

Indigenous Environmental Justice and Screening Tools:
Lessons Learned from EJSCREEN and Paths Forward for the Climate and Economic
Justice Screening Tool

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A thesis submitted
in partial fulfillment of the requirements

for the degree of
Master of Science

School for Environment and Sustainability
University of Michigan
April 2022

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I. Abstract

The Biden-Harris administration has invested considerable policy focus on environmental justice, including the Justice40 Initiative and renewed White House Council on Native American Affairs. This work has included financial investments in Tribal economies, prioritizing Tribal healthcare, and major Tribal infrastructure investments. The Justice40 Initiative aims to deliver at least 40 percent of the benefits of federal investments in climate and energy to disadvantaged communities, including many Tribes. To identify communities that should be targeted by Justice40 investments, the White House Council on Environmental Quality (CEQ) is developing a new Climate and Economic Justice Screening Tool (CEJST). Executive Order 14008 references how this new screening tool should be based on lessons learned from EJSCREEN. For Tribes, however, EJSCREEN does not adequately represent environmental justice needs relevant to the goals outlined in Justice40. In this thesis, I will discuss gaps in EJSCREEN that must be addressed in the forthcoming screening tool in order to improve the representation and inclusion of Indigenous perspectives on environmental justice. Chapter 1 provides an introduction to the environmental justice movement in the United States, including the development of environmental justice screening tools. Chapter 2 highlights environmental justice issues that have been highlighted by many different Tribal communities that are not represented in EJSCREEN. Chapter 3 reviews the methodologies and datasets used in EJSCREEN, and their relationship to Tribal perspectives on environmental justice. Chapter 4 concludes with a set of recommendations for the Climate and Economic Justice Screening Tool such that Tribes may fully benefit from Justice40 investments

II. Acknowledgements

To fulfill the opus requirement for the University of Michigan School for Environment and Sustainability Master of Science program, I have worked under the guidance of Dr. Kyle Whyte to complete this Master's thesis. I would like to thank Dr. Whyte for his continued support, and for contributing significant time and effort to the development of this thesis. I would also like to thank Dr. Andrew Gronewold for his guidance and willingness to serve on this thesis committee. Finally, I want to acknowledge that I am a non-Indigenous person who is doing research on Indigenous experiences with environmental justice. I therefore do not possess the embodied knowledge or lived experience of the environmental justice issues that I write about in this thesis. I would like to acknowledge the many Indigenous scholars, leaders, and activists whose work I have learned from and has made this thesis possible.

III. Chapter I: Introduction & History

1.1 Introduction

In January 2021, President Biden signed Executive Order 14008, “Tackling the Climate Crisis at Home and Abroad”, thereby establishing the Justice40 Initiative. The Initiative, which strives to distribute 40% of the overall benefits of federal investments to “disadvantaged communities”, includes the development of a Climate and Economic Justice Screening Tool. The screening tool is meant to publish annual interactive maps that highlight disadvantaged communities starting in July 2021. The Climate and Economic Justice Screening Tool will build upon the existing EJSCREEN, an online mapping tool developed by the EPA in 1994. EJSCREEN was developed pursuant to former President Clinton’s 1994 Executive Order 12898 with the specific goal of identifying and addressing disproportionately high and adverse human health or environmental effects on minority populations or low-income populations. It creates both maps and reports that depict environmental indicators, demographic indicators, and “EJ Indexes” for every block group in the selected communities of analysis.

Importantly, EJSCREEN is not meant to be the basis for agency decision-making or to identify “EJ communities”. Rather, the tool is intended to be used as a starting point in selecting locations for further review based on environmental justice concerns. In theory, EJSCREEN has the potential to significantly improve the accessibility of spatial data and visualizations of complex environmental justice problems that can benefit both community users and policymakers. In practice however, EJSCREEN is riddled with issues that have impeded its ability to meaningfully affect environmental justice policy changes, and these must be addressed in the development of the Climate and Economic Justice Screening Tool.

One widely cited issue with EJSCREEN is its bias towards urban areas. This is due to the choice in environmental metrics and the demographic index; more than half of the environmental indicators (10 out of 12) are related to air quality, which is highly correlated with high population counts and density. This can contribute to the creation of “invisible communities”, in which many rural communities are left out of EJSCREEN identification because of major data biases and gaps. This risk may lead to biases in the prioritization of where federal benefits related to Justice40 are delivered if not addressed in the forthcoming screening tool. Such data gaps are a key issue with EJSCREEN, notably with respect to Tribal populations in the United States.

Though many Tribes have been making use of geospatial data and technologies since the 1970s to document territorial claims and protect Tribal resources, the most widely used spatial datasets in EJSCREEN negatively affect the preservation of Tribal culture and sovereignty.¹ Many of the variables that are not included in EJSCREEN, including energy extraction and landscape impacts, are also some of the issues that have been identified by Tribal communities as some of the most devastating environmental justice issues. Notably, EJSCREEN does not make use of climate data, which is problematic for the representation of Tribal communities who are disproportionately burdened by the effects of climate change. There are other gaps in EJSCREEN data that will be discussed in more detail later in this thesis, including cultural landscapes, narrative and qualitative data, and meaningful spatial boundaries. Furthermore, the very process of creating EJSCREEN was born out of scientific expertise and access to data and analyses that are technocratic and exclusionary processes. The lack of Tribal participation in the development of EJSCREEN is a fundamental flaw of the tool, and has contributed to biases against Tribal environmental justice. This exclusionary

¹ Pearce & Louis, 2008

process has effectively rendered the tool irrelevant to many Tribal experiences with environmental justice.

Though the development and use of EJSCREEN and similar tools have historically left out Tribal environmental justice concerns, there is enormous potential for the Climate and Economic Justice Screening Tool to bring Tribal environmental justice to the forefront of federal policy. The development of this tool may provide a path toward identifying and addressing environmental racism through federal policy by correcting a long history of uneven distribution of resources and investments in low-income and communities of color. There is also the potential to achieve transformative changes for Tribal environmental justice by incorporating the knowledge and lived experiences of Tribal communities into the screening tool.

