study aims to investigate the effects of plastic waste in the Kokrobite and Bortianor communities in Accra while finding proactive ways of using recycled art from plastic waste, with post-use packages in focus to sensitize the community members on the negative effects of plastic waste. The study was pivoted on three research questions:

1. What are the possible effects of plastic waste in the environment of the Kokrobite and Bortianor communities in Accra, Ghana?

2. What are the potentials in using recycled art from plastics as a sensitization tool to curb plastic pollution in the Kokrobite and Bortianor communities, Accra, Ghana?

3. How can artworks be designed and produced from plastic waste and used for sensitization against plastic pollution in the Kokrobite and Bortianor communities, Accra, Ghana?

This study is of great significance to the Kokrobite and Bortianor communities as it helps in offering a roadmap to curb the problem of plastic pollution. Also, the use of artworks made from plastics for sensitization will serve as a form of recycling waste into something useful that would inure to environmental sustainability. This project is the first of its kind in the Kokrobite and Bortianor communities in Accra, Ghana aimed at recycling the plastic waste into usable artistic products. Moreover, the study and its allied artworks hold the prospects of creating job avenues for community members in the study areas, especially the youth, when they embrace the idea of reusing plastic waste for artistic expressions. Finally, the mass production of artistic products from the plastic waste in the Kokrobite and Bortianor communities, Accra, Ghana would enhance the environmental aesthetics in the study areas.

Literature Review

Recycling and Recycled Art

Recycling refers to the waste management method whereby waste materials are collected and converted into raw materials that can be reused to form other valuable products (Evode et al., 2021). Among the current waste management methods, recycling is perceived to be the most effective, efficient, and sustainable. Zulkernain et al. (2021) confirmed by stating all the present waste utilization processes, recycling is considered one of the most innovative ways of managing the reasonable amount of waste in the environment and reducing the negative impacts on the inhabitants (Zulkernain et al., 2021). However, Recycling is the most preferred method and it is considered the most advanced among conventional management hierarchy (Ahamed, et al. 2021), as it enhances the circularity of the material flow (Directive, 2008). It is the safest among the three most used waste management systems (incineration, landfill, and recycling).In many countries, Recycling is the most preferred practice although not the most applied method, for post-consumer plastic materials (Gu & Ozbakkaloglu, 2016), as compared to landfilling and incineration (thermal or energy recovery). Hopewell, Dvorak, and Kosior (2009) stated that for end-life post-consumer plastic products, reuse, recycling, and recovery are the 3R measures to reduce the volume of plastic waste (Li et al. 2021). As stated by Li et al. (2021), Recycling is described as the process that enables the recovery of discarded materials to form new commodities, reduces the demand for raw materials (Li et al., 2021), prevents the pollution derived from the production of virgin raw materials, as well as mitigating the waste accumulated in the environment (Hopewell, Dvorak & Kosior,2009). Recycling is one of the most researched areas as far as plastic waste management is concerned (Li et al., 2021). Like many other researchers, Fauziah et al. (2015) revealed that insufficient application of innovative recycling to the treatment of plastic waste has resulted in the disposal of waste into the aquatic bodies and other habitats in the ecosystem.

However, the current measures for reducing discarded plastic materials or waste in the environment put the recycling method at the forefront since that is perceived to be a way of providing new value to enhance the circular economy (Li et al., 2021). Szostak et al. (2021) make us understand that plastic recycling involves six steps: “collecting waste plastics, sorting, or arranging plastics into categories, washing to remove impurities, shredding and resizing, identifying and separating plastics, and compounding” Evode et al. (2021). The two mostly applied waste treatment methods namely;

landfilling and incineration have proven inefficient and environmentally unfriendly as far as plastic waste is concerned, however, this resulted in the quest for a more innovative recycling alternative (Zulkernain et al., 2021). However, waste utilization or innovative upcycling can be regarded as a better and excellent, and more efficient management method to reduce the accumulation of discarded plastic waste as well as minimize the challenge it poses to the environment as well as the inhabitants (Zulkernain et al., 2021). We must note that such an innovative method has always been the vision for effective mitigation or completely eradication of the accumulation of plastic waste and the allied pollution that has greatly contributed to the depletion of natural resources or the ecosystem as a whole (Vanapalli et al., 2019; Hopewell et al., 2009). Meanwhile, up till now the information from EPA (2019) prior to research by Zulkernain et al. (2021) revealed that about 8.4% of the total plastic waste generated globally since it was incepted has gone through the recycling process while 75.8% has accumulated in different compartments of the ecosystem due to the proven inefficient but mostly applied management methods (Zulkernain et al. 2021).

Although several waste management methods and approaches have been scrutinized, and the findings evident that they have some disadvantages like low benefits, high costs, and some produce secondary pollutants in the process, however, there is a global demand for other alternatives (Chen et al., 2020). Therefore, the development of cost-effective, eco-friendly, and efficient approaches to transform discarded plastics into value-added products is indispensable to avoid their dissemination into the various compartments of the ecosystem (Hou et al., 2021). Avoiding side reactions (hazardous substances that some recycling processes release into the environment) of recycling, is fundamentally important in environmental sustainability. Artists should have an awareness of the socio-cultural environment where they live. The artworks created should be based on contextual issues in their environment (Yulianto et al., 2017).

Recycled art as environmental activism is currently one of the key concepts of contemporary art practice globally. Undeniably, the dirty environment of the residual waste from people's consumption is found everywhere (Yulianto et al., 2017), and this condition encourages artists to manifest it into creative solutions by creating artworks that care about the environment. Recycled art is one of the current approaches as a creative solution to waste acumination. The term Recycled art is usually related to the art practice which uses everyday life disposable objects in order to convey a certain idea (Maric, 2016). Recycled art is creative work made from discarded materials that once had another purpose. These include anything from old plastic toys and vehicle tires to scraps of cloth and building supplies (Papanek, 2005; Przybylek, 2020). The process for recycled art is sometimes also referred to as "creative reuse", junk art, etc. Recycled Art has been organized to demonstrate the creative use of recycled materials and found objects in contemporary regional art (Mansour et al., 2018; Papanek, 2005). Different types of waste have different characteristics and artistic potential, thus they demand the application of different techniques (Yulianto et al., 2017). To deduce from the statements above, Recycling Art is a term used to describe creative artistic expressions made from discarded materials or objects that had served their original purpose. In terms of practice (reusing discarded materials to make art), recycled art is not new in the art world even though some art historians trace its history/ development to the 20th century when Pablo Picasso invented a collage made from used newsprint, photograph, and some other found objects. A few years later, artist Marcel Duchamp, also used found objects to create art. Duchamp used bicycle tires, wooden furniture, and even a ceramic urinal from a bathroom in his sculptures (Przybylek, 2020). This kind of art practice continued into the 1960s and 1970s when artists such as Robert Rauschenberg and John Chamberlain also joined in this movement in the form of assemblages and sculpture. This art practice has subsequently become a common

approach, especially among contemporary artists with sustainability being one of their central themes or as a form of environmental activism (Yulianto et al., 2017). Through art, they are expressing their despair and making statements about the current culture (Hess et al., 2020). By working with recycled materials, these artists encourage their viewers to question the sustainability and ecological impact of the artistic process (Artsper magazine, 2018).

