MENDEL UNIVERSITY IN BRNO

Faculty of Forestry and Wood Technology

Department of Furniture, Design and Habitat

Furniture from Refuse Materials

Bachelor thesis

Supervisor:

Ing. Milan Šimek, Ph.D.

Author:

Kateřina Valová

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Poděkování

Tímto bych ráda poděkovala všem, kteří se podíleli na vzniku této bakalářské práce. Především děkuji vedoucímu práce, Ing. Milanu Šimkovi, Ph.D., za trpělivost, hodnotné myšenky a podněty, které mi předával jak při vedení práce, tak po celou dobu studia. Mé díky patří také všem vyučujícím z MENDELU, kteří mi ve svých hodinách předali cenné informace a vědomosti. Dále děkuji organizaci Muungano Community International a celé komunitě za jejich práci a nadšení, bez čehož by tato práce nevznikla. V neposlední řadě bych ráda poděkovala celé rodině a blízkým za podporu v průběhu celého studia.

Abstrakt

Autor: Kateřina Valová

Název práce: Nábytek z odpadových materiálů

Tato bakalářská práce se zabývá možnostmi vytvářet jednoduché produkty pomocí odpadových materiálů, které jsou velkým problémem pro životní prostředí. Toto spojení odklidit a znovu využít odpad je aplikováno do prostředí rozvojových zemí, kde je mnohdy více odpadu než jiných, použitelných produktů.

Teoretická část práce shrnuje již známé možnosti, které nám eco design nabízí. Dále seznamuje s problematikou rozvojových zemí a představí Keňu jakožto zemi, do které byl projekt bakalářské práce zasazen. V praktické části práce je představen návrh několika produktů z odpadových materiálů včetně technických detailů. Dále je zahrnut i návrh jednoduché manufaktury, který by mohl místním lidem pomoci při výrobě.

Klíčová slova: Odpadové materiály, eco design, rozvojové země, pomoc

Abstract

Author: Kateřina Valová

Thesis: Furniture from Refuse Materials

This bachelor thesis deals with the possibilities of making simple pieces of furniture using refuse materials that a currently damaging the enivronment. This idea of removing waste, particularly plasic waste, is one that could greatly improve the lives and environment of those living in developing countries, where refuse disposal is particularly problematic.

The theroretical part of this work summarizes already known possibilities of this so called “eco-design”. This work will focus on Kenya however, it is hoped that the ideas presented here can be applied on a wider scale, to other developing countries in need of help. The practical part of this thesis contains descriptions of a few eco-designs, the properties from which they are made from and, the manufacturing process.

Key words: Refuse materials, eco design, developing countries, aid

Obsah

LIST OF ABBREVIATIONS AND ACRONYMS

AIDS – Acquired Immune Deficiency Syndrome

ATM - Automated Teller Machine

CZK - The Czech koruna

ČSN - Czech Technical Standard

DIY – Do It Yourself

EUR – Theofficial currency of the eurozone

FFWT - Faculty of Forestry and Wood Technology

GDP – Gross Domestic Product

GNP – Gross National Product

HDI – Human Development Index

HDPE - High-density polyethylene

HIV - Human Immunodeficiency Virus

Kg - kilogram

Lbs - pound

LDPE - Low-density polyethylene

LLDPE - Linear low-density polyethylene

MENDELU – Mendel University in Brno

MZV - Ministry of Foreign Affairs of the Czech Republic

PEACE – Play, Eat, Appropriate mentorship, Critical skills, Education

PET - Polyester

PETE - Polyethylene terephthalate

UHMWPE - Ultra-high-molecular-weight polyethylene

UK - United Kingdom

UNICEF - The United Nations Children's Fund

USD - The United States dollar

UV – ultraviolet (light)

1. INTRODUCTION

Design is all around us, even though it is often overlooked. Nature that surrounds us gives us the means to live, yet in many cases it may also be callously ignored. These two elements are much closer than they might seem. Nature provides designers with the inspiration and materials with which they can manufacture beautiful products which satisfies the needs of the customer. This relationship between production and nature is very unbalanced and the Earth is beginning to become overwhelmed by unwanted material waste, and old products from designers. Taking into account the manufacturing process that release pollutants to the atmosphere, we need to ask the inevitable question: What are the limits of the Earth? When will the collapse come? This reflection should not be any predictions of apocalypse, followed by discussions about global warming, this reflection should be about finding some solution. A solution that would help sustain the rapid production process of new products.

This thesis deals with a new solution for countries with the absence of any environmental awareness. These countries are often developing countries, and are trying their best to identify with the Western world and have the same products as they do. Unfortunately, only the higher classes of society can afford these products whereas those in the lower class live their lives from one day to the next, worrying about providing their families with food and shelter, not what impact they may be having on the environment. There is no time to look at issues like ecology or care about the world. This leads to the local environment being neglected and becoming suffocated with rubbish, the government has little interest and does not provide effective solutions.

The proposed solution to this situation is to inform the lower class about the possibilities of using materials which are available everywhere around them, so they can manufacture products for everyday use.

Waste is currently negatively looked upon and no one wants to store it in their homes, but if we can use this waste to manufacture useful products and challenge this perception perhaps we can begin to change the unbalance between nature and design. Is not Earth our home as well?

The idea to going to Kenya to try and make a change came when I was thinking about the topic of my thesis which was discussed together with Ing. Milan Šimek, Ph.D.. Work just in the theoretical level is in many topics a great contribution and a valuable source of knowledge. In my case a theoretical proposal on its own would be insufficient and the thesis would end up forgotten in the grey corner of the library. That is why I went to Kenya to test if this model of eco design can work.

Many people around me doubted about the journey and they tried to dissuade me from going. Taking into account the financial aspect, I was not far from the renunciation of the entire project, because I paid everything myself and was also expected to bring a gifts for the local children. I greatly appreciated the gifts from my friends who gave as much as they could, and especially to my little siblings who filled our bags with 20 kilos of toys for Kenyan children. Despite all the challenges, I decided to go and when my boyfriend seen that I would not give up, he decided to go with me as a psychological support and protector. Although I try to act like a hero, I have to admit that without this support I would never manage this mentally and physically challenging journey.

"Seven Deadly Sins

Wealth without work

Pleasure without conscience

Science without humanity

Knowledge without character

Politics without principle

Commerce without morality

Worship without sacrifice."

— Mahatma Gandhi

2. OBJECTIVES

The main objective of my bachelor thesis is to inform the reader about possibilities of eco design, in this case about possibilities of eco design in developing countries. This work should serve as an easy guide for potential travelers to Africa and eco designers, who are interested in the same or similar issue. The project is going to be carried out in one of the poor villages in Kenya, where the environmental condition is very alarming and the level of ecology awareness is very low, as well as the level of education. Therefore, the primary purpose of my work is to inform local people about the possibility of making simple pieces of furniture and other products from waste materials that are easily accessible, and at the same time help to clean their village and countryside. Another goal is to experience the African culture, mentality of local people and try to collaborate on a project despite the language barrier. Effective cooperation and communication with the community and voluntary organizations, which will enable to make the project workable in the first place, will be the most important factors of successful work and tangible results.

The theoretical part will contain basic information about developing countries, their main issues and their ecological situation. In this chapter, Kenya is going to be introduced as one of the developing countries as well. This information will by followed by an analysis and research of known eco designs and examples of ways of using the unwanted material. In this part, the key points, which will explain the importance of recycling, will be listed.

In the practical part, my designs prepared for the visit of Kenya will be introduced. As well as describing the designs themselves, this part will also contain a detailed description of the materials used for the project, including its durability and hygiene aspects and, the technology used during the process of manufacturing. The practical part will also contain a storyline of the stay and work in Kenya with a focus on the mutual cooperation with the local community and voluntary organizations. All points will be summarized in the conclusion part that will also focus on the accomplishment of the objectives of the work.

I hope that my work will have a positive effect on the residents of the Kenyan village where the project was carried out. Ideally, in time, this new information will be transmitted from village to village and used for their benefit. I hope that the plans for

local women to be able to sell manufactured products, creating a functional monopoly, will soon become a reality.

3. METHODOLOGY

Extensive literature reading and research was carried out to gain helpful information for the theoretical part of this thesis. It was utilized mostly from foreign books as this topic does not have many publications in Czech language. Another considerable part of sources for this work was internet and e-books. Among these sources of information were dictionaries, travel guides, web pages of Czech and Kenya government and some final thesis of graduates of Mendel University. All those sources are listed on the end of this work called Literature and Internet sources.

The technical part of this thesis was duly consulted with teachers from the Department of Furniture, Design and Habitat, namely with doc. Ing. Daniela Tesařová, Ph.D., Ing. Milan Šimek, Ph.D. and Ing. Josef Hlavatý, Ph.D.. All of them were greatly helpful. With Ing. Josef Hlavatý, Ph.D. the possibility of testing the strength of the high-density polyethylene rope was discussed,which was the main structural element of the eco design. This testing would have to follow the technical standard ČSN EN ISO 2307 (808627) Fibre ropes - Determination of certain physical and mechanical properties.

Six months before departing to Kenya I started a comprehensive collection of information about the country including its cultural aspects and environmental conditions. I contacted few people with experience from Africa and the source of information was based on personal interviews, phone calls and e-mail communication. This collection was followed by contacting voluntary organizations around Kenya. The main organisations that I focused on heavily surrounded youth work. For the research of organizations a website called "Help Exchange (HelpX)" was used. It is an online listing of different places all over the world such as farms, ranches, non-profit organizations etc. who offer accommodation for work. From the list of organizations who replied, Muungano Community International was my choice.