By incorporating narrative and qualitative data and increasing Tribal participation in the development process, the improvements made to the federal screening tool can make significant strides toward Tribal environmental justice. Institutionalizing environmental justice via the Climate and Economic Justice Screening Tool can ultimately revolutionize the way that Tribal environmental justice is represented and prioritized in federal policy, but in order to do so, the Tool must address the flaws present in EJSCREEN.

This thesis will explore this very issue: how have screening tools, especially EJSCREEN, represented Indigenous perspectives on environmental justice? How can the forthcoming Climate and Economic Justice Screening Tool use lessons learned from EJSCREEN to ensure Indigenous communities are included in federal investments from Justice40? This will start with an introduction and overview of the development of environmental justice and screening tools in the U.S. (Chapter 1), and then review the

literature on Indigenous experiences with environmental justice (Chapter 2). Chapter 3 will discuss how EJSCREEN operates with respect to the Indigenous experiences identified in Chapter 2. Finally, recommendations will be made in support of increased representation and inclusion of Indigenous peoples in the Climate and Economic Justice Screening Tool (Chapter 4).

1.2 History of the Environmental Justice Movement in the United States

In order to understand the context in which environmental justice screening tools in the United States have developed, it is important to consider the history of the environmental justice movement. The legacy of the first organizers, scholars, and policymakers is critical in understanding the scope of contemporary environmental justice work, including screening tools. The environmental justice movement may be thought of in terms of the different arenas in which the movement occurred: grassroots organizations, academic institutions, and federal agencies.

Many consider the 1982 protest in Warren County, North Carolina to be the catalyst for the environmental justice movement, and transformative for contemporary environmentalism as a whole.² The protest signified the first time that a national-based group organized in opposition to environmental racism, and specifically, the siting of a polychlorinated biphenyl (PCB) landfill in a predominately poor and Black community. This event prompted a wave of subsequent protests, and importantly, played a significant role in defining the environmental justice movement as one centered around the inequitable distribution of environmental risk with respect to race and income.

These grassroots efforts ultimately culminated in the First National People of Color Leadership Summit in October 1991. During this conference, the over 600 environmental

² McGurty, 2000

justice advocates in attendance developed what is now known as the 17 Principles of Environmental Justice (Fig. 1).³

National People of Color Leadership Summit 17 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 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 toxins, 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 U.S. government through treaties, agreements, compacts, and covenants affirming sovereignty and self-determination.
12	Environmental Justice affirms the need for urban and rural ecological policies to clean up and rebuild our cities and rural areas in balance with nature, honor the cultural integrity of all our communities, and provide 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.

³ Wilson, 2010

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 reprioritize our lifestyles to insure the health of the natural world for present and future generations.

These principles served as one of the first formalized visions of environmental justice, and provided a guiding framework for decades of activism and scholarship.

1.3 Environmental Justice Scholarship in the United States

One such study considered to be influential to the environmental justice movement was the 1983 Government Accountability Office (GAO) study entitled, “Siting of Hazardous Waste Landfills and their Correlation with Racial and Economic Status of Surrounding Communities.” The study, prompted by the Warren County protests, investigated the racial makeup of communities in the South located near hazardous waste landfills.^{4,5} The study found a strong correlation between the siting of landfills and the presence of poor and Black communities, thereby providing empirical evidence for the environmental racism that had been raised by activists for years. The study also added to the pressure on government agencies to address environmental inequities, and eventually prompted the Environmental Protection Agency to develop more rigorous guidelines for determining landfill locations.⁵

Similarly, the United Church of Christ Commission on Racial Justice (UCC)’s 1987 report, “Toxic Wastes and Race in the United States” was considered to be the most influential study in galvanizing the environmental justice movement.⁶ The study provided the first comprehensive documentation of hazardous waste sites in racially marginalized

⁴ Bullard, 1993

⁵ U.S. Government Accountability Office, 1983

⁶ United Church of Christ Commission for Racial Justice, 1987

communities at the national scale. “Toxic Wastes and Race” also found that 15 million African Americans, 8 million Hispanic Americans, and half of all Asian/Pacific Islanders and Native Americans in the United States lived in a community with at least one hazardous waste site.^{6,7} Notably, the study was one of the first to find that race, more so than socioeconomic status, is the dominant explanatory variable of hazardous waste siting.⁸

Other studies critical to the development of the environmental justice movement include Robert Bullard’s *Solid Waste Sites and the Houston Black Community*, *Dumping in Dixie: Race Class and Environmental Quality*, and *Toxic Waste and Race at Twenty*. Each of these studies made a significant impact on the environmental justice movement by introducing sophisticated methods for measuring environmental inequities. *Solid Waste Sites and the Houston Black Community* was one of the first comprehensive accounts of environmental racism, and revealed that solid waste sites in Houston were clustered around Black neighborhoods and schools.⁹ *Dumping in Dixie*, now considered a fundamental book for environmental justice scholars, was the first major study to document the linkage between historic patterns of segregation in the southern United States and present-day hazardous waste siting.¹⁰ The study found that historic and contemporary forms of institutional racism were major contributors to hazardous waste siting, and documented the major social, economic, and psychological impacts of environmental racism.¹¹ *Toxic Waste and Race at Twenty*, co-authored by Drs. Paul Mohai, Robin Saha, and Beverly Wright, followed up on the 1983 United Church of Christ Study, finding that hazardous waste facilities were concentrated in communities of color at even higher rates than previously thought.⁸

⁷ U.S. EPA, 2015

⁸ Bullard et al., 2008

⁹ Bullard, 1983

¹⁰ Mohai et al., 2009

¹¹ Bullard, 1990

In addition to these landmark studies, other scholars have made strides in quantitative and spatial methods for measuring environmental justice. One such method, used in most “classic” environmental justice studies, is known as the “unit-hazard coincidence” method. Under this approach, the researcher selects a predefined geographic unit (commonly, Census tracts, counties, or zip code areas), identifying which of the units contain a hazard (i.e. hazardous waste sites, landfills, coal-fired power plants, etc.), and comparing the demographic characteristics between units that contain hazards and those that do not.¹² Though this method has been widely used in some of the field’s most influential studies, scholars Dr. Paul Mohai and Dr. Robin Saha have pointed out that it does not take the exact location of hazards within their host units into account, thereby obfuscating the actual distance between hazards and affected communities.¹²

In contrast, distance-based methods have proved to overcome many of the “unit-hazard coincidence” method’s shortcomings. These methods map the exact location of hazards and specify their distances to nearby residential populations. After this distance has been determined, demographics of all units within the predetermined distance to the hazard (rather than simply demographics of the entire host unit) are compared to units farther away.¹² This group of methods can be classified into either 50% areal containment, boundary intersection, or areal apportionment methods. The 50% areal containment method involves mapping environmental hazards and then aggregating the demographic characteristics of units that fall within a predetermined distance from the hazard, which forms a circular buffer zone.