Contrary to the above Eurocentric history of recycled art, other art historians also trace the genesis of this genre to the era of Euro-American slavery when the enslaved African women in the Diaspora invented the art of quilt making from discarded fabrics. There is no doubt that the history of quilt-making began long before the European settlers arrived in America. However, these earlier quilts were not made from leftover fabrics (discarded clothing). During slavery, the African American slaves developed a stunning complex and unique style of quilting that was produced from discarded or leftover fabrics (worn-out fabric and food sacks). This type of Quilting became a vital strand of African American culture, telling vividly complex stories of pain, oppression, freedom, and power (Lesso, 2020). They used appliqué and embroidery techniques to create artistic designs as a form of decoration. Although the slave masters saw these as mere abstract expressions, they were coded messages to serve as a guidepost to communicate to the slaves in transit. This skill was passed down from generation to generation even after slavery was abolished. This type of art became common among women in the black communities in the United States. Harriet Powers is one of the outstanding African American women whose quilts art can be found in many esteemed museums. This genre that was once a modern African diaspora art has now been adopted by some contemporary African American artists such as; Carolyn Mazloomi, Rosie Lee Tompkins, Viola Williams Canady, Marla A. Jackson, Bisa Butler, and many others. A key aspect of recycled art stems from the intellectual engagement with constructed works. The salvaging practices of these artists help redefine originality in appropriated found objects by providing new life and purpose out of objects deemed nothing, worthless, or useless (Mears, 2018). Around the world, artists, designers, and architects are putting recycling at the forefront of their practice and using their works to highlight the impact that our waste has had on the environment (Ignacia, 2019). There's no limitation currently for recycled art in terms of material, dimension, approach, size, form, timelines, and any other criteria. This trend started gaining prominence in the 1980s when museums and galleries in the Western world opened their doors for such innovation and creativity (Al-Banna, 2019).

Recycled art offers an ecological worldview that leads to less wasteful behavior (Mears, 2018). Artworks, (sculptures, installations, etc.) made from waste materials that are damaging to the environment, such as plastic, can help to highlight the problem and open conversations to bring about change (Watson & Wolfe, 2021). Recycled art from plastics seems to be more advantageous in comparison with the other recycling processes due to its cost-effectiveness and environmental friendliness. Recycled art as a way of transforming discarded plastics into innovative futuristic valuable products should be adapted in all creative industries. This innovative form of art will undoubtedly contribute greatly to the valorization of discarded plastics to prevent the emission of plastic pollutants into the natural environment (Hou et al., 2021). Moreover, this kind of innovative method could be the best way to close the material loop of the economy (Li, et al., 2021), and curb the need for plastic disposal and demand (Sharma et al., 2021). Furthermore, an upcycling method in the form of innovative art can be a better approach to mitigate or possibly eradicate real-world plastic waste accumulation (Hou et al., 2021). Therefore, one can emphatically state that upcycling discarded plastics of this nature would simultaneously assist in the mitigation of accumulated solid waste contaminants and also, in the production of items of a greater value (Hou et al., 2021), hence,

signifying considerable economic, environmental and social benefits (Weckhuysen, 2020).

The role of Art in environmental and sustainability issues

An irrepressible human activity, art is a universal and abiding response to the world around us. The relationship between art and the environment is profound (Bicycle, 2014). Since the dawn of civilization, artists have continued to use their work to communicate human relationships with the natural environment. Meade (2008) stated that art has embodied the relationship between humans and the natural environment throughout the ages. Throughout history, artists have produced artworks that have attempted to jolt their communities out of complacency, articulate concerns about social justice and other issues, define and summarize debate, and provide enduring images that continue to inspire people down through the ages (Reichold & Graf, 1998). Logé et al. (2010) also confirmed by adding that, humans have always used art to create a sense of meaning and imagination beyond their everyday life, both by creating and enjoying art. In an era when cynics firmly decide to ignore or question scientific findings on crucial environmental challenges such (Curtis, 2012), and other environmental issues, the use of the arts to connect with people emotionally may indeed be an effective way to win support for actions to reverse problems like anthropogenic climate change and deserves further research effort (Curtis et al., 2012). Artists have a history of social activism (Gibson, 2001; Belfiore & Bennett, 2006).

The artistic creations embedded with the view of the environment genealogically depicted can be a repository of the positive and negative anthropogenic impacts on the biosphere. Dissanayake (1995) notes that the arts and culture have been a necessary part of our evolution as human beings and that people of all ethnicities have engaged with the arts in some form or another. In some ancient traditions and indigenous cultures, art was used to communicate practices on living in harmony with nature (Kulnieks et al., 2016). Many environmental and sustainability issues facing global society demand considerable public support and awareness since most of these emerged and exist as a result of anthropocentric activities. Curtis et al. (2012) make use understand that community support is only likely if the issues are widely understood. In spite of the fact that scientists have a significant role to play in environmental sustainability issues, Curtis et al. (2012: 7) continue to state "Scientists often find it difficult to communicate with the general public. The role of the visual and performing arts is often overlooked in this regard, yet the arts have long communicated issues, influenced and educated people, and challenged dominant paradigms". Furthermore, Lopes et al. (2017) research confirmed that innovative artistic projects can have unprecedented and imaginable space in sustainable development. According to Lopez et al. (2018), art is capable of evoking emotions and arousing the consciousness of individuals toward the complex environmental changes (Leavy, 2015; Coemans & Hannes, 2017). The need for effective communication, public outreach, (Moser & Dilling, 2007), and education to increase support for collective action and behavior change is perhaps most pressing in the context of anthropogenic environmental change. Art offers opportunities to communicate in a universal language which makes it accessible to a wider audience (Kindvall, 2019). In the current climate of environmental precarity, the need to prompt ecological change becomes more than just a job for the scientific community (Hayley, 2019). Thornes (2008) adds that in the current state of environmental uncertainty, there is a growing need for effective communication among people of all disciplines. Hayley (2019) revealed that addressing the devastating effects humans have had on the planet is beginning to require a multidimensional approach, incorporating not only the help of scientists, but also those of engineers, politicians, and artists. Artists use their work to shine a light on issues of environmental justice, raise awareness of environmental insecurities and risks, and imagine

more sustainable futures (Hayley, 2019). The arts have the ability to articulate elaborative scientific information (Nesci & Valentini, 2020), redirect thoughts and actions touch people's emotions, and provide a celebratory atmosphere (Curtis et al., 2012). In connection with visual art, Polfus et al. (2017) specified that visual arts have the ability to articulate complex scientific messages in a more elaborative manner. There is, therefore, considerable scope to grow this area of endeavor and, potentially, have a huge impact on public attitudes (Curtis et al., 2012).

Since the term sustainability came to the limelight in the 1970s, it has been one of the major concepts for artists portrayed through diverse genres (George, 2013). Meade (2008) emphasized that there is the need for channels of communication to address the major environmental and sustainability problems of our time. Looking towards culture and the arts has proven an effective way to begin addressing current environmental issues (Hayley, 2019). It is believed that the universal language of art can adopt this role and encourage people from all different backgrounds to develop actions to help live more sustainably (Meade, 2008; Thornes, 2008). Research on art and sustainable development imply that art has great potential to work as a medium for a more sustainable world (Kindvall, 2019). Art can assist in the transition toward a more environmentally conscious, sustainable society (Meade, 2008). There is an ever-growing recognition among practitioners of the role of the arts in facilitating societal transformation to environmental sustainability (Curtis, Reid, & Ballard 2012). Results from scientific research show that art has possibilities to re-establish the link between humans and nature that has been disconnected through modern life (Curtis, 2009; Milbourne, 2014; Kulnieks et al., 2016). Ultimately, this study proves that there is an important role for art in society, thus, educating and communicating significant concerns about environmental sustainability (Meade, 2008).In the past few decades, there has emerged a new concept used to describe art that concerns issues related to the environment known as environment art (Kagan, 2014).

