The Environmental Consequences of the Textile Industry

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We were interested in analysis certain brands and their own contribution to environmental impact.

What is our project?

Discovering the impact of the fast-fashion and textile industry on our local economy from a economic and public health point of view.

Madderson, London

What is the goal of this research?

- For consumers to be more informed of where their clothing products come from

- For leaders to find alternative solutions to industry practices

- Inform people of the environmental consequences of the textile industry

Textile & Clothing Industry
By the number

2nd
Largest polluting industry

17-20%
Global water polluter

20,000
liters of water for

1 kg cotton

21 Billion
Tons of garbage per year

10%
Global carbon emission

CO₂

Additional Statistics.

What information did we look at?

Image captured by New York Times Article, express concerns of the fast fashion industries and its environmental impact.
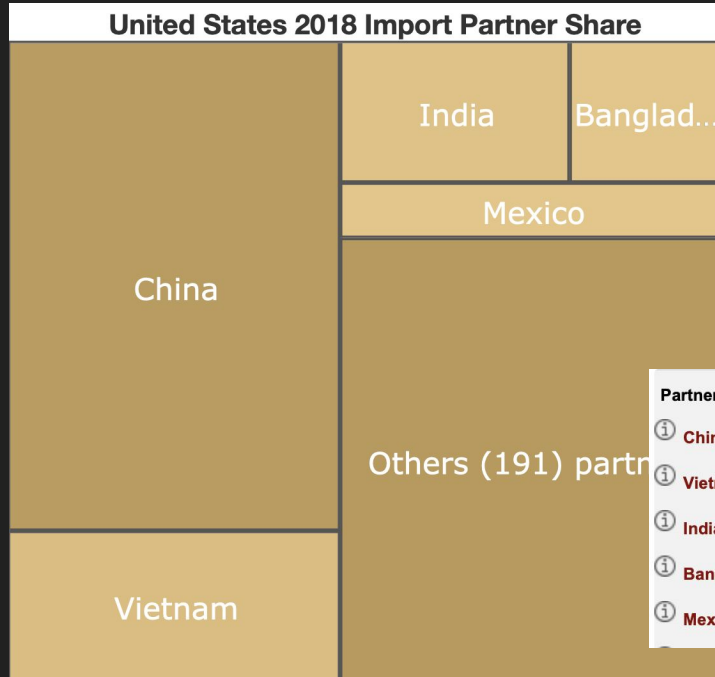
- Most Common Chemicals in each State.

- Public Health Cost of these effects?

- Impact of textile industry on water quality.

- Average water temperature each year.

We'll be talking about the process of our analysis, the technical work we did, and why it's important to consider the environment.

We'll then conclude the segment with our own individual experiences and what we learned from this entire project.

Imports of textiles into the United States.

United States 2018 Import Partner Share

| | China | India | Banglad... |
| Mexico |
| Others (191) partn... |
| Vietnam |

India
Trade Value($):8,500,339.31
Share(%): 7.11

Partner Name	Import (US$ Thousan ▾	Import Product Share (%)	AHS Weighted Average (%)
China	42,479,673.90	7.54	10.92
Vietnam	13,065,662.46	25.48	13.43
India	8,500,339.31	15.06	9.30
Bangladesh	5,688,721.53	89.89	11.01
Mexico	5,426,102.06	1.55	0.00

Preview of Our Data Sets:

We used a total of four different data sets from kaggle, gemstats, and worldbank.