The practical part was formed of the theoretical cognisance in combination with the knowledge that I learnt from studying in Mendel University in Brno.

4. THEORY

In the theoretical part of this thesis I would like to introduce important terms related to the main topic. They are important for proper understanding of the whole matter and widening our knowledge about the topic.

First we bring to mind the term „Developing Countries“ and explain the meaning of this collocation, and then we look at the problems of developing countries. After that, Kenya is going to be introduced, as the country that was chosen for the eco design project. I will provide important information about the country, such as location, culture, nature-social view and advice before you visit Kenya and travel tips.

Thereafter we look at already known eco designs and introduce their authors. We have to try to understand the idea of recycling and the ideology associated with it, such as conservation of nature, reduction of the waste materials and restoration of already used products.

4.1. Developing countries

4.1.1. Classification of Developing countries

Stated by Jeníček and Srnec (2012, p. 43), more than 75% of the total world population live in developing countries, the higher proportion of which live in South Asia, and the least in Arabic contries.

There is no main definition of developing countries to tell which one is developing and which ones have already developed. In the past, there was a big emphasis on the economic and industrial growth. Nowadays the most wide-spread tool is the Human Development Index (HDI). HDI reflects both economic and social aspects of development. It includes level of education, the average life expectancy and *„the standard of living which is measured by the income per 1 inhabitant, represented by the GDP*[1] *per capita and year in the purchasing power parity.“* (Jeníček, Srnec, 2012, p. 33)

Therefore, we may state that a developing country is a country with low living standards of the population, undeveloped industry and a low HDI.

[1] GDP: Gross domestic product

Picture 1: World map by quartiles of HID in 2014 ***(www.hdr.undp.org/en/data/map [online])***

4.1.1.1. Typical factors of Developing countries

There are many factors which may be used to identify developing countries. Jeníček and Srnec (2012) divide them in their book „Fundamental Problems of Developing Countries" into eight points:

- ➔ migration to the cities;
- ➔ underdeveloped industry and increasing pollution;
- ➔ most economic activities are held by foreign investors, mostly from the First World countries;
- ➔ poorly functioning government, public goods (education, health, defense) are low and of an insufficient level;
- ➔ relatively young population, the average age under 30 years;
- ➔ leaving of a talented university graduates to the countries of the First World;
- ➔ often a huge state debt;
- ➔ low level of education.

Region	Country
Latin America and Caribbean 33 countries	Antigua and Barbuda, Argentina, Bahamas, Barbados, Belize, Bolivia, Brazil, Dominica, Dominican Republic, Ecuador, Grenada, Guatemala, Guyana, Haiti, Honduras, Chile, Jamaica, Columbia, Costa Rica, Cuba, Mexico, Nicaragua, Panama, Paraguay, Peru, Salvador, Surinam, St.Lucia, St. Christopher and Nevis, St. Vincent and Grenadines, Trinidad and Tobago, Uruguay, Venezuela
Sub-Saharan Africa 45 countries	Angola, Benin, Botswana, Burkina Faso, Burundi, Chad, Eritrea, Ethiopia, Gabon, Gambia, Ghana, Guinea, Guinea-Bissau, South Africa, Cameroon, Capverdas, Kenya, Camorras, Congo DR, Congo, Lesotho, Liberia, Madagascar, Malawi, Mali, Mauretania, Mauritius, Mozambique, Namibia, Niger, Nigeria, Ivory Coast, Equator Guinea, Rwanda, Senegal, Seychelles, Sierra Leone, South African republic, St.Thomas and Prince Island, Swazi, Tanzania, Togo, Uganda, Zambia, Zimbabwe
Arab Countries 20 countries	Algeria, Bahrain, Djibouti, Egypt, Iraq, Libya, Morocco, Jordan, Qatar, Kuwait, Lebanon, Yemen, Oman, Palestine, Saudi Arabia, Somalia, Arab Emirates, Sudan, Syria, Tunis
South Asia 9 countries	Afghanistan, Bangladesh, Bhutan, India, Iraq, Maldives, Nepal, Pakistan, Sri Lanka
East Asia and Pacific 26 countries	Brunei, China, Fiji, Philippines, Indonesia, Cambodia, Kiribati, Korea DR, Korea, Laos, Malaysia, Marshall Islands, Micronesia, Myanmar, Nauru, Palau, Papua-New Guinea, Guinea, Samoa, Singapore, Solomon Islands, Thailand, Tonga, Tuvalu, Vanuatu, Vietnam, East Timor

Source: UNDP, HDR 2006

Tab 1: List of developing countries depending on the location according to the UNDP *(JENÍČEK,V., SRNEC, K., 2012)*

4.1.2. The problems of Developing Countries

As stated before, the term „Developing Countries“ means nations with a lower standard of living. This term is loosely thrown around in developed Western countries and it brings to mind the typical images of poverty, death and HIV. However, for those living in developing countries, it is so much more than this. People strive to become self-sufficient which will lead to an overall self-sufficient country. Funding organizations try to work along side these people in order to help them grow and develop. Knowing this, the driving force for international humanitarian intervention should not be sympathy for those in poverty but hope for what their future may hold.

First, we need to understand the main problems of developing countries. According to Jeníček and Srnec (2012, p. 31) there are two approaches to understanding the developing countries.

„The classical (older) understanding issues from the socio-economic system of criteria. while the new understanding is based on a certain level of income per inhabitant. The new understanding then operates with only one indicator, but it degrades the whole problem of the developing countries differentiation at just the economic side.“ In our

case we will focus on the classical understanding, which includes education, health care, social care and housing.

Above the problems of developing countries, there are also global problems, which are strongly connected with the individual problems of each developing country. Jeníček and Srnec (2012) summarize them into three major groups:

- inter-social global problems;
- natural-social global problems;
- anthropo-social global problems.

The natural-social problem group deals with the relationship between human society and nature. This group is divided according to following problems:

- environmental problems;
- raw material and energy problems;
- population problems;
- food/nutrition problems.

These subgroups, especially the first two, bring us to the main topic of this thesis. The environmental problems in developing countries are a big issue and we need to bring our attention to them. That is why this thesis uses eco materials as the main structural material.

4.1.2.1. The environmental problems in developing countries

„During the history of mankind, several civilizations destroyed themselves in the consequence of their irresponsible handling of environment. The present period is different only by the fact that environmental problems are spread all over the Earth.“ (Jeníček, Srnec, 2012, p. 105)

The environmental problems are everywhere, but developing countries face serious and alarming problems that are endangering the health of the population. One of those problems is polluted water. As everyone knows, water is necessary for our life. Water creates an environment for life processes, it is a solvent for lots of nutrients, helps regulate body temperature and allows digestive processes. With regular exchange of body water can leach harmful substances. (PIŤHA & POLEDNE, 2009) Unfortunately, there are already harmful substances in the water they consume.

Picture 2: The river in Kibera slum in Nairobi, Kenya ***(Kateřina Valová, 2014)***

The river in Kibera slum is an example of the bad water condition. Local people have been using water from this river for washing their clothes, washing themselves, farming and occasionally for drinking. In the slum there are tanks with clear water (still not safe for foreigners) that is for drinking and showering. However, there is a charge for this water and many people can not afford it. Due to using this water, a lot of diseases are spread among the locals and it impairs their immune system. Immunity is in their case very important for slowing the spread of HIV, by which 60% of the slum is infected.

Another big problem in developing countries is refuse material. In the practical part of this work, the project focuses on the refuse materials in Kenya. In Kenya, there are no waste bins available on the streets or refuse places. There is no job as a dustman, so the waste materials from the inhabitants are littering the streets and surroundings as there is no place for the waste to be disposed.

The accumulating waste on the streets has a negative impact on human health. As Jeníček and Srnec (2012, p. 138) present:

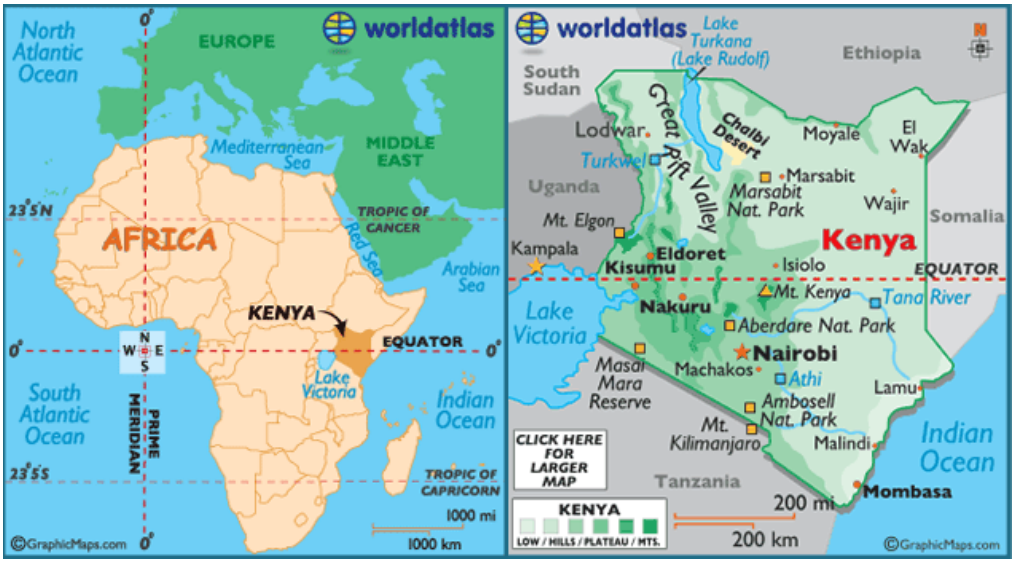
- greenhouse gases emissions from refuse dumps and processing of organic refuse;
- pollution of the air and toxic side-products from refuse burning plants;
- pollution of air and water and secondary refuse from recyclation;
- smell, flying-off of some particles, centers of infection.