The generic term that is widely used to define all artistic creations that are made or displayed with environmental issues being the main concern or absolute subject matter is Environmental Art (Thornes, 2008). Environmental art can be executed through diverse art genres namely; painting photography, sculpture, film/video making, installation, or even natural samples (e.g., driftwood, leaves soil, tree branches, mud, water, and rocks, just to mention a few) and can be displayed outdoors or in an enclosed indoor gallery (Thornes, 2008). This encompasses a new genre known as ecological art (eco-art), which serves to address environmental issues ranging from politics to culture to ethics (Kagan, 2014). As the global crisis of unsustainable development has become increasingly difficult to ignore, the interest in ecological issues has been rising in the art world (Kagan, 2014). Throughout the 20th century, artists around the world have inspired people to take a fresh look at and re-evaluate their relationship with the natural world (Meade, 2008). Many artists address their individual concerns through different art genres. Several contemporary artists have also begun to engage the public in community-based restoration, inviting students and adult members of communities to participate in projects (Lambert & Kholsa, 2000). These projects are often created to inform the public about environmental problems and ecological dynamics, proposing new ways for sustainability and co-existence (Lambert & Kholsa, 2000). The conventional divisions of visual and performing arts have transitioned into new genres incorporating environmental art (Kaye, 2013); thus sub-categories being ecological art, public art, site-specific art, and many more (George, 2013).

Contemporary art has traditionally addressed mostly human concerns; yet more recently environmental issues have become a relevant concern addressed by artists who seek to re-examine our relationship to the natural world (Vasko, 2015). More recently, researchers have found that one of the most pressing concerns of many contemporary artists is the worsening environment (Hayley,

2019; Curtis et al., 2012). Many contemporary artists express their concerns on environmental and sustainability issues through diversified creative ways. This is an initiative encouraging public awareness about environmental and sustainability issues and how art can affect socio-cultural change. In regards to this, and also to maintain the holistic, harmonious, adaptive, and flexible nature of sustainability (Geissdoerfer et al., 2017), this study aims to adopt "recycled art" as a waste management method to help mitigate the accumulation of plastic waste and emission of pollutants more harmoniously for intergenerational benefit and sustainability. This initiative will promote environmental sustainability through art by effecting change, regards to people's behaviors and attitudes about the environment and sustainability.

Eco-Innovation Theory

The concepts of this research intrinsically situate it in the confines of environmental innovation (eco-innovation) theory. Having a clear Definition for eco-innovation is a very complicated task as several concepts and definitions have emerged over the years (Carrillo-Hermosilla et al., 2010). However, the traditional EI concept by Fussler and James (1996) reveals, that new products and methods that significantly decrease ecological impacts can be classified under Eco-innovation. In addition, Oltra and Saint Jean (2009) consider EI as innovations that are absolutely new or modified in terms of process, practice, systems, or products that are not harmful to the environment (Carrillo-Hermosilla et al., 2010), therefore, contribute to environmental sustainability. Moreover, Debref (2018) makes us understand that the most current definitions of eco-innovation are based on environmental health/ benefit rather than on environmental aim since it is not the aim that is important but rather the positive and the negative environmental impacts related to the innovation (Kemp & Pearson, 2007). Eco-innovation practice is articulated in many of the 17 United Nations (UN) Sustainable Development Goals (SDGs). This was revealed by European Commission (2007), stating, "Eco-innovation is any form of innovation aiming at significant and demonstrable progress towards the goal of sustainable development, through reducing impacts on the environment or achieving a more efficient and responsible use of natural resources, including energy" (Carrillo-Hermosilla et al., 2009).

Economic, social, as well as environmental sustainability has been a growing concern in our society due to climate change, increased pollution, and the threat of scarcity of resources (Guimarães de Queiroz et al., 2021). Plastic waste and allied pollution have a negative impact environmentally, socially, and economically. These catastrophic impacts discovered triggered the need for this study. The concepts of this study are to find out the impact of plastic waste and how recycled art from plastic waste can contribute to the solution of this sustainability issue, for an environmental, social, and economic benefit/interest. Undeniably, this is qualitative research concerning human behavior and its impact on the natural environment and how that can be solved through artistic innovation. This study will physically reduce the quantity of discarded plastics in the environment since discarded plastics that are a burden on the natural environment and the entire ecosystem will be used as a medium for the execution of the projects. It will sensitize the public to the negative effect of plastic waste and an effective alternative means of waste management. Finally, it will conserve natural resources since plastic material is mainly produced from hydrocarbons that are extracted from crude oil and natural gas.

Designs/Methods

Study Areas: Kokrobite and Bortianor Communities

Bortianor and Kokrobite, the two study communities in the Greater Accra region are well-known

coastal tourism destinations for both foreign and domestic tourists (Boafo et. al., 2014). They are two small twin towns in the Ga South municipality. They have attracted a lot of attention due to the environmental aesthetics. Boafo et. al. (2014) makes us understand that they are adjoining communities located on a stretch of beach along the Atlantic Ocean. Generally, both communities lie in the coastal plain surrounded by a series of isolated hills to the north and the Gulf of Guinea to the south. Kokrobite and Bortianor are considered among the fastest urbanizing communities in the Greater Accra region with populations of 8,865 and 32,485 respectively, according to the 2010 National Population and Housing Census (GSS 2010). However, the total population for both towns is 41,350.

With their serene environment, relatively clean, and pristine sandy beaches, have become popular coastal tourism destinations for tourists, recreationist, and holiday seekers in the Greater Accra region of Ghana (Boafo et. al., 2014). As stated above, these communities have become tourism destinations for both foreign and domestic tourists; this project will subsequently benefit the world as a whole because the plastic waste problem is a global phenomenon. Boucher and Friot (2017) make us understand that plastic waste is becoming a great menace to global communities as daily estimates show that 27, 000 tonnes find their way into oceans and other water bodies. Wassener (2011) also stated that the issue of plastic waste management is therefore a major global phenomenon that has crept up over the decades, and requires a global and comprehensive solution that includes systemic rethinks about usage and production.