State Name	District Name	Block Name	Panchayat Name	Village Name	Habitation Name	Quality Parameter	Year
ANDHRA PRADESH	EAST GODAVARI(04)	PRATHIPADU(10)	GOKAVARAM(04)	VANTHADA(014)	VANTHADA(0404410014010400)	Salinity	1/4/09
ANDHRA PRADESH	EAST GODAVARI(04)	PRATHIPADU(10)	GOKAVARAM(04)	PANDAVULAPALEM(022)	PANDAVULAPALEM(0404410022010400)	Fluoride	1/4/09
ANDHRA PRADESH	EAST GODAVARI(04)	PRATHIPADU(10)	GAJJANAPUDI(06)	G. KOTHURU(023)	G. KOTHURU(0404410023010600)	Salinity	1/4/09
ANDHRA PRADESH	EAST GODAVARI(04)	PRATHIPADU(10)	GAJJANAPUDI(06)	GAJJANAPUDI(029)	GAJJANAPUDI(0404410029010600)	Salinity	1/4/09
ANDHRA PRADESH	EAST GODAVARI(04)	PRATHIPADU(10)	CHINTALURU(10)	CHINTALURU(028)	CHINTALURU(0404410028011000)	Salinity	1/4/09
ANDHRA PRADESH	EAST GODAVARI(04)	PRATHIPADU(10)	ELURU(16)	P. JAGANNADHAPURAM(035)	P. JAGANNADHAPURAM(0404410035011600)	Fluoride	1/4/09

Number of Observations: 550243
Number of Variables: 8

STATION CODE	LOCATIONS	STATE	Temp	D.O. (mg/l)	PH	CONDUCTIVITY (µmhos/cm)	B.O.D. (mg/l)	NITRATENAN N+ NITRITENANN (mg/l)	FECAL COLIFORM (MPN/100ml)	TOTAL COLIFORM (MPN/100ml)Mean	Year
1393	DAMANGANGA AT D/S OF MADHUBAN, DAMAN	DAMAN & DIU	30.6	6.7	7.5	203	NAN	0.1	11	27	2014
1399	ZUARI AT D/S OF PT. WHERE KUMBARIRIA CANAL JOINS, GOA	GOA	29.8	5.7	7.2	189	2	0.2	4953	8391	2014
1475	ZUARI AT PANCHAWADI	GOA	29.5	6.3	6.9	179	1.7	0.1	3243	5330	2014
3181	RIVER ZUARI AT BORIM BRIDGE	GOA	29.7	5.8	6.9	64	3.8	0.5	5382	8443	2014
3182	RIVER ZUARI AT MARCAIM JETTY	GOA	29.5	5.8	7.3	83	1.9	0.4	3428	5500	2014

Number of Observations: 1992
Number of Variables: 12

Year	Export(US$Thousand)
1988	3,148,861.47
1989	4,080,891.82
1990	4,899,971.21
1991	4,882,667.33
1992	5,707,423.89

Number of Observations: 31
Number of Variables: 2

```
GEMS Station Number;Sample Date;Sample Time;Depth;Parameter Code;Analysis Method Code;Value Flags;Value;Unit;Data Quality
IND00001;1991-04-04;12:00;0.6;H-T;T-COL-EDTA-EBT;;116.0;mg/l;Fair
IND00001;1991-04-04;12:00;0.6;TP;COL-SnCl-SA-PPS;;0.0;mg/l;Poor
IND00001;1991-05-07;12:00;0.6;TKN;TKN-T-COL;;3.36;mg/l;Fair
IND00001;1991-05-07;12:00;0.6;NH3N;COL-NES;;1.12;mg/l;Fair
```

Number of Observations: 237279
Number of Variables: 1

Data Set #1:

State Name	District Name	Block Name	Panchayat Name	Village Name	Habitation Name	Quality Parameter	Year
ANDHRA PRADESH	EAST GODAVARI(04)	PRATHIPADU(10)	GOKAVARAM(04)	VANTHADA(014)	VANTHADA(0404410014010400)	Salinity	1/4/09
ANDHRA PRADESH	EAST GODAVARI(04)	PRATHIPADU(10)	GOKAVARAM(04)	PANDAVULAPALEM(022)	PANDAVULAPALEM(0404410022010400)	Fluoride	1/4/09
ANDHRA PRADESH	EAST GODAVARI(04)	PRATHIPADU(10)	GAJJANAPUDI(06)	G. KOTHURU(023)	G. KOTHURU(0404410023010600)	Salinity	1/4/09
ANDHRA PRADESH	EAST GODAVARI(04)	PRATHIPADU(10)	GAJJANAPUDI(06)	GAJJANAPUDI(029)	GAJJANAPUDI(0404410029010600)	Salinity	1/4/09
ANDHRA PRADESH	EAST GODAVARI(04)	PRATHIPADU(10)	CHINTALURU(10)	CHINTALURU(028)	CHINTALURU(0404410028011000)	Salinity	1/4/09
ANDHRA PRADESH	EAST GODAVARI(04)	PRATHIPADU(10)	ELURU(16)	P. JAGANNADHAPURAM(035)	P. JAGANNADHAPURAM(0404410035011600)	Fluoride	1/4/09

