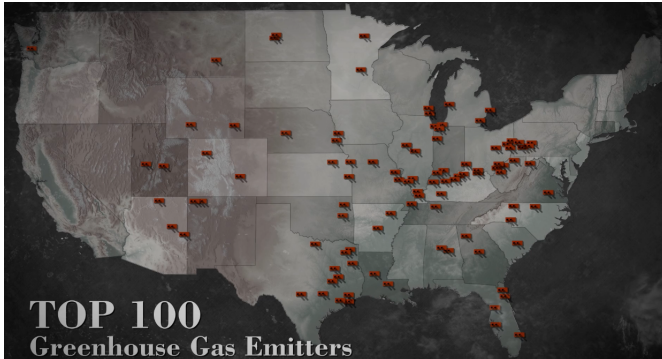


# Using RSEI to Link Super Polluters with EJ Communities

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- ▶ In 2014, 100 industrial facilities produced 1/3 of all related green house gas emissions.
- ▶ Four of these **super polluters** are located in southwest Indiana (*Hopkins 2016*).

*A key feature of society's impact on the environment  
is its unevenness.*

(Pulver & Collins, 2015)

Researchers have found:

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Some **societies** pollute significantly more than others  
(*Chambers 2014*)

Some **groups within society** consume far more resources  
than others (*Baer 2009*)

Some **industrial firms** contribute much more environmental  
harm than others (*Ash et al. 2009*)

Freudenburg termed this pattern ***disproportionality***, which he defined as

*...the strikingly unequal pattern of privileged access to environmental rights and resources that characterize modern societies and economies (Freudenburg, 2006:89, emph added).*

## Disproportionality Research

Research programs focused on ***disproportionality as a key aspect of society's relationship with nature*** are relatively rare, yet produce some striking findings in various settings.

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These studies consistently find that *disproportionality* is a key feature of pollution production, but they don't typically focus on why...

## 1. Environmental Context

- ▶ *proximity to water, urban v. rural setting, landscape characteristics, etc. (Nowak et al. 2006; Hill & Collins in prep.)*

## 2. Social Context

- ▶ **community demography, environmental justice**, *prevailing discourse manipulation, facility employment, production of critical goods, contribute to local tax base, etc. (Freudenburg 2005; Bouwes, et al. 2006; Collins, et al. 2016)*

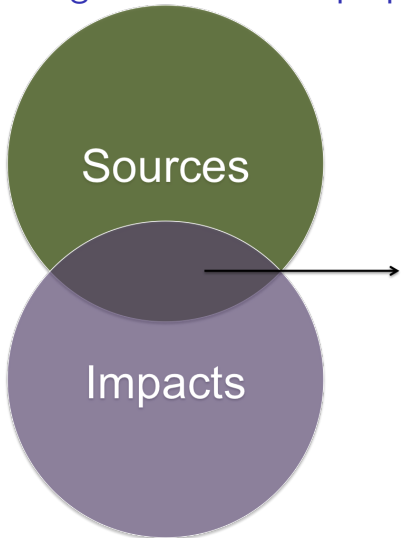
## 3. Endogenous Facility Characteristics

- ▶ *sectoral classification, goods produced, installed pollution controls, use of technology, management styles, facility vintage, ownership information, facility size, financials, etc. (Streitweiser 2004; Ash & Boyce 2009)*

## 4. Exogenous Facility Characteristics

- ▶ *compliance history, inspection history, permit characteristics, sector performance, contribution to societal good, global perspectives, etc.(Collins 2011; 2012; Jorgensen et al. 2016)*

# Linking Production Disproportionalities to EJ Impacts



**Hypothesis:** Production disproportionalities exist because they are located in communities with more non White people and more who live in poverty.

