Environmental Justice in Air and Water

Spatiotemporal Data Gaps and Indigenous Water Rights

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Contents

Abstract

Understanding the state of environmental justice (EJ) in the U.S. is contingent upon the quality of available data and modelling techniques. Datasets on air and water pollution are identified and characterized by their spatiotemporal resolution and scale. Resolving spatiotemporal differences between datasets will be an important challenge in understanding both the current state of EJ and historical trends. Gaps and biases pertinent to current datasets and models are explored – including monitoring biases, cumulative risk, and combined impacts. Available literature has identified socioeconomic, especially racial, disparities in exposure to air and water pollution and proximity to polluting sources, which are driven by unequitable siting and sorting processes. This literature review focuses on VOCs emitted by oil & gas operations and how fracking and mining disproportionately impact Native Americans, with a discussion about the systemic violations to tribal sovereignty that lead to these EJ issues. This review on EJ issues associated with air and water pollution will contribute to a broader public EPA report on EJ.

Project Goals

1. Identify currently available data and spatiotemporal limitations
2. Document EJ disparities across the US
3. Investigate specific EJ issues in air & water

Goal 1: Identify Currently Available Data and Spatiotemporal Limitations

Air data was identified in the form of self-reported data from facilities and local agencies, monitoring data, satellite data, and higher-level screening tools (Appendix Table 1). While air data has good national coverage and availability, regional and local datasets may fill gaps through regional risk-screening tools (i.e. the Minnesota Pollution Control Agency) and community-level case studies in areas of concern (i.e. the Port of Providence and Southern California monitoring projects). Data-type variations may be synthesized through neural networks to create improved hybrid models for PM2.5.[11,12,13] National water data is available in the form of public water system violation occurrences, contaminants in waterways and wells, surface water discharges, and proximity of people to underground storage tanks (Appendix Table 2). Specific contaminants in drinking water systems are not comprehensive on a national level, but may be collated from local datasets.[29] Making data comparable over time and reconciling differences in temporal resolution will be key to understanding historical trends in EJ.

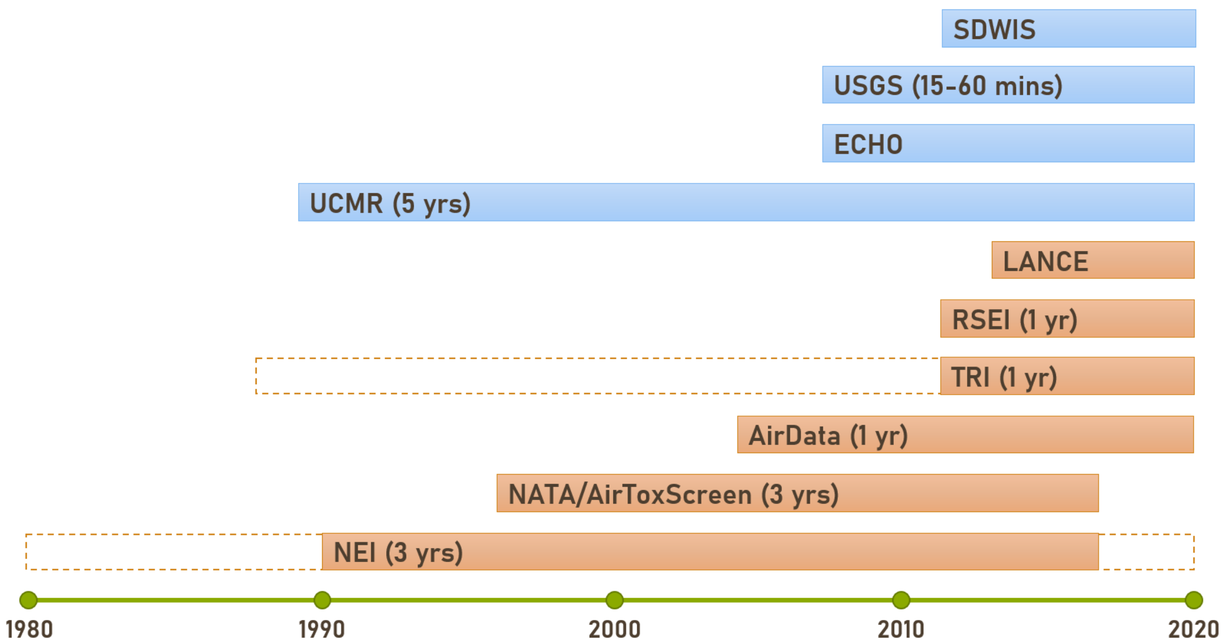

Figure 1: Comparison of the temporal scale and resolution of selected air (orange) and water (blue) datasets.

