AHL 2100/ENG 3100/DTI 6304: STEAM Design

Project Deliverable B: Develop a first prototype

Group SDG 12B:

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1. Topic

Our group is working on the Sustainable Development Goal 12: Responsible Consumption and Production. Inside this topic, we want to explore more about the environmental impacts of fast fashion, showing how it contributes to microplastic pollution, which affects marine life and comes back into our lives when we ingest contaminated food. This is especially true for indigenous people who heavily rely on foods from the ocean.

With our project we want to tell the story of how fast fashion is related to microplastic pollution and how that affects not only the environment but also our lives, closing the full circle: from microplastic production to pollution to consumption.

Hence, we want to visually and artistically represent how vast microplastic pollution is, to the point that it reaches isolated parts of the ocean such as the Arctic Ocean and show the correlation between:

- pollutants from factories and food contamination
- increase in fast fashion brands and microplastics in ocean and air microfiber pollution
- increase in fast fashion production and increased clothes waste in landfills
- increase in fast fashion production and increase in CO_2 emissions
- increase in fast fashion production and increase of toxic found in global wastewater

2. Datasets

In this section, we identify chosen datasets that contain the data necessary to support the visualization we intend to create to represent our topic. For each dataset, we provide some information we know so far about the datasets, including their description, authors, content, etc.

About: Data on microplastic particles in an isolated part of the Canadian arctic. We chose this dataset because it provides us with interesting data on microplastic in the Arctic, not only in waters but also in

the air, which helps us understand how vast microplastic pollution is even in more remote places. The dataset is downloadable, so we can use it for our project.

Data Creation Range: Data collected in 2018. Published on the website in 2021.

Created By:

- Kirstie Jones-Williams
- Tamara S. Galloway
- Victoria L. Peck
- Clara Manno

Content: Excel sheet. Downloadable Excel file.

Source:
https://frontiersin.figshare.com/articles/dataset/Data_Sheet_2_Remote_but_Not_Isolated_Microplastics_in_the_Sub-surface_Waters_of_the_Canadian_Arctic_Archipelago_xlsx/14767653/1

About: Plastic Pollution. We chose this dataset because it shows plastic pollution under various aspects, including the ones we are interested in exploring, such as plastic use and production by sector and projections of microplastics in surface ocean by 2050. Also, all data shown can be downloaded, so we can use the data to create our visualization.

Data Creation Range: 1950 - 2018. 2018 was the year when the dataset was published. There are also some projections up to 2050.

Created By:

- Hannah Richie: Senior Researcher and Head of Research at Our World in Data
- Max Roser: Founder and Director of Our World in Data

Content: Text, charts, maps, tables, images. All data shown can be downloaded.

Source: https://ourworldindata.org/plastic-pollution

About: Carbon Dioxide Emissions from Clothing Industry. We chose this dataset because it shows that CO2 emissions are the consequences of producing textiles and clothing. This data represents valid information on how much emissions the world's clothing manufacturers are creating in the aftereffects. Also, all the data shown can be downloaded in CSV/image format, therefore it will make it easier for when we want to use it for data visualization.

Data Creation Range: 2000 - 2015

Created by: Owen Mulhern

Content: Text, charts, maps, tables, images. All data shown can be downloaded.

Source: https://earth.org/data_visualization/the-9-biggest-fast-fashion-statistics/

About: Wastewater from Clothing Dye. We chose this dataset because it represents valid information on how much wastewater is accumulated from producing textiles and clothing alone. Also, all the data shown can be downloaded in CSV/image format, therefore it will make it easier for when we want to use it for the data visualization.

Data Creation Range: 2000-2015

Created by: Owen Mulhern

Content: Text, charts, maps, tables, images. All data shown can be downloaded.

Source: https://earth.org/data_visualization/the-9-biggest-fast-fashion-statistics/

About: Consequences of Apparel Overproduction. This is a good explanation of the consequences of overproducing apparel. Some information from this article will be taken into our report and project to explain how much waste is generated from fast fashion. All data shown can be used as reference.

Data Creation Range: 2018

Created by: Olena Rudenko

Content: Text, charts, images. All data shown can be used as reference.

