International Journal of Art and Art History
December 2018, Vol. 6, No. 2, pp. 66-74
ISSN: 2374-2321 (Print), 2374-233X (Online)

Published by American Research Institute for Policy Development
DOI: 10.15640/ijaah.v6n2p7
URL: https://doi.org/10.15640/ijaah.v6n2p7

Arts-Based Research as a Means of Fighting Against Poverty in Cape Verde through Plastic Recycling

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Abstract

Principle II of the Earth Charter clearly reflects the concern for ecological integrity, and specifically the use of recycling as a basis for adopting patterns of production, consumption and reproduction that safeguard the regenerative capacities of the Earth. Likewise, the General Assembly of the United Nations Organization (UN, 2015) approves the document entitled *Transforming our world: The 2030 Agenda for Sustainable Development* on September 25, in order to achieve in these 15 years 17 fundamental Objectives of Sustainable Development and 169 goals returning to the Millennium Development Goals. On the three dimensions proposed by the UN General Assembly (economic, environmental and social), the basis on which the objectives of the Project of Arts-based research (ABR) is established, under the guiding principle of recycling plastic bags, what culminates in a diversified artistic experience in three parallel paths: finishing the creation process through an artistic intervention, implementing a small industry manufacturing clothing accessories for sale at commercial level, and finally, teaching how to use these fabrics to family level in order to catch water from fog.

Keywords: research, arts, recycling, environment, sustainable development

1. Background

Starting from the basis that the human being in particular and all living beings in generaldepend largely on the environment to survive, we can say that the management of waste, and especially those of non-biodegradable materials, is a vital need, especially when it comes to solving problems as important and current as global warming, which is generating in turn other problems such as the decrease of glaciers, the change of climate and even the disappearance of some species, at worst cases, due to the deterioration of the ecosystem of its natural habitat. Therefore, the value of the recycling process is very high, since it helps to conserve the biosphere, to the sustainable exploitation of natural resources, which are limited, and to help biodiversity.

In this sense, governments, public or private entities such as the University, promoting research in this sense, the industry in general or commercial companies in particular, and of course, civil society contributing their bit with particular projects and even in their day-to-day lives, living in ecological terms, are vital to achieve a truly sustainable world:

(…) Sustainability is one of those objectives, but it is also an indispensable pre-requisite for reaching all others (...) But governments cannot advance on their own. Civil society groups must play a critical role (...) The same can be said of commercial companies. Without the private sector, sustainable development will be no more than a distant dream. (Annan, 2002, p. 177).

But observing it from the less optimistic although realistic perspectiveof Ranilla (2015):

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The economy is the one that decides what should and should not exist, valuing its benefits regardless of the damage that this produces. That is what today is masked with affable purposes and is mostly called sustainability; a new attractive form adopted by the economic government to sell to the public an ethical masquerade. A lobby operating in the darkness (p. 83). However, despite being aware that the world we have created is grounded based on excessive capitalism, we must not lose sight of the optimistic approach, since otherwise we would be doomed to disaster.

Principle II of the Earth Charter clearly reflects the concern for ecological integrity and, in particular, the use of recycling as a basis for adopting patterns of production, consumption and reproduction that safeguard the regenerative capacities of the Earth. The Earth Charter Commission (ECC) (2000) in section 7.a states: "Reduce, reuse and recycle the materials used in production and consumption systems and ensure that residual waste can be assimilated by the systems ecological "(p.3).

The General Assembly of the United Nations Organization (UN, 2015) approves the document entitled *Transforming our world: The 2030 Agenda for Sustainable Development* on September 25, with the aim of achieving in these 15 years 17 Fundamental Objectives of Sustainable Development and 169 goals returning to the Millennium Development Goals. "The Objectives and goals are of an integrated and indivisible nature and combine the three dimensions of sustainable development: economic, social and environmental" (UN, 2015, p.1).