EPA air datasets have good national coverage but each have their own set of limitations, which is important to understand in documenting spatiotemporal EJ disparities, summarized in Figure 3. The primary EPA datasets for raw air pollution data are the Toxic Releases Inventory (TRI) and the National Emissions Inventory (NEI). TRI datasets contain facilities that must report to TRI if they exceed a certain number of employee equivalents and manufacture, process, or use any of the 770 Emergency Planning and Community Right-to-Know Act (EPCRA) chemicals at a certain quantity. Since these are self-reported, under- and overreporting and tracking differences should be considered. Engineering calculations are also often used to estimate emissions if less costly than direct monitoring. NEI uses a mix of data reported from state, local, and tribal agencies and EPA models and estimates. EPA models and estimates are used for nonpoint sources (i.e. residential heating and asphalt paving), on-road and non-road sources (i.e. vehicle emissions, construction equipment, aircrafts, locomotives, and ships), and event sources (i.e. fires).

NEI considers a wider variety of emissions sources (including point, nonpoint, on-road, non-road, and “event” sources) than TRI, which only considers point sources from large facilities. As smaller, decentralized sources like fugitive emissions from unconventional oil and gas (UOG) activities and pipelines arise, they may be overlooked by TRI. However, while NEI only considers the 6 CAPs and 188 HAPs, TRI considers an extensive 770 different contaminants. TRI reports every year, while NEI only reports every 3 years. Both should be considered as raw emissions source data as they do not consider transport and dispersion, though the Risk-Screening Environmental Indicators (RSEI), National Air Toxics Assessment (NATA), and AirToxScreen datasets they feed into do.

A ProPublica investigation using RSEI data found some limitations in TRI data when engaging with reporting companies.[41]

> ***"Of the 109 companies that responded to us, 71% confirmed that their reported emissions were correct, and 29% noted errors of varying degrees, which we engaged with them to correct. An EPA study found that reported emissions of pollutants to TRI and NEI were within 10% of each other nearly half the time. The reporting system does not distinguish between trivalent chromium or the toxic hexavalent form."***

RSEI combines multiple facilities or "hotspots" for risk-related and/or EJ-related concerns that may pose potential (cumulative) impacts, but does not evaluate health risk itself. NATA (now AirToxScreen) calculates cancer risk and noncancer hazard indices by pollutant. Cumulative and combined impact of exposure to multiple pollutants will be important going forward. RSEI uses a solely relative score that is a combination of dose, toxicity weight, and exposed population. Assumptions are conservative.

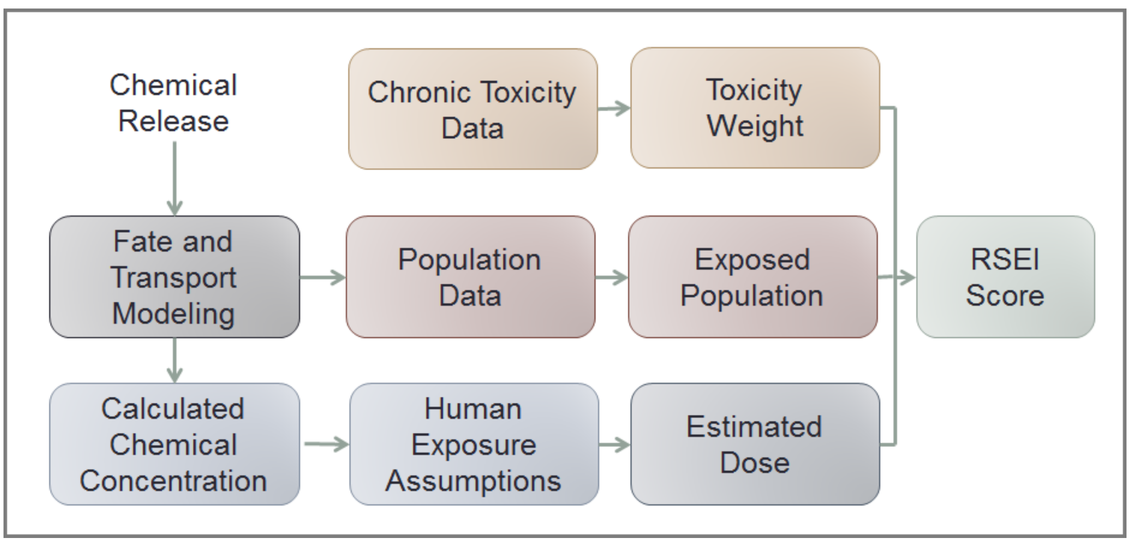

Figure 2: A RSEI Score is calculated as toxicity weight multiplied by the exposed population multiplied by the estimated dose.[42]