Source: https://sharecloth.com/blog/reports/apparel-overproduction

3. Analysis

In this section we will explain how we are conducting our data analysis so far, what we have learned from our analysis and we will present some charts we created to better visualize our data.

3.1. How we have analyzed data

First, we compiled all of the sources and datasets found by our team members into the same Excel spreadsheet. We then analyzed through each source and dataset to determine if they are relevant to our topic. The focus primarily is to collect data that represents our story which is the consequences of fast fashion overproduction and the geolocation of those countries that has an unsustainable process.

Based on the data analysis, we managed to keep the sources and data relevant to this project. The data includes textiles and clothes waste, microplastic found in rivers and ocean, global CO2 emissions, global wastewater and others. Next, we trimmed the data and kept only the important values including: country names, latitude, longitude, apparel overproduction in tons, percentage of CO2 emissions and others. Therefore, we can segregate any other un relevant data for data processing in the data visualization phase.

Lastly, we made sure to correlate our main topic's data with the environmental causes' data to make sense of the story we are about to tell later in the presentation. A mind map is created to correlate all of the information and data gathered.

3.2. What did we understand from it

From the data analysis we are able to understand that there are 92 million tons of clothes waste each year dumped into the landfills. This act alone is causing many environmental impacts all over the world. From increasing toxic found in the rivers and ocean, increasing our landfills, and CO2 emissions. These environmental impacts are supported by various sources mentioned in section 2 in this document. Also, there are some solutions we want to explain to reduce the amount of clothes waste to improve environmental sustainability.

Below are some screenshots of the Excel file we created. The file can also be accessed through the link: Data Analysis.xlsx