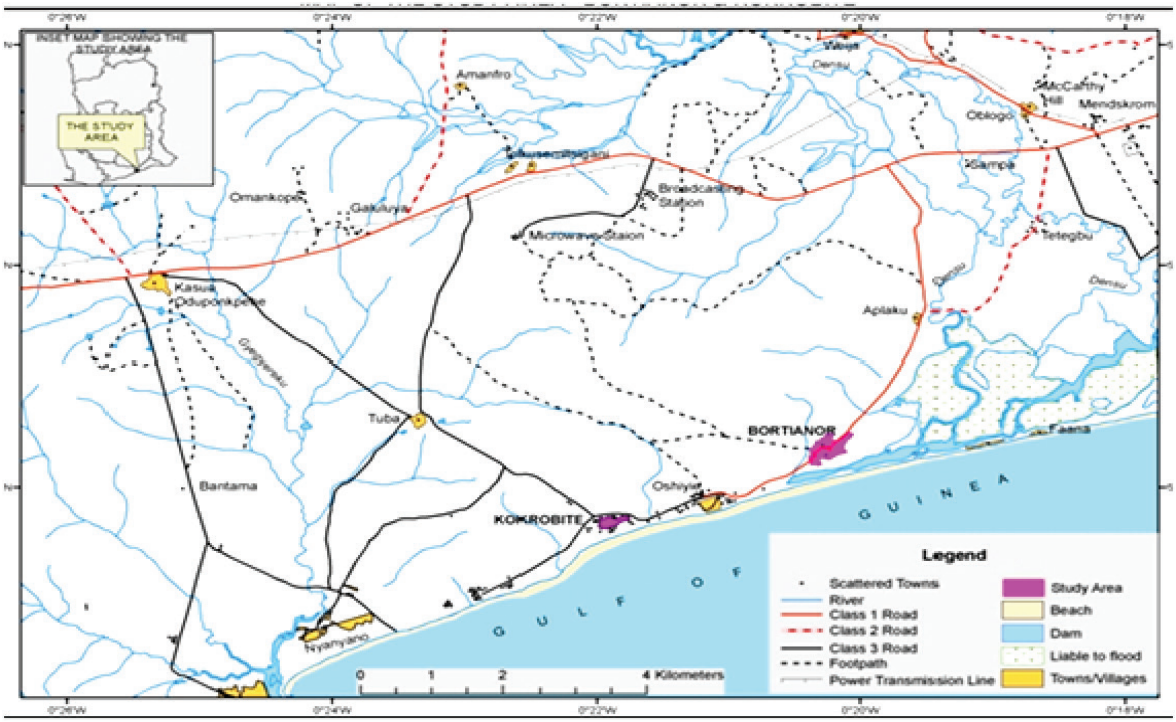

Figure 1: Map of Kokrobite and Bortianor Communities, Accra

Research Design

The phenomenology research design (Lester, 1999) under the qualitative approach (Strauss & Corbin, 2008; Levitt et al., 2017) was adopted because the study involved the description of the effects of plastic waste as well as the potentials in using recycled art from plastics for sensitization campaign on plastic pollution from the perspectives of the study participants in the Kokrobite and Bortianor communities. In addition, art studio-based research that involves the use of creativity and aesthetics

in producing functional products (Marshall, 2010) was adopted by the researchers for the designing and production of two artworks using plastic waste materials to be used as tools for sensitization against plastic pollution to enhance the environmental aesthetics of the study areas. Specifically, the procedural steps Double helix of the Praxis Exegesis Model (Figure 2) by Marshall (2010) that allows the toggling between creative processes in theory (exegesis) and practice (praxis) were meticulously followed in the execution of the two innovative projects. The steps that were followed for the projects were:

- The Idea development.
- Collection and cleaning of the found plastic objects.
- Processing the found plastic objects into diverse shapes and forms/dimensions mechanically.
- Assembling the processed plastic objects on a required surface to produce two artworks.
- Installation/exhibition for public assessment.
-

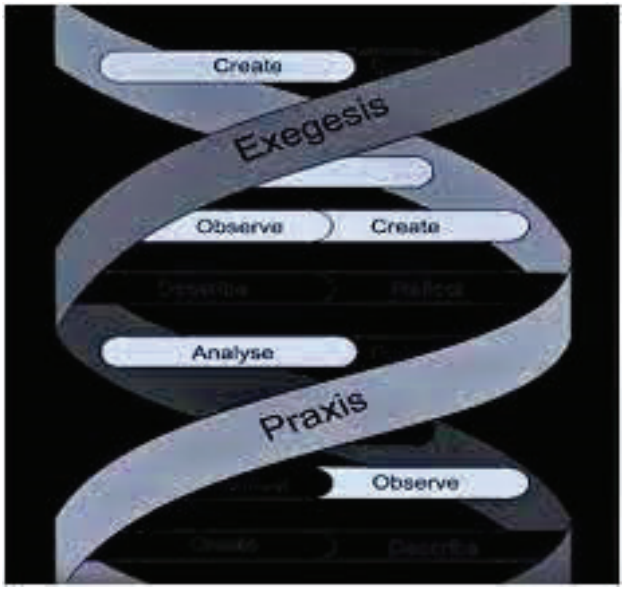

Figure 2: Double Helix of Praxis Exegesis Model
Source: Marshall (2010)

Population and Sampling Procedures

The population for the study consisted of ten teachers and forty pupils from two basic schools in the study areas, ten members each from the Kokrobite and Bortianor traditional councils, forty indigenes and twenty environmentalists from the Ghana contingent of the Global Vision, ten market women, five politicians, and twenty fishermen. The study utilized the purposive and snowball sampling techniques. Purposive sampling was 'used to select respondents that are most likely to yield appropriate and useful information' (Kelly, 2010: 317) on the effects of plastic waste, and whether or not plastic waste could be used for the production of artistic projects that could be used for sensitization campaign against plastic pollution. The purposively selected participants included the members of the traditional councils as well as the politicians in the study areas. They constitute the leadership team in the study areas and are very much aware of the menace of plastic pollution. Also, the researchers' recruited indigenes of the two communities as they are live in the communities contribute to the plastic waste and/or encounter the plastic waste as they embark on their daily activities. Likewise, the fishermen and market women who sell closer to the Kokrobite River were purposively selected because they are eyewitnesses of the negative impacts from the plastic waste

materials and how they negatively affect the purity of the river, the health of the aquatic bodies in the river, the environment, and the fishing activities in the study areas. The environmentalists from the Ghana contingent of the Global Vision were involved in the study as they also engage in activities on environmental sustainability in the two study areas such as sensitization campaigns against plastic pollution. Finally, teachers and students in two schools in the two communities were involved in the study because they have seen the plastic waste and engage in studies on the negative effects of plastic waste. As such, they were seen as knowledgeable in the phenomenon for the study. Snowball sampling (Parker, Scott & Geddes, 2019) was used in recruiting other members of the study participants. For instance, the researchers were able to talk to two fishermen, who further led the researchers to other fishermen and convinced them of the essence of the study and why they should be part of it (Dragan & Isaic-Maniu, 2013). The snowball sampling design was equally used in identifying other members in the traditional councils in the two communities as well as the market women and politicians.

Qualitative studies focus on relatively few participants who can describe their experiences and/or knowledge concerning some research questions or phenomena (Baškarada, 2014; Creswell, 2003). As a result, four (4) teachers, two from each of the two selected basic schools, five (5) students from each of the two schools, five (5) members from each traditional council, ten (10) indigenes from each of the two communities, five (5) market women, three (3) politicians, five (5) environmentalists and fifteen (15) fishermen. The total sample size for the study was 72. Data saturation point was reached after garnering rich data from these sample recruited for the study.

Table 1: Demographic information of the respondents

Community	Traditional Council Members	Politicians	Environ-mentalists	Fishermen	Indigenes	Market women	Teachers	School Children
Kokrobite	5	2	2	7	10	3	2	5
Bortianor	5	1	3	8	10	2	2	5
Total	10	3	5	15	20	5	4	10
Percentage	13.88%	4.16%	6.94%	20.83%	27.77%	6.94%	5.55%	13.88%

Source: Authors' construct (2022)

Data Collection Instruments

The researchers solicited the views of the study participants via personal interviews by using a well-developed and validated researchers-designed interview guide on the effects of plastic waste and how recycled art can help to mitigate this phenomenon. The interview guide was pretested on a section from each of the sample categories. After the pretesting and vetting by three experienced qualitative researchers, corrections were made before the final version of the interview guide was administered. The traditional leaders, politicians, leaders of the two fishermen groups, teachers and the environmentalists were engaged in personal interviews at their scheduled dates and times. Verbal responses were garnered from them using the unstructured open-ended questions from the interview guide administered.

Also, focus group discussions (Freitas et al., 1998) with the fishermen, elders in the traditional councils, market women and the schoolchildren were organized to gather data or an in-depth description of the effects of plastic and the use of recycled art from plastics to help mitigate the accumulation of plastic waste in the study area. In addition, the researchers took a non-participant stance to observe at firsthand (Wye et al., 2014; Mays & Pope, 1995), how the plastic waste materials were deposited and their negative impacts in the two communities. This observation was carried out

for three months at designated refuse dump stations and mostly in illegal but favourite spots for the disposal of the plastic waste materials by the community members. The times for the observation were in the mornings and evenings, the times that most of the community members deposited their waste. Likewise, the researchers observed the positive impacts of the recycled art projects from the plastic waste materials as the study participants critically observed and interacted with them during the final exhibition held in the Kokrobite town council.

