NATIONAL ENVIRONMENTAL JUSTICE ADVISORY COUNCIL

October 4, 2024

Dear Administrator Regan:

Cumulative impact assessment has been suggested by governments, scientists, and communities as a solution to provide greater environmental protections considering multiple environmental, social, and health burdens and stressors. Many burdens and stressors occur together and are concentrated in low-income communities and communities of color. A shift is needed for environmental policy to protect people from cumulative impacts, especially in communities confronting environmental justice issues. For this reason, the National Environmental Justice Advisory Council (NEJAC) formed the Cumulative Impacts Workgroup. The workgroup has worked together for nearly two years to conduct careful review, come to consensus through deliberation, and now to present these recommendations centering on the real-life experiences of these communities. There is substantial agreement on the need to pivot away from the way environmental protection has been implemented in the past.

This workgroup builds on the work of the 2004 NEJAC recommendations on cumulative impacts. The 2004 recommendations set up the problem, recommended specific actions, provided informational resources, and ended in a positive call in their last paragraph, which reads as follows:

> *The issue of cumulative risks/impacts is a unifying one, because it is a vehicle through which the impressive array of tools now available to ensure pollution prevention and risk reduction can be brought together and applied in new, innovative, and more effective ways. Exciting new approaches, partnerships, and models will surely emerge. Ensuring that these new possibilities will blossom will require a critical appraisal of past Agency policies and practices. Ensuring that this new day in environmental protection will come to pass will require committed individuals willing and able to provide foresight, analysis, and leadership.*

Yet, 20 years later, our workgroup is calling for many of the same actions and identifying many of the same problems. Overburdened communities cannot wait another twenty years for more robust and connected environmental protections that reflect people's real lives. EPA must address the disproportionate exposures and impacts that have been measured and modeled in this country repeatedly.

Many of the workgroup's recommendations echo and amplify those of the 2004 CI workgroup. In some respects, these recommendations reflect a great deal of scientific work and understanding that has evolved these past 20 years. For example, the NEJAC, at the recommendation of the 2004 CI Workgroup, recommended that the concepts of "community vulnerability" be incorporated into EPA's work and decisions. This understanding has evolved from the false narrative that people in a community may be inherently vulnerable toward an understanding and acknowledgement of structurally biased systems that impose barriers to certain communities to participate in government decision-making, access healthcare, and benefit from healthy food and a clean environment.

In summary, we resolutely present the following recommendations:
1. EPA should use cumulative impact assessments to reduce disproportionate exposures and impacts in overburdened communities.

- Decrease disproportionate cumulative burdens.
- Expand EPA's framework, analyses, and decision-making beyond traditional risk assessments.
- Take historic burden seriously by assessing the cumulative impacts of past projects and programs.
- Prioritize precaution over a high burden of proof of harm.

2. EPA should workshop, translate, and improve the Office of Research and Development's definition of cumulative impact before full agency adoption.

- Highlight the social determinants of health to support a broader understanding of cumulative impacts in communities with environmental justice concerns.
- Engage the NEJAC and frontline community partners to ensure that EPA's definition of cumulative impacts is culturally competent, useful to environmental justice communities, and relevant to communities' lived experience.

3. EPA should accelerate the progress of innovative approaches to cumulative impacts implementation.

- Recommendations to accelerate progress on cumulative impacts that can be started immediately.
    - Incentivize the expansion of cumulative impacts programs.
    - Expand and connect monitoring to improve multi-source assessments as the EPA moves into regularly assessing cumulative impacts.
    - Enhance polluter accountability and transparency.
    - Expand EPA multi-source standard attainment methods (TMDLs, SIPs) to incorporate multiple pollutants and advance cumulative impacts practice.

    - Apply the precautionary principle and a presumptive approach to permitting.
    - Use all regulatory authority to address the cumulative impacts of risk drivers.
    - Use existing health condition data to inform assessments regardless of cause.
    - Incorporate a cumulative impact modification factor in default risk-based screening levels.
    - Use existing health conditions to inform clean up level determinations.
- Recommendations to accelerate progress by integrating cumulative impacts into EPA culture.
    - Integrate cumulative impacts across offices, programs, assessments, and decision-making and make this work public.
    - Use existing cumulative impact mapping tools and develop new ones for regulatory decision-making and not only for information or prioritization.
    - Develop training on cumulative impacts and cumulative impact assessment.

4. EPA should determine and communicate a set of principles to guide the practice of cumulative impact assessment.

- Align cumulative impact assessments with the principles of equity and justice.
- Develop criteria for cumulative impact assessments and acknowledge where assessments and decisions fall short.
- Ensure cumulative impacts inform regulatory decision making.
- Acknowledge community harm and trauma in cumulative impacts work.
- Build upon established processes practices to develop cumulative impact assessments.

5. EPA should validate lived experience and incorporate it into assessments and processes through co-design and shared leadership.

- Define lived experience and related terms for the purposes of cumulative impact assessment.
- Specify who has lived experience and where to find it.
- Explain the value of lived experience.
- Develop and institutionalize guidance and training around lived experience.
- Educate the Agency and increase use of the tools for capturing lived experience.

6. EPA should support comprehensive, solution-oriented, community-driven programs.

- Advance comprehensive community approaches by integrating the regulatory toolkit into pollution prevention and reduction initiatives.
- Accelerate approaches that align with its structure and culture.
- Use the idea of management zones to address cumulative impacts.
- Embed accountability to the impacted community in EPA's comprehensive community approaches.
- Require metrics to track the outcomes of comprehensive community approaches.
- Improve inter- and intra-agency coordination so that comprehensive community approaches result in pollution reductions.
- Move forward with comprehensive community approaches while avoiding unintended and negative outcomes.
- Continue to work in community engagement, co-design, and shared leadership.

7. EPA should incorporate structural drivers such as colonialism and racism into its cumulative impacts practice and framework for implementation.

- Acknowledge and evaluate the root causes and structural drivers of disproportionate and cumulative impacts.
- Incorporate root causes and structural drivers of injustice into strategic and program planning.
- Incorporate structural drivers and root causes of inequality into cumulative impact assessments, and support index development.
- Apply an anti-racist lens to its work and support recruitment and retention related to DEIA.
- Acknowledge and address power imbalances in cumulative impacts work.
- Avoid erecting barriers to laws and policies that attempt to repair past harm and repair justice.

8. EPA should promote climate justice.

- Make more transparent, holistic, and connected decisions.
- Learn about and acknowledge historic and currently biased policies.
- Work to mitigate and adapt to the impacts of climate change so as not to prolong or amplify chemical stressors.

The NEJAC welcomes opportunities to continue to collaborate with the Agency on future consultations or charges related to cumulative impacts. We would like to invite the Agency to provide a response to these recommendations at the NEJAC's

spring 2025 public meeting. The NEJAC would also be happy to meet with staff to answer any questions about implementation.

Sincerely,

Na'Taki Osborne Jelks, PhD, Co-Chair

Jerome Shabazz, Co-Chair

Attachment

cc: NEJAC Members
Michael S. Regan, Administrator
Theresa Segovia, Principal Deputy Assistant Administrator, Office of Environmental Justice and External Civil Rights
Karen L. Martin, Director, Partnerships and Collaboration Divison
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Reducing Cumulative and Disproportionate Impacts and Burdens in Environmental Justice Communities

October 4, 2024

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Sandra Whitehead, George Washington University (workgroup co-chair)
Sacoby Wilson, University of Maryland

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A large portion of the content ideas in the Climate Justice theme came from a rich conversation we had in Puerto Rico with local environmental justice experts including:

Pedro Sadee, Attorney Environmental Lawyer and part-time professor, University of Puerto Rico
Ariel Lugo, Emeritus Scientist, USDA, Forest Service, International Institute of Tropical Forestry; Chairman, Estuario's Scientific Technical Advisory Board
Raul Santiago, Assistant professor at University of Puerto Rico
Edmundo Colon-Izquierdo, ECo
Tischa Munoz-Erickson, Research Social Scientist, USDA Forest Service International Institute of Tropical Forestry
Brenda Torres Barreto, Executive Director, Estuario

Sophia Owen also participated in our meeting in Puerto Rico providing ideas and recommendations.

Cumulative impacts have a long history, and we have benefited from all who have provided their work and expertise to this important and necessary lens for environmental protection.