Most households burn their waste in their gardens, which is a normal daily practice of disposal. A consequence of this may be poisoning of animals that come looking for food in the waste.

Picture 3 Children playing on the waste (*Kateřina Valová, 2014)*

4.1.3. Introducing Kenya

Kenya is situated on the west coast of Africa, directly on top of the equator. Its shores are washed by the Indian Ocean with neighbours Somalia; Ethiopia; South Sudan; Uganda; and Tanzania.



Picture 4: Location and map of Kenya *(www.worldatlas.com [online])*

OFFICIAL NAME: Republic of Kenya

FORM OF GOVERNMENT: Republic

CAPITAL: Nairobi

POPULATION: 45,010,056

OFFICIAL LANGUAGES: Swahili, English

MONEY: Kenyan shilling

AREA: 224,081 square miles (580,367 square kilometers)

MAJOR MOUNTAIN RANGES: Aberdare Range, Mau Escarpment

MAJOR RIVERS: Athi/Galana, Tana

Tab 2: Basic facts about Kenya ***(www.nationalgeographic.com [online])***

4.1.3.1. Culture of the country and religion

Culture of a country is a very important subject and one should learn about it before visiting and meeting the locals. Visitors should respect their habits, tradition and behavior unless they affect our Fundamental rights and freedom[2]. A non-negligible part of culture is made by religion, in which case it is necessary to be circumspect.

[2] **Fundamental rights** are a generally regarded set of legal protections in the context of a legal system, wherein such system is itself based upon this same set of basic, fundamental, or inalienable rights. Such rights thus belong without presumption or cost of privilege to all human beings under such jurisdiction. The concept of human rights has been promoted as a legal concept in large part owing to the idea that human beings have such "fundamental" rights, such that transcend all jurisdiction, but are typically reinforced in different ways and with different emphasis within different legal systems. *(Cram101 Textbook Reviews (2013) [online])*

Before travelling to a Muslim country, it may be best to check their law before travel. This is best sought on the Ministry of Foreign Affairs website. If travelling unprepared,one may encounter problems with Mutawa[3] who act on the basis of Sharia[4]

Box 1 Example of the cultural difference

The culture of Kenya reflects the colonial history of the country. The British colonization lasted for 74 years (1888-1962) and left behind many cultural signs like a language, tea with milk and Christianity. However, Kenya is a multicultural country, which consists of Christians, Muslims and 42 different tribes. Christianity plays a big part in Kenyans‘ social and ordinary life. Every village has its church and a pastor, who is respected among the locals. There is a community in the church and a gospel mass is celebrated every Sunday.[5] The Christian communities and organizations are an important source of volunteers and, in many cases, the main business. The business is mostly based on financial contribution of the believers or on fake miracles performed by the priests, which although being illegal, are paid for by the locals, who are hoping to be healed.

Another constituent of the Kenyan culture are Muslims living mainly on the east coast of the country. They form 11.2 % of the population (4 817 456 people).[6] The traditional and unique culture of Kenya can be seen in the 42 tribes. Each tribe has its own color of specific clothes. The most popular one is The Maasain tribe, which resides in the south of Kenya (Tanzanian border) and has a red robe. The Maasai culture has many differences. Those differences may sometimes seem unacceptable or abstruse to a foreigner.

[3] **Mutawa** is a member of a police force, especially in Saudi Arabia, charged with enforcing adherence to Shari'a law, notably in application to public conduct and dress. *(www.thefreedictionary.com [online])*

[4] **Sharia** is the body of canonical law based on the Koran that lays down certain duties and penalties for Muslims. (www.thefreedictionary.com [online])

[5] **Gospel mass** is characteristic by the Gospel music during the mass. The Gospel musicis a fervent style of black American evangelical religious singing, developed from spirituals sung in Southern Baptist and Pentecostal Churches. (*www.oxforddictionaries.com [online]))*

[6] Information available on www.mzv.cz *[online]*

Picture 5: Maasai people ***(Kateřina Valová, 2014)***

One of them could be circumcision. According to the Children Act 2005[7] circumcision in males is prohibited if they are under the age of 16,except when it is performed for religious or medical reasons. The procedure is not allowed to be carried out on infant boys and girls due to the alarming health risks. It is however, legal for boys over the age of 16, provided they give consent, as this is seen as a ritual of acceptance to the men's community. The circumcised boy has to withstand the pain with an expressionless face. *„The healing process will take 3-4 months and after that the boys must remain in black clothes for a period of 4-8 months." (*Maasai Ceremonies and Rituals [online]) After that, the boy can be welcome as a new warrior and can join the men's community headed by the senior warriors. Unfortunately, girl's circumcision is still part of the tribe tradition as well and it is done in secret.

Another important part of culture traditions is cuisine. No matter the language barrier, cuisine can be described as „the language of the senses", in other words, the food speaks for itself and tells us everything we need to know about the ingredients that are used, what is provided by the surrounding land, and the traditions of the country.

The Kenyan cuisine consists of legumes, rice and vegetable, such as carrots, spinach and cabbage. Legumes provide body with the required proteins, rice has the

[7] [Act No. 8 of 2001] Act No: CAP. 141, Act Title: CHILDREN , Kenya law, (http://www.circinfo.org/South_Africa_Childrens_Act.html)

filling function and vegetable is the cheap and healthy component of a menu. The most common food is a kind of a dumpling made of sweet corn flour with spinach. Another one is rice with cabbage and pieces of beef (or beef bones). The meat has a specific taste as it is not kept in the fridge. In the middle class, meat is only usually eaten once a week.

Picture 6: Cooking meal for the community ***(Donald Morrison, 2014)***

Picture 7: Kenyan butchery ***(Kateřina Valová, 2014)***

4.1.3.2. The environmental problem and education

In Kenya, there is an alarming problem with waste. Kenyan people produce around 0,71 kg of waste a day. That means nearly 260 kg of waste per person a year. Most of this refuse materials is plastic and the biggest problem is plastic bags, which are simply everywhere. Just in Nairobi, the capital city of Kenya, 211 316 tonnes of plastic is produced every year. From this amount, just 18% is recycled, and the rest, 82% of waste, is dumped into the environment.

In a few places in Kenya there are landfills but most of them are private, with little contribution from the council. As a result, people are basically walking through the rubbish, planting vegetables in a polluted soil and drinking bad water. All of this contributes to the spread of diseases.

Unfortunately the kids are not taught to act differently and the country is slowly getting filled with plastic.

Education in Kenya starts at the age of three or four. First, young children attend a preschool, which prepares them for grammar school at the age of six. By the time

children attend preschool, they can speak Swahili and English, they know basic math, and how to read and write. Once grammar school has been completed they can choose to go to high school and the possibly university. However, Kenyan education is only partly supported by the council, just 6.7% of Kenya's GNP (Gross National Product) was spent on education in 2010. This means that not everyone can afford to send their children to school, so on children with richer parents can get an education with the prospects of better jobs in the future.

„Education is a rope that can carry us to greatness. It is one of the most important things in life because without education you can't contribute to the world or earn money, and lack knowledge. Knowledge is power, so when you know what you can do, you can go that mile further."

Author unknown

4.1.3.3. Vaccination

Before traveling to any country, it is necessary to know about health risks and required remedy. Information about vaccination are written on many websites,[8] which also usually offer the possibility to book an appointment with a doctor. For the sake of self assurance and peace of mind, it is recommended that you find out as much information before traveling. For example if visiting any location around water, it is good to have antimalarics. *„Malaria is caused by a parasite called Plasmodium, which is transmitted via the bites of infected mosquitoes. In the human body, the parasites multiply in the liver, and then infect red blood cells." (*Malaria *[online])*

Another important vaccination may be against typhoid and hepatitis A + B. Choosing the proper vaccination depends on what the reason for visit is. The conditions will be different for someone who is going to be a volunteer and live with the local people and eat their food, than for someone who is going to stay in a holiday resort.

[8] For example on *www.ockovacicentrum.cz/cz/kena*

The only disparity is a case of yellow fever. The vaccination against yellow fever is compulsory if one travels to Kenya from a different African country. For direct flights from other continents it is not required, only recommended.

- ➔ Yellow fever is an acute viral haemorrhagic disease transmitted by infected mosquitoes.
- ➔ The 'yellow' in the name refers to the jaundice that affects some patients.
- ➔ Up to 50% of severely affected people without treatment will die from yellow fever.
- ➔ There are an estimated 200 000 cases of yellow fever, causing 30 000 deaths, worldwide each year, with 90% occurring in Africa.
- ➔ Vaccination is the most important preventive measure against yellow fever.

Tab 3: Key information about yellow fever *(www.who.int [online])*

The cost of vaccines is not covered by health insurance, thus a patient has to pay the vaccination expenses themselves.

4.1.3.4. Visa information

Travel arrangements for citizens of the Czech Republic - visa for all kinds of passports. The requirement for entering to the country - valid entry or transit visa. The possibility of obtaining a visa: Kenya Embassy in The Hague, but also the British Embassy in Prague.

Embassy of the Republic of Kenya

Nieuwe Parklaan 21

2597 The Hague

Tel.: +31 70 350 42 15

Fax: +31 70 355 35 94

E-mail: kenre@dataweb.nl

Official opening hours: 09:00-13:00 and 14:00-16:00

Disposable entry visa may also be obtained at all air, road, rail and sea borders crossing into Kenya. The fee is 50, - USD, which is 40, - EUR (recommended to have the exact amount).