The RSEI score is modelled within a 49 km radius of the TRI facility in 810-meter grid cells. Grid cell modelling is favorable for local accuracy while the census tract and block level modelling used in NATA/AirToxScreen and EJSCREEN are best as more general screening tools.

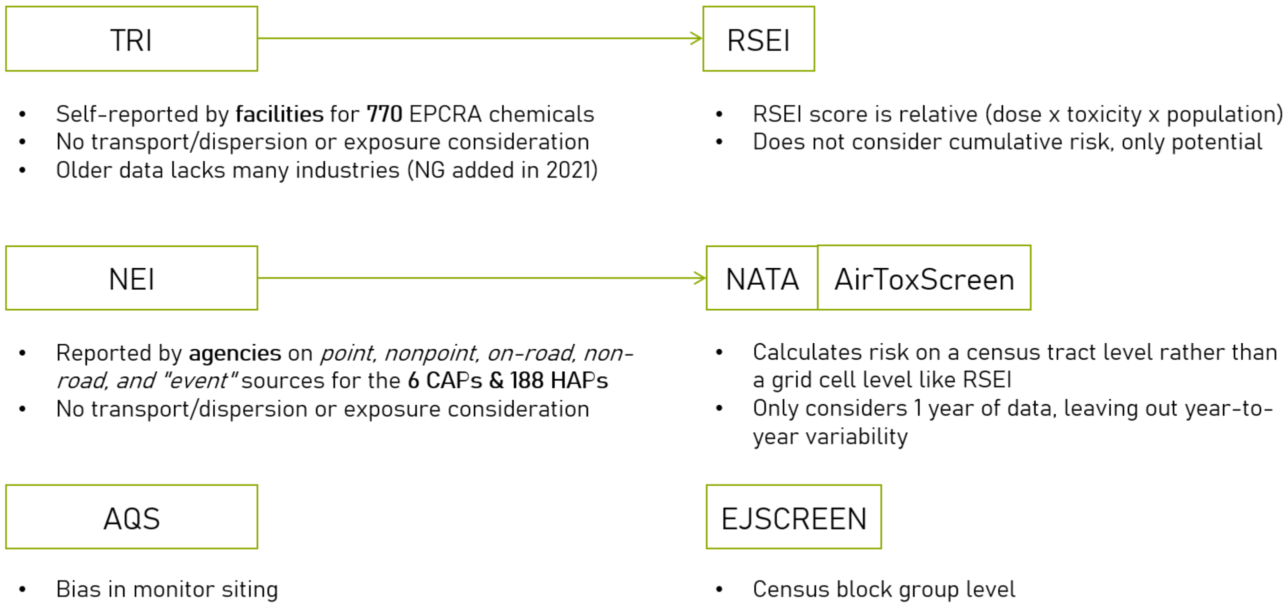

Figure 3: Structure of EPA air datasets and some of their limitations. RSEI data is derived from TRI and NATA/AirToxScreen data is derived from NEI**.**

Goal 2: Document EJ Disparities Across the US

EJ outcomes are driven by siting and sorting decisions as a result of coasean bargaining based on wealth inequality, but efficient coasean bargaining breaks down due to discrimination on the basis of race, ethnicity, and language. This discrimination is evident in private lease negotiations for oil and gas extraction.[1] Even after controlling for other socioeconomic factors such as income, age, and education, race plays an explanatory role in EJ disparities between white and non-white populations in the US. [2]

Monitoring biases further perpetuate pollution disparities by hiding exposure to vulnerable populations. Black populations and those below the poverty line are on average closer to sources of air pollution, and further from regulatory air quality monitoring.[3,4] Regulators in attainment counties avoid pollution hotspots in monitor siting, especially in black & low-income communities, due to perverse incentives that may be political or monetary.[5]