Introduction

Cumulative impact assessment (CIA) has been endorsed by governments, scientists, and communities as a process that can demonstrate a need for greater environmental protections through its examination of multiple environmental, social, and health **burdens** and **stressors**. Many burdens and stressors occur at the same time and are concentrated in low-income and communities of color. Environmental policies and practices must pivot to pivot away from single chemical and single source ("siloed") approach since it does not allow EPA to achieve its mission in overburdened communities. Acceleration in this change in approach is necessary to adequately protect people from cumulative impacts, especially those in communities confronting environmental justice issues. In support of such a shift, the National Environmental Justice Advisory Council (NEJAC) has worked for nearly two years to conduct a careful review of the issues, deliberate, and reach a consensus on these recommendations. There is substantial agreement on the need for environmental protection efforts to encompass cumulative impact principles and components, which we describe in these recommendations. The need is evidenced in part by EPA's charge to the NEJAC (see appendix A), the EPA investment in and work on cumulative impacts, a National Academy of Sciences panel to assess the state-of-the-science and the future of cumulative impact assessment, and the decades-long accounting of need and experiences by community and environmental justice organizations.

Cumulative impact assessment is a process of evaluating both quantitative and qualitative data representing cumulative impacts to inform a decision.
Source: White House Council on Environmental Quality, Climate and Environmental Justice Screening Tool. Frequently Asked Question (2022)

Burdens are the negative impacts and challenges faced by disadvantaged communities, such as pollution, underinvestment in housing and infrastructure, lack of access to healthcare, and economic disadvantages.
Source: White House CEQ

Stressors are factors that affect organisms and ecosystems. In environmental health, these are understood to include both chemicals and factors that are associated with adverse outcomes that are not chemicals (non-chemical stressors).
Source: EPA

Frontline community refers to populations most impacted by a source of environmental pollution.

The origin and purpose of cumulative impact work is to reduce disproportionate environmental, health, and social stressors and burdens. These recommendations are pointless if they do not result in improved conditions in communities overburdened with cumulative impacts. The NEJAC therefore urges EPA to integrate disproportionality into cumulative impact assessment decision making. All our recommendations are possible to implement if EPA continues to take advantage of the momentum and accelerate cross-program and connected agency actions to assess and address cumulative impacts. It is time for cumulative impact work to move from research into practice.

Because no one is exposed to pollution in the way it is regulated—chemical by chemical, facility by facility, and medium by medium—there is a need for greater inclusion of lived experience in analyses and assessments that inform regulatory decisions. Social scientists have developed approaches to gather lived experience, and mixed methods practitioners have developed approaches to integrate lived experience with quantitative approaches. Environmental decision-making that is more reflective of real-life is crucial for **frontline community** health, and the NEJAC urges EPA to continue its work in this area.

The NEJAC submits these recommendations to the EPA 20 years after the first NEJAC workgroup on cumulative impacts and risks submitted its ground-breaking recommendations. The 2004 recommendations set up the problem, recommended specific actions, provided informational resources, and concluded as follows:

> *The issue of cumulative risks/impacts is a unifying one, because it is a vehicle through which the impressive array of tools now available to ensure pollution prevention and risk reduction can be brought together and applied in new, innovative, and more effective ways. Exciting new approaches, partnerships, and models will surely emerge. Ensuring that these new possibilities will blossom will require a critical appraisal of past Agency policies and practices. Ensuring that this new day in environmental protection will come to pass will require committed individuals willing and able to provide foresight, analysis, and leadership.*[1]

Yet, 20 years later, the NEJAC is identifying many of the same problems and calling for many of the same actions. Overburdened communities cannot wait another 20 years for more robust and connected environmental protections that reflect people's real lives. EPA should address the disproportionate exposures and impacts that have been measured and modeled in this country repeatedly.

The 2004 recommendations called for financial and technical capacity for EPA and local communities to carry out more environmental justice and cumulative impact work. EPA has made progress in these areas, especially in the past several years due to increased funding from supportive leadership. In 2022, the EPA Office of Environmental Justice and External Civil Rights (OEJECR) was created and given equal standing with other EPA program offices. As a result, OEJECR received increased funding and staffing and is providing grants and other funds to overburdened communities. The 2004 recommendations also called for a set of screening tools to prioritize communities for more immediate interventions and recommended that EPA investigate its legal authorities to address environmental injustice and cumulative impacts. In these past 20 years, numerous mapping tools have evolved and are available to the EPA and the public. In 2023, EPA published *EPA Legal Tools to Advance Environmental Justice: The Cumulative Impacts Addendum*, which lays out EPA's current understanding of its existing legal authorities.[2] And finally, the 2004 recommendations called for a series of community-focused pilot projects to reduce cumulative and disproportionate exposures and impacts. At this writing in 2024, there are multiple cumulative impact demonstration projects facilitated by EPA that will inform the EPA's final cumulative impact assessment process.

EPA must address the disproportionate exposures and impacts that have been measured and modeled in this country repeatedly.

1. National Environmental Justice Advisory Council (NEJAC), *Ensuring Risk Reduction in Communities with Multiple Stressors: Environmental Justice and Cumulative Risks/Impacts,* Washington, DC: EPA, (2004): 3.

2. EPA, *EPA Legal Tools to Advance Environmental Justice: Cumulative Impacts Addendum*, Washington, DC: Office of General Council, 2023.

Many of our current recommendations echo and amplify those made in 2004. For instance, this report calls for a bias for action and urges EPA to use its legal, scientific, and programmatic tools to address disproportionate and cumulative exposures and impacts. In some respects, these recommendations reflect much scientific work and understanding that has evolved these past 20 years. For example, the 2004 NEJAC Cumulative Impacts Workgroup recommended that the concept of community vulnerability be incorporated into EPA's work and decisions. Now, rather than positing that people in a community may be inherently vulnerable, we emphasize the structural barriers that inhibit certain communities from participating in government decision-making, accessing healthcare, and benefiting from healthy food and a clean environment.

> ***Community vulnerability*** relates to enhanced susceptibility to negative impacts from proximity or exposure to harmful pollution. Sometimes this phrase is used interchangeably with *social vulnerability*.
> *Source*: Peter L. deFur et al., "Vulnerability as a function of individual and group resources in cumulative risk assessment," *Environmental Health Perspectives*, 115, no. 5 (2007): 817–24.

Now, the NEJAC is calling for EPA to move from demonstration projects to national implementation and to move from using mapping tools for prioritization to using them in regulatory decisions. We urge EPA to include more community lived experience in assessments used to provide environmental protection. Cumulative impacts must evolve from being an unusual and newly emerging practice into a core approach, maintaining a robustness that includes a wide range of environmental justice voices. The challenge is how to get from the status quo—where issues related to cumulative impacts are only now emerging as a consideration in environmental planning, facility siting, permitting and enforcement—to widespread implementation of environmental protection approaches that improve the health of overburdened communities and reduce disproportionate exposures and impacts. A broad and successful implementation flows from operationalizing and integrating cumulative impacts according to the following tenets:

1. Cumulative impact assessments should be biased toward action by providing the basis for preventing new pollution sources and decreasing existing pollution burden and sources.
2. EPA must focus on reducing current and future disproportionate and cumulative impacts and consider and repair historic cumulative impacts.
3. Use system approaches in cumulative impact assessments to avoid unintended consequences, including increases in pollution in overburdened areas or increasing disproportionate exposures and impacts.[3]
4. CIA must use all the tools available, including existing tools from other (non-environmental) fields of expertise and more recent and future innovations.
5. CI work should be intentional about transparency.
6. EPA must intentionally focus on diversity, equity, inclusion, and accessibility practices – with inclusive recruitment, hiring, and retention practices.

3. "System approaches" applies to holistic problem solving (or problem defining) that considers individual factors and their overall connections to one other or systems, see Arnold Ross D., and Jon P. Wade, "A Definition of Systems Thinking: A Systems Approach," *Procedia Computer Science* 44, (2015): 669–678.

This report was compiled over 18 months by the NEJAC's Cumulative Impacts Workgroup, made up of NEJAC members and representatives of state and local government, nonprofits and community groups. The workgroup began by spending a few months co-developing a charge with EPA and organizing the recommendations according to themes. In parallel, the workgroup spent eight months sharing information and learning from one another and others, which was followed by six months of writing and editing these recommendations. The report also reflects public input from the NEJAC's public meeting in San Juan, Puerto Rico, in July 2023, as well as an online public meeting in December 2023 and a meeting in Houston, Texas, in April 2024. In summary, we resolutely present the following recommendations:

1. EPA should use cumulative impact assessments to reduce disproportionate exposures and impacts in overburdened communities.

