

Water Environmental Justice

25 April 2007
42nd class meeting

READINGS
Wed 25 April: Environmental Justice



Figure 11-14-42: Aerial view of Hoover Dam.

Lab 25/27 April: meet at van s-side BSE
Thank Wilson Hughes
Friday ~8:40 to set up in Forbes Lobby

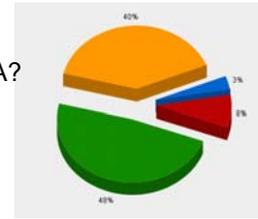
Environmental Biology (ECOL 206)
University of Arizona, spring 2007

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Anna Tyler, Graduate TA

http://eebweb.arizona.edu/courses/Ecol206/206_Page2007.html

1

Earth Day at the UA? Web Poll



Legend

- Yes, I went to an event. 8% (red)
- Yes, I planted a tree. 3% (blue)
- No, but I wanted to. 40% (yellow)
- No, I don't care. 48% (green)

This Arizona Daily Wildcat poll is not scientific and reflects the opinions of only those Internet users who have chosen to participate. The results cannot be assumed to represent the opinions of Internet users in general, nor the public as a whole.

http://wildcat.arizona.edu/poll/index.cfm?event=displayPollResults&poll_question_id=23210 - accessed 23 April 2007

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San Francisco, 2005

Water Use Example



Aral Sea

Figure 14-12 Miller, 2003 (other)

Figure 14-12 Once the world's fourth-largest freshwater lake, the Aral Sea has been shrinking and getting saltier since 1960 because most of the water from the rivers that replenish it has been diverted to grow cotton and food crops. As the lake shrinks, it leaves behind a salty desert, economic ruin, increasing health problems, and severe ecological disruption.

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Water Wars? (Religion, Ethnicity, Oil)

Egypt and Sudan
Syria and Palestine/Israel
Turkey

Figure 14-1 Miller, 2003 (other)

Figure 14-1 The Middle East, whose countries have some of the highest population growth rates in the world. Because of the dry climate, food production depends heavily on irrigation. Existing conflicts between countries in this region over access to water may soon overshadow both long-standing religious and ethnic clashes and attempts to take over valuable oil supplies.



Water Sustainability



Figure 14-33 Methods for achieving more sustainable use of the earth's water resources. Miller, 2003 (other)

5

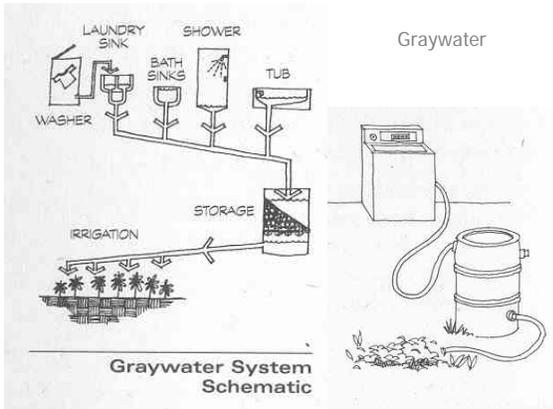
Water Efficiency



Velocipede Recycling Shower

- Redesign manufacturing processes
- Landscape yards with plants that require little water
- Use drip irrigation
- Fix water leaks
- Use water meters and charge for all municipal water use
- Raise water prices
- Require water conservation in water-short cities
- Use water-saving toilets, showerheads, and front-loading clothes washers
- Collect and reuse household water to irrigate lawns and nonedible plants
- Purify and reuse water for houses, apartments, and office buildings

Figure 12-17 Methods for reducing water waste in industries, homes, and businesses. Miller 2003



Graywater

Irrigation

- Lining canals bringing water to irrigation ditches
- Leveling fields with lasers
- Irrigating at night to reduce evaporation
- Using soil and satellite sensors and computer systems to monitor soil moisture and add water only when necessary
- Polyculture
- Organic farming
- Growing water efficient crops using drought-resistant and salt-tolerant crop varieties
- Irrigating with treated urban waste water
- Importing water-intensive crops and meat