However, some units will not fall completely within or completely outside of this buffer, but instead partially intersect the boundary around the hazard. To determine whether

¹² Mohai & Saha, 2006

or not to include such units in the analysis, researchers have used the 50% areal containment method to include units whose total area overlaps the circular buffer by at least 50%, and exclude units whose total area overlaps with the buffer by less than 50%. A slight alteration of this method includes units whose centroids are contained within the buffer zone, and excludes units whose centroids fall outside of the buffer zone. These methods have been used in many notable environmental justice studies, including Drs. Jayajit Chakraborty and Marc Armstrong's 1997 study on Toxic Release Inventory (TRI) sites in Des Moines, Iowa.¹³ The study found that buffers around TRI sites contained significantly higher concentrations of racially and economically marginalized communities than populations outside of such buffer zones. However, the results of this assessment did differ depending on method of delineating the buffer.¹³

Similar to the 50% areal containment method, the boundary intersection method also relies on a distance-based buffer zone to delineate the host neighborhood. However, rather than restricting included units to those contained by the buffer by at least 50%, the boundary intersection method includes all units whose boundaries are entirely contained, partially contained, or lie tangent to the buffer zone.¹² This method is an improvement on the unit-hazard coincidence method because it only captures units that have some area within a predetermined distance of the hazard, however, it also shares the same problem of capturing areas that may have units that lie significantly outside of the buffer zone.¹² For this reason, scholars consider this method to be the least effective of the distance-based methods.

In the areal appointment method, the demographic characteristics of all units that lie completely or partially within the buffer zone are included in the host neighborhood. However, what makes this method distinct is that each units' populations are weighted by the

¹³ Chakraborty & Armstrong, 1997

proportion of their area that is captured by the buffer zone.¹² These weighted populations are then used to calculate aggregated demographic characteristics of units within a specified distance from the hazard. The use of weights proportional to areas intersected by the buffer helps to eliminate the possibility of some units under- or overestimating demographic characteristics due to their inclusion in a host neighborhood.¹²

1.4 Environmental Justice in United States Federal Policy

These methods have been instrumental in advancing environmental justice scholarship, and provided the foundation for decades of future research and policy using spatial and quantitative methods. Around the same time these initial methods were being published, environmental justice also gained attention from federal policymakers in the Environmental Protection Agency (EPA). In response to the University of Michigan's Conference on Race and the Incidence of Environmental Hazards, the EPA established the Environmental Equity Workgroup in 1990.¹⁰ The workgroup was tasked with assessing the evidence that poor communities and communities of color were disproportionately burdened by environmental hazards and identifying ways for the EPA to address these inequities.¹⁴ In 1992, the Workgroup published a report, *Environmental Equity: Reducing Risks for All Communities*, that provided further documentation of the environmental inequities that had been cited by scholars and activists for years, including disproportionate exposures to lead poisoning, contaminated pesticides, and hazardous waste facilities.¹⁵ In addition to finding additional evidence of environmental injustices, the report and Workgroup also served as a first step in the EPA's work to address environmental justice at the federal level, and increased public attention to the field.¹⁴

¹⁴ US EPA, 2016

¹⁵ US EPA Environmental Equity Workgroup, 1992

Based on the Environmental Equity Workgroup report's suggestions, the EPA established the Office of Environmental Equity (later renamed the Office of Environmental Justice/OEJ) in 1992 to coordinate agency efforts to “decrease environmental burdens, increase environmental benefits, and work collaboratively to build healthy, sustainable communities”.¹⁶ The Office of Environmental Justice would later go on to establish EJSCREEN, which will be discussed in further detail in the subsequent sections of this article. Shortly after the establishment of OEJ, the National Environmental Justice Advisory Council (NEJAC) was convened by former EPA administrator Carol Browner in 1993. Initially composed of 25 total members, including scholars and community-based activists, NEJAC was established to advise the EPA based on the expertise of a broad spectrum of stakeholders.¹⁷

A year later, former President Clinton issued Executive Order 12898: Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations. This mandate directed federal agencies, primarily the EPA, to identify and address disproportionate health and environmental burdens on communities of color and low-income communities, develop a federal strategy for promoting environmental justice, and promote nondiscrimination in federal programs that concern public and environmental health.¹⁸ Further, the Executive Order established an Interagency Working Group on environmental justice, which included leaders of several federal agencies and White House offices. Importantly, EO 12898 also included a directive to, “collect, maintain and analyze information assessing and comparing environmental and human health risks borne by populations identified by race, national origin or income.”

¹⁶ US EPA Office of Environmental Justice, 2017

¹⁷ US EPA, 2012

¹⁸ US EPA, 2013

Consistent with this, the EPA began development of EJSCREEN in 2010. EJSCREEN was designed to be a nationally consistent mapping tool that helps government agencies and the general public better understand the environmental and demographic attributes of the communities in the United States that have been affected by environmental injustice.¹⁹ Importantly, EJSCREEN was not intended to serve as the basis for federal agency decision-making, or to label any place as an “EJ Community”. Rather, EJSCREEN is meant to highlight certain areas as candidates for further investigation, and should be supplemented with additional research and local considerations.²⁰

1.5 Introduction to EJSCREEN

EJSCREEN, which will be a major focus of this paper, draws upon a history of screening tools that had been developed for public and clinical health settings, as well as screening tools used by EPA regional offices and other state environmental agencies.^{20, 21} Further, prior to the development of EJSCREEN, two other environmental justice screening tools had been used by the EPA: EJSEAT and EJVIEW. The Environmental Justice Strategic Enforcement Assessment Tool (EJSEAT) was developed by the EPA’s Office of Enforcement and Compliance Assurance (OECA) to identify areas in the United States that are burdened with disproportionately high environmental and public health hazards. The tool was designed to highlight areas with potential environmental justice concerns such that the OECA may target inspections and resource deployment decisions.²² EJSEAT was eventually replaced by EJVIEW, another web-based mapping tool developed by the EPA that allowed users to overlay environmental and demographic data on a selected geographic area.²⁰ These tools,

¹⁹ US EPA, 2014

²⁰ US EPA, 2019

²¹ Amiri & Zhao, 2019

²² L. Ansah et al., personal communication, 2006

like EJSCREEN, were developed in accordance with Executive Order 12898, and represented the EPA's first endeavors into public-facing and national scale environmental justice screening tools.

