Advancing Environmental Justice

How PNNL applies 45 years of expertise in environmental and social science to advance environmental justice

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Environmental justice—the fair treatment and meaningful involvement of all people—does not exist for all Americans because of cross-cutting, systemic barriers. PNNL provides expertise to assist federal agencies in fulfilling their mandates to achieve environmental justice in relation to their regulations, policies, programs, and projects (i.e., federal actions). This includes environmental assessment and impact analysis, economic analysis, population demographics modeling, collaborative decision-making, and stakeholder engagement. Examples of this work encompass research and analysis of energy, the environment, infrastructure investment, and emergency response issues.

EXPERTISE ASSESSING IMPACTS ON DISADVANTAGED COMMUNITIES

The federal government has renewed its commitment to ensuring that all Americans, particularly those in disadvantaged communities, receive equitable benefits and opportunities. In addition, the government has established the goal for 40 percent of the overall benefits of federal agency programs to flow to disadvantaged communities. A key step in achieving environmental justice is accurately identifying the communities that may be affected by a federal action and characterizing the potential impacts that may occur.

PNNL has proven expertise in conducting interdisciplinary assessments to examine environmental, cultural, and socioeconomic impacts of proposed actions. PNNL capabilities also include demographic models that project the U.S. population by age, gender, and spatial location, as well as economic modeling capabilities. In combination, these capabilities enable analyses of disproportionate impacts on the most vulnerable populations that may result from federal actions, environmental hazards (e.g., extreme weather events), or systemic disruptions (e.g., infrastructure failure) and subsequent identification of effective mitigation.

EXAMINING TRADE-OFFS AND IDENTIFYING MITIGATION SCENARIOS

To achieve environmental justice, agencies must identify the impacts of a federal action on disadvantaged communities and quantitatively evaluate the trade-offs between proposed actions and alternatives.

PNNL's multidisciplinary researchers have integrated advanced predictive tools that reflect the dynamics and interactions of natural and human systems. Drawing upon four decades of experience in environmental assessment, PNNL developed the ***Framework for Assessment of Complex Environmental Tradeoffs (FACET)*** to underpin socially equitable decisions based on defensible cost and benefit impact valuations and trade-off analyses. This framework is set apart from typical stand-alone decision-making tools because of its application of advanced analytics and data modeling to incorporate complex environmental factors—including climate change and extreme weather events—and diverse stakeholder perspectives to arrive at socially equitable decisions.

For example, PNNL's expertise in understanding and predicting climate change and extreme weather events was highlighted in a FACET-based assessment that included addressing long-term dynamic baseline changes and accounting for climate change and extreme weather events in decision-making. In addition, PNNL modeling tools integrating natural and human systems were used to identify the most cost-effective pollution control strategies across states for reducing mortality from air pollutants, an impact that falls disproportionately on the most vulnerable. They have also been used to evaluate trade-offs between greenhouse gas emissions reductions and progress toward Sustainable Development Goals to evaluate the fairness of emissions reduction commitments across low- and high-income countries.

CREATING MEANINGFUL STAKEHOLDER INVOLVEMENT

Successfully achieving environmental justice is contingent on full engagement with all stakeholders, in particular the disadvantaged communities that may be affected by a federal action. To be effective, such engagement must be transparent and collaborative and incorporate community perspectives, values, and needs to arrive at creative and equitable decisions.

PNNL has decades of experience in developing approaches and engaging with stakeholders and Native American Tribes. For example, a project to shape the cleanup of the Hanford Site in Washington State led to the development of a novel Native American human health risk assessment that included aspects of a traditional tribal way of life and unique tribal exposure pathways. In addition, PNNL has been instrumental in assisting federal agencies in adapting their stakeholder engagement programs to fully examine environmental justice issues.

ABOUT PNNL

Pacific Northwest National Laboratory advances the frontiers of knowledge, taking on some of the world's greatest science and technology challenges. Distinctive strengths in chemistry, Earth sciences, biology, and data science are central to our scientific discovery mission. PNNL's research lays a foundation for innovations that advance sustainable energy through decarbonization and energy storage and enhance national security through nuclear materials and threat analyses. PNNL collaborates with academia in its fundamental research and with industry to transition technologies to market.

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Environmental Justice Methodology for the Energy Domain