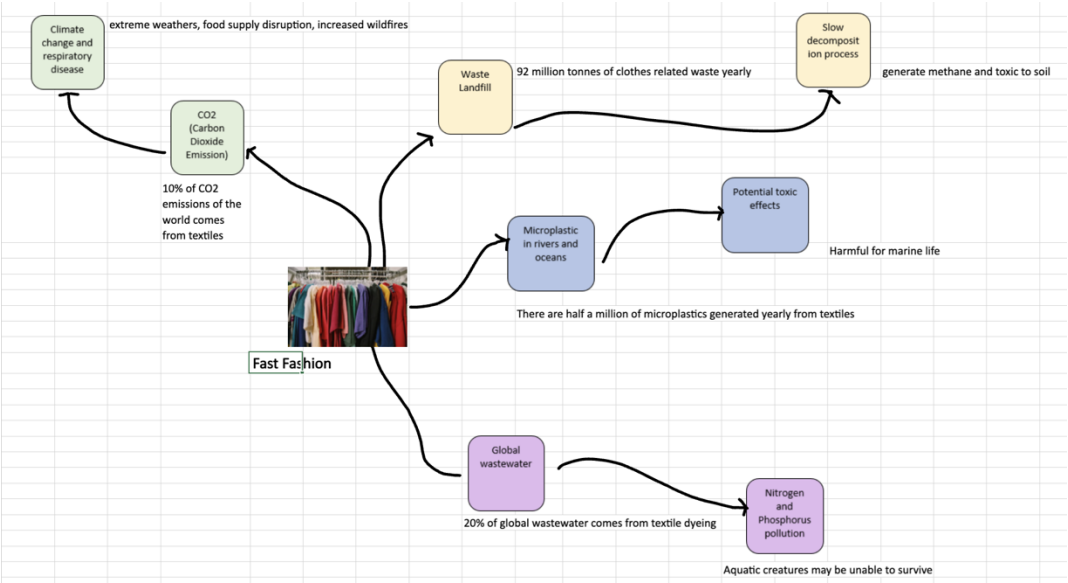

Figure 1: Mindmap correlating fast fashion with environmental impacts

A	B	C	D
Entity	Year	Primary plastic waste generation (million tonnes)	Waste Percentage from Overall Production
Additives	2015	17000000	0.68
All industrial sectors	2015	302000000	0.742014742
Building and Construction	2015	13000000	0.2
Consumer & Institutional Products	2015	37000000	0.880952381
Electrical/Electronic	2015	13000000	0.722222222
HDPE	2015	40000000	0.769230769
Industrial Machinery	2015	1000000	0.333333333
LD, LDPE	2015	57000000	0.890625
Other polymer type	2015	11000000	0.6875
Other sectors	2015	38000000	0.808510638
PET	2015	32000000	0.96969697
PP	2015	55000000	0.808823529
PP&A fibers	2015	42000000	0.711864407
PS	2015	17000000	0.68
PUT	2015	16000000	0.592592593
PVC	2015	15000000	0.394736842
Packaging	2015	141000000	0.965753425
Textiles	2015	42000000	0.711864407
Transportation	2015	17000000	0.62962963

Number Format

Figure 2: Trimmed dataset for plastic waste generation

A	B	C
Entity	Year	Plastic mass input from rivers
Africa	2015	109200
Amazon (Brazil, Peru, Colombia, Ecuador)	2015	38900
Asia	2015	1210000
Australia-Pacific	2015	300
Brantas (Indonesia)	2015	38900
Central & North America	2015	13400
Cross (Nigeria, Cameroon)	2015	40300
Dong (China)	2015	19100
Europe	2015	3900
Ganges (India, Bangladesh)	2015	115000
Hanjiang (China)	2015	12900
Huangpu (China)	2015	40800
Imo (Nigeria)	2015	21500
Irrawaddy (Myanmar)	2015	35300
Kwa Ibo (Nigeria)	2015	11900
Magdalena (Colombia)	2015	16700
Mekong (Thailand, Cambodia, Laos, China, Myanmar, Vietnam)	2015	22800
Pasig (Philippines)	2015	38800
Progo (Indonesia)	2015	12800
Serayu (Indonesia)	2015	17100
Solo (Indonesia)	2015	32500
South America	2015	67400
Tamsui (Taiwan)	2015	14700
World	2015	1404200
Xi (China)	2015	73900
Yangtze (China)	2015	333000
Zhujiang (China)	2015	13600