Screening tools, and the GIS methodologies that underlie them, have the ability to significantly improve the way policymakers, researchers, and the general public understand spatial relationships. The field of environmental justice is no exception, and screening tools are especially useful for understanding the connections between pollution, health, and demographic characteristics.²³ Environmental justice screening tools have tremendous potential to advance environmental justice by providing policymakers with clear, accessible evidence of communities that are disproportionately burdened by environmental and public health hazards. Such evidence can help policymakers direct and emphasize funding and other resources to overburdened communities. Specifically, regulatory agencies such as the EPA can use screening tools to assist in decision-making that directly addresses environmental justice issues.

When EJSCREEN went into development in 2010, these tools, along with other environmental justice research and methods, were reviewed as a first step. The EPA gathered information from stakeholder and expert presentations at EPA-hosted workshops and conferences, EPA's Office of Research and Development (ORD)'s Community-Focused Exposure and Risk Screening Tool (C-FERST), ORD's Environmental Quality Index (EQI), NEJAC's review of EJSEAT, and EPA guidance documents on environmental justice.^{20, 24} The EPA also considered a number of points when designing their approach to EJSCREEN, including usefulness to end-users, EPA policy goals, sound science, data quality

²³ Maantay, 2002

²⁴ Riddick, 2017

considerations, and feasibility.²⁰ Further, the development of EJSCREEN was largely guided by an EPA workgroup. The workgroup included members from EPA programs and regional offices, and received consultation from four peer reviewers in early 2014.²⁰ After peer review, the tool's data and interface were updated, and EJSCREEN was made publicly available in 2015. Updated versions of the tool were released once a year from 2016 to 2020.

EJSCREEN works by combining demographic and environmental data into an “Environmental Justice Index” that ultimately represents a community’s overall social and environmental vulnerability. It creates both maps and reports that depict environmental indicators, demographic indicators, and EJ Indexes for every Census block group in the selected communities of analysis. The EJ Indexes are calculated by combining an environmental indicator with a demographic index and the population count for the selected block group. The demographic index is the average of two indicators, low-income and minority populations, for a given block group. This is then combined with a single environmental indicator, selected by the user, and the total population for the block group.

IV. Chapter 2: Indigenous Perspectives on Environmental Justice

2.1 Introduction

There are many unique aspects of Indigenous environmental justice that merit special attention with respect to screening tools. Notably, sovereignty and self-determination represent political and cultural cornerstones of Indigenous environmental justice that differentiate Tribes from other communities.²⁵ These concepts are so central that all environmental justice issues affecting Tribes must be contextualized by the dynamics of government-to-government relationships, treaty rights, the federal trust responsibility of the United States government to Tribes, and the various jurisdictional rules governing Tribal lands.²⁶

Federal recognition of Tribes is one such consideration. Tribes that are federally recognized are typically those with established histories of engaging with the federal government through treaties and executive orders, and thus participate in a nation-to-nation relationship with the United States government. Further, these relationships are governed by the trust doctrine, which was first established by the Supreme Court in *United States v. Mitchell* in 1983. The trust doctrine dictates that the federal government has a responsibility to support Tribal self-determination, which means providing the necessary services to protect and enhance tribal lands, resources, and self-government.²⁷ Many Tribes, however, do not have such a relationship with the federal government, and therefore do not have access to many of the resources granted to federally recognized Tribes, including favorable tax positions, federal services provided by the Bureau of Indian Affairs (BIA), Indian Health

²⁵ Vickery & Hunter, 2016

²⁶ Walker et al., 2002

²⁷ US Department of Health and Human Services, n.d.

Service, and other agencies, and the exercise of certain treaty rights, among others.²⁸ All Tribal environmental justice issues should be understood within the context of these complex and important legal and political dynamics.

2.2 Key Aspects of Indigenous Environmental Justice

For many Indigenous communities, human systems are interlinked with natural ones, creating eco-cultural systems or ethno-habitats.²⁹ These systems are ultimately a large part of what must be understood within screening tools to accurately assess Indigenous environmental justice. These measurements of Indigenous environmental justice must integrate physiological, mental, ecological, socio-economic, cultural, and spiritual aspects of health and well-being.³⁰ Further, each Tribe must be recognized as an independent sovereign, with distinct cultures, beliefs, and values. There is no singular universal approach to operationalizing Indigenous environmental justice, but the information presented in this chapter reflects shared themes expressed by many different Tribal communities and scholars. For many Tribes, eco-cultural systems or ethno-habitats can include webs of resources, goods, and service flows that support traditional Tribal lifeways and culture.²⁹ Impacts to eco-cultural systems may be measured in terms of impacts to affected resources, loss of current or future land use options, or loss of traditional hunting/fishing activities, among others.²⁹ Harris and Harper (2011) suggest a variety of ways that these eco-cultural impacts may be measured, including Tribal narratives describing cultural and sacred attributes of specific resources, identification of cultural keystone species, and dependency webs.²⁹ Each of these indicators provides an opportunity for environmental justice screening tools to incorporate measures of eco-cultural impacts to Indigenous communities.

²⁸ Fletcher, 2006

²⁹ Harris & Harper, 2011

³⁰ Harris & Harper, 2000

Landscapes and traditional lands represent one significant aspect of Indigenous environmental justice. The well-being of many Tribes is deeply intertwined with access to and preservation of the lands on which Tribes have historically resided or relied for interactions with food and water sources, gathering sites, ceremonial grounds, or other culturally important uses.³¹ However, Tribal lands are also frequently the sites of locally unwanted land uses (LULUs), such as energy extraction and development, waste disposal, and military testing facilities.^{25, 32, 33} Such activities can significantly degrade and restrict access to such culturally important lands, and thus pose a considerable threat to Tribal health.