Of the seventeen objectives posed by the countries representing this Assembly, ten implement the word sustainable and nine are directly related to this piece of work. UN (2015, pp.17-31) raises the following objectives, among others:

(...) Objective 6. Ensure the availability and sustainable management of water and sanitation for all.
- (...) 6.a. By 2030, expand international cooperation and support provided to developing countries to build capacity in activities and programs related to water and sanitation, such as water harvesting, desalination, efficient use of water resources, wastewater treatment, recycling and reuse technologies (...).

(...) Objective 8. Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all.
- (...) 8.a. Increase support for the Aid for Trade initiative in developing countries, in particular the least developed countries, including through the Enhanced Integrated Framework for Technical Assistance to the Least Developed Countries in Trade (...).

Objective 9. Build resilient infrastructures, promote inclusive and sustainable industrialization and encourage innovation.
- (...) 9.3. Increase access of small industries and other businesses, particularly in developing countries, to financial services, including affordable credit, and their integration into value chains and markets (...).
- (...) 9.a. Facilitate the development of sustainable and resilient infrastructure in developing countries through increased financial, technological and technical support to African countries, least developed countries, landlocked developing countries and small island developing States (...).

(...) Objective 11. To make cities and human settlements inclusive, safe, resilient and sustainable.
- (...) 11.6 By 2030, reduce the negative environmental impact per capita of cities, including paying special attention to air quality and the management of municipal and other waste (...).

Objective 12. Ensure sustainable consumption and production patterns.
- (...) 12.4 By 2020, achieve the environmentally sound management of chemicals and all wastes throughout their life cycle, in accordance with agreed international frameworks, and significantly reduce their release to the atmosphere, water and soil in order to minimize its adverse effects on human health and the environment.
- 12.5 By 2030, considerably reduce the generation of waste through prevention, reduction, recycling and reuse activities (...).

Objective 13. Adopt urgent measures to combat climate change and its effects.
- (...) 13.b Promote mechanisms to increase capacity for effective planning and management in relation to climate change in the least developed countries and small island developing States, with particular emphasis on women, youth and communities local and marginalized.

(...) Objective 15. Protect, restore and promote the sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, stop and reverse land degradation and stop the loss of biodiversity.
- (...) 15.3 By 2030, fight against desertification, rehabilitate degraded lands and lands, including lands affected by desertification, drought and floods, and seek to achieve a world with a neutral effect on the degradation of lands (...).

Objective 16. Promote peaceful and inclusive societies for sustainable development, facilitate access to justice for all and build effective and inclusive accountability at all levels.
- (...) 16.b Promote and apply non-discriminatory laws and policies in favor of sustainable development.

Objective 17. Strengthen the means of implementation and revitalize the World Alliance for Sustainable Development.
- (...) 17.11 Significantly increase the exports of developing countries, in particular with a view to doubling the share of the least developed countries in world exports by 2020 (...).

From organizations such as the UN, the current global concern about recycling and the management of waste, especially plastic, is transmitted, and not without reason, since the production of this material in the last half century is far above any other material produced by men. The big problem is that, in addition to being a highly resistant and durable material, which makes very difficult to remove it, it is produced much more than it can be recycled or assimilated by nature. In this sense, Geyer, Jambeck& Lavender (2017) show data that blow up all the alarms when they state that since 1980, recycling and incineration rates have been increasing slowly until reaching a worldwide global average of 18% and 24% respectively in 2014. In the United States, recycling rates have remained at 9% since 2012, a really low rate, and approximately the same rate maintained by 52 other countries in the rest of the world in that year.

Europe and China in this case are those that reflect the highest recycling rates, with 30% and 25% respectively. However, they are also the ones that produce more plastic. According to the data from the Plastics Europe association (2017), China is the largest producer of plastic materials (29%), followed by Europe (19%) and NAFTA (North American Free Trade Agreement)(18%). According to the data from the same association, in 2016 there were 335 million tons of plastic produced worldwide.