Figure 3: Trimmed dataset for plastic mass found in rivers

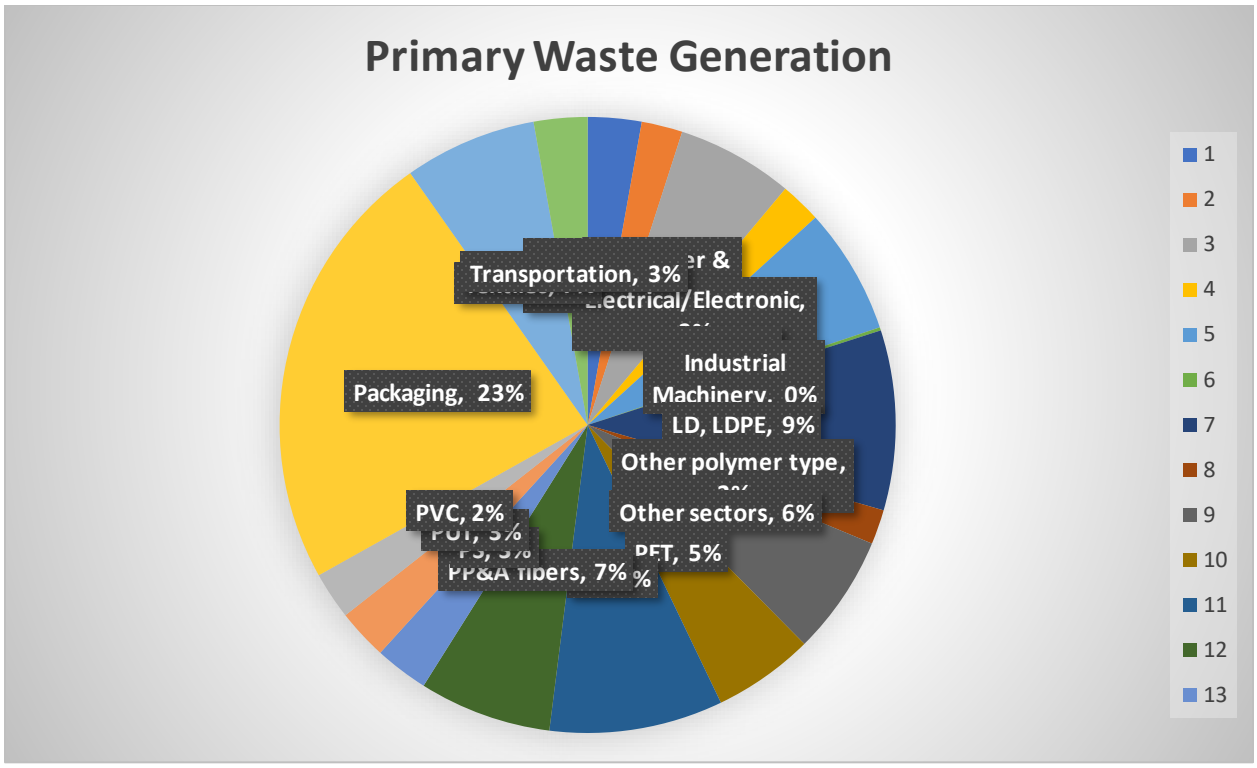

Figure 4: Pie chart representing plastic waste generation by sectors

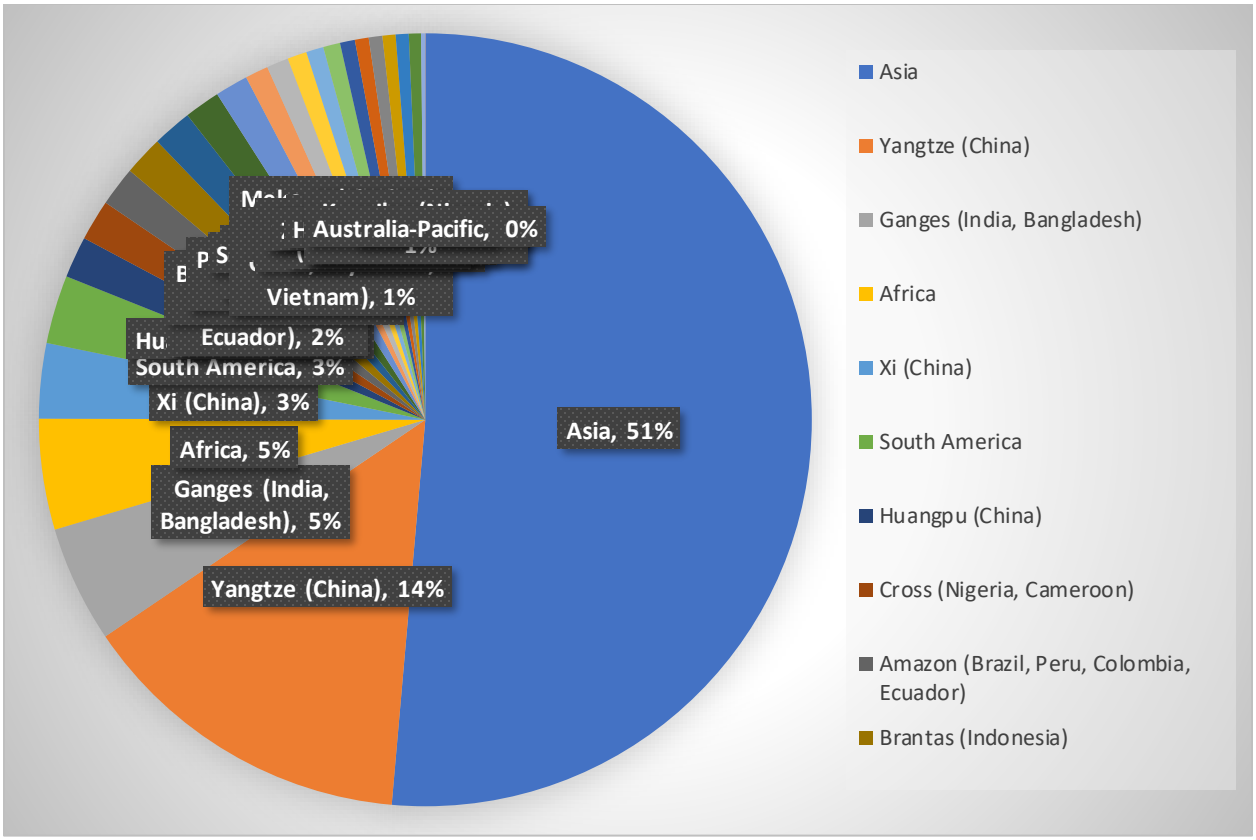

Figure 5: Pie chart representing locations that has most polluted rivers and oceans