- Decrease disproportionate cumulative burdens.
- Expand EPA's framework, analyses, and decision-making beyond traditional risk assessments.
- Take historic burden seriously by assessing the cumulative impacts of past projects and programs.
- Prioritize precaution over a high burden of proof of harm.

2. EPA should workshop, translate, and improve the Office of Research and Development's definition of cumulative impact before full agency adoption.

- Highlight the social determinants of health to support a broader understanding of cumulative impacts in communities with environmental justice concerns.
- Engage the NEJAC and frontline community partners to ensure that EPA's definition of cumulative impacts is culturally competent, useful to environmental justice communities, and relevant to communities' lived experience.

3. EPA should accelerate the progress of innovative approaches to cumulative impacts implementation.

Recommendations to accelerate progress on cumulative impacts that can be started immediately.

- Incentivize the expansion of cumulative impacts programs.
- Expand and connect monitoring to improve multi-source assessments as the EPA moves into regularly assessing cumulative impacts.
- Enhance polluter accountability and transparency.
- Expand EPA multi-source standard attainment methods (TMDLs, SIPs) to incorporate multiple pollutants and advance cumulative impacts practice.
- Apply the precautionary principle and a presumptive approach to permitting.
- Use all regulatory authority to address the cumulative impacts of risk drivers.
- Use existing health condition data to inform assessments regardless of cause.
- Incorporate a cumulative impact modification factor in default risk-based screening levels.
- Use existing health conditions to inform clean up level determinations.

Recommendations to accelerate progress by integrating cumulative impacts into EPA culture.

- Integrate cumulative impacts across offices, programs, assessments, and decision-making and make this work public.
- Use existing cumulative impact mapping tools and develop new ones for regulatory decision-making and not only for information or prioritization.
- Develop training on cumulative impacts and cumulative impact assessment.

4. EPA should determine and communicate a set of principles to guide the practice of cumulative impact assessment.

- Align cumulative impact assessments with the principles of equity and justice.
- Develop criteria for cumulative impact assessments and acknowledge where assessments and decisions fall short.
- Ensure cumulative impacts inform regulatory decision making.
- Acknowledge community harm and trauma in cumulative impacts work.
- Build upon established processes practices to develop cumulative impact assessments.

5. EPA should validate lived experience and incorporate it into assessments and processes through co-design and shared leadership.

- Define *lived experience* and related terms for the purposes of cumulative impact assessment.
- Specify who has lived experience and where to find it.
- Explain the value of lived experience.
- Develop and institutionalize guidance and training around lived experience.
- Educate the Agency and increase use of the tools for capturing lived experience.

6. EPA should support comprehensive, solution oriented, community driven programs.

- Advance comprehensive community approaches by integrating the regulatory toolkit into pollution prevention and reduction initiatives.
- Accelerate approaches that align with its structure and culture.
- Use the idea of management zones to address cumulative impacts.
- Embed accountability to the impacted community in EPA's comprehensive community approaches.
- Require metrics to track the outcomes of comprehensive community approaches.
- Improve inter- and intra-agency coordination so that comprehensive community approaches result in pollution reductions.
- Move forward with comprehensive community approaches while avoiding unintended and negative outcomes.
- Continue to work in community engagement, co-design, and shared leadership.

7. EPA should incorporate structural drivers such as colonialism and racism into its cumulative impacts practice and framework for implementation.

- Acknowledge and evaluate the root causes and structural drivers of disproportionate and cumulative impacts.
- Incorporate root causes and structural drivers of injustice into strategic and program planning.
- Incorporate structural drivers and root causes of inequality into cumulative impact assessments, and support index development.
- Apply an anti-racist lens to its work and support recruitment and retention related to DEIA.
- Acknowledge and address power imbalances in cumulative impacts work.
- Avoid erecting barriers to laws and policies that attempt to repair past harm and repair justice.

8. EPA should promote climate justice.

- Make more transparent, holistic, and connected decisions.
- Learn about and acknowledge historic and currently biased policies.
- Work to mitigate and adapt to the impacts of climate change so as not to prolong or amplify chemical stressors.

Recommendations

Theme 1. EPA should use cumulative impact assessments to reduce disproportionate exposures and impacts in overburdened communities.

This section highlights four key elements that distinguish cumulative impact assessment:

1. Addressing disproportionate cumulative impacts and burdens
2. A transition away from traditional risk assessment
3. Attention to historic burden
4. Precaution and a bias for action

Decrease disproportionate cumulative burdens.

Justice requires that no group bear a disproportionate burden of the cumulative impacts of environmental pollution, especially according to the principles of **distributive justice** (the fair distribution of burdens and benefits) and **restorative justice** (repairing harm). As environmental justice movements have long argued, EPA should assess how regulatory decisions affect the disproportionate distribution of cumulative environmental impacts and associated disease, disability, and death.[4] Communities experiencing disproportionate burdens overwhelmingly comprise people of color, Indigenous people, and low-income households.[5] EPA analyses must explicitly identify how any chemical, pollutant, or proposed project or program affects the spatially and demographically undue distribution of those impacts.[6] Doing so is already supported by an established body of scholarship on the science of differential burden.[7]

As reviewed in *EPA Legal Tools to Advance Environmental Justice*, the EPA's responsibility and authority for fostering environmental justice rests in various policies, regulations, and laws, including but not limited to:[8]

- Title VI of the 1964 Civil Rights Act
- Executive Order 12898 of February 16, 1994 ("Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations)
- Executive Order 13985 of January 20, 2021 ("Advancing Racial Equity and Support for Underserved Communities Through the Federal Government")
- Executive Order 14091 of February 16, 2023 ("Further Advancing Racial Equity and Support for Underserved Communities Through the Federal Government")

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4. NEJAC, *Ensuring Risk Reduction in Communities*; United Church of Christ Commission for Racial Justice, *Toxic Wastes and Race in the United States*, New York: United Churce of Christ, 1987.

5. John K. Kodros et al., "Unequal Airborne Exposure to Toxic Metals Associated with Race, Ethnicity, and Segregation in the USA," *Nature Communications* 13, no. 1, 2022; Clark, Laura P., Dylan B. Millet, and Julian D. Marshall, "Changes in Transportation-Related Air Pollution Exposures by Race-Ethnicity and Socioeconomic Status: Outdoor Nitrogen Dioxide in the United States in 2000 and 2010," *Environmental Health Perspectives* 125, no. 9, (2017); Tessum, Christopher W. et al., "Inequity in Consumption of Goods and Services Adds to Racial-Ethnic Disparities in Air Pollution Exposure," *Proceedings of the National Academy of Sciences of the United States of America*, 116 no. 13, (March 2019): 6001–6006.

6. Executive Office of the President. National Science and Technology Council. Environmental Justice Science, Data and Research Report. July 2024.

7. Tessum et al., "Inequity in Consumption of Goods and Services"; Gochfeld, M., and Joanna Burger, "Disproportionate Exposures in Environmental Justice and Other Populations: The Importance of Outliers," *American Journal of Public Health*, 101 no. S1 (2011): S53–S63.

8. EPA, *EPA Legal Tools to Advance Environmental Justice*.

- EPA's addition of "advance justice and equity"[9] to the Agency's existing guiding principles of "follow the science," "follow the law," and "be transparent" in the Agency's 2022–2026 Strategic Plan

The Agency's January 2023 Cumulative Impacts Addendum to *EPA Legal Tools to Advance Environmental Justice* further specifies the Agency's authorities under various environmental statutes to consider and address cumulative impacts across the Agency's work.

The NEJAC recognizes that one of EPA's key authorities to address cumulative impacts—the disparate impact standard of Title VI—is currently being challenged in court, and that these cases will influence how the Agency addresses disproportionate and cumulative impacts in the future.[10] While fully parsing these challenges is beyond the scope of this report, the NEJAC wants to address two items.

First, EPA and its partner agencies must not treat cumulative impact assessments, however rigorous, as a substitute for the robust enforcement of civil rights law or otherwise reduce disproportionate and cumulative impacts. In the context of legal battles, some agencies have done exactly this, which is an unjust and inadequate interpretation of civil rights enforcement. For instance, following the announcement that EPA would drop its civil rights investigation in Louisiana, the EPA reported that it would conduct a cumulative impact assessment of some neighborhoods in Cancer Alley.[11] Additionally, after rejecting residents' demands for robust enforcement of civil rights laws in Flint, Michigan, the Michigan Department of the Environment, Great Lakes, and Energy promised to instead "[pursue] funding for a community-led public health assessment."[12] Cumulative impact assessments that are disconnected from pollution reduction actions are a means, not an end, and are certainly not a replacement for pursuing civil rights infractions.