**Question:**  
Is there a spatial co-location of the largest production and human impact disproportionalities?



2007 Risk Screening  
Environmental Indicators  
Geographic Microdata (RSEI-GM)

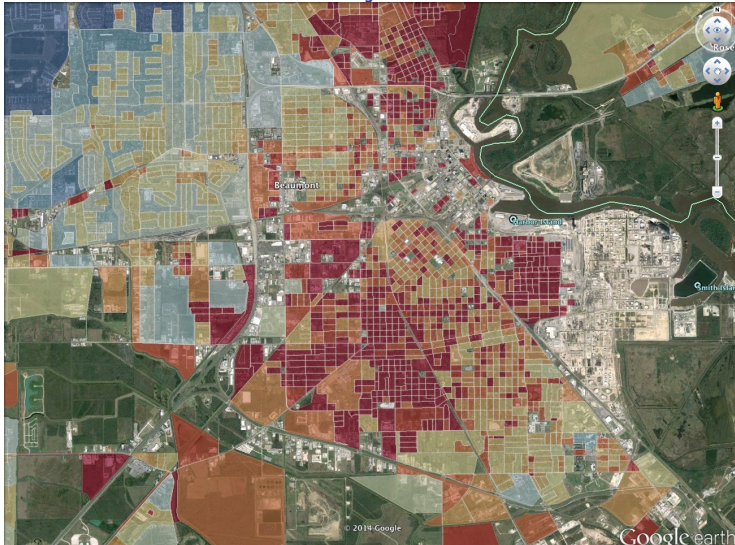
Information about toxicity  
impacts (cancer/non-cancer)



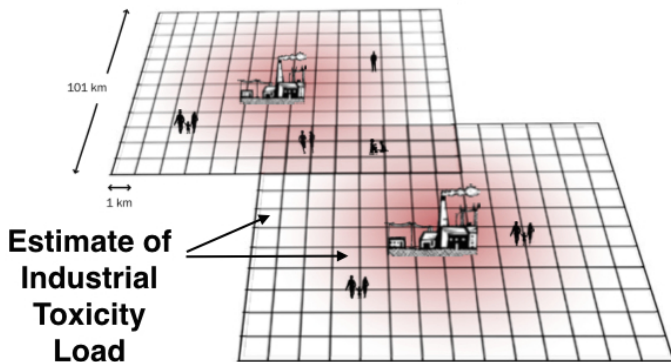
2000 US Census of Population  
and Households

Information about community  
race and income composition

# US Census Block Geometry



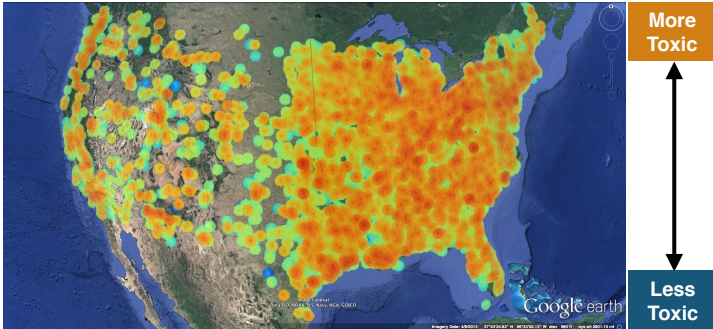
# RSEI-GM



Grid cell-based toxicity,  $ToxicConc_g$ , can be calculated by:

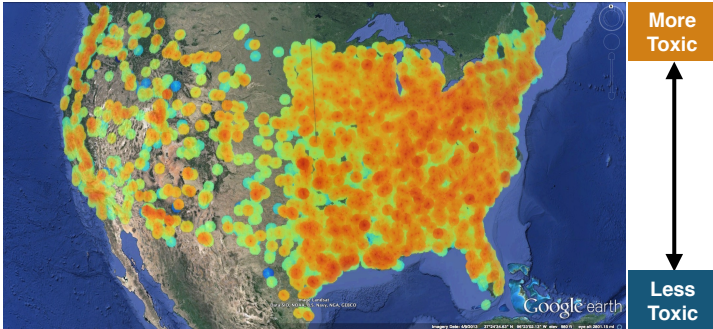
$$ToxicConc_g = \sum_f \sum_c ToxicConc_{f,c,g}$$





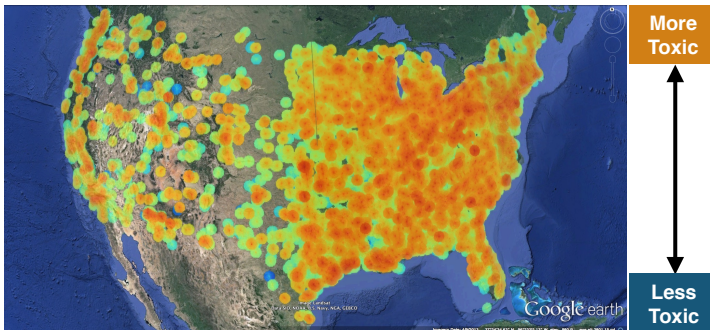
National Scale (Continental US)





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1 billion chemical releases of 800 chemicals from nearly 16,000 permitted industrial facilities



