The Environmental Consequences of the Textile Industry Hervin Sagnep, Steven Lu, Naa Lamptey-Mills We were interested in analysis certain brands and their own contribution to environmental impact.





#### EVERLANE

# 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



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.



# 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 Paramete	er 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

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
DAMANGANGA AT D/S OF MADHUBAN, DAMAN	DAMAN & DIU	30.6	6.7	7.5	203	NAN	0.1	11	27	2014
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
ZUARI AT PANCHAWADI	GOA	29.5	6.3	6.9	179	1.7	0.1	3243	5330	2014
RIVER ZUARI AT BORIM BRIDGE	GOA	29.7	5.8	6.9	64	3.8	0.5	5382	8443	2014
RIVER ZUARI AT MARCAIM JETTY	GOA	29.5	5.8	7.3	83	1.9	0.4	3428	5500	2014
	LOCATIONS DAMANGANGA AT D/S OF MADHUBAN, DAMAN ZUARI AT D/S OF PT. WHERE KUMBARJIRIA CANAL JOINS, GOA ZUARI AT PANCHAWADI RIVER ZUARI AT BORIM BRIDGE RIVER ZUARI AT MARCAIM JETTY	LOCATIONS      STATE        DAMANGANGA AT D/S OF MADHUBAN, DAMAN      DAMAN & DIU        ZUARI AT D/S OF PT. WHERE KUMBARJRIA CANAL JOINS, GOA      GOA        ZUARI AT PANCHAWADI      GOA        RIVER ZUARI AT BORIM BRIDGE      GOA        RIVER ZUARI AT MARCAIM JETTY      GOA	LOCATIONS      STATE      Temp        DAMANGANGA AT D/S OF MADHUBAN, DAMAN      DAMAN & DIU      30.6        ZUARI AT D/S OF PT. WHERE KUMBAR/RIA CANAL JOINS, GOA      GOA      29.8        ZUARI AT D/S OF PT. WHERE KUMBAR/RIA CANAL JOINS, GOA      GOA      29.5        RIVER ZUARI AT PANCHAWADI      GOA      29.7        RIVER ZUARI AT MARCAIM JETTY      GOA      29.5	LOCATIONS      STATE      Temp      D.6. (mg/)        DAMANGANGA AT D/S OF MADHUBAN, DAMAN      DAMAN & DIU      30.6      6.7        ZUARI AT D/S OF PT. WHERE KUMBARJRIA CANALJOINS, GOA      GOA      29.8      5.7        ZUARI AT D/S OF PT. WHERE KUMBARJRIA CANALJOINS, GOA      GOA      29.5      6.3        RIVER ZUARI AT BORIM BRIDGE      GOA      29.7      5.8        RIVER ZUARI AT MARCAIM JETTY      GOA      29.5      5.8	LOCATIONS      STATE      Temp      D.O. (mg/l)        DAMANGANGA AT D/S OF MADHUBAN, DAMAN      DAMAN & DIU      30.6      6.7      7.5        ZUARI AT D/S OF T. WHERE KUMBARIRIA CANAL JOINS, GOA      GOA      29.8      5.7      7.2        ZUARI AT D/S OF T. WHERE KUMBARIRIA CANAL JOINS, GOA      GOA      29.5      6.3      6.9        ZUARI AT DANCHAWADI      GOA      29.7      5.8      6.9        RIVER ZUARI AT BORIN BRIDGE      GOA      29.5      5.8      7.3	LOCATIONS      STATE      Den, mp, mp, mp, mp, mp, mp, mp, mp, mp, mp	LOCATIONS      STATE      Temp      D.O. (mg/l)      PH      CONDUCTIVITY (µmhos/cm)      B.O. (mg/l)        DAMANGANGA AT D/S OF MADHUBAN, DAMAN      DAMAN & DIU      30.6      6.7      7.5      203      NAN        ZUARI AT D/S OF MADHUBAN, DAMAN      GAGA      29.8      5.7      7.2      18.9      2.2        ZUARI AT D/S OF MADHUBAN, DAMAN      GGA      29.8      5.7      7.2      18.9      2.2        ZUARI AT PANCHAWADI      GGA      29.7      6.3      6.9      17.9      1.3        RIVER ZUARI AT BORIM BRIDGE      GGOA      29.5      5.8      7.3      8.3      1.9	LOCATIONS      STATE      Temp      D.O. (mg/l)      PH      CONDUCTIVITY (µmhos/m)      B.O. (mg/l)      INTRATENAN N+ NITRITENANN (mg/l)        DAMANGANGA AT D/S OF MADHUBAN, DAMAN      