From 2014, one can apply for a single tourist visa for Kenya, Rwanda and Uganda (i.e. East Africa Tourist Visa), and for multiple entry visas that are valid for 90 days. The visa fee is 100 USD.

It is recommended to check the current conditions of the country before traveling. The actual information is published at the embassy.

Entry into the country is possible by many ways:

1) By air: Through the International Airport Jomo Kenyatta; the International Airport in Nairobi, which uses larger European airlines; or through Moi International Airport in Mombasa.
2) On the road: Either from the territory of Uganda or Tanzania. The entry from Ethiopia and Somalia to Kenya is not recommended for safety reasons, partly because it is necessary to use off-road vehicles due to bad road conditions.
3) By train: From Uganda or Tanzania
4) By ship: Through the port in Mombasa and Kisumu or through the lake harbor in Lake Victoria. Due to the age and condition of the boats used on Lake Victoria, this type of transport is not recommended.

There is no need to demonstrate the financial means when entering the country.

When arriving into the country from other African destinations or other high risk areas, you are required to have a yellow fever vaccination .[9]

[9] Information available on web side of Ministry of Foreign Affairs of the Czech Republic

4.1.4. Introducing Muungano Community International

„Muungano Community International is a non-profit organization based in Nairobi, Kenya. Muungano was started by Kenyan locals and is supported by an international network of volunteers. We place volunteers from around the globe looking to make a real difference in the lives of poverty stricken communities throughout Kenya. Many of our community volunteer projects are focused on improving the lives of displaced children and youths through healthcare, mentoring, community outreach, agricultural, education, sports, and fund-raising initiatives.“ (About Us [online])

Muungano Community International is an organization consisting of family members. Michael, the father of the family, is pastor in village Ndeyia where the aid programs are focused. His son, Francis, is a head of organization and project coordinator. He cares about administrative matters, looks after volunteers and spends his time with them as much as possible. Francis Macharia´s sister Lucy works in organization with kids and youth and she gives them the necessary basic information about good behavior as many of them don´t have possibility to get an education. Volunteers are integrated into all programs of Muungano Community International and, when they are completely integrated, they become part of its family.

The aid they offer is divided into different specialized programs and, depending on their skill set, volunteers are sent to where they will be needed the most. Such programs include:

- Orphanage program
- Sports program
- HIV/AIDS program
- Medical Program
- Teaching program

Volunteers are accommodated in the family member´s houses where they learn about the African culture and can see the ordinary life in Kenya. This accommodation is included in the volunteer fees which has to be paid. As the web side of Muungano Community International says *„Program costs cover transportation, accommodation and meals at the project location, orientation, and 24/7 support and supervision. Transportation includes pick-up from the airport, transportation to your volunteer placement and transfer back to the city if required at the completion of your placement.*

Muungano also guarantees that part of every volunteer's program fee will go toward donations and financial support for various ongoing projects established by Muungano International." (Program costs [online])

Volunteer Period	Volunteer Fee
	Program costs listed below are in USD and do not include the $150 registration fee.
2 weeks	$252
3 weeks	$378
4 weeks	$504
5 weeks	$630
6 weeks	$756
7 weeks	$882
8 weeks	$1008
9 weeks	$1134
10 weeks	$1260
11 weeks	$1386
12 weeks	$1512
4 months	$2016
5 months	$2520
6 months	$3024

Tab 4: Volunteer Fee ***(Source: muunganointernational.org/volunteer_costs.html)***

4.2. Eco Design

Eco design is becoming increasingly popular between designers in the 21st century. Many designers all over the world are realizing that the environment´s resources are limited and the pollution from manufacturing products is far too big. The way designers create products is changing. They need to begin to consider certain certain factors more carefully, such as; economic, environmental and social values, the life cycle, and choice of materials. Designers as creators are taking the responsibility for their products. The responsibility is not just to customer but also to the environment we live in.

Due to the commercial life style of the Western culture, designers are becoming increasingly taught after, so as to give us the new trends we crave. New designer products that are showcased throughout the world may bring new directions of thinking and innovative ideas to inspire other designers, bringing an new wave of change.

As was said before, the main idea of this thesis is to give a new, clean, eco-friendly life to waste materials and make them useful products for people in need. Many designers have already come up with innovative ideas on how to recycle waste and turn them into unique pieces of work. This chapter will focus on these designs for research purposes and will show how they can open new horizons.

As Brower et al. (2009, p. 7) say *„These designers use the refuse of yesterday to create a stylish product for today, considering its lifespan and degradability to protect the environment tomorrow.“*

Picture 8: Reuse, Reduce, Recycle
(www.englishexercises.org [online])

4.2.1. Recycling paper and furniture

- ➔ *Recycled paper produces 73% less air pollution than if it were made from raw materials.*
- ➔ *12.5 million tonnes of paper and cardboard are used annually in the UK.*
- ➔ *The average person in the UK gets through 38kg of newspapers per year.*
- ➔ *It takes 24 trees to make 1 ton of newspaper.* (Recycling facts and figures [online])

Sustainable Workchair

Retur Furniture

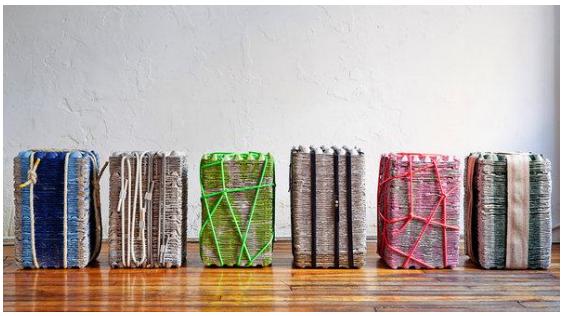
Picture 9: Sustainable workchair

(www.nigelsecostore.com/acatalog/info_2_CHAIR01.html)

The Swedish company Retur is making cardboard furniture which is composed of 40% recycled sustainable cardboard. This chair is simple, genuine and completely biodegradable.

Cardboard furniture such as this has been around since he 60s when architect Frank O. Gehry designed his „Wiggle Side Chair“ made from corrugated cardboard, fiberboard, and round timber.

Egg carton stools



Picture 10: Egg cartoon stools

www.nytimes.com/2011/12/15/garden/turning-egg-cartons-into-stools-what-you-make-of-it.html)

The idea of Egg carton stools can be found in most of the DIY guides. This model is made with cooperation of an architect and designer Jen Turner and Trevor Tondro. Egg cartons are also very popular between musicians because they work well in soundproofing a room.

4.2.2. Recycling plastic and furniture

- ➔ *Most families throw away about 40kg of plastic per year, which could otherwise be recycled.*
- ➔ *The use of plastic in Western Europe is growing about 4% each year.*
- ➔ *Plastic can take up to 500 years to decompose.*
- ➔ *275,000 tonnes of plastic are used each year in the UK, that's about 15 million bottles per day.* (Recycling facts and figures [online])

Hose Chair

Chase DeForest

Picture 11: Hose chair

(greenupgrader.com/3247/hosewar e-repurposed-garden-hoses/)

„*By recontextualizing a garden hose, Chase DeForest illustrates a creative way to reuse a surplus garden and household product."* PROCTOR, R. (2009)

The chair is made of a simple metal frame which is wrapped with a garden hose. The simplicity gives an amenity to this chair.

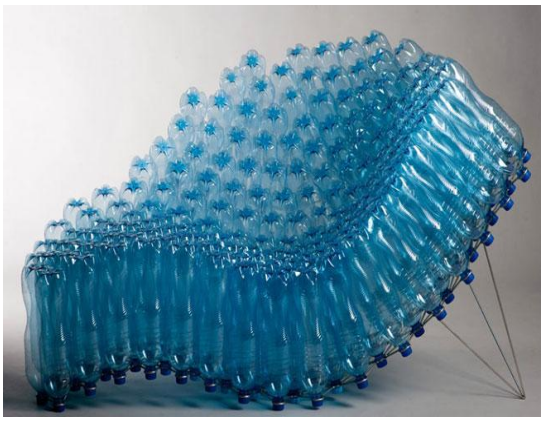
Garden hose bench

Picture 12: Garden hose bench

(www.gardeningchannel.com/6-ways-to-recycle-garden-hose/)

Chair SIE 43

Pawel Grunert



Picture 13: Chair SIE 43

(www.environmentteam.com/innovation/pet-bottle-chair/)

„*Called 'SIE 43'; this is a contemporary chair which is entirely made of repurposed PED bottles and stainless steel. It was created by Polish designer Pawel Grunert for the exhibition "Eco Trans Pop" at Edizioni Galleria Colombari in Milano, Italy. The entire structure is composed of about 200 PET bottles which are arranged in a way that they create an organic structure. Moreover, if any bottle gets damaged, it can be replaced with a newer one."* (Contemporary Chair Made from Repurposed PET Bottles [online])

RD4 Chair

Cohda Design

The RD4 Chair (as in Roughly Drawn) is made by 100% recycled plastic waste using the hand waving process. On the chair is no glue or any other additives.