Second, while these legal battles unfold, justice requires that EPA marshal all of its authorities—including the Civil Rights Act and any other applicable anti-discriminatory laws—to redress cumulative, disproportionate impacts more stringently and creatively than it has in the past. EPA staff—including but not limited to legal counsel—must use their discretion to examine and use all possible legal opportunities to reduce disproportionate and cumulative impacts of environmental harm as contextually appropriate and in a manner consistent with applicable legal requirements. Delaying such efforts means that people in the nation's most overburdened, marginalized, and underserved communities will continue to be harmed and killed by environmental problems.

Community impact assessments are a means, not an end, and are certainly not a replacement for pursuing civil rights infractions.

9. EPA, *FY 2022 –2026 USEPA Strategic Plan*, Washington, DC: EPA, 2022.

10. For instance, see the state of Louisiana's pushback against EPA's Civil Rights investigations: Budryk, Zack, "Judge Bars EPA from Enforcing Civil Rights Act Provision in Louisiana's 'Cancer Alley,'" *The Hill*, January 24, 2024.

11. Michael Phillis, "EPA Drops Environmental Justice Investigations in Louisiana," Nation, Public Broadcasting System, June 28, 2023.

12. State of Michigan Department of Energy Great Lakes and Environment, "EGLE Statement on Resolution of Flint-Area Civil Rights Complaint," news release, August 10, 2023.

Expand EPA's framework, analyses, and decision-making beyond traditional risk assessments.

The mission of the EPA is to protect human health and the environment. The Agency implements this mission through traditional risk assessment, a science-based method to understand the potential human health impacts of a single type of emission or release at a time. Traditional risk assessment was originally developed to protect a healthy white adult. Many people working on environmental health and justice issues finds risk assessment to be overly narrow in scope, unreflective of overburdened communities of color and low-income communities, and, *most importantly*, not protective of human health. **Traditional risk assessment** does not account for what those communities experience: the physical, social and emotional burdens from experience, nor disproportionate burdens between communities.[13] In fact, in 2009 the National Research Council warned that failure to expand and modify risk assessment methods to be more cumulative (beyond the traditional, single chemical approach) may result in EPA's loss of credibility among stakeholders and environmental decision-makers.[14]

> ***Traditional (human health) risk assessment*** is a process to estimate the nature and probability of adverse health effects in humans who may be exposed to chemicals in contaminated environmental media, now or in the future.
> *Source*: EPA Human Health Risk Assessment, 2023.

The Agency's 2003 *Framework for Cumulative Risk Assessment* sought to identify and rectify some of the limitations of traditional risk assessment.[15] The 2003 framework proposed ways to integrate chemical and non-chemical stressors using both qualitative and quantitative data.[16] Despite its contributions, the framework very closely followed the traditional risk assessment paradigm, which is the continuum from source to exposure to dose to an effect at a specific place in the body. This framework suggests that effects could be more fully understood by adding together the risk from water, air, and land pollution that results in the same biological impacts. The emphasis of this framework was on biological sensitivity and toxicology, and it did not address the damaging yet complex impacts of racism and colonialism, other social factors that shape people's vulnerability to harm from exposure (i.e., the **social determinants of health**), or the ways that certain communities are disproportionately impacted.[17] Furthermore, traditional risk assessment addresses only the most sensitive end point of the toxicological analysis, or the effect found at the lowest dose. The interaction of chemicals and health effects and how that interaction might modify the effect is not considered in this approach. The Agency should develop cumulative impact assessment methodologies that rectify the limitations noted above.

> ***Social determinants of health*** are the conditions in the environments where people are born, live, learn, work, play, worship, and age that affect a wide range of health, functioning, and quality-of-life outcomes and risks.
> *Source*: CDC Healthy People 2030

13. Payne-Sturges D, Gee GC. National Environmental Health Measures for Minority and Low-Income Populations: Tracking Social Disparities in Environmental Health, *Environmental Research*, 102, no. 2 (2006):154–71.

14. National Research Council, *Science and Decisions: Advancing Risk Assessment*, Washington, DC: National Academies Press, 2009.

15. EPA, *Framework for Cumulative Risk Assessment*, Washington, DC, EP: 2003.

16. An example of an EPA cumulative risk assessment is the AirTox Screen, in which risks from air pollutant exposures are summed for numerous health effects including respiratory, cancer, and neurological effects, among others.

17. S. Prasad and Shannon R. Murphy, "Moving from 'Risk' to 'Impact' Paradigm is Critical to Achieve Environmental Justice," *EM*, 66 (June 2016): 24–28.

EPA has increased its internal understanding and slowly moved its work beyond single chemical risk assessment to aggregate risk assessment, **cumulative risk assessment,** and cumulative impact assessment.[18] Keeping this in mind, the NEJAC advises EPA to acknowledge and communicate that a cumulative risk assessment's primary use is in circumstances where EPA is acting under a legal duty to make a risk-based decision. When conducting cumulative impact assessments, EPA should not exclude chemicals merely because they lack a similar adverse effect or a common mode of action. Sharing molecular pathways can be helpful information, but it is not the whole story. The NEJAC recommends that EPA continue to release guidance on cumulative risk assessment and strongly advises that EPA move its emphasis toward cumulative impact assessments that are set up and directed at equity-based—and stressor and burden reducing—decision-making.

A ***cumulative risk assessment*** is an analysis, characterization, and possible quantification of the combined risks to human health or the environment from multiple agents or stressors.

Traditional environmental decision-making seeks to identify thresholds of harm in a siloed manner, focusing on individual substances and comparing these levels to pollutant concentrations in the environment that are likely to enter individuals. This comparison is not possible for all conceivable combinations of chemical and non-chemical stressors; there are simply too many combinations to test. The NEJAC agrees that research on the interactions of common risk driver pollutants must continue, but the time it takes to test all possible combinations is too lengthy and therefore should not be required for litigation-proof cumulative standard development. This allows harm to persist in overburdened communities. Chemicals should be tested and harm assessed as a class so that the highest protection can be afforded communities faster. The Agency does not need to test every combination of PFAS, for instance, to know that they are harmful to human health and need to be regulated.

Take historic burdens seriously by assessing the cumulative impacts of past projects and programs.
Examining only current or future proposed exposures does not acknowledge that communities of color and low-income communities have experienced disproportionate exposures and impacts that are not just historical but are ongoing. Justice requires that EPA evaluate the impacts of past projects and programs considering the full, cumulative array of hazards and social determinants of health that contribute to health disparities. For this reason, it is important to include the language of both stressors and burdens in discussing cumulative impacts.

To fully assess these types of cumulative impacts, EPA will need to take a new look at the uncertainty factors that are currently used to reflect biological sensitivity and develop uncertainty factors that are protective of historically disenfranchised populations. Additionally, EPA will need to adopt methods to factor in qualitative data such as public testimony and lived experience, or community science with small numbers of participants, existing health conditions, and other data that are often dismissed in traditional risk assessment.

18. EPA, *Cumulative Impacts Research: Recommendations for EPA's Office of Research and Development*, Washington, DC: EPA, 2022; EPA, *Guidelines for Cumulative Risk Assessment Planning and Problem Formulation* (Public Comment Draft), Washington, DC: EPA, 2023; EPA, *Draft Proposed Approach for Cumulative Risk Assessment of High-Priority Phthalates and a Manufacturer-Requested Phthalate under the Toxic Substances Control Act*, Washington, DC: EPA, February 2023; EPA, *Draft Proposed Principles of Cumulative Risk Assessment under the Toxic Substances Control Act*, Washington, DC: EPA: 2023.

Prioritize precaution over a high burden of proof of harm.

Justice requires that in the face of scientific uncertainty, EPA actions and programs be implemented to protect human health and the environment. This is the Agency's fundamental mission. In traditional risk assessment, the burden is on the Agency to prove that there will be human exposure and that a chemical or project is harmful. The NEJAC's recommended approach means that when there is uncertainty—which is always—EPA should act with precaution to provide the highest levels of protection possible for human health and the environment, erring on the side of precaution, rather than doing nothing while "definitive data" are gathered, published, and made available. This may take years, while harm continues. It is important to take a less timid approach to uncertainty, one that is less biased toward the status quo and that less privileges the economic interests of specific companies over the collective wellbeing.