- Changing year variable to a time series
- Swapped index with year

Data Set #2:

STATION CODE	LOCATIONS	STATE	Temp	D.O. (mg/l)	PH	CONDUCTIVITY (µmhos/cm)	B.O.D. (mg/l)	NITRATENAN N+ NITRITENANN (mg/l)	FECAL COLIFORM (MPN/100ml)	TOTAL COLIFORM (MPN/100ml)Mean	Year
1393	DAMANGANGA AT D/S OF MADHUBAN, DAMAN	DAMAN & DIU	30.6	6.7	7.5	203	NAN	0.1	11	27	2014
1399	ZUARI AT D/S OF PT. WHERE KUMBARJRIA CANAL JOINS, GOA	GOA	29.8	5.7	7.2	189	2	0.2	4953	8391	2014
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3182	RIVER ZUARI AT MARCAIM JETTY	GOA	29.5	5.8	7.3	83	1.9	0.4	3428	5500	2014

- Merged datasets based on States
- Swapped index with Year
- Fill specific NA columns with researched values.
  - Fill Forward/Backward

Data Set #3:

GEMS Station Number;Sample Date;Sample Time;Depth;Parameter Code;Analysis Method Code;Value Flags;Value;Unit;Data Quality				
IND00001;1991-04-04;12:00;0.6;H-T;T-COL-EDTA-EBT;;116.0;mg/l;Fair				
IND00001;1991-04-04;12:00;0.6;TP;COL-SnCl-SA-PPS;;0.0;mg/l;Poor				
IND00001;1991-05-07;12:00;0.6;TKN;TKN-T-COL;;3.36;mg/l;Fair				
IND00001;1991-05-07;12:00;0.6;NH3N;COL-NES;;1.12;mg/l;Fair				
IND00001;1991-05-07;12:00;0.6;O2-Dis;T-COL-I-AZD;;8.2;mg/l;Fair				
IND00001;1991-05-07;12:00;0.6;Mg-Dis;Mg-CALC-H-Ca;;40.0;mg/l;Fair				
IND00001;1991-06-12;12:00;0.6;SO4-Dis;SO4-TURB;;10.0;mg/l;Fair				

- Everything was in 1 column,
  - Split via ;
- Created variable using split function for the column headers

Data Set #4:

Year	Export(US$Thousand)
1988	3,148,861.47
1989	4,080,891.82
1990	4,899,971.21
1991	4,882,667.33
1992	5,707,423.89

- Remove commas and convert export to float
- Stripping the Year column to time series and set it as index

What is our project?

Discovering the impact of the fast-fashion and textile industry on our local economy from a economic and public health point of view.
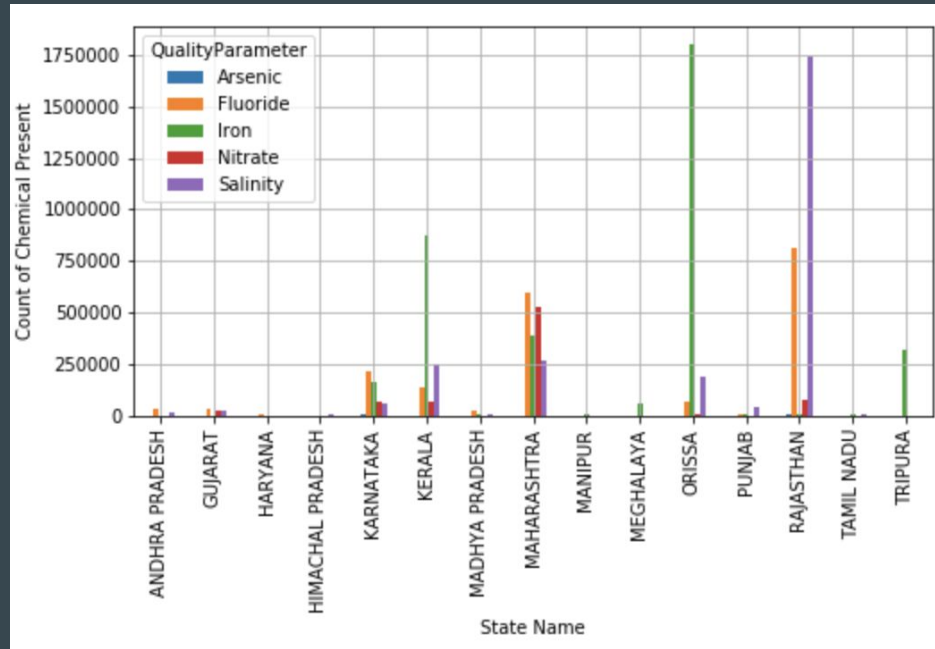