On the other hand, this problem is causing the entry of solid waste into the ocean from the land, what is polluting the sea alarmingly. Jambeck*et al.* (2015) state that in 2010, plastic waste generated by 192 coastal countries was about 275 million tons, of which between 4.8 and 12.8 million entered the ocean that year, and that without good management and improvement infrastructures, the amount of accumulated plastic waste that will end up on the seabed will increase in magnitude by 2025. In addition to the great pollution caused by these plastics waste not managed in a sustainable manner, there is a great important problem in many countries of the world, and especially in some developing countries, such as desertification, which in some way is related or it may be the consequence of climate change produced largely by the planet pollution.

When Cape Verde is named, there is such a tendency to think that it is a country rich in vegetation, abundant in water and with green landscapes and prosperous lands. However, this is very far from reality. In deed, it is a country suffering from a strong desertification, since the precipitations are very scarce and when it rains, it does it in the form of torrential ones, causing serious problems, such as sweeping the villages, most of them built with adobe, trunks of trees and unsafe materials and very easy to be dragged and devastated by the weather inclemencies. There is no water scoring for these towns, except in the capital and any other city, which prevents most Cape Verdeans from having running water or even a minimal sewage system. Soria (1991) already pointed out the worrying situation of desertification in Africa: "(...) one third of the surface of the Earth is arid or semi-arid (...). Drylands are home to about seven hundred million people around the world" (p.64).

It has been a long time since many techniques are known in order to combat desertification, such as the cultivation of jojoba, a plant that prevents soil erosion (Soria and Real, 1992), or the capture of water from the mist. This last technique is not new; it has been a practice used by ancient civilizations for many centuries (Gleason, 2005) and is currently used in multiple areas of the world. However, they are specialized companies that manufacture and carry out the assembly of large meshes with a very high economic cost, what poor regions cannot be allowed. Despite this and according to Barradas (cited in Parada-Molina and Cervantes, 2017) in some South African countries or Chile, through the installation of these meshes of capture of fog water, up to 10,000 litres of water per day have been collected. Despite the worrying situation, Cape Verde has an advantage over other African countries: the large amount of fog its islands have that can be used to collect water and use it in their daily needs. Currently we are immersed in a time of diversity, as regard cultures, languages and knowledge that are culminating in a miscegenation of knowledge and performances. Therefore, the collaboration of the different areas of knowledge and interdisciplinary, such as the economy and the study of biodiversity (Ranilla, 2015), as well as the contribution of research and science should be part of our current reality, which lead to much more creative and innovative solutions. For this reason, both Art and Science can and should go hand in hand to achieve these challenges and objectives.

In this way, addressing social and environmental issues from an artistic and research perspective, which highlight the concern for these issues with a research aspect is more than justified. The discordant note of this situation is precisely that the tradition of scientific research has always been nourished by the study based on the premises of the objectively observable in order to be measured, quantified and verified, separating at a distance the scientist-observer from the observed and investigated object (Hernández, 2008). In this sense, any action that takes place in an artistic context, would be outside of these control mechanisms and, therefore, of what is accepted as research. However, in the last few decades, a new paradigm in the Arts is breaking through, with new approaches to research in the Arts and education emerging (McNeef, 2004). The Arts-based research (ABR) is based on the experience itself, since knowledge is not only created in a theoretical way, but also it can be created through the senses, the manipulation and ultimately the action itself. So, we could reach much deeper and lasting discoveries, if possible.

This project is therefore presented as a mainly innovative and vital work, because although the practice of reusing materials is not new, we do find ourselves at a moment in history, in which a transformation process of used materials, especially non-biodegradable, such as plastic, is completely necessary.

The three dimensions proposed by the UN General Assembly (economic, environmental and social) (UN 2015; UN 2002), and the ABR approach establish the basis on which the objectives of the current environmental project are set. Such a project is developed within the framework of the teaching and research stay at the University Institute of Educação(IUE) on the Island of Santiago, in Cape Verde, from March to July 2015.

2. Objectives

The development of this sustainable art project aims to achieve the objectives related to economic problems in Cape Verde derived from widespread poverty; objectives related to the social problems of the mentioned country, and likewise, environmental objectives, in the same line that Sarriugarte (2010) points out "(...) by means of sustainable art we want to delve deeply into social, economic, environmental and political issues, but always maintaining the philosophy of sustainable art as a starting point" (p.228).