Figure 14-17 Methods for reducing water waste in irrigation. =12-16; Miller, 2003 (other)

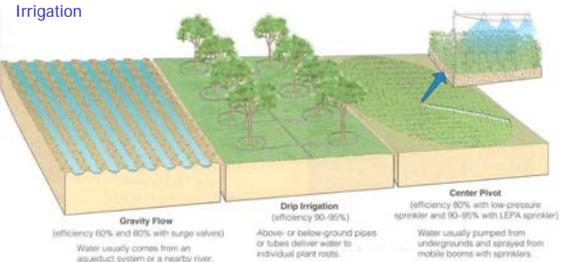
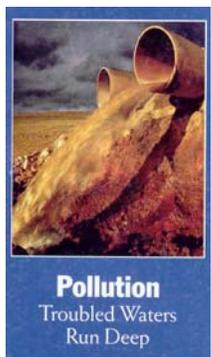


Figure 14-16 Major irrigation systems. Because of high initial costs, center-pivot irrigation and drip irrigation are used on only about 1% of the world's irrigated cropland each. However, this may change because of the development of new low-cost drip irrigation systems (Solutions, p. 341). =12-15; Miller, 2003 (other)



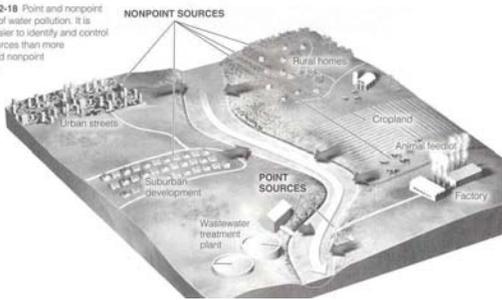
Pollution Troubled Waters Run Deep

Point/Nonpoint



Point vs. Nonpoint

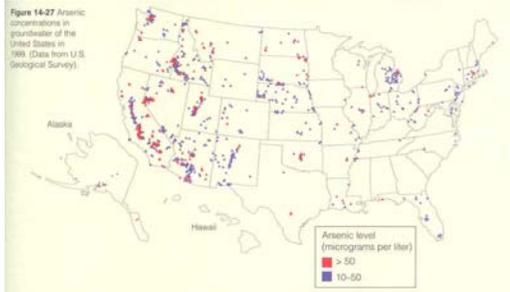
Figure 12-18 Point and nonpoint sources of water pollution. It is much easier to identify and control point sources than more dispersed nonpoint sources.



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Arsenic

Figure 14-27 Arsenic concentrations in groundwater of the United States in 1998. (Data from U.S. Geological Survey.)



CANCER

=p.292; Miller, 2003 (other)

14

Ground Water Pollution

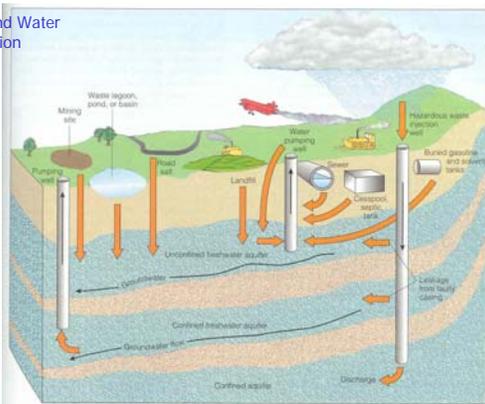


Figure 14-25 Principal sources of groundwater contamination in the United States. =12-22; Miller, 2003 (other)

Table 14-1 Major Categories of Water Pollutants States

=Table 19-1; Miller, 2003 (other)