Data Analytical Plan

The Interpretative Phenomenological Analysis (Smith & Osborn, 2008; Pietkiewicz & Smith, 2014) was used in analyzing the qualitative data from the personal interviews, focus group discussions and the non-participant observations made at the exhibition of the two artworks produced from the plastic waste materials. The analytical procedure involves the transcription of the views of all the study participants, referred to as the emic perspective (Smith & Osborn, 2008). The audio and video recorded interviews and focus group discussions were thoroughly listened to understand the data garnered from the study participants. Key strands from the interactions with the study participants were extracted and thickly quoted throughout the discussions to throw emphasis on the data analyzed. The data from the interactions were organized based on the research questions for the study. In each category of the sample, key study participants were selected to validate the transcribed data using the processes in member checking (Leedy & Ormrod, 2010). The units of meaning from the transcribed data were scholarly compared with the information in scientific studies that have been reported in trusted academic sources to offer scholarly answers to the research questions for the study.

Ethical Consideration

All the 72 study participants recruited for the study gave their consent to voluntarily partake in the study by signing an informed consent form. The informed consent form provided information on the study's purpose, its procedures, risks, benefits, voluntary participation, participants' rights to quit the study at any time if they wanted to, and the processes to protect their views and identities (Bailey, 1996). The informed consent was read to the study participants and interpreted in their local languages before asking them to partake in it.

Findings/Discussion

The possible negative impacts of post-used plastics in the Kokrobite and Bortianor communities

This section of the paper presents an analysis of the views of the 72 participants who were interviewed about the negative impacts of post-consumer plastics on the environment of the Kokrobite and Bortianor communities. These are the main strands that emerged from their opinions on the possible impacts of post-used plastics on their environment:

- *Choked gutters*
- *loss of aquatic lives*
- *Air pollution as a result of burning plastic waste*
- *Creation of more stagnant water as a result of blocked drainage systems*
- *Creation of breeding habitat for disease vectors such as mosquitos and other organisms.*
- *Negatively impact the fishing profession and other related businesses*
- *The decline of tourism and tourism businesses*
- *The decline of the fish marketing business*

- *Flooding*
- *Increase in boat accidents and mortality rate*
- *Unsuccessful fishing*

All the participants agreed that plastic waste is one of the environmental challenges in these communities. They related the problem to the fact that there is an excessive amount of plastic being used in every sector they can think of. These are some of the responses:

> *"We are aware of the constant increase of plastic waste in the environment and we cannot deny the fact that we are the cause but presently we cannot single out any alternative material that functions like plastic. Plastic domineer in terms of usage in our everyday lives, however it is very challenging to control as leaders, even though we are not reluctant* (Some traditional council respondents from Kokrobite and Bortianor, 5th May, 2022)."

The traditional leaders from Kokrobite pointed out that although there has been an effort to control the situation to some extent, by offering a piece of land to the GVI to build a plastic deposit center, they don't perceive that to be a complement solution. Responses from the market women illuminate that the packaging sector presides over any other material they know in terms of utilization of plastic.

> "*Every product bought in the market is supposed to be packaged, and the common package now is plastic, that is what we use because it is the available material and cheap as well. Moreover, most of the products from industries that are brought to the market are already packaged in plastics* (Market women participants, 14th May, 2022)."

These statements from the market women correspond with the research findings from Evode et al. (2021), who stated that the greatest percentage of plastic produced globally is utilized for various packaging. In addition, that also corresponds with findings from research by Shams et al. (2021), Geyer et al. (2017) and Silva et al. (2020) which collectively point to the fact that the efficiency and some physical characteristics of plastic make it a better choice for diverse packaging universally. When auxiliary questions were posed to supplement the principal question, to identify some of the challenges elaborately, from the perspective of the participants, the following information arose. Most of the respondents stated that most drainage systems in the communities are blocked as a result of plastic waste. Although flooding was the outstanding consequence of these blocked gutters, some few indigenes drew attention to the increase in the number of stagnant waters in the community by stating:

> "*Even a few days after rain, we still see stagnant waters all over and that keeps increasing in this community. People take advantage and dump more waste in these small water bodies. That cause visual nuisance* (Indigenes respondents, 15th April, 2022)."

These statements made by some indigenes on stagnant water opened more discursive avenues for detailed discussions of some problems associated with blocked drainage systems as a result of plastic waste and the associated stagnant waters. Most of the respondents pointed out that these waters serve as breeding habitats for disease vectors such as mosquitoes and other organisms. Some students among the respondents stated that they experience the presence of mosquitoes and encounter

mosquito bites even in their classrooms, especially during the rainy season. This will undeniably increase the mortality rate of harmful diseases such as malaria and many others. These correspond with research findings from some scholars such as Gu (2021) who state that in human habitats, post-consumer plastic materials accumulate, and consequentially impact every aspect of life due to improper huddling/disposal and the ability of plastics to resist natural decomposition. Moreover, Boucher et al. (2019) reveal that plastics block waterways, preventing water flows that help in flushing off human waste leading to severe forms of flooding, erosion, and a high mortality rate in water-borne-related illnesses. Green and Whitebread (2019) also add that plastic waste provides breeding grounds for harmful disease vectors such as mosquitoes, flies, and rodents that cause various forms of water-borne diseases. Some challenges in connection with plastic waste from the perspectives of fishermen and some of the fish sellers along the shores of the sea are loss of aquatic lives, the decline in the sales of fish in their local harbors, unsuccessful fishing, and boat accidents, among others.
From the information gathered:

> *"When the shores become untidy, buyers fail to come there, and few customers who come around become very discouraged and quickly leave because of the visual nuisance." We lose a lot of clients in the rainy season since that is when we experience a lot of plastic being washed to the shores by erosion and sea waves* (Market women respondents, 6th July, 2022)."

> *"We also see some dead fish washed to the shore, some entangled in a discarded fishing net and other unidentified plastic materials. All these cause visual nuisance* (Market women and fishermen participants, 6th July, 2022)."

These statements prove the veracity of the conclusions drawn by Provencher et al. (2017) that the presence of discarded plastics in various aquatic bodies increases the mortality rate of creatures in this habitat and those whose livelihoods depend on them, through diverse encounters. Additionally, some fishermen revealed that the presence of plastic particles in the marine environment is also caused by some fishermen who carry food, drinking water (mostly in plastic sachet), and some beverages to work. They confessed that after consuming the content, they don't carry the waste back but rather dump them into the ocean. Their statements prove the fact that the presence of discarded plastics in various aquatic bodies is through both direct and indirect sources (Andrady 2011; Fauziah et al., 2015; Jambeck et al 2015; Subramanian, 2019). The interactions of marine creatures with plastic substances undeniably enhance sub-lethal and fatal effects. The accumulation of plastic materials in aquatic bodies negatively affects the fishing profession as narrated by the fishermen as they recounted several occasions when their nets caught more plastics than fish. Some fish sellers and other individuals who visit the local harbors also testified to that.

> *"Sometimes, when nets are pulled to the shores, to our surprise, the number of plastic materials outnumbers the fish, and that is very common now a day* (Fish sellers and other indigenes, 12th July, 2022)."

> *"We have witnessed some ourselves and have had several reports about that and that is one of the reasons why sometimes we collaborate with the GVI to organize beach clean-ups* (Traditional council participants, 12th July, 2022)."

The fishermen also stated that the presence of plastic materials in the ocean scares and drives the fish

away. Another important issue that arises from the fishermen is the increase in accidents on the sea. They revealed that when plastic materials attach themselves to the outboard motors (the engine of the fishing boat), it can capsize the boat and that sometimes result in loss of life. This also results in a financial loss since many of their outboard motors (boat engines) break down as a result of plastic waste.