EJ in Air Pollution

Nitrogen Dioxide, PM2.5, and other contaminants disproportionately affect socioeconomically disadvantaged populations for both indoor and outdoor exposure, especially BIPOC. Since the 1980s, absolute PM2.5 disparities have fallen, but relative disparities persist.[6] Mean NO_2 concentrations are 38% higher for nonwhite than white populations. This gap is linked to a higher ischemic heart disease mortality of ~7,000 deaths/year for nonwhite populations.[7] Indoors, socioeconomic status (SES) disparities exist for exposure to NO_2, PM2.5, radon, asbestos, lead, and other contaminants[8] and radon in Rocky Mountain West tribes.[9] Lifetime cancer risks spanning between 6.8 to 591 in 100,000 in Southern California are associated with HAP exposure, mostly due small sources, and race plays explanatory role.[10]

EJ in Water Pollution

Low SES populations also face higher drinking water violations and contamination, associated with homeownership. Lower SES is also associated with increased initial and repeat drinking water violations.[25] Community water systems (CWSs) with lower home ownership and SES residents have more MCL violations and arsenic levels in San Joaquin Valley, CA.[26] Hispanic population (even after controlling for those living near agricultural land), those living near agricultural land, and CWS reliant on groundwater are all associated with high nitrate in CWS nationally.[27] In California, health outcomes associated with nitrate in drinking water are associated with methemoglobinemia and thyroid cancer in California.[28] Cumulative cancer risk is greater for water systems serving communities with higher percentage of Hispanic/Latino and Black members in California and Texas.[29]

Goal 3: Investigate Specific EJ Issues in Air & Water

VOC Exposure from Oil & Gas Operations

The process of UOG development raises EJ issues starting with initial decision-making parameters of developers, siting, and housing decisions/sorting, which create patterns of proximity to extraction in many contexts.[43] Gas flaring and fugitive emissions are often underreported and overlooked in monitoring. The highest quantity of flares in the US occurs in the Bakken, Permian, and Eagle Ford Basins, disproportionately exposing black, indigenous, and Hispanic populations to UOG flares.[14,15]

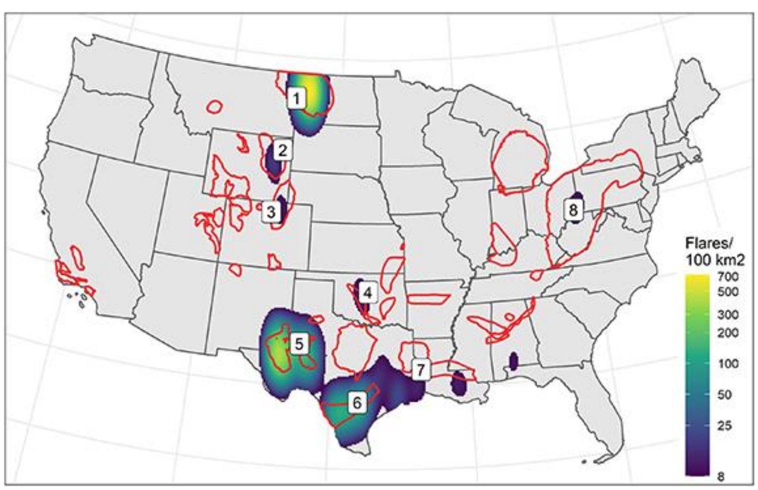

Figure 4: Most flares are present in the (1) Bakken, (5) Permian, and (6) Eagle Ford basins.[14]

"In the Permian Basin, the proportion of children under five living near flares was slightly higher than the overall population, while in the Western Gulf, a higher proportion of seniors were exposed. With respect to race and ethnicity, Blacks were more likely to live within 5 km of a flare in the Permian Basin and Western Gulf than other groups. In the Williston, the Native American and Hispanic populations were the most likely to live near flares. In particular, over a fifth of the Native American population in Williston shale counties lived within 5 km of over 100 flares. Flaring is particularly intense in the Fort Berthold Reservation in North Dakota, which accounted for 70% of the Native American population exposed to more than 100 flares. McKenzie county, which includes part of the Fort Berthold Reservation, had the most UOG flares of any county nationally (83 000) and we estimated that virtually all (93%) of its 6400 residents lived within 5 km of more than 100 flares."[14]

The main HAPs of concern to human health resulting from oil & gas operations, due to a combination of toxicity, exposure, and difficulty to measure across literature, are:

- BTEX (hematological,[16] neurological, birth defects, cancer, hearing),
- formaldehyde and acetaldehyde (cancer),
- H2S (irritant, respiratory, psychological), and
- acrolein (irritant, respiratory).[17]