<p>INFECTIOUS AGENTS Examples: Bacteria, viruses, protozoa, and parasitic worms. Major Human Sources: Human and animal wastes. Harmful Effects: Disease.</p> <p>OXYGEN-DEMANDING WASTES Examples: Organic waste such as animal manure and plant debris that can be decomposed by aerobic (oxygen-requiring) bacteria. Major Human Sources: Sewage, animal feedlots, paper mills, and food processing facilities. Harmful Effects: Large populations of bacteria decomposing these wastes can degrade water quality by depleting water of dissolved oxygen. This causes fish and other forms of oxygen-consuming aquatic life to die.</p> <p>INORGANIC CHEMICALS Examples: Water-soluble (1) acids, (2) compounds of toxic metals such as lead (Pb), arsenic (As), and selenium (Se), and (3) salts such as NaCl in ocean water and nitrates (NO₃⁻) found in some soils.</p>	<p>Major Human Sources: Surface runoff, industrial effluents, and household cleaners. Harmful Effects: Can (1) make freshwater undrinkable for drinking or irrigation, (2) cause skin cancers and crippling spinal and neck damage (P²⁺), (3) damage the nervous system, liver, and kidneys (Pb and As), (4) harm fish and other aquatic life, (5) lower crop yields, and (6) accelerate corrosion of metals exposed to such water.</p> <p>ORGANIC CHEMICALS Examples: Oil, gasoline, pesticides, cleaning solvents, detergents. Major Human Sources: Industrial effluents, household cleansers, surface runoff from farms and yards. Harmful Effects: Can (1) threaten human health by causing nervous system damage (some pesticides), reproductive disorders (some solvents), and some cancers (gasoline, oil, and some solvents) and (2) harm fish and wildlife.</p> <p>PLANT NUTRIENTS Examples: Water-soluble compounds containing</p>	<p>nitrates (NO₃⁻), phosphate (PO₄³⁻), and ammonium (NH₄⁺) ions. Major Human Sources: Sewage, manure, and runoff of agricultural and urban fertilizers. Harmful Effects: Can cause excessive growth of algae and other aquatic plants, which die, decay, deplete water of dissolved oxygen, and kill fish. Drinking water with excessive levels of nitrates lowers the oxygen-carrying capacity of the blood and can kill unborn children and infants ("blue-baby syndrome").</p> <p>SOLIDWASTE Examples: Soil, all. Major Human Sources: Land erosion. Harmful Effects: Can (1) cloud water and reduce photosynthesis, (2) deplete aquatic food webs, (3) carry pesticides, bacteria, and other harmful substances, (4) settle out and destroy feeding and spawning grounds of fish, and (5) clog and fill lakes, artificial reservoirs, stream channels, and harbors.</p> <p>RADIOACTIVE MATERIALS Examples: Radioactive iso-</p>	<p>topes of iodine, radon, uranium, cesium, and thorium. Major Human Sources: Nuclear power plants, mining and processing of uranium and other ores, nuclear weapons production, natural sources. Harmful Effects: Genetic mutations, miscarriages, birth defects, and certain cancers.</p> <p>HEAT (THERMAL POLLUTION) Examples: Excessive heat from cooling of electric power plants (Figure 19-20, p. 302) and some types of industrial plants. Almost half of all water withdrawn in the United States each year is for cooling electric power plants. Harmful Effects: Lowers dissolved oxygen levels and makes aquatic organisms more vulnerable to disease, parasites, and toxic chemicals. When a power plant first opens or shuts down for repair, fish and other organisms adapted to a particular temperature range (Figure 4-13, p. 65) can be killed by the abrupt change in water temperature—known as thermal shock.</p>
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Great Lakes Basin Pollution



Miller, 2003 (other)
 Figure 14-24 The Great Lakes basin and the locations of some of its water quality problems. The Great Lakes region is dotted with several hundred abandoned toxic waste sites that are listed by the EPA as Superfund sites to receive cleanup priority (p. 380). (Data from Environmental Protection Agency.)

<http://www.foxriverwatch.com/index.html>



PCBs "polychlorinated biphenyls"
 Dioxins
 Etc.