A precaution-based approach would place the burden of proof on the regulated actor to determine that the cumulative impact of its chemical or project is safe before it could be approved. Post-normal science provides a conceptual framework for this, as this practice has evolved to address questions where high levels of uncertainty and urgency co-exist, such as is the case in policy-relevant science.[19] In some instances, such as the development of National Ambient Air Quality Standards (NAAQS), EPA is required to use precaution in setting regulatory standards, as evidenced by the phrase "an ample or adequate margin of safety."[20] The Agency should explore how cumulative impact assessments might be used to integrate precaution more fully.

Cumulative impact assessments must be developed and used to inform regulatory decisions; they should not be conducted solely for research purposes. It is important that these assessments be used to inform permitting decisions. If there is not a possibility that permitting conditions or denials will stem from a cumulative impact assessment, communities will be reluctant to spend their scarce time and resources participating, and the Agency will erode any trust it has built. The Agency must create more stringent rules that require permit conditions to reduce existing chemicals and other hazards contributing to disproportionate and cumulative impacts, and it must refuse to allow new harmful chemicals and projects that would exacerbate disproportionate and cumulative impacts by *denying permits*. The point of disproportionate and cumulative impacts analysis is to make regulatory decisions that improve material conditions in overburdened and vulnerable communities and reduce inequalities across communities. A first step in this continuum must begin by incorporating environmental justice and cumulative impact mapping and screening tools into decision-making to meet its mission and mandate to act with precaution using existing authorities and tools.

EPA must refuse to allow new harmful chemicals and projects that would exacerbate disproportionate and cumulative impacts by *denying permits*.

19. Funtowicz, Silvio, "A Quick Guide to Post-Normal Science," *Integration and Implementation Insights*, blog, October 19, 2021, accessed June 7, 2024, https://i2insights.org/2021/10/19/guide-to-post-normal-science/.

20. 42 U.S.C. § 7409 (1976 & Supp. I 1977 Supp. 11 1978); 42 U.S.C. § 7412 (Supp. I 1977 & Supp. II 1978).

Theme 2. EPA should workshop, translate, and improve the Office of Research and Development definition of cumulative impacts before full Agency adoption.

The EPA Office of Research and Development (ORD) has defined cumulative impact as "the totality of exposures to combinations of chemical and non-chemical stressors and their effects on health, well-being, and quality of life outcomes."[21] Because no prior Agency definition of cumulative impacts existed, this definition is an important advance in accounting for all the burdens in communities disproportionately impacted by environmental risks and harms. Since it is the only definition that is publicly available on EPA's website, it stands as the Agency's official definition even though it is intended to direct Agency research. In this theme, the workgroup makes several recommendations for improving this definition, given that definitions are foundational in framing program and method development. Above all, the definition of *cumulative impact* must be worded such that it drives actionable analyses that decrease disproportionate burdens and exposures. Moreover, and very importantly, we will repeat an overarching theme in these recommendations – this definition work need not delay any other action-oriented activities and programs at EPA. Pollution reduction in overburdened areas cannot wait.

> EPA's definition of *cumulative impact* must be worded such that it drives actionable analyses that decrease disproportionate burdens and exposures to overburdened communities.

Highlight the social determinants of health to support a broader understanding of cumulative impacts in communities with environmental justice concerns.

A goal for this work must be health equity, which is the state in which everyone has a fair and just opportunity to attain their highest level of health. The ORD definition can be improved by clarifying the role of the social determinants of health. According to the CDC, the social determinants of health are key determinants of health inequities—"the unfair and avoidable differences in health status seen within and between populations."[22] Determinants such as social and economic disadvantage, racism, under- and unemployment, unsafe or insecure employment conditions, and social exclusion create stressful conditions that exacerbate environmental stressors. While the term "non-chemical stressors" can be inclusive of the social determinants of health, it is a field-specific term and not clearly understood outside of EPA.

21. EPA, *Cumulative Impacts Research*, 2022.

22. US Centers for Disease Control and Prevention. Social Determinants of Health at the CDC. (2024) https://www.cdc.gov/about/sdoh/index.html.

Engage the NEJAC and frontline community partners to ensure that EPA's definition of cumulative impacts is culturally competent, useful to environmental justice communities, and relevant to communities' lived experience.

People in overburdened and underserved communities have important insights into environmental inequalities and a right to participate in discussions about cumulative, disproportionate impacts. Therefore, EPA's definition of cumulative impact must be useful and understandable to people outside of EPA and the research community, and specifically to overburdened communities. While there are few community-developed definitions for cumulative impact, community-based organizations tend to respond to definitions that [23]

- are location- and context-specific, rather than being more general, technical, and abstract relative to their experience of living daily with cumulative impacts;
- include the types of exposures and stressors that should be considered, rather than being limited to specific regulatory contexts (i.e., an air program defining cumulative impact within the context of existing air regulations or the water program doing the same);
- include the many ways of knowing, including risk estimates, pollution source density, social determinants of health, existing health conditions, and community lived experience that are conveyed through qualitative or quantitative data;
- indicate the importance of community participation and validation in identifying the stressors, impacts, sources, and communities most affected by cumulative impacts;
- use plain language and terms easily understandable by disproportionately impacted communities and the public.

23. Coming Clean, Louisville Charter for Safer Chemicals, website, accessed June 7, 2024, https://comingcleaninc.org/louisville-charter/endorse.

Theme 3. EPA should accelerate the progress of innovative approaches to cumulative impacts implementation.

Operationalizing and integrating cumulative impacts into EPA's regulatory assessments, implementation, and enforcement activities require research, planning, and practice. While these recommendations address all three dimensions, the focus in this section is on practice and the need for assessments with a bias for action. The NEJAC recommends that EPA maintain and accelerate all work and learning that occurred due to support from EPA leadership, staff, and outside experts. Twenty years between a cumulative risk assessment framework and guidance on planning and problem formulation is too long. While it's our understanding that the Agency has developed and revised a cumulative impact framework, that work is not public, and the NEJAC has not been consulted or informed of its contents. Furthermore, there are several cumulative risk documents that have yet to be finalized.[24] To accelerate progress, public and transparent progress on EPA programs and strategies related to cumulative impacts require bold and expedited communication, development, and implementation.

The following recommendations have been categorized as those that (1) can be started immediately; and (2) long-term actions to promote culture change at EPA to shift from a cumulative risk-only mindset to considering cumulative impacts. Further, the NEJAC emphasizes that these recommendations are not "one and done" but instead are ongoing activities that require intentionality. Incorporating a cumulative impact approach is continuous work and requires cultural and systemic changes. This theme is not a detailed "how to" guide. Rather, the recommendations provide a road map for implementation. Our expectation is that EPA's technical and policy experts will determine the technical details and sequence of steps to implement these approaches, and organizational experts would be assigned to connect programs for co-development, co-learning, and data coordination.

Twenty years between a cumulative risk assessment framework and guidance on planning and problem formulation is too long.

Recommendations to accelerate progress on cumulative impacts that can be started immediately

Incentivize the expansion of cumulative impact programs.

Environmental laws and regulations allow consideration of cumulative risk and impacts to various degrees, and these cumulative approaches are a relatively new consideration in regulatory decision-

24.US EPA. "Guidance for Cumulative Risk Assessment Planning and Problem Formulation." https://www.epa.gov/risk/guidelines-cumulative-risk-assessment-planning-and-problem-formulation; US EPA. Cumulative Risk Assessment Under the Toxics Substance Control Act. https://www.epa.gov/assessing-and-managing-chemicals-under-tsca/cumulative-risk-assessment-under-toxic-substances#:~:text=EPA%20will%20use%20the%20peer,ultimately%20the%20unreasonable%20risk%20determinations.

making.[25] Breaking from the status quo to create and integrate cumulative impacts approaches will take continued effort, creativity, and innovation from regulators, from the public, and from regulated parties. To make those things happen, EPA should develop and launch incentive programs for industrial proposals and activities that attempt to address the results of cumulative impact assessments by participating in pollution reduction programs that go beyond existing requirements. EPA must also consider and implement programs that incentivize community groups to share their innovations, and employee awards to shine light on especially useful work. All of this allows existing incentive work to gain momentum in order to evolve cumulative impacts methodologies and processes. Additional environmental monitoring incentives may be especially useful in locations where this information is scarce since connected monitoring and modeled data is fundamental in cumulative impacts work. Incentive programs may or may not have a financial or market-based dimension. Determining what types of incentives will advance cumulative-impact-driven decision-making is itself an area where creativity and innovation are needed.