> *"Most of our boats that capsized on the sea is due to these plastic materials, thus, when entangles the fan of the outboard motor, it can stop it from functioning. As a result of the plastic wastes, many of the outboard motors breakdown* (Fishermen participants, 12th July, 2022)."

Another important issue discussed was the impact of pollution from plastics on tourism and related businesses. This was very important because tourism has become one of the major sources of revenue for the people in these communities which subsequently benefits the nation as a whole as stated by some politicians and the indigenes among the participants/respondents. With their serene environment, relatively clean, and pristine sandy beaches, have become popular coastal tourism destinations for tourists, recreationists, and holiday seekers in the Greater Accra region of Ghana (Boafo et. al., 2014). As stated above, these communities have become tourism destinations for both foreign and domestic tourists. However, apart from fishing, there are several tourism-related businesses such as hotels, restaurants, handicraft shops, and many others in these adjoining communities. Some of the youth involve themselves in various art genres. Moreover, some also act as tourist guides, especially the boys. The hoteliers who were among the respondents confirmed that these communities attracted a lot of tourists due to the serene and clean beaches:

> *"This place used to have every clean beach and was the reason why tourists used to visit in their numbers, however, that is changing gradually. Clients who visit nowadays complain and we know it's all because of the plastic* (Hotelier participant, 12th July, 2022)."

Other respondents whose businesses mostly depend on tourism also gave diverse narrations of how their businesses have been affected by the decline of tourism. Among these people was a gardener who also expressed his grievance on how difficult it is now to get black soil (fertile soil) for the gardens of his clients.

> *"I work as a gardener for some of these hotels and individuals. Previously, it was very easy to get black soil for the plants but now, those refuse-dumps which used to be the main source are contaminated with plastics* (Gardener participant, 12th July, 2022)."

This statement from the gardener proves that the presence of plastics in the soil reduces its quality because decomposition can take centuries (Chamas et al., 2020). When the views of the participants were sourced for some possible ways that will help in the reduction of these plastics and allied pollution, the traditional council respondents repeated that their collaboration with the GVI to create a plastic deposit center was one of the possible ways.

> *"We sometimes organize clean-up exercises but the turnout is not that encouraging. We will advise that the community members turn out in their numbers in the subsequent ones. We have also distributed some containers to some institutions and establishments to collect their*

> *plastic waste to the deposit center. Although that may not completely solve the problem, such initiatives can help* (Environmentalists, 17th July, 2022)."

Some of the school children revealed that, although there are waste containers in their schools it is for all waste. They suggested that the school authority provide some waste bins purposely for plastics. Both the teachers and the environmentalists promise to consider that proposal. Some of the participants expressed their disagreement with the fact that provision of containers, especially for plastic waste by stating may not solve the problem but rather discipline:

> "*Sometimes, people intentionally don't want to put waste in the waste bin even when they are provided. Even some containers end up in people's houses for an unknown reason. To prevent this, the government should set up a task force that will see to it that anyone who carelessly disposes plastics in the environment gets a deserving punishment* (Indigenes, 12th June, 2022)."

> "*The government will play her part but we will appeal to the traditional authority to also play their part by instating some laws, we can collaborate and deliberate on them to see how best that can be implemented. We will propose that to the higher authority* (Politicians, 4th June, 2022)."

The politicians and many other respondents proposed that there should be comprehensive (public sensitization) education on the negative effects of plastic waste for people to be mindful of the use and disposal of plastics. The above statements align with findings by Owusu-Sekyere (2013) that state that in Ghana what has been the greatest challenge is sensitizing the public against the use and disposal and/or waste management of plastics (Owusu-Sekyere 2013). However, Increasing education and environmental awareness are steps needed to combat this bad practice (Yulianto & Sulistyo, 2019).

Some of the indigenes revealed that previously, the plastic waste was burnt since they are aware that plastic does not decompose, however, since they became aware of the hazardous effects of this traditional waste management method (incineration), they have stopped. They recommended that intensive education on health issues associated with air pollution as a result of incineration should be carried out. Henceforth, the conclusion drawn from this face of the discussion was that the traditional waste management systems (landfilling, incineration) have not been successful. However, there is a need for more innovative ways to help end this global phenomenon. When the researchers proposed the idea of recycled art from plastics that will serve a dual purpose (to sensitize the public and physically reduce the quantity of plastic waste), the participants were willing to embrace that as an alternative solution to plastic pollution, even though they did not have much knowledge in the art.

Design and produce Artworks using plastic waste for public sensitization against plastic pollution to enhance the environmental aesthetics of the study areas.

Processing of post-used plastic containers

The researchers visited several refuse dumps, beaches, and other open areas where plastic materials are being dumped after serving their primary purposes. Approximately four thousand (4000) plastic bottle containers comprising of drinking water packages, beverage containers and cosmetic packages were gathered and transported to the working center. The researchers also gathered approximately two thousand (2000) used sachet containers. The domineering sachet packages found in the environment

were packages for drinking water. After transporting all these found plastic items to the processing center, they went through a primary and secondary washing to clean all the unwanted materials off them. These thorough washing/cleaning processes were carried out using detergent (liquid soap) for the primary washing and antiseptic for the secondary washing (Figure 3). After washing, these varieties of washed used packages were exposed to direct sunshine and air for drying.

Figure 3: Use plastic containers being washed, 3rd January, 2022
Photographed by Evelyn Asamoah

The next step after drying was cutting. These plastic items were cut into diverse dimensions desired by the researchers to manipulate to form the various compositions of the intended artistic projects. The cutting was done with the help of a pair of scissors, and a knife heated in a fire. Heat energy was then applied to these pieces of plastics to change the molecular structure to achieve ripple textural effects.

Preparation of the support for the installation

The wooden panels commonly referred to as plywood was used as a support for this installation, with the used plastic packages as medium. Pieces of these wooden panels were manually cut with saw and joined together to form two larger panels with a dimension of 9.9f X 6.5ft each. The researchers employed gluing and nailing techniques in joining the wooden panels. After joining, an insecticide (Dursban 4E) was applied to these panels with a pump sprayer for insect prevention. Each of these panels was covered with canvas with the help of adhesive (Leyland white glue and Azar fix white glue) and a stapler. The surfaces of the two supports for the plastic installation were primed with acrylic primer and also painted with diverse shades of blue after drying. This background color made the composition more visible when sketched with a white chalk on the prepared support. The painting only assisted in the visibility of white contours that demarcate the various elements in the composition but did not form part of the final installation project.

Creation of the Recycled Art Installation from Plastic Waste

The researchers employed post-used plastics as a medium and a wooden panel covered with canvas as a support for the art installation. The major techniques used for the execution are gluing, nailing, and stapling. The creation process started with idea development in a sketchbook before being transferred onto the prepared support. The major tools used in various stages in these two creative projects are a pair of ceases, stapling machine, a painting brush, a hammer, and a hand cutter.

The elements in this composition such as canoe, fishes, sky, sun and the sea were sketched on the prepared support with a piece of chalk. The upper part of the work that represents the skies, and the emerging moon, was first created with diverse shades of transparent plastic bottles harmoniously rendered from ultramarine blue to white. Different shades of green bottles, used for both alcoholic and non-alcoholic beverage packages, were installed to create imaginary sea and images of diverse species of fish. The transparency of the water, and the ripple effect, were achieved by superimposing transparent bottles that are almost colorless on the diverse shades of greens already harmoniously installed. The researchers used post-consumer plastic bottle caps for the creation of the moon as well as the eyes of the various fish. The image of the canoe was created with different shades of brown. Finally, the images of fish were covered with discarded fishing nets stretching from the top of the canoe resting on the aquatic body (sea). The researchers employed nailing, stapling, and gluing techniques throughout the installation process. Figure 4 below shows the final art installation project from the plastic waste materials.