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AZDSar 28 March 2004

Factory Farms and Water Pollution



Factory Farms and Water Pollution



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Threats to human health

... The stench can be unbearable, but worse still, the gases contain many harmful chemicals. For instance, one gas released by the lagoons, **hydrogen sulfide**, is dangerous even at low levels. Its effects -- which are irreversible -- range from sore throat to seizures, comas and even death. Other health effects associated with the gases from factory farms include headaches, shortness of breath, wheezing, excessive coughing and diarrhea.

Animal waste also **contaminates drinking water supplies**. For example, nitrates often seep from lagoons and sprayfields into groundwater. Drinking water contaminated with **nitrates can increase the risk of blue baby syndrome**, which can cause deaths in infants. High levels of nitrates in drinking water near hog factories have also been linked to spontaneous abortions. Several **disease outbreaks** related to drinking water have been traced to **bacteria and viruses** from waste.

The widespread use of **antibiotics** also poses dangers. Large-scale animal factories often give animals antibiotics to promote growth, or to compensate for illness resulting from crowded conditions. These antibiotics are entering the environment and the food chain, contributing to the rise of **antibiotic-resistant bacteria** and making it harder to treat human diseases.

Threats to the natural environment

The natural environment also suffers in many ways from factory-farming practices. Sometimes the damage is sudden and catastrophic, as when a **ruptured lagoon causes a massive fish kill**. At other times, it is cumulative -- for example, when manure is repeatedly overapplied, it runs off the land and accumulates as **nutrient pollution** in waterways.

Either way, the effects are severe. For instance, water quality across the country is **threatened by phosphorus and nitrogen**, two nutrients present in animal wastes. In excessive amounts, nutrients often cause an explosion of algae that robs water of oxygen, killing aquatic life. **One such algae type, *Pfiesteria piscicida***, has been implicated in the **death of more than one billion fish** in coastal waters in North Carolina. Manure can also contain traces of salt and heavy metals, which can end up in bodies of water and accumulate in the sediment, concentrating as they move up the food chain. And lagoons not only pollute groundwater; they also deplete it. **Many factory farms use groundwater for cleaning, cooling and providing drinking water.**

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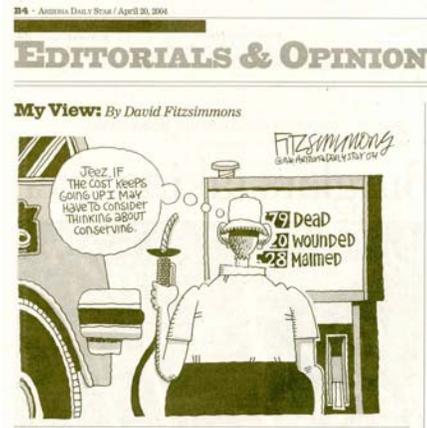
Environmental Justice



Figure 2.8 Communities of poor people and people of color have suffered more than their share of environmental problems in the United States and around the world, a situation that has given rise to the environmental justice movement. Shown in this photo are demonstrators protesting a toxic waste dump in Warren County, North Carolina.

Brennan and Withgott 2005

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Environmental Justice

The United States Environmental Protection Agency defines environmental justice as

'the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations and policies.'

It continues:

'Fair treatment means that no group of people, including racial, ethnic, or socio-economic groups should bear a disproportionate share of the negative environmental consequences resulting from industrial, municipal, and commercial operations or the execution of federal, state, local, and tribal programs and policies.'



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Altgeld Gardens was built in 1945 on an abandoned landfill to house returning African American veterans of World War II.

The area used to be wetlands, but of the original 20,000 acres, only around 500 acres remain. At the time Chicago was growing, the land in this area was cheap. Heavy industry was attracted to the Calumet region for the convenient transportation to the Calumet River and Lake Michigan. Factories and residential housing was built upon the land after it had been filled in with industrial waste, steel slag, sludge, and municipal solids. Slag is the byproduct of the reduction of iron ore and iron to steel. Sludge is treated and dehydrated sanitary sewage.