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Q1: Most common chemical present in each state.

Most Common Chemicals in each States in India.
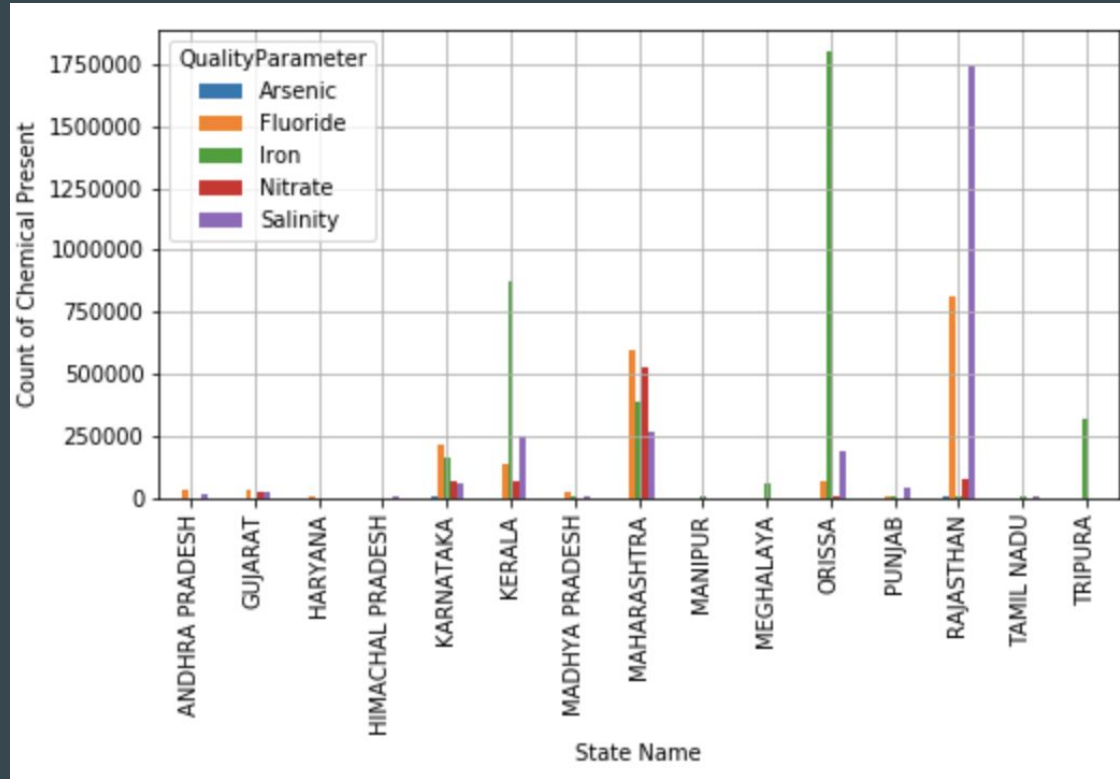
Q1: Most common chemical present in each state.

Most Common Chemicals in each States in India.

- Grouped by states and how many counts present

- Created a pivot table of most common chemicals in each state

- Filled NA

Q1: Most common chemical present in each state.

Iron, Salinity, Fluoride.

Importance of these chemicals.