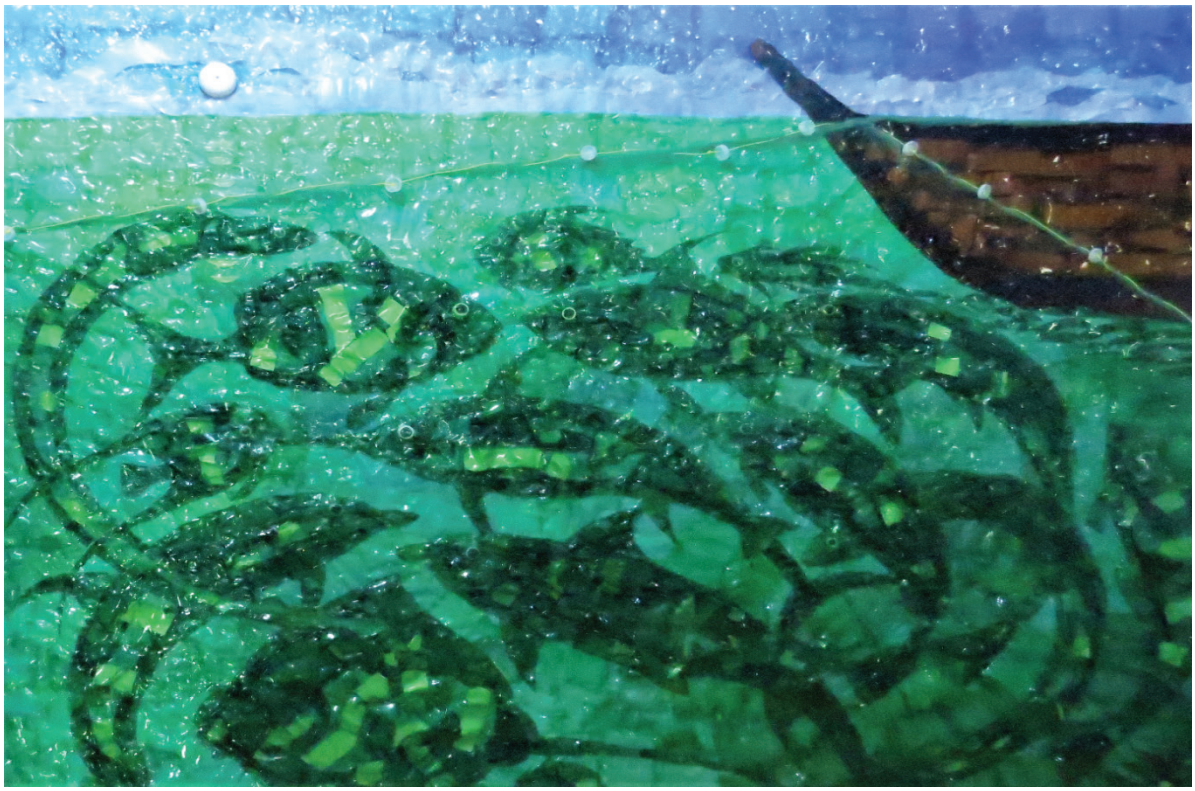

Figure 4: The Art Installation Project from Plastic Waste
Photographed by Evelyn Asamoah

The perceptions of community members and stakeholders, on the potential of using recycled art from plastics as a sensitization tool to curb plastic pollution

Recycling is more efficient and effective in comparison with landfilling and incineration. According to research recycling is very important among modern waste reduction strategies and the third

strategy of the "Reduce, Reuse, and Recycle" (Das, 2020), waste hierarchy (Lienig & Bruemmer 2017). Undeniably, most of the recycled plastics today are down-cycled into products of low value. However, this innovative way of upcycling in the form of recycled art from discarded plastics as an alternative was embraced by all the participants and opened the conversation for more innovative ideas. Some of the participants expressed their appreciation of the external or the visual qualities of these projects, whiles others tried to interpret the philosophical meanings. Moreover, suggestions from the participant as narrated below opened avenues for future research:

> *"These projects are very educative and we need several in the community. It will help people to think of creative ways of reusing plastic waste to help reduce the quantity in the environment* (Traditional council members and politicians' participants, 1st July, 2022)."
> "
> *"We need some mounted close to the beach. We will also recommend that if there is a way of converting the plastic waste into canoes, to replace wooden canoes. That will widen the scope, and save our forest since no more wood will be used for canoes. These artworks have really proved that everything is possible. This idea should be proposed to the government and all who can invest in this and other related works* (Fishermen participants, 1st July, 2022)."

> *"Even apart from the big canoes, artists can start casting plastic waste into miniature canoes which could be sold to visitors who come around* (Handicraft dealers, participants, 1st July 2022)."

Teachers and some traditional council members propose to the researchers to organize workshops to train children and the local craftsmen on the possible ways of converting plastic waste into artistic pieces. The environmentalists from GVI also embrace that idea and stated:

> *"Our visions are not limited to the environment. We are also into health and education among others, and we think this project merges these three mentioned. We will recommend workshops for students and mobile exhibitions. It will open the minds of people to think of innovative ways of repurposing plastic waste* (Environmentalist participant, 1st July, 2022)."

> *"We will add by saying that the solution is all about innovations and creativity but sometimes people need to be triggered and that is what you have just done. When people are enlightened this way, it will broaden their horizon, and they will come up with wonderful things* (Teacher participant, 1st July, 2022)."

Some fishermen among the participants drew their attention to the fact that the sea is joined with rivers and other water bodies, however, the plastic pollution in the communities is not caused by only the activities of the community members. Sometimes these water bodies carry the waste from other communities near and far. However, the recycled art projects and the associated public sensitization, and every other step that is taken should not be limited to only these two communities.

Waste from plastics is being counted among major pollutants since its inception as a more hygienic material for packaging to replace the conventional materials formally used for packaging. Although plastic has undoubtedly served the purpose of its inception, its physicochemical properties have made it one of the major pollutants in the worldwide environment which Kokrobite and

Bortianor communities are not an exception. In correspondence with the research by Chamas et al. (2020) which proves that the degradation of plastics takes centuries which results in uncountable planetary consequences? Another challenge is in relation to the toxic chemical released in the process of decomposition as indicated by Webb et al. (2013).

From the research herein, a conclusion can be drawn that the main cause of plastic pollution is the hazardous chemical components and its resistance to rapid natural degradation which makes it accumulate. Findings from this study prove that, if not absolute, the main contributing factor to this challenge is anthropogenic rather than neurogenic. This aligns with the research findings by Ahamed et al. (2021) who also attributed plastic pollution in the environment to the perpetual escalation of the selfish anthropogenic activities as well as careless and indiscriminate disposal habit.