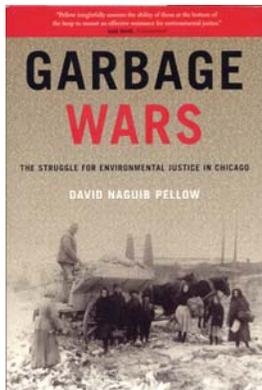
The land upon which Altgeld is built is north and west of a wetland area and was reportedly agricultural land before development. It became an area of industry and the location of such industries as U.S. Steel, The Ford Company, and Pullman Factory. It has been exposed to the wastes of these industries, as well as the waste the people of Chicago. There are 100 industrial plants and 50 active or closed waste dumps in the area, and 90% of the city's landfills surround Altgeld Gardens.

Altgeld has about 2,000 housing units on 1400 acres, half of which are currently occupied. Out of a population of nearly 8,000 about 95% are African American and nearly 65% live below poverty level. It is surrounded by 53 toxic facilities and 90% of the cities landfills in a city that has more landfills per square mile than any other U.S. city.

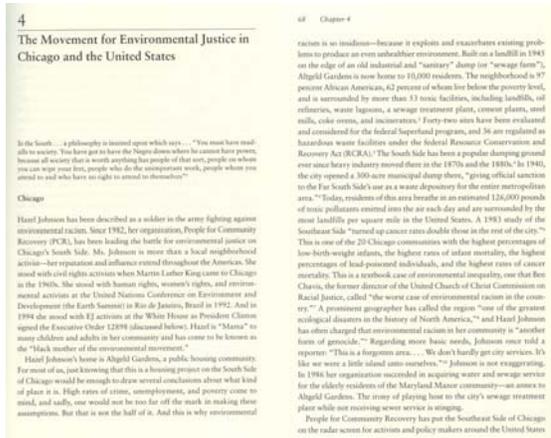
It is one of the densest concentrations of potentially hazardous pollution sources in North America. Many of the landfills that surround them are unregulated, and some of those are still being used. Since most of these landfills as well as many industrial plants are located along the waterways surrounding the area, of the 18 miles of rivers and lakes surrounding Altgeld Gardens, 11 miles of them are unfit for human consumption and recreation, though many residents still fish in them citing that "something's going to kill them anyway."

<http://www.geology.wisc.edu/~wang/EJ/Baldwin/PCR/bcrwhatsaltgeld.htm>

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2002, MIT Press 29



The Movement for Environmental Justice 49

who are concerned about environmental racism. Activists from all around the United States and from other nations came to visit in order to meet and learn from PCR and to take a "toxic tour" of the area. Cheryl Johnson, Hans' daughter, has worked with the organization since the beginning, she says: "We call this area the "Toxic Triangle" because everywhere you look, 360 degrees around us, we're completely surrounded by toxics on all sides."

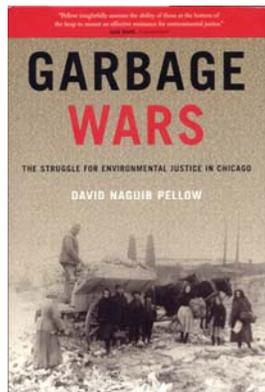
Hans, Cheryl, and others have worked hard to document the health reality they face on a daily basis. Through health surveys of local residents and studies correlating race and income with toxic releases, PCR and other Chicago environmental organizations have done their homework. Studies demonstrate that of Chicago's 162 toxic "hot spots," 99 are in zip codes that are at least 62 percent people of color, and the 24 city wards that are 62 percent or more people of color account for nearly 80 percent of the illegal garbage dumped in the city.³¹ But studies and data are never enough, they do not speak for themselves. PCR quickly learned that if they were ever going to improve the community's situation, they would have to mobilize and create a political force to challenge the state, corporations, and white residents who helped produce the toxic waste by buying their homes and avoiding their taxes. And, as I discuss in chapter 6, PCR would also need to do some soul-searching to overcome their own mistakes in the complex drama that environmental injustice in Chicago has become.