Specifically, land degradation and dispossession can reduce access to traditional foods, increase exposure to effects of climate change, limit mobility for adaptation options, and decrease capacity to participate in land-based practices in general.^{34, 35} Therefore, it is crucial that impacts to Tribal lands are meaningfully represented in environmental justice screening tool indicators. Examples of such measures might include data on uranium mining, oil and gas infrastructure, disease incidence related to declining First Foods, cultural habitat equivalency analysis, and interruptions of specific services to people such as nutritional or medicinal services.²⁹ The subsequent sections provide specific examples of Indigenous environmental justice issues that illustrate the importance of measuring holistic, landscape-based measures in screening tool analyses.

2.3 Mining

Mining has been a major environmental health issue for Tribes, particularly those situated in the Western United States. Hardrock mining, which can include extraction of

³¹ Norgaard & Reed, 2017

³² Bulltail & Walter, 2020

³³ Moore-Nall, 2015

³⁴ Tobias & Richmond, 2014

³⁵ Farrell et al., 2021

copper, lead, iron ore, silver, gold, uranium, and other minerals, generates substantial amounts of solid and chemical waste that pose significant threats to human and environmental health.^{36,37} It is estimated that there are at least 140,000 abandoned hard rock mines in the United States, but there could be over 390,000 that have not yet been captured in federal databases.³⁸ Many of these abandoned mines lie on or proximal to Tribal lands, and thus directly contaminate Tribal lands and watersheds.²⁰ It is estimated that at least 600,000 Native Americans live within ten kilometers of an abandoned mine, which leaves Tribal communities in the West exposed to high concentrations of toxic metals (including, but not limited to, arsenic, cadmium, mercury, and lead) that have been linked to increased risks for various negative health outcomes, including hypertension, kidney disease, atherosclerosis, cardiovascular disease, and a variety of autoimmune diseases, neurocognitive disorders, and cancers.^{20,39}

The presence of uranium mines, both current and legacy, on Navajo Nation lands represents a key example of the environmental justice issue of mining on Tribal lands. Uranium mining on Navajo Nation lands began in the early-to-mid 20th century, when uranium was discovered first in Cove, Arizona, and then elsewhere on the Navajo reservation.⁴⁰ Many Navajo peoples themselves were recruited to work in uranium mines, and were not informed of the occupational risks associated with uranium mining.^{23,41} As a result, Navajo uranium miners were exposed to high levels of radon without proper ventilation, protective equipment, or worker safety training.^{23,24} It is now estimated that between 500 and 600 Navajo uranium miners who worked between 1950 and 1960 died of

³⁶ Candeias et al., 2019

³⁷ Lewis et al., 2017

³⁸ U. S. Government Accountability Office, 2020

³⁹ Fashola et al., 2016

⁴⁰ Brugge & Goble, 2002

⁴¹ Dawson, 2008

lung cancer associated with radon exposure, and that 67% of lung cancer cases among Navajo men between 1969 and 1993 can be connected to uranium mines.^{23, 42} This phenomenon represents a rare example of exposure in a single occupational setting accounting for the majority of lung cancer cases for an entire population.²⁵

2.4 Energy Extraction

In addition to the specific issue of mining operations, energy extraction in general is a key aspect of Indigenous environmental justice that remains to be addressed in federal screening tools. Indeed, energy extraction and development is one of the most well-documented Indigenous EJ issues, with examples of such injustices spanning centuries and Tribes across the United States.^{43, 44, 45, 46} The exploitation and violation of Tribal lands and peoples by extractive industries is situated within a history of settler colonialism that has eroded the sovereignty and self-determination of Tribes.²⁹ The settler-colonial dynamics that have shaped U.S.-Tribal relationships are ultimately what has made it possible for non-consensual, exploitative, and often violent instances of energy projects on Tribal lands.

In particular, the case of the Dakota Access Pipeline (DAPL) points to the significance of energy projects on and near Tribal lands with respect to environmental justice. The DAPL was constructed near the Standing Rock Sioux Reservation, and also occurs on culturally important land and waters, including Oceti Sakowin ancestral burial sites.²⁹ The pipeline was constructed in 2017 despite legal contestation from the Tribe, protests of historic proportions, and significant international media coverage.⁴⁷ Its construction inflicted substantial colonial ecological violence, including destruction of at least 380 culturally

⁴² Gilliland et al., 2000

⁴³ Whyte, 2017

⁴⁴ Nuttall, 2010

⁴⁵ Thomas-Muller, 2005

⁴⁶ Butler & LaDuke, 1995

⁴⁷ Johnson, 2019

significant archeological sites, disturbance of a river crossing with deep historical and cultural significance, threats to the reservation's drinking water, and repeated pipeline leaks.^{48, 49} The DAPL is a prevalent example of the energy infrastructure burdens that affect Tribes. It is a major omission, then, for this subject to be excluded from the list of environmental indicators included in EJSCREEN.

2.5 Landscape Degradation

Related to energy development, landscape degradation is another Indigenous environmental justice issue that is absent from the environmental indicators used in EJSCREEN. As previously discussed, landscapes and traditional lands represent a significant aspect of Indigenous environmental justice. For many Tribes, perceptions of and connections to land and resources can be represented as cultural landscapes that capture culturally and geographically significant areas.⁵⁰ The concept of Tribal cultural landscapes is also one that has been recognized and used by various federal agencies, including the Bureau of Ocean Energy Management (BOEM) and the National Oceanic and Atmospheric Administration (NOAA).⁵¹

Use of the cultural landscape concept can allow for the integration of Western science, and historical, archaeological, and traditional ecological knowledge into a holistic indicator of places and resources that are significant to Tribes. The cultural landscape considers cultural heritage as an integral part of an ecosystem, along with the human and non-human relationships that exist within a place. This conception is especially useful in

⁴⁸ Bacon, 2020

⁴⁹ Estes, 2019

⁵⁰ Stoffle et al., 1997

⁵¹ Ball et al., 2015

quantifying impacts to Tribal lands without relying solely on Western indicators of resource impacts.