Given the problem existing in the aforementioned country in relation to the large amount of garbage that is generated and which ends up accumulated in the corners of the city (Figure 1A), especially plastic bags, as there are no waste management companies, in addition to the strong desertification, this project of environmental artistic research arises. Therefore, on the one hand, it is worked on redefinition, that is to say, the elaboration of a fabric produced from a material (plastic) which normally has another completely different use, with the aim of making the population aware of the importance of recycling and the sustainable management of the waste. At the same time, an economic-social objective is pursued, with the intention of encouraging foreign trade and helping to create jobs improving the quality of life of the most needed Cape Verdean society. On the other hand, the possibility of investigating the tissue created with plastic was raised to discover if it could serve to collect water from the fog and thus to obtain a further benefit, with the final intention of helping the most needy families to accumulate their own water to be used for human consumption and domestic use.

Thus, a diversified project is proposed in three different ways, under the guiding thread of the fabric through the plastic bags recycling, with the objectives of:

1. Finishing the process of creation through an artistic intervention in the town square, wrapping the trunks of the trees with the multicoloured fabrics that were created, helping social awareness.
2. Creating a small industry manufacturing backpacks, bags, fanny packs and all kinds of clothing accessories for sale at commercial level.
3. Teaching how to use these fabrics at the family level to capture mist water and consume it, how to irrigate the orchards and be able to grow their own food products, to give animals to drink, etc., being of great help to get out of the extreme poverty, to the majority of the Cape Verdean families.
4. Not only the artistic intervention for social awareness, but also the collection of water from the fog, and the recycling for the transformation of plastic into objects that can be sold creating a small industry, are becoming the main objectives of this project, reflected in the final document of the United Nations summit for development after 2015, resuming the Millennium Goals to try to achieve what they did not achieve.

3. Participants

This project was carried out by the students from the Master of the Complement Course of the Artistic Education Degree of the Instituto Universitário de Educação (IUE) from the Higher School of Formation of Professores Herminia Cardoso of the city of Assomada, on the Island of Santiago, in Cape Verde.

The number of members who participated in this project was a total of 49 people, being the distribution in two groups, one from the morning group with 19 students and a second one from the afternoon group of 30 students, all of them graduates in Early Childhood and Primary Education.

4. Method

There are basically two procedures for reusing materials. On the one hand, those which are used as raw material to form the same type of material (recycle paper to make cardboard), and, on the other hand, those which are manufactured to create another type of product (what would be the case of the current project). This is the wayto recycle plastic bags for artistic-environmental creation, and also for the manufacture of backpacks and clothing accessories and, finally, to manufacture fabrics that capture and collect water from the fog. In this way, they combine "the three dimensions of sustainable development: economic, social and environmental" (UN, 2015, p.1).

This project was, therefore, conceived under these premises and guided by a qualitative methodology in which several methods are intertwined: the research-action method, decision-oriented research and exploratory research, all under the umbrella of the ABR.

5. Procedure

The creative process was carried out in three phases. The first one began with a theoretical introduction on the importance of recycling as a resource to combat environmental pollution and the ABR as a basis for project development. For this purpose, the visualization of artistic works related to recycling and the environment that research in Arts has worked was used. This phase lasted approximately 4 hours, two sessions of two hours each. Once the students knew the basic and necessary background, they proceeded to explain the methodology that would be carried out and the procedure to be followed.

The second phase consisted on going out into the streets of the town to collect all the plastic bags that were found and then proceeded to clean them and cut them into strips about 2cm wide making balls (Figure 1B). Several exits were made in which most of the bags were collected, although afterwards the students gradually brought what they found in their day to day. This fact demonstrates the involvement of the students with the project and their own environmental awareness, since the collection of the bags was not limited to group outings of the first days, but during almost all the creative process, the students were contributing the material that they found on the street.