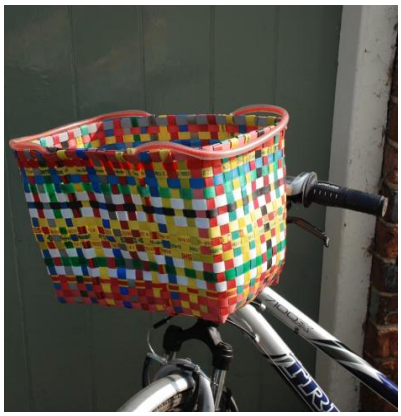
Picture 14: RD4 Chair ***(www.treehugger.com/eco-friendly-furniture/rd4-chair-by-cohda-design-roughly-drawn.html)***

4.2.2.1. Other products from recycled plastic

Plastic basket

Hen & Hammock

Picture 16: Plastic shopping basket *(www.henandhammock.co.uk/recycled-shopping-basket.html)*



Picture 15: Plastic bicycle basket *(www.henandhammock.co.uk/recycled-bicycle-basket.html)*

Hen & hammock´s colorful range of baskets made from recycled plastic packaging tape.

It is made in different sizes and there is a bicycle version, too.

Plastic Spoon Lamp

Yaroslav Olenev

Picture 17: Plastic Spoon Lamp *(www.stylisheve.com/diy-plastic-spoon-lamp-by-yaroslav-olenev/)*

The plastic spoon lamp can easily be found on most „Do It Yourself" websites, also with a detailed manual how to create this lamp at home. One of the DIY manual[10] says that what is needed to make this lamp at home are following items : plastic spoons, glue gun, plastic bottle, light bulb, light socket with an outlet plug, extension chord, scissors and drill.

The inventor of this design is a Russian nuclear plant system engineer, Yaroslav Olenev, who won the Ecology and Design Award in FuruteNow magazine for this design.

[10] www.instructables.com

4.2.3. Drapery recycling and furniture

Recycling textiles is not seen as important as recycling plastics but it is equally relevant. By recycling textiles, not only do we improve the environment but we also help the slave workers in the world. This topic is delicate and in the Western world, collective repressed. The situation is especially alarming in Uzbekistan, which belongs among the top ten producers in the world. Over two million children in Uzbekistan live and work in appalling conditions.

Rag chair

Tejo Remy for Droog

Picture 18 Rag chair

(www.droog.com/webshop/furniture/rag-chair/)

*„This chair is layered from the contents of 15 bags of rags. It arrives ready made but the user has the option to recycle their own discarded clothes to be included in the design. Each piece is unique; a treasure-chest of memories.“ (*Rag Chair [online])

Ting´s Sling hammock Inghua Ting, TING

Picture 19 Hammock

(www.tinglondon.com/print.php?nid=12&size=82x230cm&color=red)

The Ting´s Sling hammock is woven out of reclaimed seat belt fabric. Ting offers choice of bright shades including comfort and alternative look.

„*Ting recommends a maximum safe weight of 120 kilos / 264 lbs. Stainless steel tubes for extra strength and durability on ends“ (*Sling hammock [online])

Cushions
Nicola Prodromou, Use UK

Picture 20 Cushions *(fabgreen.com/tag/nicola-prodromou/)*

„*Use UK was set up with the aim of making eco-friendly products more desirable to the design-conscious. Nicola Prodromou uses fabric rescued from textile sample books that would otherwise have gone into landfill. The samples are sourced from high-quality manufacturers, yet are now considered out of date*.“ PROCTOR, R. (2009)

5. PRACTICAL PART

The main idea of this thesis depends on a practical part. The practical part should bring contribution to the studied field and help as a new source of knowledge.

I have decided to do the practical part of this thesis in-situ, i.e. in the real world, the determine if the designs will work, and also to gain valuable experience. As it comes the biggest experiences are happening in real life, out of school class. That is why I visited Republic of Kenya with my little eco design project through a volunteer program.

The project in Kenya is focused on cleaning the environment followed by making easy products from the collected waste. During the stay I realized how important it is for designers to be in contact with final consumer and how important is demarcation of needs. These terms determine the final utility of products.

The practical part of this thesis will be divided into two main parts. The first part thoroughly describes the technical aspects of all of the designs and the manufacturing process. It will be focused on used materials and its purification.

The second part of the practical contains the stay in Kenya and describes the ordinary life of volunteers, local people and approach of the African mentality. This part will contain information about the manufacturing process and cooperation with members of the community.

“I did then what I knew how to do. Now that I know better, I do better.”

— *Maya Angelou*

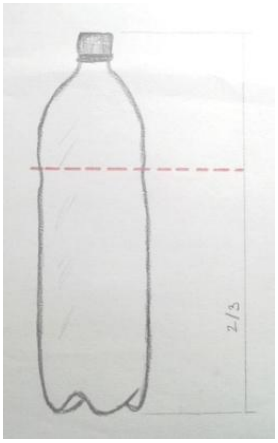
5.1.The eco projects used in Kenya

The local people in village Ndeyia were informed about three different ways they can reuse the waste materials around them. Unfortunately, we had time to implement just two of them and the last one was described just theoretically. This chapter will explain the details of the manufacturing process of each method of reusing the materials around them.

5.1.1. Seat made from plastic bottles

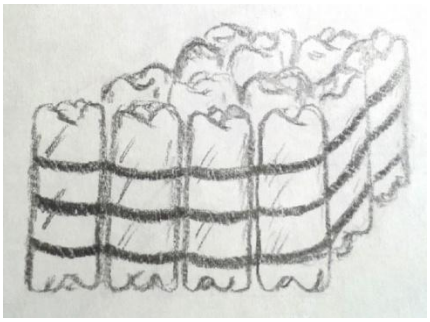
This design was explained just in theoretical level but the group fully understood the concept and promised they will try to make it. The seat is made of thirty two plastic bottles, preferably of 2 liter capacity; plastic rope which is described in next chapter 5.1.2. and, plastic weave and sand. As a cushion can be used the products from two following chapters.

1) Filling bottles with sand: At first is good to fill sixteen bottles with sand. This seat will be heavy but stable. This point was discussed with local women and they said they do not move their furniture at all so the weight is not an obstacle.
2) Cutting of the empty bottles: Next step is to cut the remaining sixteen bottles in two thirds of their height which is sketched on picture 21.



Picture 21: Cutting of the bottle *(Sketch)*

3) Layering of the bottles: Once the bottle are cut is possible to put them on the top of the bottles filled with sand. This will make the bottles stronger and prepare them for the necessary sitting area.
4) Connecting of the bottles: The bottles can be connected by any rope but we use the plastic rope which is described in following chapter. Bottles should be organized in four rows of four bottles so it makes a square. As soon as we have them lined up we can start to interlace the ropes and tight them together as is showed on picture 22.



Picture 22: Plastics seat *(Sketch)*

5) Covering of the seat: The completed plastic seat should be covered for the wanted comfort and aesthetics. A cushion can be used from the plastic weave which is introduced in next chapter 5.1.2 and a cushion made of old textile from chapter 5.1.3. At the end is possible to cover the whole seat in an old textile.

5.1.2. Plastics weave

The plastic weave ended up becoming the main project of the visit due to the fact that the woven object can be used in many ways.The original idea was use it as a seat inserted into a wooden construction. Another idea came during the first lecture with local people when they asked me if is possible to make a hand bag from the material, which they could use for shopping. The next ideas came from local women as well when they started to think about selling the final products. They think the plastic weave can be use as a doormat, a saucer, a saddle on a donkey (Kenyan woman are responsible for the family donkey), mattress or just for sitting on the ground. The community use it as a hammock in front of their church.

The weave is made just from plastic bags. The manufacture is divided to few points:

1) Collecting plastics bags: The plastics bags can be found everywhere around in Kenya, on the streets, trees or gardens.
2) Washing the bags: To clean the plastic bags is simple, all that is needed is water and soap.[11]
3) Drying the bags: The bags are dried under
   the sun which is combined with a destruction

[11] More about purification in chapter 5.2.1. Hygiene and depuration of the waste plastics materials in Kenya

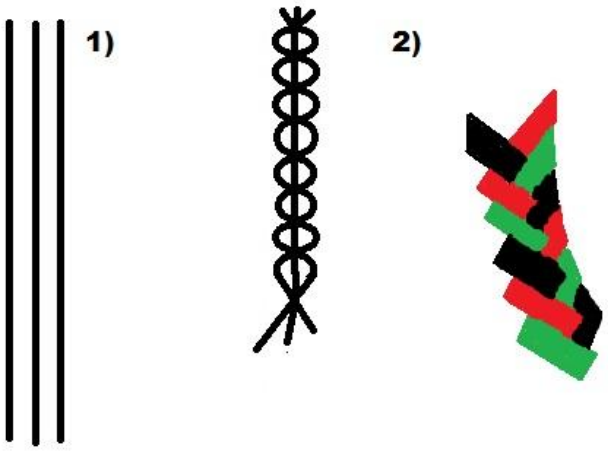
of bacteria caused by the sun heat.

4) Making knots on the bags: In making the knot, a thin plastic rope is formed which is used in the next step. Before making the knots it is good to make the bag bigger by cutting one side of it.
5) Making a plastic rope: Using three pieces of the thin plastic rope is possible to make a strong rope. The technique is well known for local woman as they use it for their hair, for making plaits.

Picture 23: Thin rope

(Source:Kateřina Valová. 2014)

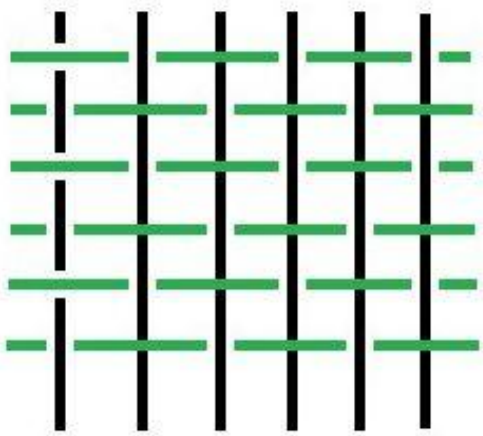
Picture 24: Plastic rope ***(Kateřina Valová, 2014)***



Picture 25: Technique of weaving ***(Sketch)***

Picture 26: Weaving process ***(Kateřina Valová, 2014)***

6) Making a stronger rope: This point can be applied or not, it depends on the function of a final product. The same technique from the previous point is applied here, with the only difference being that the actual plastic rope is used instead of the single plastic ropes.A very strong rope is formed from weaving this rope.
7) Entangling of the ropes: The final weaving of plastics ropes uses the basket weaver´s technique. This technique gives the final product the necessary strength, stability and durability. At the ends, the plastic ropes are connected and tied with string.