An example of a cultural landscape is the Mission Mountains landscape, located on the Confederated Salish and Kootenai Tribes' (CSKT) Flathead Indian Reservation. In a 2011 study by Watson et al., interviews were conducted with Tribal members and nontribal reservation residents on meanings attached to the cultural landscape of the Mission Mountain Tribal Wilderness. Among the themes that stood out were protecting nature and culture; functional, emotional, and symbolic attachments; wildlife and watershed protection; and access, beauty, privacy, and recreation.⁵² Tribal members on the Flathead Reservation described the landscape's importance for spirituality, emotional values tied to animals and plants, and connection with ancestors. The practice of defining a cultural landscape for a particular Tribe, in this case the CSKT, proved useful in creating a better understanding of Tribal attitudes towards and perceptions of a particular place, which was then used to guide land management decisions.³⁹ The same concept is relevant for environmental justice broadly. By including impacts to cultural landscapes in environmental justice analyses, scholars and policymakers gain a more holistic and comprehensive understanding of the various environmental burdens facing Tribes.

2.6 Spatial Boundaries

Compounding all of these data gaps on Indigenous environmental justice is the complex issue of spatial representation of Tribes. The current version of EJSCREEN uses a 'Tribal Lands' layer that includes American Indian Tribal lands in the lower 48 states and Alaska, including Federally recognized Reservations, Off-Reservation Trust Lands, and

⁵² Watson et al., 2011

Census Oklahoma Tribal Statistical Areas.⁵³ Though these areas do represent lands that are culturally and historically significant for many Tribes, they do not represent the totality of Tribal lands across the United States. Many Tribes, for example, do not hold federal recognition, and are instead state-recognized, or not at all recognized as sovereigns. These Tribes are then excluded from EJSCREEN analyses, in the sense that they are not represented by the ‘Tribal Lands’ layer.

Further, there are many lands across the United States that hold historical and cultural significance to Tribes, regardless of whether or not there are large populations that permanently live on that land. There are many ceded territories across the United States that were formally ceded to the United States by Tribes. However, these former territories often still hold historical significance to Tribes, and Tribes may have treaty rights that govern their use of these lands. For example, the Bois Forte Band of Chippewa and the Grand Portage Band of Lake Superior Chippewa formally ceded land to the United States through a series of treaties in the mid-1800s.⁵⁴ However, these treaties also delineated certain usufruct rights, in which the Tribes’ rights to hunt, fish, and gather on these ceded lands were affirmed. Today, these rights, though contested, are still held by the Bois Forte Band of Chippewa and the Grand Portage Band of Lake Superior Chippewa, which allow the Tribes to exercise certain off-reservation harvesting rights.^{43, 55} In EJSCREEN, these ceded territories are also not included in the ‘Tribal Lands’ layer, and thus impacts to these historically and presently important lands are not included in any analysis on Tribes.

⁵³ US EPA, 2015

⁵⁴ Thompson, 2020

⁵⁵ Wisconsin Department of Natural Resources, 2022

2.7 Qualitative and Narrative Data

One of the fundamental issues with EJSCREEN in relation to Indigenous environmental justice is the lack of qualitative data. EJSCREEN is reliant on Western measures of science, health, and the environment that are ill-equipped to accurately reflect the distinctive cultural and political characteristics of many Tribal communities.⁵⁶ Because some Tribal definitions of health and well-being often include cultural, spiritual, communal, and land-based aspects, they can be difficult to characterize in quantitative terms alone.^{2, 45} Instead, Western scientific measures of health (i.e. prevalence of certain health conditions, life expectancy, etc.) should be supplemented by Tribal narratives, which can provide Tribe-specific and culturally relevant accounts of social outcomes related to certain environmental burdens. There is substantial scholarly evidence in support of using Tribal narratives to inform decision-making at the federal level, and there is further precedent for using such narratives in screening tools, as is seen in EJAtlas.^{2, 45, 57, 58}

2.8 Engaging with Tribes

At the crux of the issues with EJSCREEN's lack of inclusion of Indigenous environmental justice is the lack of engagement with Tribes that occurred during the tool's development process. The creation of screening tools such as EJSCREEN and the Climate and Economic Justice Screening Tool are inherently exclusionary and technocratic processes that rely on the technical expertise of scholars, policymakers, and researchers. As such, the resulting tools can easily become biased without intentionally incorporating the perspectives of those who screening tools are ultimately meant to help. EJSCREEN was developed primarily by federal agency officials, and thus lacks much of the lived experience and

⁵⁶ Vickery & Hunter, 2016

⁵⁷ Status of Tribes and Climate Change Working Group, 2021

⁵⁸ Temper et al., 2015

embodied knowledges of communities directly affected by environmental justice issues. As a result, the data and methods used in EJSCREEN are not fully representative of community experiences of environmental justice, including those of Tribes. To remedy this, the Climate and Economic Justice Screening Tool should be developed in consultation with Tribes.

2.9 Conclusion

The issues discussed in this chapter highlight the unique dimensions of Indigenous environmental justice related to screening tools. These issues include, but are not limited to, energy extraction, landscape degradation, representation in indicators and spatial data, and lack of meaningful engagement with the federal government in the screening tool development process. Each of these issues points to a need for screening tools to better incorporate Tribal experiences of environmental justice by modifying the data, both in terms of indicators and spatial boundaries, used in EJ analyses, and meaningfully engaging Tribal communities throughout the development and implementation processes for federal environmental justice screening tools. Doing so will help to ensure that Tribes can fully benefit from any federal investments informed by screening tool analyses.