EPA should use its strong history in implementing successful incentive programs such as the Climate Leaders Program, Climate Protection Partnership Program, Energy Star, and the Inflation Reduction Act to remove financial barriers for assessing cumulative impacts and using those results for pollution-reducing actions. Cumulative impact assessments and results could also become eligible activities in funding opportunities across programs and are especially suitable from Office of Land and Emergency Management grants such as brownfields assessment and clean up as well as those issued by OEJECR. A concerted effort by EPA to develop and launch incentive programs and expand grant-eligible activities is an important component to operationalizing and integrating cumulative impacts to move meaningfully and aggressively to protect health in overburdened communities.

Expand and connect monitoring to improve multi-source assessments as the EPA moves into regularly assessing cumulative impacts.

Conduct real-time and continuous monitoring. Current monitoring and reporting requirements are inadequate and keep communities impacted by multiple sources of pollution (or sometimes a single highly polluting source) in harm's way and unable to determine if the air they are breathing is unhealthy. Some gaps in the existing environmental monitoring network are due to attainment with NAAQS being based on air monitoring placed to reflect regional air quality. Siting requirements and prioritization assessments sometimes fail to detect local hotspots, resulting in a missed opportunity to reduce area-wide air pollution because they are "averaged out," meaning that when averaged with other air quality data and indexed, the hotspot does not show up as an issue of concern. To this end, the agency should invest in 'hyper-local' air monitoring that is valuable for community-led action alongside monitoring data that can be used directly for regulatory purposes. Given that industrial activity tends to be clustered in overburdened communities, monitoring that reflects a regional scale can mask the magnitude of cumulative impacts faced by these communities. Furthermore, delays in releasing monitoring results to communities makes data much less useful and does not build trust.

As stated in Goal 4 of EPA's FY 2022–2026 Strategic Plan (Ensure Clean and Healthy Air for All Communities):

> *…the Agency will work to assess the current state of the nation's monitoring network and pursue collaborative approaches to modernize the technologies, equipment, and network*

25. EPA, EPA Legal Tools to Advance Environmental Justice: Cumulative Impacts Addendum; *EPA Legal Tools to Advance Environmental Justice*.

> *design used to measure air quality as well as enhance the quality and security of critical data collection, handling, and reporting from the network.*[26]

Broad implementation of continuous emissions/effluent monitoring combined with real-time, publicly accessible reporting is a foundational building block of several recommendations in this report. Such a shift in monitoring and reporting can support meaningful progress in identifying disproportionately impacted communities and reducing those cumulative impacts.

Use environmental justice and cumulative impacts information to determine the placement of monitors. The EPA outlines how state agencies shall perform and submit an air quality surveillance system assessment every five years to determine, among other objectives, the ability of the existing and proposed sites to characterize air quality for areas with relatively high populations of susceptible individuals (e.g., children with asthma), for proposed discontinuance of monitoring sites, and the effect on data users other than the Agency itself such as for health effects studies. Guidance indicates one purpose of a monitor in a network may be to evaluate population exposures to air pollutants for assessing environmental justice issues.[27] EPA should make placement of some portion of network monitors for cumulative impacts and environmental justice-related issues mandatory and provide guidance on how cumulative impacts should be assessed for monitor placement. These requirements should consider impacts from multiple environmental media such as the ability to determine air deposition onto nearby surface water.

Expand source monitoring "inside the fence." The expansion and enhanced connections in ambient monitoring must be coupled with significant improvements in source/emissions monitoring. The ability to truly achieve a meaningful breakthrough in terms of healthier air and cleaner water (and environment) for environmental justice communities and the public requires that monitoring is upgraded on "both sides of the fence," meaning inside and outside the facility.[28] The limited frequency and extent of source/emissions data received by EPA, state, and local regulators is a major barrier to operationalizing and integrating cumulative impacts. This type of source monitoring informs multi-source assessments of both air and water pollution and enhances the accuracy and coverage of the National Emission Inventory, translating to a more robust AirToxScreen.[29]

Enhance polluter accountability and transparency.

Air emissions and effluent discharge data should be provided in real-time to communities through a map format in a mobile app that shows the location of the regulated emissions and effluent sources, whether the regulated activities are in compliance, how long and how many times a facility has been out of compliance, the severity of the problem, and when a corrective action will be taken and has been taken. This information could also be flagged for pollutants that accumulate or deposit onto the land and are taken up into animals, plants, and food products. The continuous reporting system should be coupled with automated "push notifications" to regulators when a facility is out of compliance. It could be added to the AirNow application, in fact the workgroup had an extended conversation with environmental professionals in Puerto Rico about accountability through radical transparency (real-time data on facilities), for example by providing a QR code on the fence of facilities that provide compliance and enforcement information and could also include cumulative indices. There are many examples of air

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26. EPA, *FY 2022 –2026 USEPA Strategic Plan*.

27. EPA, *Ambient Air Monitoring Network Assessment Guidance: Analytical Techniques for Technical Assessments of Ambient Air Monitoring Networks*, Washington, DC: EPA, 2007.

28. Goho, Shaun, "Advances in Air Monitoring Opportunities and Challenges for Addressing Race, Poverty, and Environmental Justice," *American Journal of Law and Equality* 3: (2023): 53–63.

29. EPA, Air Toxics Screening Assessment, 2020.

pollution data being collected, but these are not always sufficiently accessible or adequately combined to provide a fuller picture of air quality. Doing so is a relatively low-cost way of taking full advantage of the investments in air monitoring that have already been made. Engagement with the Beyond Compliance Network[30] could open up productive avenues to address this recommendation and build on the further recommendations below.

The key features of this approach to public engagement, effective enforcement, accountability, and pollution reduction to mitigate cumulative impacts include:

- continuous emissions and effluent monitoring;
- real-time and accessible reporting of emissions and effluent monitoring results to the public through a mobile app with an interactive map;
- mobile app with real-time notification from the public to regulators of polluted discharges (based on visual pollution or odors, 24 hours a day);
- real-time reporting of emissions violations (24 hours a day);
- real-time notification (automated "push notification") of violations (24 hours a day); and
- public record of actions taken (or not) to fix cause of violations.

Environmental compliance and pollution reduction systems with all these key features have been fully operational and successful outside of the United States.[31] This type of program would provide full accountability for polluters in overburdened communities. While these systems are fully operational, and the technical aspects are straightforward to implement, this approach may need to begin as a pilot before full operationalization and integration. As an initial step, EPA Office of Air and Radiation should request an in-depth briefing on the technical components of these pollution monitoring and reporting systems including information on integration into a fully operational system, the historical success of these systems to lead to pollution reduction, and improved compliance attainment. Steps in the process may include the following:

1. Receive an in-depth briefing and demonstration from the developer of the system.
2. Identify technical requirements to implement a similar system in the United States.
3. Identify the aspects of this type of system that can be required through existing regulations and what aspects would depend on voluntary cooperation.
4. Develop the scope, purpose, expectations, and requirements of a pilot implementation project.
5. Develop a cooperative agreement among regulated parties, community, regulators, and other collaborators that includes app user testing, information sharing about the project and data, potential incentive programs, regulated party cooperation, and government agency facilitation and support.
6. Conduct engagement for participation in a pilot, describing the scope, purpose, expectations, and requirements, along with potential incentives or compensation for participation.
7. Select one or more locations based on cumulative or disproportionate impacts and implement the project.

30 Beyond Compliance Network. https://www.openenvironmentaldata.org/pilot-type/beyond-compliance-network accessed: July 2, 2024.

31. Institute of Public and Environmental Affairs (Beijing, China) developed the Blue Map Database and Blue Map Application.

8. Provide community engagement and technical assistance and support throughout the pilot project to achieve successful outcomes and maximize learning.

Expand EPA multi-source standard attainment methods (TMDLs, SIPs) to incorporate multiple pollutants and advance cumulative impacts practice.

The NEJAC recommends that EPA lift up and expand existing assessments to include more cumulative impacts components. For example, the current enforcement priority around reducing air toxics in overburdened communities is a start, but still limited to a single media and single category of pollutants.[32] Another approach that is multi-media though single pollutant is in the lead mapping work.[33] EPA needs to elevate and build on these starting-points and establish clear expectations for their use in implementing programs. In addition to these programs, the EPA has a well-established technical toolkit to inform attainment of water and air quality standards. The Clean Water Act is implemented using an assessment of individual pollutant or pollutant group inputs into a waterbody within a watershed, called a Total Maximum Daily Load (TMDL). Using authority from the Clean Air Act, the EPA directs state air programs to develop State Implementation Plans (SIPs), which inventory multiple sources of an air pollutant to determine how states can maintain or comply with NAAQS. When attainment of an air quality standard requires a larger geographic focus, Good Neighbor laws, and sometimes boundary organizations, are used to support this. Both programs are based on similar overarching approaches and technical toolkits, which include ways to measure or model multiple pollution sources to assess whether a standard can be met, and if the standard cannot be met, to move forward to identify which pollution sources need to be decreased and where those decreases need to occur. (See appendix B.)