In Cape Verde, the technique of the long needle point, or what is the same, the short needle crochet, was still unknown and there were no shops to market them. Therefore, a dry tree placed near the facilities of the University was used, and dried branches were cut with a cutter and polished with sandpaper to make the knitting needles (Figure 1C). This was the first recycling job, the needles themselves. The process of weaving with plastic lasted approximately 3 months until they were able to accumulate about 100 meters of multicoloured fabrics, since each student wove about 2 metres long and 50 centimetres wide (Figure1D). 30 metres were used to manufacture backpacks and bags and 70 metres were reserved for the final artistic installation.

Figure 1. Plastic bag waste (A); plastic ball (B); needle construction (C); finished fabrics (D)

In parallel, we proceeded to research and documentation in order to prepare an entire business project with the idea of generating a small industry that created jobs in the field of sustainable trade, making a feasibility plan, a detailed economic report, compiling all the necessary information for the implementation of the mentioned project. It was interesting to draw on Cabo Verde own resources using the country strengths. One of these points is the sports field, specifically Kitesurf and Windsurf. The island of Sal is the international meeting point for sports competition annually. Currently Cabo Verde already has a great prestige in this sports field, since the world champion, MituMonteiro, is a native from this country. For this reason, the possibility of starting selling products to tourists (backpacks, bags, etc.) in establishments on this island and in the airport itself was raised, to avoid the initial cost of international exports much more expensive. The brand that was created was Ku-SCIENCEART ("Ku" in the creole dialect means "with"): with science (referred to scientific research) or also conscience (referred to the respect towards nature), Art (because it was born in the area of artistic knowledge).

Also, we investigated the fabrics and meshes (Figure 2) that are used to capture fog water (Corell, 2014), arriving at the conclusion that we had to weave in such a way that the obtained structure would allow us to capture the water from the fog or from the condensation that occurs between day and night. The result was a fabric much more open than the one that was woven to make the backpacks, since it must have holes allowing to direct the water downwards.

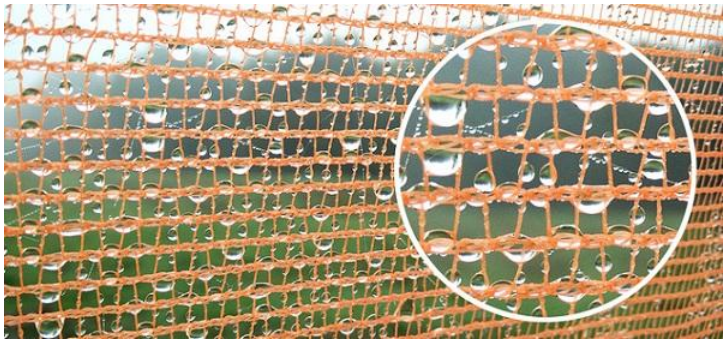

Figure 2. Plastic mesh to collec fog water. Source: https://www.google.es/search?q=mallas+para+recoger+agua+de+la+niebla

Finally, the last phase of this diversified project consisted, on the one hand, on making an artistic intervention at the end of the course in the town square of Assomada, coinciding with the World Environment Day, on June 5, and wrapping the trunks of the trees of the square with these tissues (Figure 3A), thus claiming the need to treat and manage waste in a creative way. There is also an exhibition of recycled products made only from plastic: brooms (Figure 3B), slopes (Figure 3C), backpacks(Figure 3D), bins (Figure 3E), etc.). On the other hand, the Ku-SCIENCEART commercial project was presented to the contest BBVA Foundation Aids for Researchers and Cultural Creators in 2016, in Spain, being only selected 45 of more than 2000 projects submitted nationwide. And finally, they were taught to place these fabrics in suitable areas for the capture and collection of fog water and by condensation (the mesh is placed around the trunk of a tree) with which to irrigate their small family gardens, to use it to their personal grooming or to give animals to drink.

It was an especially rewarding job, both for the fact of doing a friendly activity with the environment and for learning a technique (the point) that they did not know in the country and that was very practical and useful, because they quickly realized the infinite possibilities that this fabric had in order to apply it in their daily lives and to take advantage of it (making shade roofs for animals, manufacture backpacks and other accessories without having to spend money they do not have and collect water from the fog for their daily needs).