Picture 27: The technique of basket weaving *(Sketch)*

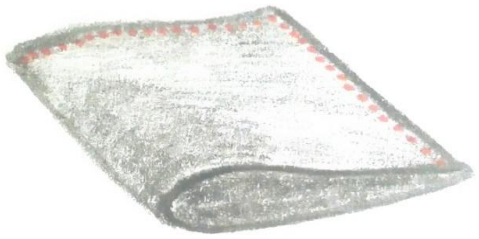
Picture 28: The weaving process *(Donald Morrison, 2014)*

Picture 29: The final tying *(Donald Morrison, 2014)*

5.1.3. Cushion made of old textile

The cushions made of old textile can be a useful way how to recycle unwanted pieces of clothes, blankets or other textile materials. The manufacturing method of this product is very simple. The only necesary equipment is a piece of textile, scissors and a sewing kit. The process would be even easier with a sewing machine but it is not an indispensable product.

1) Shredding of textile: The first step is to cut up the old textile to small bits so the padding for pillow is forming and fluffy.
2) Making of the pillow cover: Cover can be made of old piece of clothes or other nice looking piece of textile. The manufacture can be difficult for people who do not have any experience with sawing. The easiest way to make a cover is to fold the textile in half and seam two of the open sides.



Picture 30: Pillow cover ***(Sketch)***

3) Filling of the cover: Another step is to fill cover with already prepared small bits of textile.
4) Sewing the last orifice: At the end is necessary to sew up the last orifice so the bits of textile do not spill.

Picture 31: Cushion made of old textile ***(Source: Kateřina Valová, 2014)***

5.2. Plastics

In this thesis, plastic the main problem. The previous chapter describes the projects which used plastic materials such as bottles and bags as their main material. In this chapter, the reader will be informed about different types of plastics and what they may be used for with regards to application to furniture. Finally, the focused is shifted to how waste plastics are cleaned before being used as a construction material for furniture.

The characteristic of all plastics is described by Lawson (2013) in his book Furniture Design: An Introduction to Development, Materials and Manufacturing.

Polyester/polyethylene terephthalate (PET/PETE)

Type: Thermoplastic

Charecteristics: Strong, low cost, transparent, high UV resistance

Price ($/KG): Low

UV resistance: High

PET is used widely in the drinks-bottle and food-packaging industries, but also has a broader range of applications, including space blankets, chopping boards and, in fibre form, as sails. Its high mechanical strenght means that very thin bottle walls can match the strength of glass, at a fraction of the weight and with less invested energy. The majority of PET production is of fibres for textiles and rope, with bottles and food packaging accounting for most of the reminder, PET´s use in furniture was very limited until the launch in 2010 of Marcel Wanders´s Sparkling Chair, which was manufactured in the same way as plastic bottles are, but with a greater wall thickness.

Applications: Textile fibres (woven and non-woven), bottles, carpets, flexible packaging, space blankets, chopping boards, boat sails.

Manufactured: PET can be blow moulded, injection moulded and extruded.

Picture 32:The Sparkling Chair ***Source: (www.marcelwanders.com)***

Box 2 : Polyester/polyethylene terephthalate (PET/PETE) (Source: LAWSON, S. , 2013, page 180)

There are three types of plastics used for plastic bags, linear low-density polyethylene (LLDPE), high-density polyethylene (HDPE) and low-density polyethylene (LDPE). The difference between all of them is in chemical structure and the polymer chain. The chains in LDPE are branched but in HDPE and LLDPE the chains are unbranched, they are in linear systems. The difference is also considerable from the thickness and qualities of products, in our case of plastic bags. As Robert Korpella (HDPE Vs. LDPE [online]) says the HDPE materials are tough, rigid and resistant to chemicals,ultraviolet rays and don´t have such a big flexibility. On the other side LDPE is flexible so it resists stress fracturing, and it is softer than HDPE.

In his book, Lawson (2013, p. 179) only describes the high-density polyethylene and the low density polyethylene.

High-density polyethylene (HDPE)

Type: Thermoplastic

Characteristics: Easily moulded, durable, low cost

Price ($/KG): Low to moderate

UV resistance: Moderate

HDPE is mainly used for the manufacture of bottles and some helmets and kayaks. HDPE has good resistance to abrasion, a low coefficient of friction (third only to nylon and ultra-high-molecular-weight polyethylene [UHMWPE]) and very good impact resistance. It is particularly suited to blow molding, while also being good for rotational molding. Even though its resistance to UV is poor, the demanding strength requirements of products such as kayaks make it the ideal material for their production.

Applications: Food containers, construction helmets, kayaks, chopping boards, plastic bags.
Manufacture: HDPE can be thermoformed, injection molded, rotational molded, blow molded, extruded, machined, sawn, drilled, laser cut and water-jet cut. HDPE can be ultrasonically welded and thermo-welded, but does not bond well with adhesive, although it is slightly better than HDPE. However, if bonding is the only option then there are some pre-treatments available that improve adhesion performance.

Box 3 High-density polyethylene (HDPE) (Source: LAWSON, S. , 2013, page 179)

Low-density polyethylene (LDPE)

Type: Thermoplastic

Characteristics: Easily moulded, durable, low cost

Price ($/KG): Low to moderate

UV resistance: Low

LDPE´s flexibility and toughness make it one of the most popular plastics for rotationally molded furniture and blow-molded children´s toy (two processes for which it is very well suited). Compared to HDPE, LDPE is fairly scratch resistant but has a comparable UV performance, altought this can be greatly improved using stabilizers.

Applications: Traffic cones, roadsede bollards, blow-molded children´s furniture, rotational mulded seating, polythene sheeting, plastic bags.

Manufacture: LDPE can be thermoformed, injection mulded, rotational mulded, blow mulded, extruded, machined, sawn, drilled, laser cut and water-jet cut. It can be welded and thermo-welded, but does not bond well with adhesive. However, if bonding is the only option then there are some pre-treatments available that improve adhesion performance.

Box 4 Low-density polyethylene (LDPE) (Source: LAWSON, S. (2013, page 179)

5.2.1. Hygiene and depuration of the waste plastics materials in Kenya

This thesis focuses on the dirty and uncomfortable way of making furniture due to the fact that waste materials are being used as the main material. The waste material collected from the streets is full of dirt and bacteria, which is harmful to human health. Therefore, before using the waste plastic, it needs to be thoroughly cleaned. To start with, plastic gloves are needed. Due to the fact that not everyone in Kenya is able to afford plastic gloves, it is possible to use clean plastic bags as gloves. Once the dirty bags have been collected, they are cleaned using a simple bar of soap. In Kenya, local people use one bar of soap for everything, including washing dishes, clothes, and the body. This bar of soap is the only detergent that people use.One of the most common soaps is Ushindi Soap which contains Water (Aqua), Talc, Coconut Acid, Palm Acid, Tallow Acid, Palm Kernel Acid (Contains One or More of These Ingredients), Glycerin, Fragrance (Parfum), Sorbitol, Sodium Chloride, Pentasodium Penetate, Tetrasodium Etidronate, Titanium Dioxide (CI 77891).[12]

[12] Information available online on www.easyshoppa.com/ushindi-multi-purpose-soap-blue-175g.html

The soap ingredients were consulted with academic staff and deputy head of department in Department of Furniture, Design and Habitat (FFWT)[13], doc. Ing. Daniela Tesařová, Ph.D.. The result is that just a bar of soap is not enough to kill all the bacteria in waste material which is not surprising. We have decided that the best solution for this situation is the heat effect of sun. Kenya, as a country situated on the equator has an average air temperature 25°C, in the summer months 32°C. This figures gets higher on the direct sunlight and can rise up to 70°C where is the heat high enough to kill the harmful bacteria.

The process by which the bags are dried uses the suns heat, killing all the bad bacteria in the final step of preparing the plastic for use.

Picture 33: Washing of the plastic bags ***(Donald Morrison)***

[13] Faculty of Forestry and Wood Technology

5.3. Journey to Kenya

Before traveling to Kenya, it was necessary to collect as much information about the country as possible, as was described in chapter 3: Methodology. The information that was obtained was useful, and allowed me to obtain a good understanding and grounding of the locals. As well as gaining information about the locals, it was also necessary for me to take care with regards to medical aspects and the protection of my health. To do this, I prepared a first aid kid to take with me, I was vaccinated against yellow fever and also against typhoid. I also brought a package of anti-malaria drugs which brought my total spend on medication to 3020 CZK. The first aid kid contained things such as plasters, bandages, scissors, a sewing kit, pain killers, vitamins, plastic gloves, and additional protection such as sun cream and insect repellent. During the preparation for the journey, emails were exchanged between the project coordinator of Muungano International Community. In these emails, we discussed the possibilities of realizing the true impact of the eco project, accommodation, volunteer fees and donations as gifts for local children.