Altgeld Gardens residents have a lot to say about the state of their community. One resident, Regina Roberts, explained:

The been to St. Francis Hospital that we ain't advised as many times I feel like I live there. It's an extra help out here with asthma. You can't grow vegetables out here and you can't have flowers out here. It don't grow. You know it's something in the air when you get a sore stomach when you get on the highway. It's like a hot smell with acid fumes. At the hospital they advised me how long my son had been sick and I said "well he was sick when he was born."

A young African American man put it this way:

I feel they put us in one group with all these factories around us and they know more of us than they know you do. You don't live long when you are out here—see by somebody killing you—usually you would die by chemicals.³²



2002, MIT Press 31

Appendix
The Principles of Environmental Justice

Adopted at the First National People of Color Environmental Leadership Summit, October 24-27, 1991, Washington, D.C.

Preamble

We, the people of color, gathered together at this multinational People of Color Environmental Leadership Summit, to begin to build a national and international movement of all peoples of color to fight the destruction and taking of our lands and communities, to hereby re-establish our spiritual interdependence to the sacredness of our Mother Earth, to respect and celebrate each of our cultures, languages and beliefs about the natural world and our roles in healing ourselves to insure environmental justice, to promote economic alternatives which would contribute to the development of environmentally safe livelihoods, and, to secure our political, economic and cultural liberation that has been denied for over 500 years of colonization and oppression, resulting in the poisoning of our communities and land and the genocide of our peoples, do affirm and adopt these Principles of Environmental Justice:

1. Environmental justice affirms the sacredness of Mother Earth, ecological unity and the interdependence of all species, and the right to be free from ecological destruction.
2. Environmental justice demands that public policy be based on mutual respect and justice for all peoples, free from any form of discrimination or bias.
3. Environmental justice mandates the right to ethical, balanced and responsible uses of land and renewable resources in the interest of a sustainable planet for humans and other living things.
4. Environmental justice calls for universal protection from nuclear testing, extraction, production and disposal of toxic/hazardous wastes and poisons and nuclear testing that threaten the fundamental right to clean air, land, water, and food.
5. Environmental justice affirms the fundamental right to political, economic, cultural and environmental self-determination of all peoples.
6. Environmental justice demands the cessation of the production of all toxic, hazardous wastes, and radioactive materials, and that all past and current producers be held strictly accountable to the people for detoxification and the containment at the point of production.
7. Environmental justice demands the right to participate as equal partners at every level of decision making including needs assessment, planning, implementation, enforcement and evaluation.
8. Environmental justice affirms the right of all workers to a safe and healthy work environment, without being forced to choose between an unsafe livelihood and unemployment. It also affirms the right of those who work at home to be free from environmental hazards.
9. Environmental justice protects the right of victims of environmental injustice to receive full compensation and reparations for damages as well as quality health care.
10. Environmental justice considers governmental acts of environmental injustice a violation of international law, the Universal Declaration on Human Rights, and the United Nations Convention on Genocide.
11. Environmental justice must recognize a special legal and natural relationship of Native Peoples to the US government through treaties, agreements, compacts, and covenants affirming sovereignty and self-determination.
12. Environmental justice affirms the need for urban and rural ecological justice to clean up and rebuild our cities and rural areas in balance with nature, honoring the cultural integrity of all our communities, and providing fair access for all to the full range of resources.