Table 1 (below) summarizes the current core approaches to meet environmental standards, with possible areas to incorporate more cumulative impact components. The descriptions below are possible now but are incremental and, in some ways, still incorporate the traditional risk assessment framing. Since the traditional risk assessment approach has been demonstrated to be less than protective, the NEJAC continues to urge the EPA to move in the direction of cumulative impact assessment.

32 EPA. National Enforcement and Compliance Initiative: Reducing Air Toxics in Overburdened Communities. https://www.epa.gov/enforcement/national-enforcement-and-compliance-initiative-reducing-air-toxics-overburdened. Accessed: July 2, 2024.

33 EPA. Data Mapping to Identify High Lead Exposure Risk Locations in the U.S. https://www.epa.gov/lead/mapping Accessed: July 2, 2024.

As a purely hypothetical example, the decision framework of TMDLs and SIPs would evolve as follows:

From: The TMDL/SIP process identified all sources of a pollutant and determined how much each source must reduce its contribution to meet the (single pollutant) standard.

To: The TMDL/SIP process identified applicable environmental stressors and burdens and determined the percentile of each in an assessment community. Stressors may be combined by overall domain (environmental, social, or public health), by connection with a health endpoint, scoped based on the lived experience of the community, or some other grouping mechanism. Action plans to reduce stressors and burdens would be developed based on disproportionality, a percent decrease goal, or informed by health studies where communities at certain overall percentiles were found to have higher health outcomes.

Table 1. Current core approaches to meet environmental standards and ways to incorporate more cumulative impact components

Primary Considerations in the Total Maximum Daily Load Process (water program) and the State Implementation Plans (air program)	***Potential steps toward a cumulative impacts approach***
Single pollutant standard development	1. Standards are multi-pollutant, grouped to protect health endpoints, chemical classification, or other grouping. 2. When single-pollutant standards are legally required, they are made more protective to account for past and current stressors and burdens.
Assessment determines the watershed or waterbody loadings, or air pollutant emission contributions to ambient air that are possible while still meeting the standard.	1. Contributions would not only include inventories of direct (point) air or water sources, but they would also include non-point sources, cross and multi-media contributions (e.g. air deposition onto water bodies). 2. The loadings would be grouped stressors that impact a health endpoint, or another grouping of stressors or burdens.
What are the sources of that key pollutant to the watershed or ambient air?	1. Contributions would not be screened out for further consideration based on percent contribution, culpability in standard nonattainment, or location of the pollutant source (i.e. from another state or country). Locally significant contributions to air pollution may appear insignificant in state or county averages. This would be considered. 2. Assessments would include all sources that contribute to a health endpoint or environmental impact, and/or that contribute to stressor or burden disparities.

Primary Considerations in the Total Maximum Daily Load Process (water program) and the State Implementation Plans (air program)	*Potential steps toward a cumulative impacts approach*
Where are the source contributions located?	Where are the sources of the environmental stressors and burdens that contribute to cumulative and disproportionate stressors and burdens?
How can those sources be reduced?	1. There would be an ability to address both point and nonpoint sources, and an acting understanding that both (not either) are important. cumulative impact assessments are not a source prioritization exercise. 2. Non-chemical stressors would inform how and to what extent sources would be reduced or eliminated. For example, heat and extreme heat both worsen health impacts when combined with pollutant exposures,[34] and also lead to heightened formation or growth of pollutants.[35] 3. Source reductions would be made to eliminate disproportionate stressors and burdens and reduce to some threshold or standard level. 4. Since environmental burdens and stressors are concentrated in low-income and communities of color, care would be taken to address local issues and not limited to decision-making based on regional averages.

From a technical perspective, adapting the core approaches from the air and water programs to a more cumulative approach would involve the following general actions:

- Fully engage the community and other stakeholders to share information and communicate the intended process going forward. Continue to engage those most impacted by the decision throughout the process, including in planning.
- [Scoping] Determine and agree on the geography of the assessed community.
- [Assessment] Redefine and develop decision-making to reflect multiple stressors and burdens (e.g., multi-pollutant standards, decrease in disproportionality). The goal is to move toward environmental health standards and rules that
    - are informed by multiple pollutants (pollutant class standards, such as combined PFAS drinking water standards);[36]
    - reflect all pollutants that impact a health endpoint (the Massachusetts cumulative impact rule); or
    - are directed at decreasing disproportionate and cumulative impacts (the New Jersey environmental justice rule).

34. U.S. EPA. "Integrated Science Assessment for Ozone and Related Photochemical Oxidants" https://www.epa.gov/isa/integrated-science-assessment-isa-ozone-and-related-photochemical-oxidants accessed 8/30/2024.

35. U.S. EPA "Harmful Algal Blooms" https://www.epa.gov/habs.

36. "Per- and Polyfluoroalkyl Substances (PFAS) Final PFAS National Primary Drinking Water Regulation," accessed June 7, 2024, https://www.epa.gov/sdwa/and-polyfluoroalkyl-substances-pfas; Mass. Department of Environmental Protection, "Cumulative Impact Analysis in Air Permitting," accessed June 7, 2024, https://www.mass.gov/info-details/cumulative-impact-analysis-in-air-quality-permitting; New Jersey Department of Environmental Protection, "Environmental Justice Law." Accessed June 7, 2024, https://dep.nj.gov/ej/law/.

- [Assessment] Use existing methods and tools to inventory the emissions, effluents, and discharges within the assessment community.
- [Scoping] Use existing tools to determine the reductions necessary to achieve the decision-making criteria that reflect multiple stressors or burdens.[37]
- [Recommendations] Develop a plan to deny or limit permits, implement control measures, and reduce point and nonpoint sources such that the decision-making criteria are met.

Overall, the NEJAC recommends that EPA use its regulatory authority to implement changes in environmental regulations so that they are more inclusive of the components of cumulative impact assessments, such as multiple pollutant sources and existing health burden in a community. And, to ensure pollution reductions, new requirements are needed so that the agency can take action on currently unregulated source contributions. For example, some TMDLs are triggered by aquatic life impacts, and in turn updated SIPs could be triggered by adverse existing health conditions in a community such as elevated asthma rates. TMDLs are sometimes based on multiple pollutants, such as nutrients. EPA could likewise develop guidance or requirements for multi-pollutant SIPs, such as an air toxics SIP aimed at protecting respiratory outcomes. Within the air program, this is an especially timely and possible approach because of the upcoming Air Emissions Reporting Requirement.[38] Both multi-source assessments could better integrate cross-media pollution and multi-pathway exposures, such as atmospheric deposition and existing lead burden.

Decision-making criteria, based on a larger set of disparate data, could apply a matrix approach. These approaches organize summaries of different types of data into columns or rows for comparisons. The NEJAC described and recommended this approach in their 2004 recommendations.[39] Matrices were also used in a sensitivity analysis of the CalEnviroScreen tool to compare how changes in each index impacted the census tracts that were in the top 10th percentile (based on an aggregated index).[40] Saha et al. used a matrix approach to study the cumulative impacts of Liquid Natural Gas buildout.[41] They organized the data around five themes:

1. Existing environmental burdens
2. Existing social and health vulnerabilities
3. Environmental impacts of LNG
4. LNG health and safety risks
5. LNG climate impacts, which they aggregated into metrics ranging from 1 to 5

Decision-making requires a comparison, and these numeric metrics, organized in a matrix, set up such a comparison.

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37. For example, the 2020 AirToxScreen is online at: https://www.epa.gov/AirToxScreen, and EPA Water Data and Tools are online at https://www.epa.gov/waterdata (accessed June 7, 2024).

38. National Archives, "Revisions to the Air Emissions Reporting Requirements, August 2023," *Federal Register*, August 9, 2023.

39. NEJAC, *Ensuring Risk Reduction in Communities with Multiple Stressors,* 2004; see appendix L.

40. California Environmental Protection Agency, Office of Environmental Health Hazard Assessment, "Sensitivity Analyses of the CalEnviroScreen Model and Indicators," June 2013.

41. Saha, Robin K., Robert D. Bullard, and Liza T. Powers, "Liquefying the Gulf Coast: A Cumulative Impact Assessment of LNG Buildout in Louisiana and Texas," *Environmental Studies Faculty Publications*, 12 (2024).