VOC exposures are often elevated around fugitive emissions from well pads, especially from UOG, and petrochemical facilities (in CO, PA, UT, & TX).[18-22] In one study that took air samples near fracking operations in WY, AK, PA, OH, and CO, benzene, formaldehyde, and H_2S exceeded US ATSDR minimum risk levels and EPA IRIS cancer risk levels.[23] According to sampled measurements, BTEX levels after fracking-related groundwater spills in Colorado exceeded MCLs (though they were remediated over the course of 1-2 years).[24]

Indigenous Water Rights

Diné Fundamental Law contains core differences from the Euro-American worldview on the connection between humans and nature, which compels the need for tribal sovereignty over their land. There is such an emphasis on water quality in movements like “water is life” because of the reliance on water for ceremonial, livestock, & subsistence farming uses in indigenous culture. Women are at greater risk to water contamination because they are often caretakers, medicine women, harvesters, and landowners. Oil & gas operations increase the threat of violence toward indigenous women from "man camps" (the oil & gas workforce is 88% white) which has led to many missing and murdered indigenous women (MMIW). [30] Elders face higher risk because they are more likely to participate in cultural practices, live in rural areas, and practice traditional subsistence lifestyles that involve growing crops and raising livestock.

In the US:

- 13% of Native homes lack safe water compared to national average of <1%.[30]
- 5.4% of Navajo wells exceed SDWA. [39]
- 30% of Diné (people of the Navajo Nation) rely on hauling water, which is 71x more expensive than municipal.[31]
- Native Americans are 2x as likely to die from diabetes, 60% are more likely to have a stroke, 30% are more likely to have high blood pressure, and 20% are more likely to have heart disease.[32]
- Native Americans are ~5-20% undercounted in census.[33]

Violations to tribal sovereignty comes from a long history of settler colonialism. In 1851, the first Fort Laramie Treaty created a 12 million-acre reservation, but continual appropriation has dwindled Sioux land to now 400,000 acres, on which there are now 500 oil wells.[33] In the Greater Chaco region, the US has conducted archeological digs that have been destructive to important indigenous sites and promoted ideas of “pristine wilderness” in preserving the Chaco Culture National Historic parks, which ignores the long history of Pueblo and Navajo people on this land.[30]

In 1987, tribes were given the opportunity to attain Treatment as a State (TAS), which allows tribes to establish water quality standards (WQSs) which may be more stringent than neighboring state standards, and can be used to influence pollution levels coming from upstream, off-reservation users. Tribes can also develop WQSs that support unique tribal values, including ceremonial and cultural uses of native waters. However, attaining TAS status can be inaccessible to unrecognized tribes and those with financial limitations. “Checkerboard” regulation, or the piecemealing of land between state, federal, and tribal authority, makes it more difficult for tribes to attain this status. The concept of environmental federalism is also pervasive; TAS gives tribes the ability to be treated as a state, but this is not the same as true sovereignty, since federal entities like the EPA and the Supreme Court still set terms.[34] For instance, a 1980 Supreme Court decision compensated the Sioux Nation for mining operations on their land, but did not return the land back to them.[33] The opportunities and constraints of TAS are outlined in Figure 5.

Opportunities	Constraints
• increases tribal authority	• not accessible to all tribes
• facilitates tribal enforcement (on-reservation and off-reservation)	• highly technical application process
• provides a dispute resolution process	• financial limitations
• offers flexibility of engagement	• increased risk of conflict
• recognizes tribal values	• persistence of "checkerboard" regulation
• allows more stringent standards	• contradictions for self-determination
• protects public health	• federal agency is the final decision-maker
• enables pollution reduction	• differences in values
• supports monitoring and regulation	• partial delegation of authority (operational and policy levels)
• expands access to clean water	• less effective for non-point source pollution
• program funding, capacity building, and jobs	• lack of cultural match
• increases political access	• political risk to program longevity

Figure 5: Opportunities and constraints to TAS.

The impetus at which the federal government values tribal rights and EJ in general is fluctuating. Tribal consultations are crucial but are often inadequately conducted or treated as merely procedural. In 2020, NEPA permitting language for "fair treatment and meaningful involvement" in their EAs/EISs and language on "cumulative impact" and the "people/environment relationship" was gutted in 2020 under the Trump administration. However, courts upheld that federal agencies must take "hard look" at EJ, and recent Executive Order 12898 on EJ further preserved it.