After our arrival, we were picked up from the Jono Kenyatta International Airport in Nairobi and taken to the village of Zambezi, where we stayed with the program coordinator for two weeks. We lived there with his wife Monica and their two children, Elvis and Melanie. We spent our first two days getting acclimatized and meets Francis and Monicas family and friends. On the second day, we were invited to church as most people there were Christians. To our surprise, the mess that surrounded the church was accompanied by gospel music and dance, which made the experience even more intense. Later that day, Francis and his friends took us to the local tavern where we learnt first hand how uncomfortable people from Europe can be made to feel by African people. We wanted to pay the bill with a 100 USD note, which was rejected and we were told to pay another way due to the fact that they thought it was fake. After an obvious disagreement the guard, armed with a handgun and a bow and arrow, locked us in he pub. In this moment I realized that there were 12 men agains 4 men and 1 woman, and that they were expecting the white visitors to pay them money. The argument lasted from 12p.m. until 3a.m, and we were only freed once the money had been paid. In this situation, no-one had enough money to pay the bill, and calling the police was not an option due to the fact that the police will side with whoever gives them the most money. After being locked in the tavern for two hours, the tavern manager let Francis go to the

closest ATM, which took an hour of traveling. Once the bill had been paid, we were free to go. This story is told as an example of of a bad experience and shows that for African people, the „white visitors“ are just seem as a way to obtain money. This fact was following us for the entire stay.

During the stay we visited many places which could help us to understand the Kenyan culture, condition and possibilities. The most striking place for us was the Kibera slum. *„There are approx 2.5 million slum dwellers in about 200 settlements in Nairobi representing 60% of the Nairobi population, occupying just 6% of the land. Kibera houses almost 1 Million of these people. Kibera is the biggest slum in Africa and one of the biggest in the world.“* (Facts & information about Kibera [online]) It was not possible to prepare ourselves for the living conditions that people have to reside in. The only thing we could do to make things a little more bearable was to take four packets of candies for the Kiberian children. More about Kiberia and pollution in chapter 4.1.2.1: The environmental problems in developing countries.

Picture 35 Kibera (*Kateřina Valová, 2014*)

Picture 34 Waste materials in Kibera *(Kateřina Valová, 2014)*

5.4. Community of Ndeyia

On the third day of our stay in Kenya we met the community we were going to work with. The community is made of the church members where is pasturing father of Francis, the head of Muungano organization. The members of community are mostly women and their children. When we saw each other the first time there was a shyness in the air and the language barrier because not everyone got the education to learn English. After the introduction children showed us around the church and vied with each other who will hold our hands. In the first meeting we have spoke about the organization and

plan our stay so is as most effective as possible. This planning included our free time, visiting the Kibera slum, visiting the local school, volunteering in P.E.A.C.E. program and making a simple pieces of eco designed furniture.

The community of Ndeyia is around 20 kilometers from Zambezi, the village we stayed in. To get there could be for many people small adventure. The journey starts on main highway which goes form Nairobi to other bigger cities in Kenya. After 10 kilometers spent in matatu[14] it is required that you take the motorbike taxi. The taxi drivers are waiting beside the highway, waiting for their customers. The following 10 kilometers is on a dusty road full of holes so there is not many others possibilities. One motorbike can carry four adults and, if you are able to pay a little bit more, you can choose a motorbike with a radio or a helmet.

Picture 36: The motorbike taxi ***(Source: Kateřina Valová)***

The church community community consists of the pastor, teacher and around fifty other members. A large part of the community are women and their kids so the age is between two to sixty years.

[14] Matatu: (In East Africa) a minibus or similar vehicle used as a taxi. *(www.oxforddictionaries.com)*

5.4.1. Work with the community

Work with the community was in many ways a great experience. The project was implemented around the Ndeyia church so everyone in the group was religious. That is why I decided to do the first lecture in a way they can understand and they will be interested about. I tried to substantiate the topic like their pastor with reference to God and use religion as opportunity to get closer to them. There was no possibility of hypocrisy as I myself am religious.

Before the seminar started we had given to the group a paper blocks and pens for notes. Those pens and papers were a sponsor gift. During the seminar was the program coordinator translating everything to Swahili because local people do not speak English.

Picture 37: Church of Ndeyia community ***(Source: Kateřina Valová, 2014)***

5.4.1.1. The first lecture

Picture 38: Start of the seminar ***(Donald Morrison, 2014)***

„Karibuni! Hujambo? Jina langu ni Katerina, natoka Czech Republic.[15] I am very happy to see all of you in here. I can see some new faces but with most of you we already met in the play group with your kids, didn´t we? At first I met your kids and spoke with them about our nature and they showed me around. The fish tanks, goats, cabbage field and everything around what is important for them. They took a stranger into their world and showed me everything that they have and what they thought was

[15] In Swahili „Welcome. How are you? My name is Katerina and I am from Czech Republic.“

important for me to see. In that moment I realized how important is to meet you like their parents. Because you are making their world and you are teaching them how to live and how to care about the stuff they have. And this is what are we going to speak about. So thank you for coming.

We came to your village to tell you about the waste materials and how they impact the environment. We would like to show you what you can do with it and show you what you can make from a simple plastic bag, or bottle.

But on the start we have to look at the reasons why should we care abut the nature and why the rubbish is not good. Why is that so important. I will ask you one question: Do you eat fruit…? Do you eat vegetable…? Yes! Of course you do! So do I. And do you know where is all this from…? God given us all this so we can take it and have it. His love was that big that he given us all the planet, all the nature so we can have it and take what ever we need. But he didn´t give us just this. He given us our life. Our health. He given us each other.

You might wonder right now why am I telling you all this. I am telling you this just so we can realize together what all we have. We have everything we need and we are used to take. Take, take, take. But do we give something back?

Do we care about the gifts God gave us? Do we? No! We just go to the tree, take banana and give back plastic bag! But why? Does the tree deserve it? Does nature deserve it? What is so difficult about making a trash bin from an old barrel and using it for our waste?I think that this would be practical and better option than just fill our environment by waste, what do you think? And in the same time it would be easier for us to collect the materials we need for our project.

This project should be a lot about understanding why do we do it. It should be about the passion to make something new and in the same time to clean the village and be a good example for other villages. We will try to make useful things for our ordinary life so I hope you will go into it with me and you will enjoy it! As first before we get to the project, let me tell you some alarming facts about waste in your country. In Kenya people produce around 0,71 kg of waste a day. That means nearly 260 kg of waste per person per year. Most of this refuse materials is plastic and as you might notice, the biggest problems is plastic bags. Before I came to Kenya I spoke with one boy who

used to be a volunteer in Kenya in medical relief organizations *Médecins Sans Frontières*[16] and he told me that in your country are growing plastic bags on the trees. I was laughing at that but when I actually saw it I was shocked.

Picture 40: Plastic bags on trees ***(Source: Kateřina Valová, 2014)***

Picture 39: Rubbish in nature ***(Source: Kateřina Valová, 2014)***

Just in Nairobi, your capital city, 211 316 tonnes of plastic is produced every year. And you can guess now how much of that is recycled..? Just 18%. The rest, 82% of waste, is dumped into the environment.

So now we can get to our projects. After we finish this seminar we should be able to make chair from plastic bottles, hammock from plastic bags, pillows made of old textile which can be used for the bottles chair or just for sitting on the ground.“

The manufacture of each object has been explained: the bottle seat (page 37); the plait made from plastic bags (page 38) and the pillow made from old textiles (page 41); these methods were implemented when the community next met.

„Now I would like to tell you something about the process itself. As I told you we have to do lots of things before we start to make something. We have to collect the bags, wash them, let them dry, tangle the bags, weave the ropes, connect the ropes together and as final use the hassock in the construction. And if everyone did the same it would take long time. So my idea is to make a groups because one of the main things when you start to do something is cooperation. The team work makes a dream work. Let´s say we have five groups and those groups will cooperate and make the work easier for the following processes.

[16] www.lekari-bez-hranic.cz

- Collectors
- Cleaners
- Knot makers
- Weaving group
- Constructors

I think this is everything I wanted to tell you before we start and you should know the required information. Before the next time we meet, you have some homework to do. The homework is to bring as many plastic bags is possible so we can start to work.“

At the end of the seminar was a space for discussion and questions. The students appreciated the idea a lot and asked about the possibilities of application the weaving technique into a hand bag. The local women have to go food shopping every second day because no one has a refrigerator where they could keep the food fresh. For the shopping they need a hand bag to put the food and other things in. Most of the women in the village Ndeiya do not have money to buy a bag so this was a great opportunity for them to make one. We called the eco design project *„Your trash is my cash.“*

Picture 41: The first lecture *(Donald Morrison, 2014)*

After the seminar the students prepared lunch, rice mixed with beef bones and cabbage. The free lunch was one of the reason they came. When the program coordinator told me I should pay for lunch for the community I was not happy about it and to be honest I could not afford it. It held a bargaining about the food price as it would be a lot even in Czech Republic, let alone in Kenya. Thereafter we realized the manner of organization is not as honorable as we thought at the start. After some clear arguments the program coordinator admitted that the figure had been overestimated. However, we paid for the

lunch and during the dine I realized how nice is to see the people happy and share with them the paucity you have.

Picture 42: The first lecture ***(Donald Morrison, 2014)***

Picture 43: The first lecture ***(Donald Morrison, 2014)***

5.4.1.2. The second lecture

The second lecture in Ndeyia community was very productive and has become one the best experiences in my life. At the first lecture got the students a home work to bring as many plastics bags they can and most of them did.

We started with a thorough washing of the dirty bags in soapy water followed by its drying on the sun. As was said in previous chapter, the drying process also helps with proper disinfection of the waste material. Some of the women had the bags already clean so we could start with the process of making tight knots on the bags. To make a bag longer is good to cut one side in half as is showed on picture 23. The manufacture was divided into few groups. Someone was washing bags, someone was making knots and another group was making ropes. The spirit of the moment was surprisingly nice and everyone looked happy. Francis, the program coordinator had a function as a translator between me and the community.