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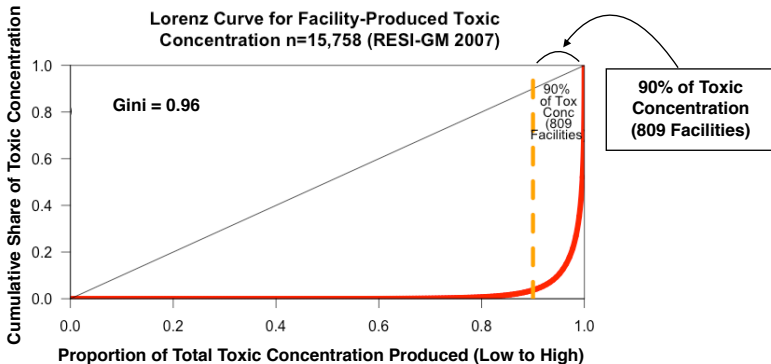
Toxicity is modeled to take into account both cancer and non-cancer human health end points, which is linked to community characteristics.

# Disproportionality: Producers

Facility-based toxicity,  $ToxicConc_f$ :

$$ToxicConc_f = \sum_g \sum_c ToxicConc_{f,c,g}$$

# Disproportionality: Producers

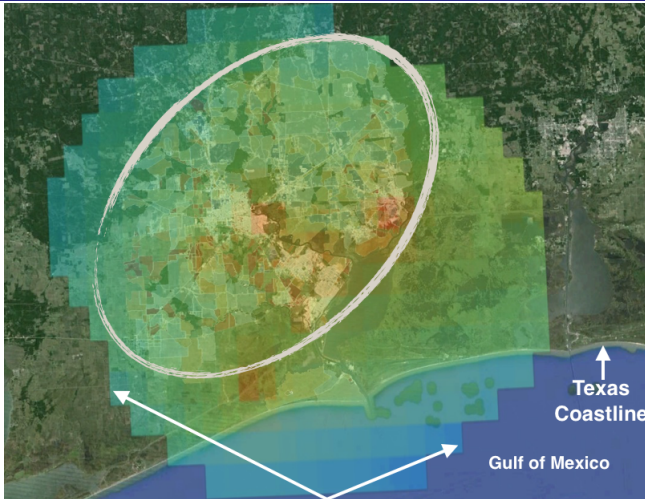


## **Create links between polluters and communities by sampling across the landscape**

Just over 4 million points across the US continental landscape

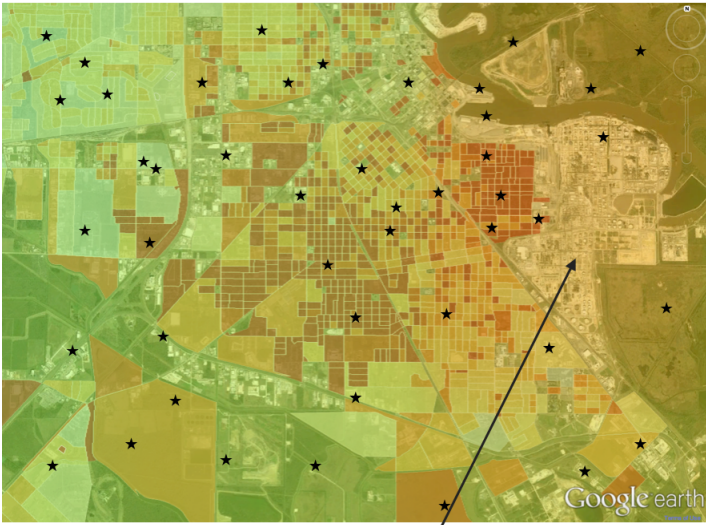
Stratified by population density

Each point falls within a RSEI grid cell, a census block group, and a census block



RSEI-GM Grid Cell Map Layer





Sample Points

Cluster of Several Facilities

US Census Block Geometry Outline: Measured in proportion of respondents reporting their race as "white only."