DAMAN & U      30.6      6.7      7.5      203      NAN      0.1        ZUARI AT D/S OF MADHUBAN, DAMAN      GAA      29.8      6.7      7.5      203      NAN      0.1        ZUARI AT D/S OF MADHUBAN, DAMAN      GAA      29.8      6.7      7.2      1898      2      0.2      0.2        ZUARI AT DANCHAWADI      GGA      29.5      6.3      6.9      1.7      0.1      0.1        RIVER ZUARI AT BORIM BRIDGE      GGA      29.7      5.8      6.9      64      3.8      0.5        RIVER ZUARI AT MARCAIM JETTY      GGA      29.5      5.8      7.3      83      1.9      0.4	LOCATIONS      STATE      Temp      D.O.(m/l)      PH      CNDUCTIVIT (µmhos/m)      B.O.(m/l)      NTRATENAN + NTRATENAN (m/l)      FECAL COLIFICAM (MPN/100m)        DAMANGANGA AT D/S OF MADHUBAN,DAMAN      DAMAN & U      30.6      6.7.7      3.02      NAN      0.1      1.1        ZUARI AT D/S OF MADHUBAN,DAMAN      GAOA      29.8      5.7.8      7.2      1.03      0.2      0.0.2      0.33      3.03        ZUARI AT DANCHANGANANANAN      GAOA      29.8      5.7.8      6.9.9      1.7.9      0.1      3.03      3.03        ZUARI AT DANCHANGANGANGANGA      GAOA      29.5      6.3.9      6.9.9      1.7.9      0.1      0.1      3.03        RIVERZUARI AT DORIM BRIDGE      GAOA      29.7.9      5.8.9      7.3.9      6.6.9      1.9.9      0.0.4      0.9.1      3.02        RIVERZUARI AT MARCALIM JETTY      GOAA      29.5      5.8.9      7.3.9      7.8.9      9.9.9      0.4.9      0.4.9      3.04.9	LOCATIONSSATETemD.G.(m)/PMONDUCTIVI (unhos/n)B.D.D.(m)/ITRATENAN + NITRITENAN (m)/FEAL COLIFORM (MPN/100m)TOAL COLIFORM (MPN/100m)TOAL COLIFORM (MPN/100m)DAMANGANGA AT D/S OF MADHUBAN, DAMANDAMANO30.630.67.530.0NAN0.11127ZUARI AT D/S OF MAUHUSAN, DAMANOGAM29.830.77.231.802.00.20.24.95.333.93ZUARI AT D/S MANGANGANANDANGAM29.56.36.917.00.10.132.9333.93RIVER ZUARI AT BORIM BRIDGEGAM29.55.87.38.831.90.0.434.2834.28RIVER ZUARI AT MARCAIM JETTYGAM29.55.87.38.831.90.0.434.2855.00

#### Number of Observations: 1992 Number of Variables: 12

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;TF;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

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

# 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
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

- 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/I;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.



Madderson, London

### 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



Damaged Skin Cells

Importance of these chemicals.



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:  $\bullet$ 
  - Looking at the effects of the textile 0 industry from a water POV

#### Why is this important: ightarrow

- Immediate death of aquatic organism 0
- Seafood Supply Chain Shortage 0
- Healthy/Normal seafood temperature = 24-27 Cightarrow

### Q4: Average water temperature of each year.



- 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.

![](_page_20_Picture_4.jpeg)

Death of aquatic organisms.

Chemically polluted soil leading to bad vegetations

![](_page_21_Picture_0.jpeg)

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

#### Takeaways for us:

![](_page_22_Figure_1.jpeg)

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

# Closing Off Statistics: Unethical Sweatshops

![](_page_23_Picture_1.jpeg)

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

Questions?