The study participants agreed that their irresponsible anthropogenic activities contribute to the canker of plastic pollution in their environment. Thus, anthropogenic activities are universally perceived to be an outstanding contributing factor to pollution (Menzel et al., 2021).The excessive use of plastic is mainly due to its availability and efficiency. However, the participants justified their overreliance on the fact that there is no alternative material to replace plastic as far as packaging is concerned. From the findings, it can be seen that the amassment of plastic in the environment and its corresponding pollution affects every business sector in these studied communities which sustain their livelihood. Aside from that, because human health is greatly influenced by environmental conditions, and human life is jointly connected with the environment, the study also revealed how plastic waste consequently affects the lives of the people in the Kokrobite and Bortianor communities. Attestations from the participants in the study comparatively align with that of Yuliastuti et al. (2018) which reveal that the existing plastic waste can be interpreted in an environmental, economic, and aesthetic context. In view of that, concerns have been raised on how important is it to collectively contribute diversely to the mitigation, or possibly, to the solution of the problem. The participants expressed their awareness of the two main conventional waste management systems, namely landfilling and incineration, which have not been helpful. Ahamed et al., (2021) revealed that the two main ways of disposing of waste are through landfilling and incineration. Meanwhile, recycling is currently considered the most appropriate method to mitigate the accelerating global plastic waste issue and the impact on the entire biota, although most of the recycling methods applied today are down-cycling. The findings also prove the fact that initiatives have been taken by the Government through the Environmental Protection Agency; the Traditional Council in collaboration with the Non-Governmental Agency; some School Authorities; and individuals to control the situation. These are through periodic clean-up exercises, distribution of containers to various institutions and establishments, implementation of sanitation laws, and many more. In spite of all these, the amount of plastic in the environment keeps accelerating. This study uncovered some of the factors that contribute to the amassment as bullet below:

- *Increase in the demand for plastics indiscipline*
- *Lack of proper education on the effects of discarded plastics.*
- *Mismanagement of waste from plastics*

An increase in the demand for plastic, especially in the packaging sector, has immensely contributed to the constant increment of its waste on the environment. The participants related this to the fact that there is currently no alternative material to replace plastic as a mode of packaging. However, it was recommended to the government and all stakeholders to come up with different

material that is eco-friendly and possibly ban the use of plastic. Because the banning of plastics may be a very difficult decision to take until an alternative material is incepted, there should be an innovative way of repurposing plastic, and waste such as recycled art to sustain the environment. Indiscipline has also been one of the contributing factors because, despite the creation of the plastic deposit center, some of the indigenes are unwilling to send their plastic waste to the center. Others demand a high amount of money from the management of the center and if their financial expectations are not met, they sometimes refuse to deposit the waste at the center. According to some informants, some people end up burning the waste or depositing them in the ocean. In order to instill discipline in society, the government should strengthen the environmental protection agency by providing them with the necessary logistics and incentives that will enhance their work. Environmental and sanitation laws should be enforced and new ones should be implemented especially for the proper management of plastics.

Lack of proper education on the impacts of plastic waste also contributes to the amassment of the environment. Sensitizing the public on the negative impacts of waste from plastics and the allied pollution will lessen the improper management of the waste generated. This initiative can be enhanced, with recycled art from plastics. Installation from plastic waste that is informative and aesthetically appealing should be mounted in various locations in the community and used as a sensitization tool to curb the problem. Research by Kindvall (2019) revealed that art offers opportunities to communicate in a universal language which makes it accessible to a wider audience. In connection with visual art, Polfus et al. (2017) specified that these innovative creations can convey various messages for effective sensitization.

Improper management of plastic waste is the prime factor that contributes to the persistence of the problem. People should be inspired by recycled art projects and come up with diverse innovations that will make use of the plastic waste generated. Government and all stakeholders should come up with programs to award skilled people who creatively repurpose plastic waste into new products. This initiative can be extended into academia. Competitions should be organized at all levels of education and the shortlisted innovative participants should be rewarded accordingly. From the findings, the plastic materials in these communities were not used and disposed of solely by the indigenes but also by the visitors who come there for tourism and various recreational activities. It was also revealed that the sea, rivers, and other aquatic bodies also carry plastic materials from other communities and deposit them at the shores and other areas within these communities, as indicated by some respondents in the fishing profession. Moreover, attention was also drawn to the fact that most of the products that are brought to the market from various industries are already packaged, whiles the domineering material for most packages is plastic. In view of that, it will be advisable that any proposed possible solution to this problem should not be limited to that locality but rather, the scope should be widened to other communities in the region and possibly beyond.

From the discussions so far, it can be concluded, that recycled art from plastics can undeniably contribute to the mitigation of plastic waste in the study area, it encourages/enhances public awareness about environmental and sustainability issues and how art can affect socio-cultural change. There is, therefore, considerable scope to grow this area of endeavor and, potentially, have a huge impact on public attitudes (Curtis, Reid, and Ballard 2012). The researchers agrees with Leavy (2015), Coemans and Hannes, (2017), as well as Lopez et al. (2018) that art can evoke emotions, cultivate empathy, capture the multi-sensorial nature of lived experience, and promote self-reflection and consciousness about complex environmental changes.

Conclusion

This study aimed at describing the nature of the problem from the perspective of the participants and practically provides an alternative and more innovative way of dealing with post-used plastic items. The study contends that the accumulation of plastic waste has undeniably negatively impacted both the fauna and the flora in the Kokrobite and Bortianor communities. Findings from this study confirm that the improper management of post-used plastic items is the major factor of plastic pollution. The recycled art installation project from the plastic waste materials produced serve as a practical demonstration and awareness creation of how discarded plastics can be manipulated into an artistic piece for environmental aesthetics and sustainability to curb plastic pollution. The key findings and the unquestionable conclusions drawn suggest that, in the broader scope of the study, both artists and non-artists can embrace this idea of upcycling plastic waste into diverse products.

This study should offer guidelines for people of diverse backgrounds, especially skilled workers, to experiment with how waste materials can be repurposed. In a broader scope, the traditional leadership in various societies and communities should encourage activities related to the repurposing of waste into usable products. They can come out with programs that will reward various companies and individuals who will come out with innovations from plastic waste. For instance, competitions could be organized periodically for the skilled workers in various sectors, and the outstanding participants could be awarded prizes. This same idea could be extended to the educational sector, thus, the Ministry of Education and Ghana Education Service in collaboration with the Ministry of Environment Science Technology and Innovation and the Ministry of Tourism Arts and Culture can organize such completions to reward students of all levels who will come out with innovations using plastic waste. Moreover, creative art teachers in basic schools should encourage the students to consider recycled art in their art studies. Future researchers should embark on similar studies in other communities, extending it to other regions in the country, and the impact of other kinds of waste materials should also be investigated.

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Disclaimer Statement

This work is part of an MPhil thesis of Samuel Prophask Asamoah submitted to the Kwame Nkrumah University of Science and Technology for the award of an MPhil degree in African Art and Culture in the Department of Painting and Sculpture supervised by Dr. Dickson Adom.

Author Biographies

Samuel Prophask Asamoah is a creative, versatile, and detail-oriented artist from Ghana. Asamoah was trained at the Kwame Nkrumah University of Science and Technology. He has a unique way of expressing his artistic ideas in abstract, realism, and surrealism by exploring diverse mediums, ranging from conventional water and oil-based paints on canvas to the transformation of discarded

material into innovative installations. His works bear traces of Ghanaian culture and other cultures globally, advocating for intercultural unity, and sustainability. Although Asamoah's creative expressions, and philosophy, were influenced by Ghanaian traditional, and modernist art, his themes reflect contemporary socio-cultural issues.

Dr. Dickson Adom is a researcher in the pluridisciplinary fields of Place Identity History, African Art, Art Installations, and Cultural Anthropology for Biodiversity Conservation, Recycled Art, Environmental Sustainability, and Heritage Sites Conservation. He is a senior member in the Department of Educational Innovations in Science and Technology, Kwame Nkrumah University of Science and Technology, Ghana. He is an expert in the use of traditional knowledge systems and community engagement strategies in rural communities.

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Authorship and Level of Contribution

Samuel Prophask Asamoah conceived the research idea and led the research team on this project, taking the lead in the planning, execution, data collection and writing of the paper. Dickson Adom supervised the project, partook in the data collection, execution of the project and the final writing of the paper. Steve Kquofi and Ralph Nyadu-Addo contributed to the final writing of the paper and gave substantial contributions during the execution of the project.

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