

Decision Point 1: Indicator Domain Selection

Adoption Date: April 11, 2024

Recommendation for Environmental Justice Mapping Tool Domains

Place (Community Burdens & Benefits) Environmental Exposures Environmental Effects Climate Change Risks Built Environment	People (Vulnerable Populations & Opportunities) Human Health Disparities Demographic and Social Factors
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Rationale:

- The domains are intentionally broad, and the structure is easy for users to follow.
- Environmental exposures, toxic hazards, climate change risks, human health, demographics and social factors, and community benefits are directly mentioned HB 4077.
- The built environment is indirectly mentioned in HB 4077 in the definition of EJ communities as “communities with limited infrastructure.”
- Oregon natural resources agencies whose primary focus is the built environment will be better equipped to contribute to and use the EJ Mapping Tool with the inclusion of a built environment subdomain.
- Federal grants from the Inflation Reduction Act and Bipartisan Infrastructure Law prioritize built environment investments that advance environmental justice in communities, improve health and equity, and reduce greenhouse gas emissions.

Adopted Recommendation for Environmental Justice Mapping Tool Domains

Place (Community Burdens & Benefits) Environmental Exposures Environmental Effects Climate Change Risks Built Environment	People (Vulnerable Populations & Opportunities) Human Health Disparities Demographic and Social Factors
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Decision Point 2: Geographic Units

Adoption Date: April 11, 2024

Recommendations for Geographic Units:

The Environmental Justice Mapping Tool Methodology Workgroup recommends **Census tracts** for the primary geographic unit defining community boundaries in the first version of the Oregon EJ Mapping Tool.

The Methodology Workgroup also recommends the inclusion of additional geographic units in the EJ Mapping Tool including Census County divisions, zip codes, and county boundaries in the second version of the mapping tool.

Rationale:

- Census tracts are the smallest geographic unit that many American Community Survey data are available at with a reasonable degree of reliability.
- Census tracts are used as the primary layer in most state and federal EJ mapping tools and are the standard for many community-based mapping tools.

Adopted Recommendations for Geographic Units:

- Census Tracts for the primary geographic unit defining community boundaries for first version
- Inclusion of Census County divisions, zip codes, and county boundaries for future versions

Decision Point 3a: Community Designations

Adoption Date: June 11, 2024

Recommendations for Community Designations:

- Coastal
- Remote
- Large City
- Small City
- Rural
- Statewide

Rationale:

1. Coastal: The DLCD Coastal Boundary is a state standard and is included in the Oregon Data Framework.
1. Remote
 - A. HB4077, Section 10(9): “Remote community” means a community with low population density and high geographic remoteness.
 - B. Criteria used for remote communities were population size, and limited access to healthcare and amenities like a full-service supermarket.
 - C. USDA Data source is the same used by Oregon Rural Health.
 - D. USDA Frontier and Remote Areas I & II were not selected because those areas include micropolitan core areas with urban amenities.
 - E. Sub-county data sources were prioritized so tracts in counties with micropolitan core areas were not excluded from the designation.
3. Large City: USDA Rural-Urban Commute Areas Metropolitan Core Area were selected because they include the U.S. Census Urban

Area density threshold, continuous development, and travel primarily within the area.

4. Rural: None of the data sources evaluated by the Methodology Workgroup included both rural AND remote designations. Therefore, rural areas were selected as places outside of large city, small city, coastal and remote areas.

Adopted Recommendations for Geographic Designations

- Coastal
- Remote
- Large City
- Small City
- Rural
- Statewide

Decision Point 3b: Geographic Comparisons

Adoption Date: June 11, 2024

Recommendation for Community Comparisons: The ability to compare communities by designation.

- Large City to Large City
- Rural to Rural
- Coastal to Coastal
- Remote to Remote
- Small City to Small City (optional)
- Statewide

Rationale:

1. Statewide community comparisons are unable to account for regional, environmental and social differences which can result in diverting state funds away from EJ communities potentially contributing to environmental injustices,
2. Community designations were selected instead of regions because none of the state regions we evaluated group environmentally similar communities as well as the designations recommended in decision point 3a.
3. The Methodology Workgroup anticipates there may be the need for some state agencies to compare Oregon communities using a statewide index score in their rule making and infrastructure investment processes.

Adopted Recommendation for Community Comparisons: The ability to compare communities by designation.

- Large City to Large City
- Rural to Rural
- Coastal to Coastal
- Remote to Remote
- Small City to Small City (optional)
- Statewide

Decision Point 4: Weighting Methods

Adoption Date: October 10, 2024

Recommendations for Weighting Methods:

Principal Component Analysis: EPA Environmental Quality Index



- PCA is a technique used to simplify data and make it easier to analyze.
- Indicators are loaded into a variance matrix and the indicators are weighted based on their relationships with the other indicators inside the domain.
- Indicators with higher variation in their scores will receive higher weights. Indicators with lower variation in their scores will receive lower weights.
- The Methodology Workgroup requests flexibility to revisit the recommendation for Decision Point #4 during the sensitivity analysis (Decision Point #8) after the final set of indicators are selected.
- The Methodology Workgroup also recommends transitioning to participatory weighting of indicators and domains using conjoint analysis for future versions of the Oregon Environmental Justice Mapping Tool. Participatory weighting should include community survey input and technical expert consultation.

Rationale Principal Component Analysis:

- Environmental conditions impact health and quality of life unequally and therefore should not be weighted equally.
- PCA is a measure of inequity that can tell us which environmental burdens and social disparities are the most inequitable in Oregon.
- PCA can also tell us which Oregon communities are experiencing the greatest inequities.

- There is an underlying assumption in using PCA for determining weights that the chosen indicators are important, comprehensive components of environmental equity.