Fracking on Tribal Land

The rapid rise of fracking has made tribes increasingly vulnerable to pollution from UOG activities. Under the Trump administration, the EPA included fracking as a key component of the clean energy plan due to a nationalistic push for energy independence. As a result of this activity, tribal authorities pushed for a new environmental impact statement (EIS) under the Resource Management Plan Amendment (RMPA). The RMPA-EIS has been ongoing since 2014 for UOG in the Greater Chaco Region, but the DOI has authorized permits for 400 wells between 2010-2021. Tribal consultations continued to be inadequate, especially during the start of the COVID-19 pandemic. The Navajo Nation had the highest per capita coronavirus rates in the US in May 2020 when a virtual public comment period was held, despite requests to delay it.[35] This public comment was especially inaccessible because New Mexico is 49th in internet access and less than 50% of indigenous residents have Internet access in their homes.[35]

Oil and gas companies lobbied the Bureau of Land Management (BLM) to bypass new 2012 requirement to disclose chemicals used in fracking 30 days before drilling if they asserted a "trade secret" with an affidavit, with a final rule preserving this in 2015. The EPA currently categorizes secret fracking fluid as produced water, which is "special waste" when put to "beneficial uses" (i.e. agriculture) in arid regions, making fracking fluid RCRA (Resource Conservation and Recovery Act) and CWA exempt. The EPA issued its own report in 2016, which concluded that fracking impacts drinking water resources under some circumstances. The report cites data gaps as the reason the severity of those impacts cannot be assessed. [30] However, a study found that more than 75% of chemicals in produced water affect the respiratory & gastrointestinal system, 40-50% kidney, nervous, immune, & cardiovascular systems, 37% endocrinal, 25% may cause cancer.[36] 17 cows also died within an hour of ingesting the flowback fluid used for livestock.[36] Flowback fluid contains toxins, such as radon, methane, and heavy metals. The EPA itself is unsure how close wells and fractures are to underground aquifers, which create risk for toxic flowback contamination. [30]

There are a series of legal loopholes that allow UOG activities to go unregulated, especially on tribal land. These include:

- **Checkerboarding:** the piecemealing of territory between tribal, federal, and state ownership, which may give the BLM and BIA legal authority to make OG decisions and conceals cumulative impact on EISs
    - In their environmental assessment, the BLM failed to analyze the impact of new wells in the Chaco Region increasing water use by 82%[30]
- **Tiered scalar analysis:** cultural exam deferred to after leassee already has right to develop (minor changes like building around medicinal plant)[35]
- **Livestock loophole:** Lack of EPA regulation of produced water allows discharge onto tribal pastures. For example, in the Wind River Reservation in Wyoming, produced water from OG discharged onto tribal pastures was found to have a foam/sheen and H_2S fumes[36]
- **Haliburton loophole:** exempts fracking companies from Underground Injection Control (UIC) permit program under SDWA because diesel not used[30]
- **NPDES permit exempt** because flowback fluid is disposed in groundwater

Mining on Tribal Land

Extractivism on tribal lands extends to mining for resources such as uranium and gold. The Navajo Nation has felt the burden of abandoned uranium mines polluting unregulated wells that they rely on (Figure 6). Uranium, arsenic, and other metals surpass MCLs in unregulated Navajo wells,[37] and arsenic and other metals in Alaskan tribal groundwater[38] Uranium health outcomes include renal, reproductive effects, and DNA damage. There is also correlation with hypertension, bone cancer, and leukemia.[39] Native mine workers face disproportionate death due to Radiation Exposure Compensation Act (RECA) discrimination in proving respiratory damage, which reinforces intergenerational health effects that Native people are already predisposed to.[33]