Damaged Skin Cells
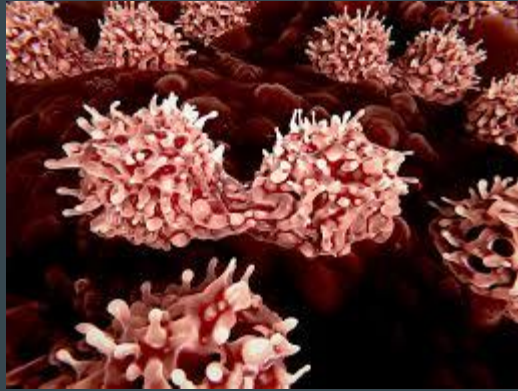
Mutated Genes

Leftover Residue causing Plumbing Issues

Q2: What are the economic costs of these to India?

- India is still a developing country, 1.3b residents
  - Water quality plays a huge role in the lifestyle of these residents
- 80% of India's surface water is contaminated
- Destructive economic growth in downstream communities
  - Decreasing GDP by 33%

Q3: How does textile export affect water quality?

Linear Regression Fitted to Textile Exports Over Time
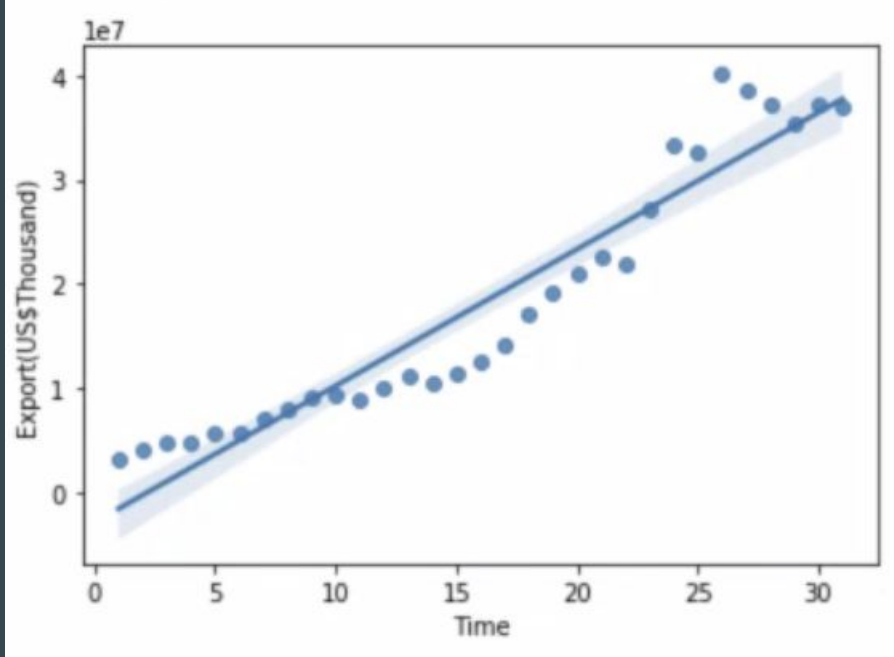
- One of the most rapidly growing industry

- Greater textile exports will lead to large volume of wastewater and garment dye