V. Chapter 3: How EJSCREEN Works & Relationship to Indigenous EJ

3.1 Introduction

EJSCREEN works by combining demographic and environmental data into an “Environmental Justice Index” that ultimately signifies a community’s overall social and environmental vulnerability. It creates both maps and reports that depict environmental indicators, demographic indicators, and “EJ Indexes” for every block group in the selected communities of analysis. These consist of seven demographic indicators and 12 environmental indicators. The demographic indicators include percent people of color, low-income, unemployment rate, linguistic isolation, less than high school education, under age 5, and over age 64.⁵⁹ The environmental indicators include Particulate Matter 2.5, Ozone, Diesel Particulate Matter, Air Toxics Cancer Risk, Air Toxics Respiratory Hazard Index, Traffic Proximity and Volume, Lead Paint, Superfund Proximity, Risk Management Plan (RMP) Facility Proximity, Hazardous Waste Proximity, Underground Storage Tanks (UST) and Leaking UST (LUST), and Wastewater Dischargers Indicator.⁶⁰

⁵⁹ US EPA, 2014

⁶⁰ US EPA, 2015

Indicator	Place on Exposure– Risk Continuum	Key Medium
NATA Air Toxics Cancer Risk Lifetime inhalation cancer risk	Risk/Hazard	Air
NATA Respiratory Hazard Index Ratio of exposure concentration to RfC		
NATA Diesel PM (DPM) ($\mu\text{g}/\text{m}^3$)	Potential Exposure	
Particulate Matter (PM_{2.5}) Annual average ($\mu\text{g}/\text{m}^3$)		
Ozone Summer seasonal average of daily maximum 8-hour concentration in air (ppb)		
Lead Paint Percentage of housing units built before 1960		
Traffic Proximity and Volume Count of vehicles (average annual daily traffic) at major roads within 500 meters (or nearest neighbor outside 500 meters), divided by distance in kilometers (km)	Proximity/ Quantity	Air/ Other
Proximity to RMP Sites Count of facilities within 5 km (or nearest neighbor outside 5 km), divided by distance		Waste/ Water/ Air
Proximity to TSDFs Count of major TSDFs within 5 km (or nearest neighbor outside 5 km), divided by distance		
Proximity to NPL Sites Count of proposed and listed NPL sites within 5 km (or nearest neighbor outside 5 km), divided by distance ⁶		
Wastewater Discharge Toxicity weighted stream concentrations divided by distance in kilometers (km)		Water

Abbreviations:

NATA	National Air Toxics Assessment	RfC	Reference concentration from EPA’s Integrated Risk Information System
NPL	National Priorities List, Superfund program	PM _{2.5}	Particulate matter (PM) composed of particles smaller than 2.5 microns
RMP	Risk Management Plan	$\mu\text{g}/\text{m}^3$	micrograms of PM _{2.5} per cubic meter of air
TSDFs	Hazardous waste Treatment, Storage, and Disposal Facilities	ppb	parts per billion, of ozone in air

Figure 1: Table of environmental indicators used in EJSCREEN. Source: EJSCREEN Technical Documentation, EPA 2019. Note: The above table is taken from the 2019 Technical Documentation of EJSCREEN, which was developed prior to the addition of the Underground Storage Tanks (UST) and Leaking UST (LUST) indicator.

Two of these demographic indicators that were explicitly referenced in Executive Order 12898, people of color and low-income, can also be averaged into a demographic index, which is then multiplied by one environmental indicator (selected by the user), to create an overall EJ Index. The resulting scores can then be classified as “areas of concern” if

they are at or above the 80th, 90th, or 95th percentile, which can be calculated in relation to the state, EPA region, or country average. EJSCREEN also includes additional layers on climate, health, prisons, schools, and transportation, among other indicators, but these data are not included in EJ Index calculations. EJSCREEN ultimately does cover a wide breadth of environmental and socio-economic burdens that have been proved to be key factors in environmental justice. However, EJSCREEN also has major gaps in data and methods that prevent its analyses from meaningfully representing some communities, including Tribes.

3.2 Issues

At a fundamental level, EJSCREEN was born out of scientific expertise and access to data and analyses that are technical processes which are inherently exclusionary. The tool was developed by scientists and policymakers, and appears to have had limited engagement with the communities that the tool was developed to benefit, including Tribes.^{59, 20} By not consulting with or engaging Tribes during the development of EJSCREEN, the EPA missed a critical opportunity to support and affirm Tribal self-determination by not allowing Tribal communities to provide input on their representation in the screening tool.

Further, there is an overall bias towards urban areas due to the choice in environmental metrics and the demographic index used in EJSCREEN that impacts Tribes living in rural parts of the U.S. Most of the environmental indicators (10 out of 12) are related to air quality, which is correlated with high population counts and density.^{61, 62} A report compiled by EarthRise and the Environmental Policy Innovation Center demonstrates EJSCREEN's urban bias; while only 31% of the U.S. population live in areas classified as urban, between 54% and 78% of individuals grouped into the top 10% of each EJ Index

⁶¹ Stone, 2008

⁶² EarthRise et al., 2021

reside in urban census blocks within major metropolitan areas.⁶² Many Tribal reservations are generally located in rural areas, and thus have different experiences with environmental justice from communities in urban ones, including those discussed in Chapter 2, such as mining, energy extraction, and landscape degradation issues, for example.

As previously mentioned, the spatial data used in EJSCREEN also poses a challenge for Tribes to be accurately represented. EJSCREEN calculates EJ Index values at the census block group level, including those that lie within the ‘Tribal Lands’ layer. While block groups are useful for understanding demographic attributes at a fine spatial resolution, they also have uncertain estimates.²⁰ This is especially true for Tribes, which are among the most undercounted groups by the U.S. Census.⁶³ Relying on this data to represent Tribal populations in EJSCREEN risks underestimating and misrepresenting the severity of environmental issues that affect Tribes, which could inadvertently exacerbate the existing resource disparities between Tribes and other groups.⁶⁴

3.3 Relationship to Tribal Environmental Justice

Each of these challenges with EJSCREEN also presents an opportunity to involve Tribes and incorporate Tribal perspectives on environmental justice into the Climate and Economic Justice Screening Tool. By working with Tribes to develop an intentional and respectful plan for consultation during the Tool’s development process, the CEQ may improve the screening tool such that it is more reflective of the lived experiences and embodied knowledges of communities that are directly affected by environmental justice issues. This consultation will also likely lead to the inclusion of environmental metrics that are known to affect Tribes, and move beyond EJSCREEN’s overrepresentation of urban air

⁶³ US Census Bureau, 2020

⁶⁴ Fink, 2020

pollution-related indicators. Finally, by making use of spatial boundaries that are more representative of Tribal lands and populations, the forthcoming screening tool can account for environmental justice issues that affect a more complete account of Tribal communities.