13. Environmental justice calls for the strict enforcement of principles of informed consent, and a halt to the testing of experimental reproductive and medical procedures and vaccinations on people of color.
14. Environmental justice opposes the destructive operations of multinational corporations.
15. Environmental justice opposes military occupation, repression and exploitation of lands, peoples and cultures, and other life forms.
16. Environmental justice calls for the education of present and future generations which emphasizes social and environmental issues, based on our experience and an appreciation of our diverse cultural perspectives.
17. Environmental justice requires that we, as individuals, make personal and consumer choices to consume as little of Mother Earth's resources and to produce as little waste as possible; and make the conscious decision to challenge and re-prioritize our lifestyles to insure the health of the natural world for present and future generations.

One important example of contamination at Altgeld Gardens is a sample taken at the south end of a courtyard surrounded by Chicago Housing Authority buildings. This area is open, accessible and clearly residential. This table reflects PAHs found in the sample:

Chemical	Amount Found in Sample	Safe Amount Proposed by IEPA	How much Sample exceeds IEPA suggestion
Benzo(b) flouranthene	7.9 mg/kg	.9mg/kg	8.7x
Benzo(k) flouranthene	11mg/kg	9mg/kg	1.2x
Benzo(a) pyrene	9mg/kg	.09mg/kg	100x
Indeno(1,2,3-cd) pyrene	4.6mg/kg	.9mg/kg	5x
Benzo(a) anthracene	9.7mg/kg	.9mg/kg	10.7x
Dibenzo(a,h) anthracene	2.3mg/kg	.09mg/kg	25x

The existence of PAHs in Altgeld Gardens soil corresponds with a recurrent complaint made by loc residents—skin irritation. All PAHs have similar effects on human health. Non-carcinogenic PAHs are also skin irritants. Carcinogenic PAHs are also skin irritants in addition to having an immunosuppressive effect.

<http://www.geology.wisc.edu/~wang/EJ/Baldwin/PCR/pcrcenvhealth.htm>





NYTimes 29 March 2004 37

environmental justice

It has come a long way since its humble beginning in the predominately rural African American Warren County, North Carolina, where in the early 1980s a hazardous waste landfill ignited protests which resulted in over 500 arrests. The protests provided the impetus for the United States General Accounting Office to conduct an independent investigation. They also led the United Church of Christ Commission for Racial Justice to produce its historic report, [Toxic Waste and Race](#) in the United States, in 1987. This was the first national study to correlate waste facility sites with demographic characteristics.

Over 28.4 per cent of all low-income African American children are **lead-poisoned** compared to 9.8 per cent of low-income white children

Bad air hurts. It is also costly: the federal Center for Disease Control and Prevention places **air pollution-related health costs at \$14 billion a year**. **Ozone** has been associated with rising asthma, allergic and cardio-respiratory disorders and death. **Asthma accounts for 10 million missed school days, 1.2 million emergency room visits, 15 million outpatient visits, and 500,000 hospitalizations each year.** The asthma hospitalization rate for African Americans and Latinos is three to four times greater than for whites.



Mohai and Bryant 1992
Environmental Injustice/Justice

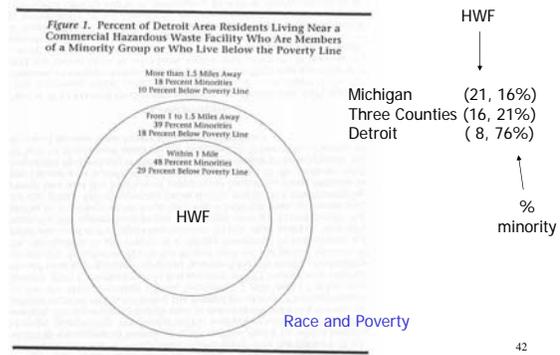
- Race and income
(-if minority, 4x more likely to live near HWF)
- percentage of minorities correlated with:
- Commercial Hazardous Waste Facilities
 - Pollution, Landfills etc.
 - Toxic fish consumption

- Minorities correlated with:
1. Low price of land
 2. Lack of political opposition
little organization, need jobs, underrepresentation
 3. Immobility

NIMBY (global implications)

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Mohai and Bryant 1992
Environmental Injustice



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