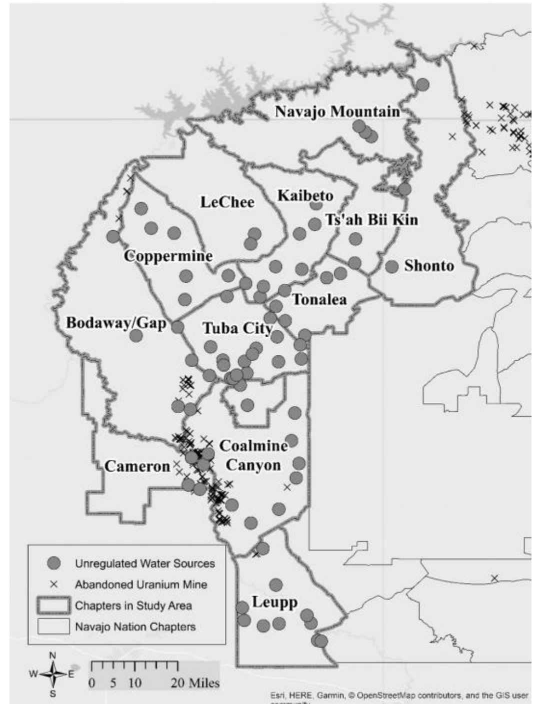

Figure 6: Abandoned uranium mines are in close proximity to unregulated water sources in the Western Navajo Nation.[33]

There are 160,000+ abandoned mines in Western US[33] and 600,000 Native Americans live within 10 km of an abandoned mine.[33] 1 in 5 uranium mines are located within 10 km of a Native American Reservation with more than 75% within 80 km. [33] In the Wind River Reservation, level of uranium in wells spiked at 100 times the MCL following floods in 2010, and radium and thorium have also been found in groundwater. 4 in 10 residents of Wind River Reservation have relative who died of cancer.[33] A study found that there are 6 times the violation points (according to their metrics) for tribal facilities and 2x the monitoring & reporting violation points for water facilities serving tribal communities[40]

Conclusions

- **Air data is much more comprehensive & available than water data, and specific data may enable us to calculate *cumulative risk* on a *finer grid cell level***
- ***Race, ethnicity, and language* breakdown efficient Coasean Bargaining leading to disparities in pollution and monitoring**
- **Fugitive emissions and gas flaring, especially from UOG, *disproportionately exposes BIPOC to VOCs***
- **Permit requirements should include regular testing of water sources and *disclosure of chemicals and toxins in fracking fluid* and fracking flowback prior to injection activity**
- **Major systemic changes are needed to protect tribes from extractivism by *returning land back* and *providing them with sovereignty***

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Appendix

Table 1: Datasets on air pollution with spatiotemporal scale and resolution. See Excel file for more details and description of datasets and their limitations/biases

Title	Summary	Year	Scale	# monitors/data points	Spatial Resolution	Temporal Resolution
Minnesota Pollution Control Agency	GIS of PM and air toxics	2017	Regional	based on NEI data from every 3 years	Block	1 year (only 2017)
New England Air Quality Reports	Info on monitors and graphs changes of CAPs over years.	1973-2012	Regional	>250 ambient air quality monitors at >110 sites	At site	1 year
Texas Commission on Environmental Quality - Texas Air Monitoring Information System (TAMIS) database	Air toxics from many regions' air monitors	2003-2020	Regional	234 monitors	At site	1 hour to every 6 days
Chesapeake Bay Environmental Justice and Equity Dashboard		~2018	Regional		Tract Population by race from ACS is better, 1 dot = 12 people	Using recent 5-year averages
CalEnviroScreen 4.0		2021	Regional			
EPA Air Toxics Screening Assessment "AirToxScreen" Mapping Tool	GIS mapping tool similar to NATA From NEI data	2017	National	see NEI	Tract	1 year (only 2017 right now)
LANCE: NASA Near Real-Time Data and Imagery	VIIRS can identify flares; pollution in troposphere; ozone; spectroradiometers	2022	National	Instrument abroad NASA satellite		3 hour latency, unsure resolution
CEQ & USDS BETA Climate and Economic Justice Screening Tool	Identifies communities who are "disadvantaged" as part of Justice40 initiative.	2015-2019 ACS	National	Pulls from 2017 EJSCREEN based on 2014 NATA & DOT trafffice data	Tract	Just current
EPA EJSCREEN	https://www.epa.gov/ejscreen/environmental-justice-indexes-ejscreen	2017	National	600+ monitors from NAMS/SLAMS	Block (NATA, PM2.5, and ozone) For PM, block groups range from <1 km2 to 100 km2	Just ~2017
EPA National Emissions Inventory (NEI)	Emissions Inventory System (EIS) data from state, local, and tribal air agencies + point, nonpoint, onroad, nonroad, and "event" sources	1990-2017	National	1426486 tier 3, 632609 tier 2, 205098 tier 1 in 2017	50 km for point sources or county for any given source	3 years (with updates every 1.5 years)
EPA National Air Toxics Assessment (NATA)	Emissions data, ambient concentrations and health-effect results mostly focused on cancer risk From NEI data	1996-2014	National	see NEI	Tract (from NEI)	3 years, since 1996
EPA AirData Air Quality Monitors	Receives data from Air Quality System (AQS) for ambient concentrations of pollutants	2004-2022?	National	>4000 monitoring stations	At site	1 hour to 1 day
EPA Risk-Screening Environmental Indicators (RSEI) Model	Screening-level model that uses TRI data to score human health risk	2011-2020	National	See TRI	810-meter grid cells around the	1 year