VI. Chapter 4: Paths forward for the Climate and Economic Justice Screening Tool

4.1 Recommendations

(1) Tribes should be engaged at every level of the development and implementation processes, in ways that affirm Tribal sovereignty and principles of free, prior, and informed consent. There is a wealth of scholarly, political, and legal documentation regarding best practices for consultation with Tribes and Tribal data sovereignty that are applicable to the development of the Climate and Economic Justice Screening Tool.^{65, 66, 67} Beyond consultation, the CEQ should work towards forming deliberate and respectful partnerships with Tribes that uphold principles of sovereignty and free, prior, and informed consent. Such partnerships can be leveraged to ensure that Tribes are an integral part of the screening tool development process, resulting in a Climate and Economic Justice Screening Tool that is representative of Tribal environmental justice concerns.

(2) The Climate and Economic Justice Screening Tool should include environmental, climate, and socioeconomic indicators that are reflective of the environmental justice issues that are known to specifically affect Tribes. As previously discussed, Tribal environmental justice has unique social, political, historical, and cultural dimensions that differentiate it from the environmental justice issues that affect other communities. As such, the inclusion of Tribal environmental justice in the Climate and Economic Justice Screening Tool necessarily merits the use of different indicators and datasets. These indicators should include data on mining and energy development, holistic cultural landscapes, and Tribal narratives. With respect to mining and energy development,

⁶⁵ Kukutai & Taylor, 2016

⁶⁶ Carroll et al., 2019

⁶⁷ Dockry et al., 2018

there are many examples of relevant datasets developed by federal agencies that could be incorporated into the screening tool. For example, the U.S. Geological Survey maintains several relevant datasets, including those on historic asbestos mines, region-specific mines and mining districts, and active mines and mineral processing plants.^{68, 69, 70}

The tool must also make use of data on energy projects in general, including those provided by the U.S. Energy Information Administration, which maintains data on coal fields, crude oil pipelines, ethanol plants, natural gas processing plants, hydrocarbon gas liquid pipelines, and many other forms of energy infrastructure.⁷¹ For holistic measures of cultural landscapes, though there is not yet a widely used dataset on Tribal cultural landscapes, Harris and Harper (2011) suggest a variety of ways to quantify such impacts. Such methods might include cultural Habitat Equivalency Analysis (HEA), constructed scales (for example, number of lost visits to historical sites/culturally important spaces), and eco-cultural dependency webs that identify users, uses, linkages, and secondary impacts related to resource impacts.² These might further include culturally important species, as well as nutritional and medicinal services. Data on specific indicators of these aspects of cultural landscapes is often maintained by Tribes themselves, and can contain critical information on impacts to food webs, sacred sites, and holistic measures of Tribal health.^{72, 73}

Further, there are many ways that Tribal narratives could be used to improve the screening tool. This qualitative data could include descriptions of impacts on traditional lifeways, culturally-important species, access to traditional resources, traditional languages, among other impacts. This could also include governance data, such as degree of compliance

⁶⁸ Van Gosen, 2019

⁶⁹ Burger et al., 2018

⁷⁰ U.S. Geological Survey, 2003

⁷¹ U.S. Energy Information Administration, 2020

⁷² Donatuto et al., 2020

⁷³ Harris & Harper, 1999

with treaty rights or trust obligations that affect Tribal environmental justice.² The CEQ should engage with Tribal communities to incorporate narrative and qualitative data on Tribal health and wellness that can be used to support Tribes within the scope of the Climate and Economic Justice Screening Tool. Any of these datasets and measures could be valuable additions to the indicators used in the Climate and Economic Justice Screening Tool, as they would contribute to better understandings of the environmental justice burdens facing Tribes.

(3) The Climate and Economic Justice Screening Tool should utilize spatial boundaries that more accurately represent Tribal communities. In general, the imposition of rigid, stagnant, geographical boundaries does not always accurately reflect Tribal land tenure. Because Tribes have occupied the United States since well before present-day jurisdictional boundaries were imposed, many of the geographic boundaries that are now used in nationally-consistent and publicly available datasets (census tracts, for example) do not adequately represent the complexity and totality of Tribal land holdings. However, since EJSCREEN, there have been developments in quantifying the spatial extent of Tribal lands in the U.S., including the Census Bureau’s 2018 “American Indian/Alaska Native/Native Hawaiian (AIANNH) Area National Shapefile,” and importantly, Farrell et al.’s work to develop a comprehensive dataset on Indigenous land dispossession and forced migration.^{74, 75} Incorporating this data would signify a notable improvement from EJSCREEN by utilizing fine-grain geographic units that include state-recognized American Indian reservations and Hawaiian home lands.⁵¹ The use of these datasets would significantly aid the Climate and Economic Justice Screening Tool’s ability to account for and analyze the impacts on a far more diverse and wide-reaching set of Tribal lands.

⁷⁴ U.S. Census Bureau, 2018

⁷⁵ Farrell et al., 2021

4.2 Conclusion

By committing to investing 40% of federal investments on climate and energy in underserved communities, the Biden-Harris administration is well-positioned to deliver substantial environmental justice benefits to Tribes. Executive Order 14008 specifically calls for the development of a Climate and Economic Justice Screening Tool, built off the EPA's EJSCREEN, to help identify underserved communities towards which to target such climate and energy investments. Screening tools such as this one, and the GIS methodologies that underlie them, have the ability to significantly improve the way policymakers, researchers, and the general public understand spatial relationships.

However, in order for the Climate and Economic Justice Screening Tool to deliver meaningful environmental justice benefits to Tribes, the data and methodological gaps in EJSCREEN must be addressed. Namely, the new screening tool should engage with Tribes at every phase of the development and implementation processes, incorporate environmental and socioeconomic indicators that are reflective of Tribal environmental justice, and utilize spatial boundaries that more accurately represent Tribal communities. These lessons learned from EJSCREEN present significant potential for the Climate and Economic Justice Screening Tool to meaningfully incorporate Indigenous environmental justice and deliver tangible and relevant benefits to Tribes.

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