Rationale: Conjoint Analysis

- HB4077 requires Oregon community participation in the development of the Environmental Justice Mapping Tool.
- Conjoint analysis will give us greater opportunities to incorporate community concerns into indicator weighting.
- Unfortunately, the time and resources required for setting up community surveys with equitable demographic and socioeconomic representation and analyzing the data prevent us from using conjoint analysis for the first version of the Oregon Environmental Justice Mapping Tool.
- The EJ Mapping Tool Leadership Team will begin building surveys during development of the first version of the EJ Mapping Tool to collect statewide input from community members for version two of the tool.

Adopted Recommendations:

- Principal Component Analysis
- Conjoint analysis for future versions of the Oregon Environmental Justice Mapping Tool

Decision Point 5: Domain Aggregation

Adoption Date: October 10, 2024

Recommendation for Domain Aggregation: Multiplicative Approach

(Environmental Exposures + Environmental Hazards + Climate Change Risks + Built Environment)/4 x (Human Health + Social Factors)/2 = EJ Index Score

Rationale:

- Cumulative impacts are not independent. Health effects caused by environmental exposures are multiplicative in vulnerable populations (McHale et al., 2017).
- Evidence from human studies have shown that population characteristics can modify the response to pollution burden multiplicatively, providing scientific support for the use of a multiplier ([Alexeeff et al., 2012](#)).
- Priority rankings done by various emergency response organizations to score threats have used scoring systems with the formula:
 - **Risk = Threat x Vulnerability** ([Brody et al., 2012](#)).
- Applying additive aggregation to subdomains will provide more insight into the interactions of the indicators ([VanderWeele & Knol, 2014](#)).

Adopted Recommendation: Multiplicative Approach

(Environmental Exposures + Environmental Hazards + Climate Change Risks + Built Environment)/4 x (Human Health + Social Factors)/2 = EJ Index Score

Decision Point 6: Data Standardization

Adoption Date: October 10, 2024

Recommendations:

- Standardizing raw indicator values using z-scores.
- Reducing the effects of extreme outliers in the data.
- Using a process called "winsorization" to reduce outliers and rescale the z-scores.
- Rescaling winsorized z-scores between 1-99 percent for easier interpretation.
- For future versions of the Oregon EJ Mapping Tool, explore the feasibility of identifying optimal indicator scores and scale the data by distance from the optimal score or reference point.

Rationale:

- A percentile does not describe the magnitude of the difference between two or more communities. For example, a community ranked in the 30th percentile is not necessarily three times more impacted than a community ranked in the 10th percentile.
- Investments in communities should be made where risks are the worst. Z-scores are more accurate than percentiles at identifying outliers and similarities between communities. Indicators with extreme values thus have a greater effect on the composite index.
- It may be necessary to cap high and low z-scores to avoid skewing the mean indicator scores.
- The Methodology Workgroup endorses further exploration of setting reference points for indicators because it can show whether a goal is achieved for a community or how far it is away from reaching a goal.

Adopted Recommendations:

- Standardizing raw indicator values using z-scores.
- Reducing the effects of extreme outliers in the data.
- Using a process called "winsorization" to reduce outliers and rescale the z-scores.

- Rescaling winsorized z-scores between 1-99 percent for easier interpretation.
- For future versions of the Oregon EJ Mapping Tool, explore the feasibility of identifying optimal indicator scores and scale the data by distance from the optimal score or reference point.

Decision Point 7: Indicator Selection (Inclusion Criteria)

Adoption Date: December 12, 2024

Recommendation for Indicator Selection Criteria:

Criteria for Indicator Selection	HB 4077 Subsection
Indicators should provide a measure that is relevant to the subdomain it represents, in the context of “Environmental Burden”, “Environmental Justice”, and “Environmental Justice Community” definitions in HB4077.	<ul style="list-style-type: none">• 11(2)• 11(3)• 11(4)
Indicators should represent community concerns related to pollution burden, climate change risks, environmental conditions, human health, or social factors.	<ul style="list-style-type: none">• 12(A)
Community input and feedback should be considered. Indicators proposed and accepted during the community engagement process should be prioritized.	<ul style="list-style-type: none">• 12(2)
Indicators should be linkable to policy and other actions with measurable goals for reducing environmental disparities across Oregon.	<ul style="list-style-type: none">• 13(1)(d)
The mapping tool should include data from Oregon natural resources agencies or data compatible with environmental justice mapping tools developed by other state agencies.	<ul style="list-style-type: none">• 12(3)(d)
If a health-related measure, the health outcome should be associated with environmental exposures or known to be exacerbated by environmental conditions.	High Priority
The presence or absence of the environmental characteristics represented by the indicator should have a quantifiable negative effect on human health.	High Priority
Data for each indicator should be available for the entire state or community designation at the census tract level or be translatable to the census tract level.	High Priority
Data should be of sufficient quality and be: a) Complete b) Current c) Accurate	<ul style="list-style-type: none">• 12(3)(b)• 12(4)
Data should be accessible to the public.	<ul style="list-style-type: none">• 12(3)(e)

The office of Enterprise Information Services shall recommend data quality standards.	<ul style="list-style-type: none"> • 12(4)
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Rationale:

Content needed, not in slide deck

Adopted Recommendation:

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Data should be of sufficient quality and be: d) Complete	<ul style="list-style-type: none"> • 12(3)(b) • 12(4)

e) Current f) Accurate	
Data should be accessible to the public.	<ul style="list-style-type: none"> • 12(3)(e)
The office of Enterprise Information Services shall recommend data quality standards.	<ul style="list-style-type: none"> • 12(4)

Decision Point 7: Initial Indicator Inventory

Adoption Date: April 17, 2025

Recommendation for Initial Indicator Inventory: Link from EJC website

Rationale:

Adopted Recommendation: Link from EJC website