					facility for 49 kilometers	
EPA Toxics Release Inventory (TRI) Program	Toxic Release inventory map of facilities and toxic releases in US	2011-2020	National	815291 reporting forms since 2011 29668 facilities since 2011	~25-50 miles between facilities	1 year
NASA LANCE Air Quality Data	Aerosol, CO, SO2, HNO3, N2O, O3 with "Worldview" visualizer	2013-2022?	National	25-45 km depending on data type	2 km depending	1 day
ProPublica: The Most Detailed Map of Cancer-Causing Industrial Air Pollution in the U.S.	Shows cancer risk in >1,000 hotspots where risk is combined. Based on RSEI.	2014-2018	National	TRI data from ~1,000 hotspots	810-meter grid cells based on RSEI dat	Averaged over 5-year period
ALOHA	Air hazard modelling for chemical/gas pipeline/etc. spills, software download	N/A	National	N/A	x miles from chemical release	minutes
Community Modeling and Analysis System (CMAS)	Online coupling system consists meteorology model (WRF), the CMAQ model, and the coupler	N/A	National	N/A		
South Coast Air Quality Management District (AQMD)	Community investigations on air pollutants in South Coast Air Basin and the Coachella Valley portion of the Salton Sea Air Basin, in Southern California.	2015, 2016, 2020, other	Local	Varies, 3-6 sites for some studies	At site	N/A
Port of Providence and Surrounding Communities Community Scale Air Toxics Monitoring Project	Community investigations on PM, NO2, Air toxics/VOCs (mainly black carbon, benzene, and 1,3 butadiene)	N/A	Local	8 monitoring sites	At site	PM2.5 & NO2: 24/7, every 15 mins Air toxics/VOCs: 24-hr samples once every 6 days

Table 2: Datasets on water pollution with spatiotemporal scale and resolution. Also see Excel file.

Title	Summary	Year	Scale	# monitors/data points	Spatial Resolution	Temporal Resolution
Safe Drinking Water Information System (SDWIS)	Violations, #facilities, #site visits, and populations serves for Public Water Systems (PWS) which you can query by state/city/county	2011-2022	National	143,727 water systems	PWS (can filter by state, city, town, country, PWS)	Whenever a violation occurs
Water Quality Portal (WQP)	Query for EPA, USGS, and ARS (Ag Research Service) data downloads on waterways (stream, rivers, lakes, oceans, etc.), facilities, and wells.	?-2022	National	380 million data records 2.6 million monitoring locations	900 federal, state, tribal, and other partners	
USGS National Water Information System "Water Data for the Nation"	Samples and instruments collected at surface and groundwater sites analyzing chemical/physical/biological propteries of water, and continuous data on pH, specific conductance, temperature, dissolved oxygen, and percent dissolved-oxygen saturation. (I think this feeds into the WQP)	2007-2022	National	4.4 million analyses since 2005	2,435 sites for historical observations & current conditions 15,055 sites for "daily data" 6,407 sites for statistics 427,356 sites for field/lab studies (not all verified)	15-60 mins

Unregulated Contaminant Monitoring Rule (UCMR) occurance data	Data for contaminants that are suspected to be present in drinking water and do not have health-based standards set under the SDWA	1988-2020	National	Probably # of PWSs, or a subset	PWS	Seems to be daily/monthly within each few-year report
Wes Austin's Data Scrape	Data scraped from internet i.e. local water agency websites, on locations of water quality monitors and chemical sampling data	2022?	National	Thousands in each state		
ECHO Water Pollutant Loading Tool	Query Discharge Monitoring Report (DMR) & TRI surface water discharges, prioritized based on total mass and toxicity	2007-2022	National			
Underground Storage Tank (UST) Finder	Location/attributes of USTs and leaking USTs & surface and groundwater public drinking water protection areas; estimated number of private domestic wells and number of people living nearby; and flooding and wildfires.	2018-2021	National			