Figure 2. Artistic intervention (A); broom (B); earrings (C); backpacks (D); paper basket (E)

6. Results

With respect to the first goal, making an artistic intervention in the AssomadaSquare, it is important to mention that there was all the institutional support to carry it out, on the part of the IUE, the Municipal Chamber (City Council), the Ministry da Educação e Desporto and the Direção do Ambiente, Saneamento e Protecção Civil de Santa Catarina, offering all the necessary help for the organization, preparation, dissemination and finally installation of the project. In the same way, although it was not planned to carry out any other activity that day, the delegates of the Municipal Chamber and representatives of the Direção do Ambiente, Saneamento e Protecção Civil asked to carry out an artistic exhibition of products and objects made all with plastic, request that logically was received with much pleasure. The exhibition was held on the same day and objects of all kinds were exhibited: earrings, bins, brooms, mobiles with tassels, glasses, baskets, etc.

The second objective could not be carried out in full, on the one hand, due to the short time that the stay lasted, barely four months, and on the other hand, because there was a bigger problem related to the lack of funding to be able to start up the small company that we wanted to create, because to start with it, we needed a minimum capital injection of about 7,000 euros, investment that neither the EUI nor the institutions that supported us could assume, since we are talking about a country that can be broadly categorized in development paths, which just 40 years ago achieved the independence of Portugal and the little capital that exists eminently reverts to education.

The last objective of the project: teaching them how to weave their own meshes to capture the water and to use it in their day to day was successfully achieved, since most of the students made a complementary fabric with which they could verify that placing it around the trees of their orchards, after a day, they were able to collect about 3-7 litres of condensed water from the fog. This special material for collecting water cannot be woven in the same way as it was used to make backpacks. It has to be a much more open weave, not as closed and tight as the other, as for the drops of water that are accumulated in the fabric to fall by gravity to the container previously placed or simply to the ground, that is to say, to the land where the tree is, it must have a certain structure, with holes that allow directing and directing the water downwards.

7. Conclusions

The plastic arts in their contemporaneity show their most pitiful face and have found the atrocious refuge in places as inhospitable and grey as galleries, museums, cultural centres, etc. (Ranilla, 2015). For this reason, now more than ever, a paradigm shift is necessary where art can be created, developed and lived on the street, enjoyed by all, and if possible, bringing environmental benefits to society. But, we should not be naive thinking that the final solution simply goes through a new conception of art. Art must be one more tool with which to transmit these values that seem, that in the society in which we live, to be lost or forgotten. A society based on the depletion of natural resources, the production of polluting waste, global warming produced by the emission of gases, the destruction of the ecosystem or massive urbanization without control, all of this based on the importance of capitalism and "progress".

Therefore, strategies must be created in order to manage creatively the billions of tons of waste that accumulate in the different ecosystems of the planet, giving solutions to the problems related to the global growth of the production and use of plastics. Organizations and entities of all kinds, public and private, have been worrying for years about sustainable development although economic power and interests make real progress in this sense too difficult. However, it is evident that it is everyone's work and the personal contribution of each of us is vital to one day achieve the objectives set. For this reason, the current project is developed from which the maximum performance was sought by diversifying it in three different ways but starting from the same primary idea: plastic recycling as a material for the development of a sustainable art research project.

The current era characterized by globalization, but at the same time the cultural diversity, of languages and ways of doing, allows us the collaboration and synergy between different communities, countries and continents. Thanks to the agreement existing between the University of Extremadura and the University Institute of Education of Cape Verde, this project could be carried out, which although it has only been a small glimpse of what it could become, has allowed to lay the foundations for future collaborations of a scientific, educational and research type.

In spite of being aware that the intention to carry out the three main objectives of the project was ambitious, especially because of the limited time available to carry it out, the final sensation is fully satisfactory, since with the exception of the second objective, which really required a considerable injection of capital, although not unfeasible, and the short time to start up the company, the other two objectives were successfully achieved, and one could even say, that in general terms, exceeded the expectations that were raised at the beginning of the project.

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