- We predict that exports will only increase moving forward

# Q3: How does textile export affect water quality?

Linear Regression Fitted to Textile Exports Over Time
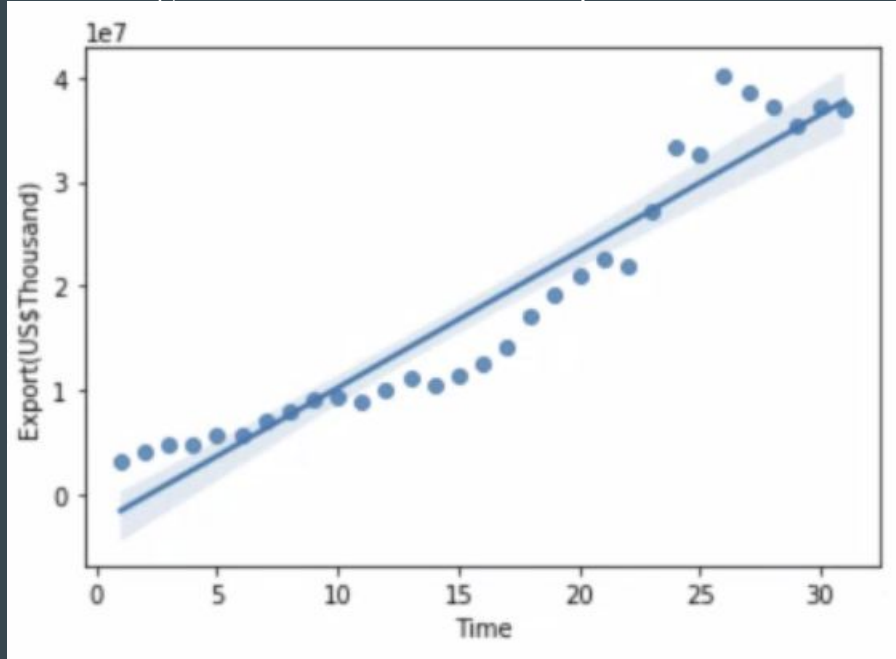
- Fitted Regression using statsmodels.api library

- Had to reshape it to be (-1,1)

- 96% accuracy with forecasting times data points
  - Accuracy decreases moving outside

- Time is a strong indicate of forecasting export value

# Q4: Average water temperature of each year.

Average water temperature over time
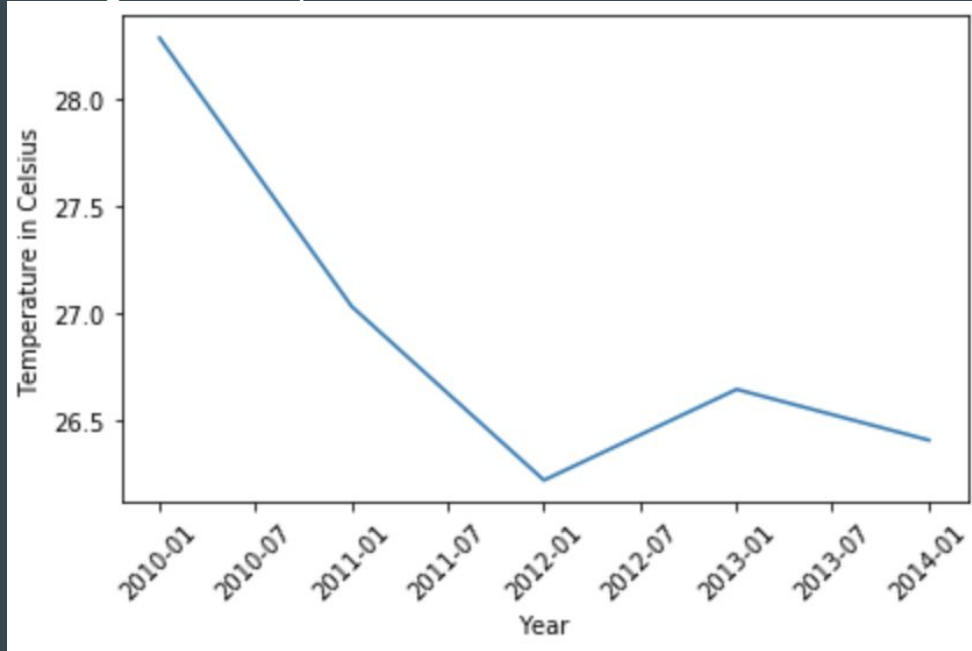
- Why we chose this:
  - Looking at the effects of the textile industry from a water POV

- Why is this important:
  - Immediate death of aquatic organism
  - Seafood Supply Chain Shortage

- Healthy/Normal seafood temperature = 24-27 C

Disclaimer: Did not take into consideration other factors (weather, etc.)

Q4: Average water temperature of each year.