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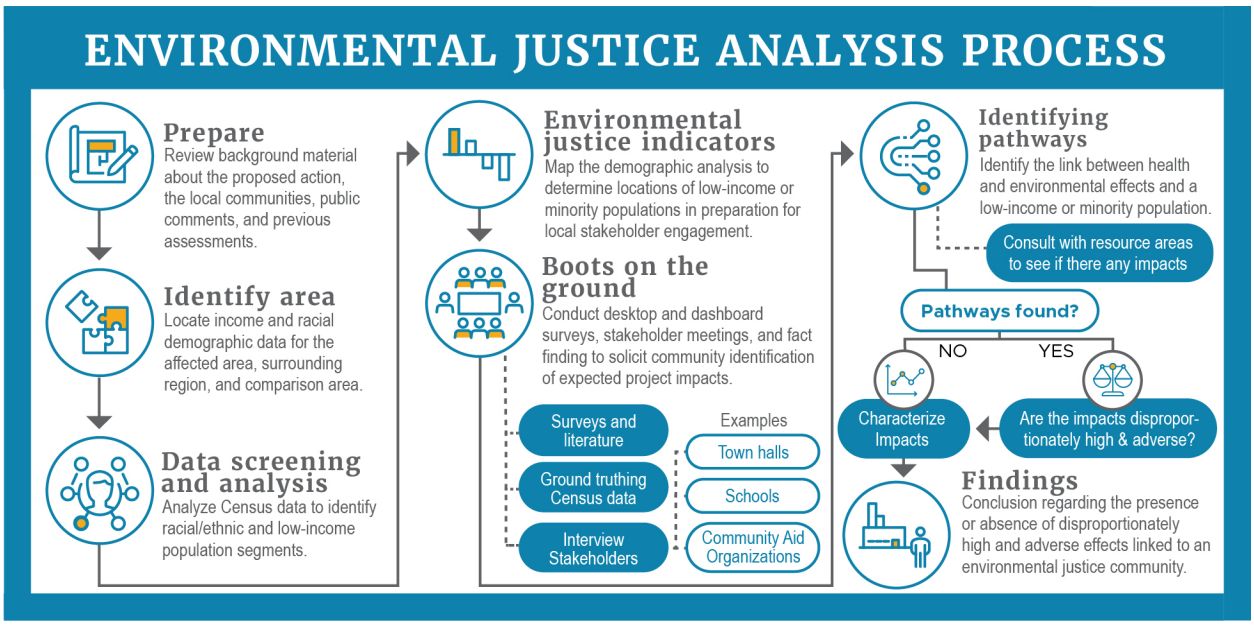
The terms environmental justice and equity are linked but not synonymous. **Environmental justice** (EJ) is the fair treatment and meaningful involvement of all people, regardless of race, color, national origin, or income, with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies.[1] **Equity** is defined as the consistent and systematically fair, just, and impartial treatment of all individuals, including individuals who belong to underserved communities; members of religious minorities; LGBTQ+ persons; persons with disabilities; persons who live in rural areas; and persons otherwise adversely affected by persistent poverty or inequality.[2]

Federal agencies increasingly need to incorporate defensible scientific analyses and data to support cost and benefit impact valuations and trade-off analyses that underpin socially equitable decisions. The **challenge** lies in selecting the appropriate scales and multisectoral human-earth systems models, integrating modeling results with social sciences, and engaging with disadvantaged communities to produce actionable results that an agency can use to support decision-making and achieve EJ.

ENVIRONMENTAL JUSTICE METHODOLOGY

The level of detail required to perform an EJ analysis varies depending on the scope and expected impact of the anticipated federal policies, programs, or projects (i.e., the proposed action). However, the process of collecting information from a variety of sources then requires a methodical ground-truthing or follow-up with community leaders, partners, and local resources to understand the risks of the proposed action to these communities in terms of health and environmental consequences. The steps to prepare an EJ analysis are depicted below.



STEP 1: PREPARE, IDENTIFY, AND SCREEN FOR AFFECTED POPULATIONS

Background material needed to identify disadvantaged (minority and low-income) populations in a potentially affected area is obtained by reviewing the geographic area of the proposed action along with U.S. Census Bureau data, population, demographic, and economic models, and any local income or racial demographic data. Minority or low-income populations may be communities of individuals living near one another, or they may be a geographically dispersed or transient set of individuals, such as migrant workers or American Indians.

STEP 2: ENGAGE WITH BOOTS ON THE GROUND

Using the results of the demographic analyses, a federal agency plans engagement with local stakeholder and disadvantaged communities to assure discovery of community issues, concerns, and interests, and share information regarding the proposed action—its purpose, environmental resources that may be affected, and benefits to the community. These engagement activities require interactions at town halls, in-person surveys, interviews with stakeholders, and ground-truthing of census and demographic data. These activities reveal and describe linkages between human health and environmental effects relative to the disadvantaged communities that are used when assessing the health and environmental impacts of the proposed action.

STEP 3: IDENTIFY IMPACT PATHWAYS

The assessment needs to determine whether there are potentially significant pathways for human health or environmental impacts on the identified disadvantaged groups and whether any such impacts may have disproportionately high and adverse effects on minority or low-income communities. Subject matter experts in human health impacts and environmental resources (hydrology, ecology, air quality, hazardous waste, etc.) determine if the proposed action will affect health or have adverse environmental outcomes. They use different resource modeling and analysis tools that consider the existing, dynamic baseline conditions, alternatives to the proposed action, and cumulative effects from other sources, including climate, that may represent additive impacts of the proposed action.

STEP 4: DETERMINE EJ IMPACTS FROM FINDINGS

The analysis results in two outcomes. First, it identifies whether the proposed action will affect EJ population groups and whether it may affect potential pathways between environmental impacts and the identified population groups. Second, if impact pathways can be linked to the identified disadvantaged community or groups, then a determination is made about whether any of the identified impacts would be disproportionately high and adverse. A key element in identifying EJ concerns is the recognition that relatively minor impacts on the general population may be disproportionately adverse for disadvantaged populations because of their greater reliance on local resources or more precarious economic status. In most cases, the federal agency would be likely to mitigate adverse impacts to avoid a finding of disproportionately high and adverse impacts on EJ groups from the proposed action.

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[1] US Environmental Protection Agency, accessed 03/15/2001 at https://www.epa.gov/environmentaljustice
[2] 86 FR 7009. Executive Order 13985, Advancing Racial Equity and Support for Underserved Communities Through the Federal Government.