## Sample Characteristics

Just over 4 million points across the US continental landscape

Covers 99% of generated toxic concentration from about 3500 facilities

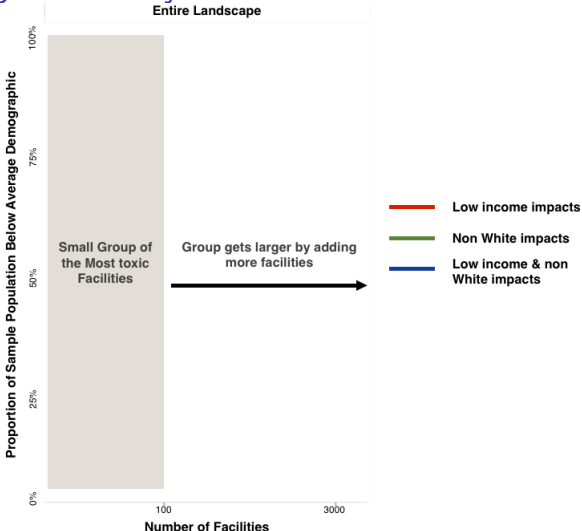
Sample mean income = \$64,581

Sample mean proportion reporting White as their race = 82.5%

Stratified by population density



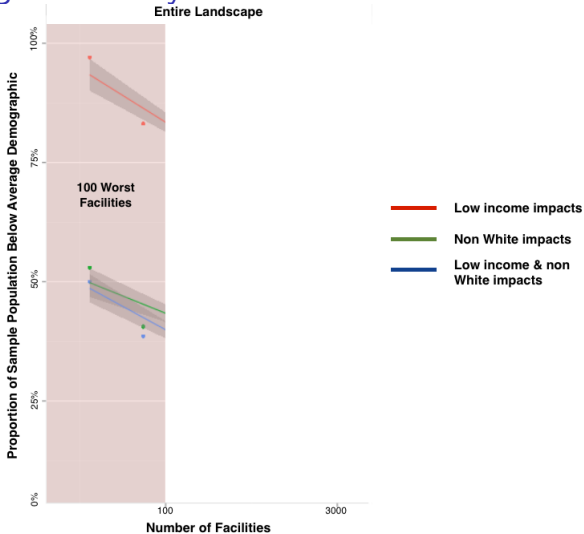
# Findings Summary



(Ranked from Highest Log Toxic Concentration to Lowest Log Toxic Concentration)



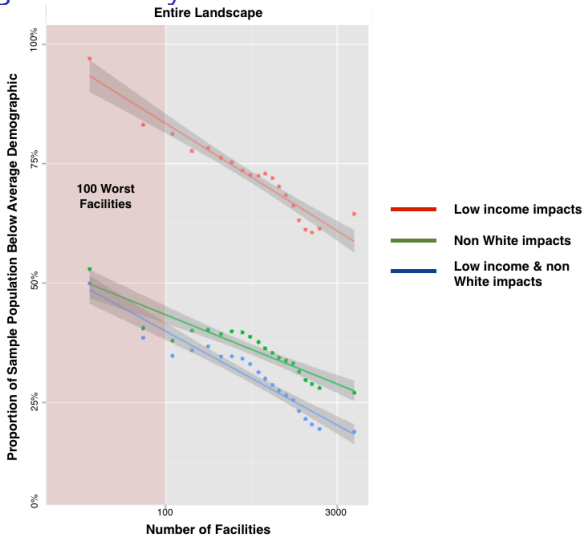
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## General Remarks

There does seem to be a spatial co-location evidence.

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Some of our most vulnerable populations, are not simply dealing with more than their fair share of industrial impacts. They face the worst of the worst.

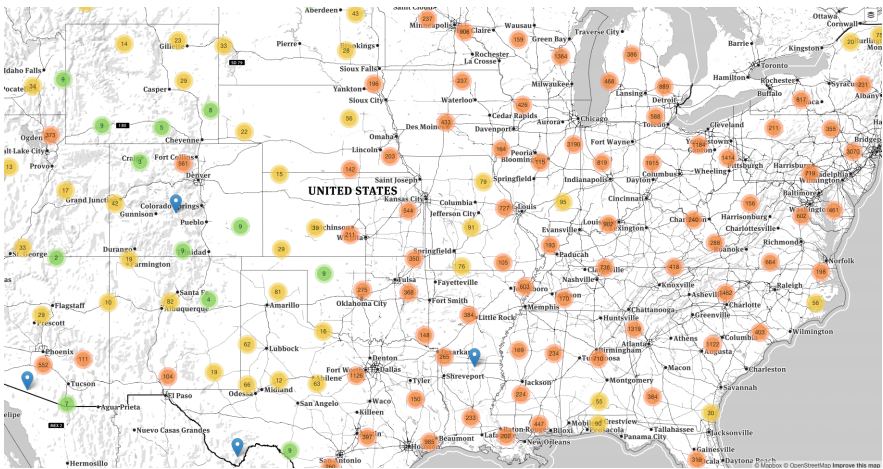
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Some of our most vulnerable populations, are not simply dealing with more than their fair share of industrial impacts.

They face the worst of the worst.

Recognizing disproportionalities can inform our understanding of how to design better environmental policy.



visit: [dcdatageek.com/tri\\_map/](http://dcdatageek.com/tri_map/)



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