Average water temperature over time
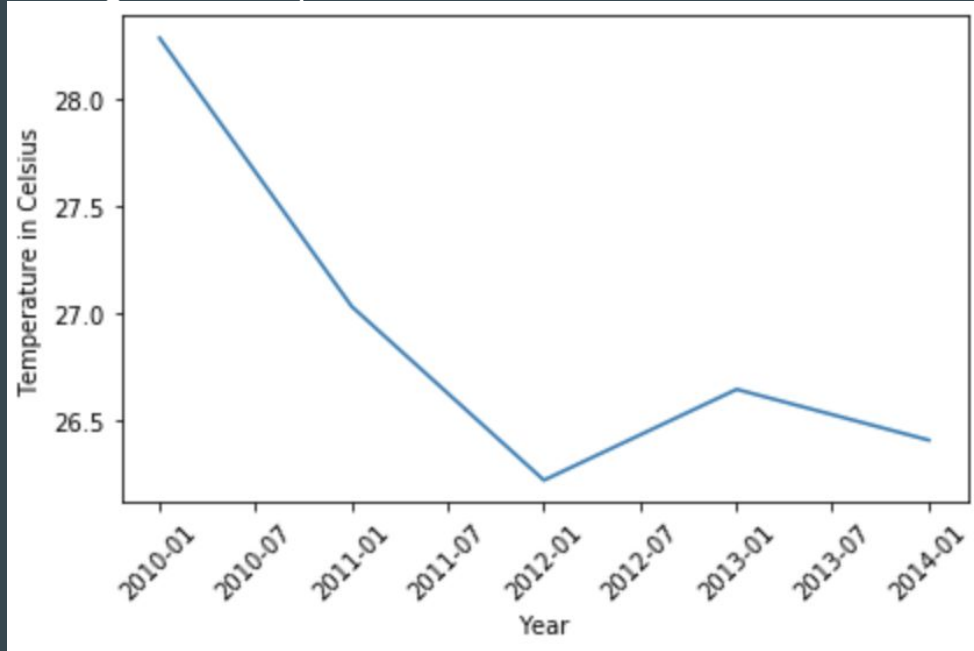
- Removed all NAN, spaces, null

- Made sure time series variable was a date type

- Graphed average temperature and time series using matplotlib.pyplot library

Disclaimer: Did not take into consideration other factors (weather, etc.)

Analysis Conclusion:

Economic inequality in rural areas.

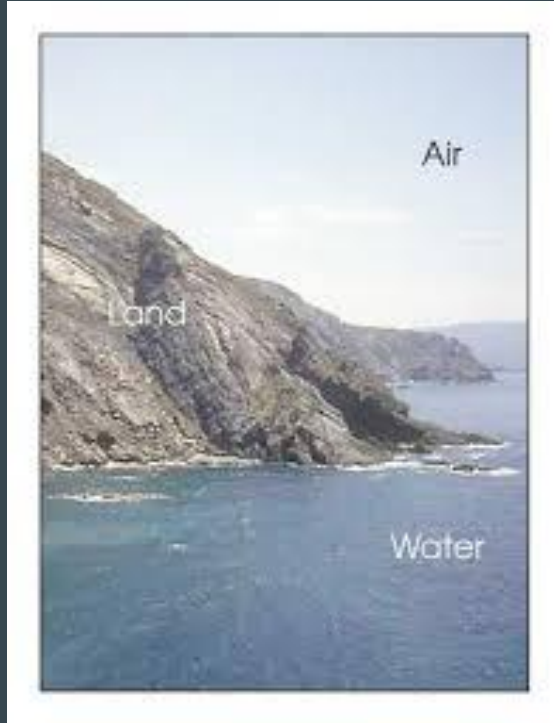Insufficient supply of seafood & dangerous seafood supply.

Health Hazard for communities that rely on public bodies of water.

Death of aquatic organisms.

Chemically polluted soil leading to bad vegetations

The textile industry is affecting every single aspect of this photo.

Takeaways for us:

Data Life Cycle

Additional Statistics.

Look into other parameters.

Talk to companies.

Reach out to industry leaders more.

Should've picked a specific garment.

Look at case studies.

Interview sweatshop workers.

We were too adventurous on trying to analyze such a dense topic.

Companies do not want the public to analyze these types of information.

Closing Off Statistics: Unethical Sweatshops

300,000 VND/8hrs ~ $13 USD/8hrs
1 worker ~ 200 + Garments/hr

Questions?