After the thin ropes were finished we tried to make the big strong ropes we wanted use for a hammock. Unfortunately we realized that there is not enough of material to make it from the thick ropes so we had to untangle them and use the thin ropes as a final material for final weaving.

The final weaving went fast and the group worked at it together and helped as much as possible. We had twelve ropes so we split them to six short ones and six longer ones.

The short ropes were used as rudiments and the longer ones were used for the weaving around them. The ends were tight by a string.

Once we were finished everyone was happy and we were thinking what all possibilities of use this product has. As was already said the local woman need a hand bag for food shopping which was for them the great opportunity to learn how to make one. Another idea was to use it as a doormat, a saucer, a saddle on a donkey, mattress or just for sitting on the ground. Than we thought about a hammock for the community kids so we had to try the strength of it and to our surprise the pleat was very strong.

Picture 44: Making a handbag *(Donald Morrison)*

Picture 45: Trying the strength *(Donald Morrison)*

Picture 44: Group with final product

5.4.1.3. Work with kids and youth

Another point of our stay was work with children in local schools. Children can give to travelers the genuine experience as the do not know what a hypocrisy is. When they are happy they do feel free to enjoy it. When they are not they let someone to cheer them up. The work with children was important as we realized they are not told to do things different. They are not told to say „the magical words" as thank you or please. They take as much they can and do not care about anything else. The regard to anything is just totally different than we were used to see. That is the reason we decided to have a few meetings with them where we tried to explain to them a basics concepts as an environment, nature and good behavior. This meetings were happening through the P.E.A.C.E. program in School of Ndeyia. *„P.E.A.C.E. program was made to give youths the needed knowledge and abilities that are necessary for their development into happy, healthy and compassionate adults that can be a part of the solution to creating a Kenya that is peaceful, prosperous and adheres to a higher purpose. This program aligns with and supports projects like the ONE Campaign and UNICEF's goals for world development."* (Our programs [online])

PLAY - On a weekly basis, gather young people who are interested in playing football, active games and other activities as a way of attracting youths in need of critical skills and knowledge. All activities should be delivered in an atmosphere that is enjoyable, compassionate and promotes possibilities. Sportsmanship, fair play and skill development will be central themes during the "play" activities.
EAT - After playing, healthy snacks are to be provided to all participants as the kids cool down in a comfortable location. During this time, participants learn about

accessing and creating healthy, tasty snacks and meals for themselves as well as their families.
APPROPRIATE MENTORSHIP - During the "eat" portion of the program, the volunteers take time to connect with the kids. This time provides opportunities for the development of relationships between peers and volunteer role-models from the local community as well as international volunteer mentors. Also, time to just "hang out" is given to further connections between participants and mentors. Mentors/teachers will also reinforce the importance of healthy living as well as pre-assess the days lesson focus.
CRITICAL LIFE SKILLS - Critical life and vocational skills are to be taught in an informal and fun experiential learning environment located inside and outside the classroom. Program participants will be taught and given structured opportunities to apply the life and vocational skills needed to survive and thrive in Kenya.
EDUCATION - Relevant and critically important information is taught to develop applicable knowledge that helps youths make positive choices that are a part of creating and sustaining a happy, healthy and purposeful adult life. Topics will include fitness, nutrition, hygiene, HIV/AIDS prevention, drug and alcohol abuse prevention, moral values, community, citizenship, non-academic learning, formal education support and the development of an attitude of love and respect towards ones self and all others.

Tab 5: P.E.A.C.E. program ***(Source: muunganointernational.blogspot.cz/p/our-programs.html [online])***

Picture 45: Giving candies ***(Kateřina Valová, 2014)***

Picture 46: School of Ndeyia ***(Kateřina Valová, 2014)***

Picture 47: Kids with gifts ***(Donald Morrison, 2014)***

6. DISCUSSION

Plastic is a common material used to produce a wide variety of products all over the world. Many designers have started to realized the ecological footprint we leave on the planet, and that it needs to change. Eco design brings around new, innovative products that are produced in a way that will not harm the environment. This design does not burden the environment and yet, it is still able to keep the customer satisfied with regards to the products that they need. As is shown in the theoretical part of this thesis, there are many ways to make functional and good looking products from recycled materials

This work is specialized in countries with an alarming problem with environmental pollution due to waste materials. The biggest problem comes from countries which are still developing. In these countries there are many problems that have to be solved however, people do not have the time to care about the environment. This fact made me think about the connection between the lower class and pollution, and any possible solutions.

Using waste materials as a main material for manufacturing various products in developing countries can bring many benefits for the environment and for the local people. The only disadvantage could be the uncomfortable smell of waste materials which could discourage people from collecting. The smell is removed by using soap water which is insufficient means for killing bacteria. Bacteria are killed on the sun during the drying process. This makes the process limited just for sunny days which should be resolved.

In Kenya, there is a problem with education and with transport of information. Most information the people can get is from the local churches as the majority of population is religious. My suggestion is to inform people about possibilities of using waste materials for manufacturing of simple products by regular mass which takes place every Sunday. The pastors all over Kenya could be informed about the technology by volunteers. This program could be offered to international non-profit organizations which has their own contacts around Kenyan voluntary centers.

7. CONCLUSION

After returning to the Czech Republic I am happy to announce that work in Kenya was a success. Local people accepted the idea of eco design and they already have their own ideas about their own products. This work has brought awareness to villages and they welcomed and appreciated it. Mutual co-operation of both parties injected joy into the community as they reaped the benefits of a cleaner environment. In the village where the project was based, local women have already started to think about a functioning manufacturing process as they split the different jobs between themselves for an effective work force. In the future, the community would like their manufactured products to be sold on the market and to dealers. The objective was accomplished with many benefits: not only that the work bring awareness and ideas on how to use waste materials, but also the entry of local women into the economy of the village.

Developing countries should develop.

8. SHRNUTÍ

Bakalářská práce s názvem „Nábytek z odpadových materiálů" se zabývá výrobou jednoduchých nábytkových produktů z již nepotřebných či odpadových materiálů. Práce se tímto způsobem snaží řešit problematiku znečištěného životního prostředí, zejména v zemích třetího světa, kde je stav znečištění alarmující. Obyvatelé těchto zemí jsou zaneprázdněni obstaráváním prostředků k ukojení základních potřeb, tudíž nezbývá čas ani zájem na kladení environmentálních otázek. Řešením se tato práce snaží přiblížit myšlence eco designu a aplikovat ho do prostředí jedné z rozvojových zemí, Keni.

Teoretická část práce přináší základní informace o problematice rozvojových zemí a představuje Keňu, jakožto zemi, která byla pro celý projekt vybrána. Čtenář se seznámí s její kulturou, úrovní tamního vzdělání a budou zde přiblíženy ekologické a politické problémy země. Dále teoretická část představí pojem eco design a s ním rešerši již známých produktů, které jsou tvořeny z recyklovaných či recyklovatelných materiálů, a jejichž výrobní postupy jsou šetrné k životnímu prostředí. Myšlenka eco designu provází celou práci a ztotožňuje se s faktem, že přírodní zdroje jsou omezené a znečištění z výroby je příliš velké. Způsob, jakým designéři vytvářejí své produkty, se mění v závislosti na cenách materiálu, možnostech zpracování a potřebách konečného zákazníka. Designér by měl ovšem také uvažovat o environmentálních a sociálních hodnotách, životním cyklu produktů a zvážit výběr materiálů. Designér, jakožto tvůrce, bere odpovědnost za své produkty. Tato odpovědnost se neváže pouze k zákazníkovi, ale také k životnímu prostředí, ve kterém žijeme.

V praktické části je popsána cesta do Keni, kam jsem se vydala pod křídly tamní neziskové organizace Muungano Comminity International, která se snaží pomáhat jedné z chudých komunit vzděláváním a dalšími programy jako je prevence HIV, práce se sirotky či pomoc se zemědělstvím. S touto komunitou byl realizován projekt, který jsme pracovně nazvali *„Your trash is my cash"*. Tento projekt bere za vlastní myšlenku eco designu a snaží se informovat obyvatele vesnice o možnostech recyklace odpadových materiálů manufakturou jednoduchých produktů. Práce začíná seminářem, kde je komunita informována o škodlivosti odpadů, zejména plastových pytlíků, které jsou všude kolem nich. Dále jim jsou představeny návrhy produktů, které mohou z odpadu tvořit, a celý postup výroby. Mezi těmito produkty je sedák vytvořený z plastových lahví, polštáře ze starých textilií a výplet z plastových pytlíků, který má velmi široké použití. Místní ženy tento výplet budou používat na výrobu tašek, rohožek, matrací,

prostírání a venkovního posezení v podobě hamaku. Dále jim byl navžen jednoduchý model manufaktury, při kterém si celá komunita rozdělí funkce, aby byla práce efektivní. Při dalším shledání se společenstvím byl vyroben plastový výplet, který na sebe vzal funkci hamaku a ve stínu stromů slouží jako místo pro odpočinek. Obyvatelé tuto možnost recyklace odpadu přijali s nadšením a do budoucna plánují své produkty prodávat. Tento projekt posloužil k osvětě tamních obyvatel, k vyčištění vesnice od odpadu a k potenciálnímu vstupu komunity do ekonomiky vsi jakožto monopol v daném odvětví. Ráda bych, aby se tato myšlenka eco designu v rozvojových zemích šířila a byla inspirací.

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