4. Prototype

After the initial analysis of our data, we developed our first prototype, which includes a sketch of various environmental impacts by fast fashion in a tree drawing and a geospatial map. For now, we are still representing it through a sketch given the time constraints. However, we plan on digitalizing our prototype as we progress with the project development using tools such as Photoshop.

The tree sketch represents the connection and relation of the same root cause of issue, which is the fast fashion sustainability. Each branch represents each effects and it has different colors to show its differences.

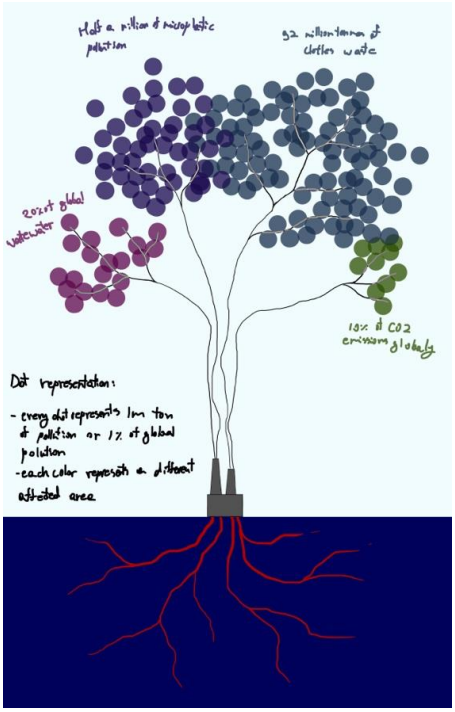

Figure 6: a Tree sketch representing fast fashion (root cause) and its several environmental effects in each branch

The second prototype is build using ARCGis. Our team wants to represents deeper information on where each environmental effects are happening in the world. In this below example, we see ARCGis showing a big red mark which indicates there are a microplastic pollution in the Amazon river in Brazil. The end result of this representation will cover more locations.

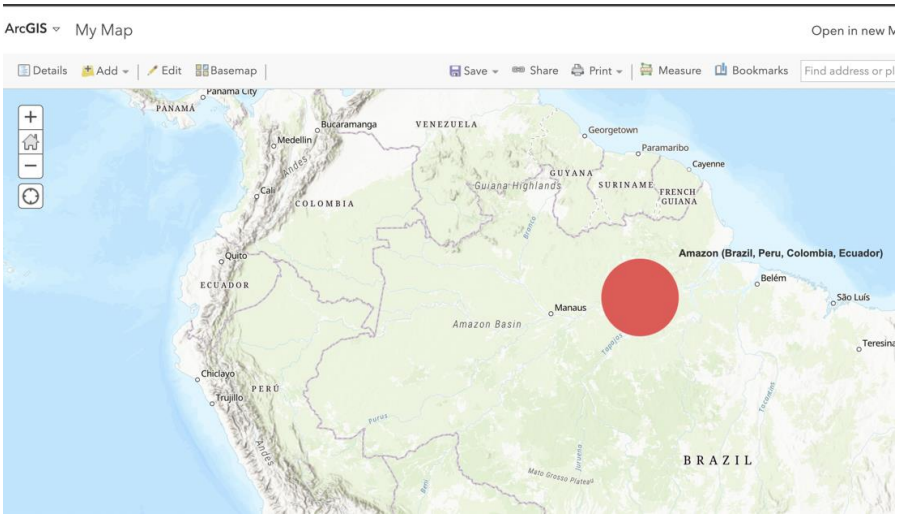

Figure 7: Geospatial map representing one of the polluted rivers in Brazil. Tool: ArcGIS