Apply the precautionary principle and presumptive approach to permitting.

Reducing existing sources of pollution in overburdened communities, as required by restorative justice, requires permit limits, conditions, and denials. Cumulative impacts information can be used to screen where permit issuance and limits must be improved or to inform the level of improvement or denial requirements, similar to multiple state laws.[42] Even with stricter, more health protective permitting laws, a great deal of information and analysis are required to demonstrate that facilities discharging pollutants to the air or water are out of compliance with their existing permits. This puts the public—the recipients of these emissions—at a major disadvantage. In order to reverse the assumption that industry is "innocent until proven guilty," EPA needs to apply a presumptive approach to permitting. Following this logic, if one facility is found to require a certain level of control, a regulatory agency would presume that similar facilities would also require that level of control. Accordingly, pollution control upgrades could be required more broadly, rather than remain based on analyses of impacts for each individual source.

Furthermore, a presumptive approach moves the burden of proof for requiring more effective pollution control equipment and properly operating it from an overburdened community (having to prove harm) to the facility (having to prove they are *not* harming residents). Current approaches sometimes fall to communities to monitor air emissions or report odors to regulatory agencies. If communities don't make these reports, and if the facility goes unmonitored by an agency, the presumption is that there are no odors or harmful emissions. Instead, EPA should require pollution control devices with continuous emission monitoring so that the presumption is that there is an odor or emission unless the control device is working and demonstrates otherwise.

The *Cumulative Impact Addendum* to the *EPA Legal Tools to Advance Environmental Justice* provides information on existing EPA regulatory authority to incorporate cumulative impacts approaches into existing EPA programs aimed at protecting and improving environmental health. There are several aspects of the Prevention of Significant Deterioration or PSD (air permitting) framework that could be applied to an expanded multiple pollutant or stressor approach.

PSD is designed to (1) protect public health and welfare; and (2) preserve, protect, and enhance air quality in national parks and other areas of special natural, recreational, scenic or historic value. The PSD framework does not limit air regulatory agencies from carefully evaluating the impacts of other criteria and hazardous air pollutants from all sources in a permit decision. The PSD program provides relevant established practices to move this framework into a multiple pollutant and stressor approach. This approach would presumably start in the locations where EPA is already implementing cumulative impact demonstration projects, with the approach further developed, improved, and expanded over time.

Use all regulatory authority to address the cumulative impacts of risk drivers.

EPA incorporates all air pollution emissions into a dispersion model, which is used to estimate potential harm across census tracts in the United States. This results in maps and data tables comprising the AirToxScreen. In 2019, this analysis indicated that the cancer risk drivers in the highest risk census tracts in the United States are Ethylene Oxide, Formaldehyde, Carbon Tetrachloride, Benzene, and Acetaldehyde. EPA has access to similar estimations of risk drivers in water and land. It is obvious that EPA should prioritize reducing or eliminating these risks, but EPA should also work on these risk drivers as a group. It is possible now for EPA to accelerate such cumulative impacts work by

42. Tishman Environment and Design Center blog, "New Research: Understanding the Evolution of 'Cumulative Impacts' Policies in the U.S.", September 28, 2022.

- incorporating any evidence of interactions of these chemicals into making regulations more health protective;
- prioritizing research on interactions of these chemicals, especially related to synergism;
- ensuring rulemaking involving these chemicals are informed by multi-source (point and non-point) assessments and not limited to individual types of facilities;
- incorporating any evidence of interactions among these risk drivers and non-chemical stressors into making regulations more health protective;
- ensuring decision-making thresholds include existing health burdens; and
- ensuring decision-making thresholds include impacts from past exposures to these risk drivers.

Use existing health condition data to inform assessments regardless of cause.

The NEJAC recommends that as EPA builds cumulative impacts into its programs, existing health burden metrics must be considered. Furthermore, the EPA should explicitly state that the presence of a cancer cluster is important information and should be included in the cumulative impact assessment, regardless of the cause. Currently, EPA has no mechanism to incorporate the presence of a statistically significant cancer cluster in traditional risk assessment. Traditional risk assessment results in a probability of increased risk of cancer in a community and does not account for the existing cancer in the community. Current guidelines indicate that "a statistically significant excess of cancer cases can occur with a given population without a discernible cause and might be a chance occurrence." In other words, the guidelines indicate the results could be a false positive. EPA should act protectively by incorporating the presence of a cancer cluster regardless of the chances for false positives.

EPA must also act protectively in the case of health effects other than cancer using specific types of data as appropriate. The incidence of asthma is not as strong an indicator of burden as the rates of asthma attacks, since the occurrence of asthma is widespread. Asthma attack rates provide insight into the level of asthma control. Uncontrolled asthma is associated with access to care, socioeconomic stressors, and susceptibility to exacerbation from ambient triggers such as air pollution.

These existing health conditions must be considered in assessments for them to remain credible. A clean-up threshold based on the traditional risk assessment that does not account for the current health conditions of the community is not credible.[43] This is equally true for the determination of *potentially exposed or susceptible subpopulations* in a Toxic Substance Control Act risk evaluation. Including consideration of existing health conditions and disease burden, especially where there are disparities, is an important part of cumulative impacts and can be implemented now.

43. Centers for Disease Control and Prevention, Investigating Suspected Cancer Clusters and Responding to Community Concerns, *Morbidity and Mortality Weekly Report*, 62, no. 8, Sept. 27, 2013: 22.

Including consideration of existing health conditions and disease burden, especially where there are disparities, is an important part of cumulative impacts and can be implemented *now*.

Incorporate a cumulative impacts modification factor in default risk-based screening levels.

EPA's Regional Screening Levels for Chemical Contaminants at Superfund Sites provides comparison values for residential and commercial or industrial exposures to soil, air, and drinking water. These are calculated using the latest toxicity values, default exposure assumptions, and physical and chemical properties. Screening levels provide very useful information to compare exposure media concentrations quickly and easily to risk-based limits. With this comparison, regulators and stakeholders understand the degree of concern of contamination. Some states also provide their own screening levels (e.g., Texas Risk Reduction Rules). These tools are simply for screening and are not intended to replace a Baseline Risk Assessment.

The problem is that screening levels fail to account for cumulative impacts, but they are nevertheless used to provide early guidance to regulators and stakeholders. For example, the risk-based screening level calculator provides options to select a target risk and could also include a selection of cumulative impact concerns to reduce the screening level to be more protective (for example, score on the EJScreen or CDC Environmental Justice Index).[44] Regulatory agencies have also studied and suggested such modification factors to account for exposures to intentional and unintentional mixtures. Again, this is not a replacement for a Baseline Risk Assessment that includes site-specific cumulative impacts considerations, but it provides necessary early guidance to keep pollution remediation progressing across sites.[45]

Use existing health conditions to inform clean up level determinations.

An example from Houston, Texas, highlights how the siloed traditional risk assessment approach fails to protect public health. The state health department evaluated the incidence of cancers associated with the chemicals of concern at the Houston site and found the census tracts around the site had an incidence of those types of cancers statistically higher than expected. So, there are elevated levels of exposure to pollutants that are associated with the type of cancer the community is already experiencing.

A risk assessment was used to calculate a concentration level in the soil that must be met by remediation so as not to pose a risk of an increase in cases (often 10 cases) of cancer out of one million people. In other words, the cleanup level is set to protect against the risk of excess (that is, above expected) cancer cases

44. EPA, Regional Screening Levels: Generic Tables, accessed June 10, 2024, https://www.epa.gov/risk/regional-screening-levels-rsls-generic-tables/.

45. Treu, Gabriele, Jona Schulze, Wiebke Galert, and Enken Hassold, "Regulatory and Practical Considerations on the Implementation of a Mixture Allocation Factor in REACH, Environmental Sciences Europe 36, no. 101 (May 2024).

associated with pollution exposure, but the area already has statistically elevated rates of the same cancer. There is no approved method to incorporate the existing cancer incidence with the risk or probability from the traditional assessment. At this Houston site, the number of excess cases of cancer per million people, defined as the number of actual cancer cases greater than the expected rate, is already between 871 and 11,262 in a million people, depending on the census tract and type of cancer.

Because there is consensus that there is no safe level of exposure to a carcinogenic pollutant, there cannot be a safe soil cleanup level for a community with existing elevated rates of the cancers associated with the pollutant. Even if there is currently no complete exposure pathway, the empirical evidence of increased cancer rates indicates a past burden of exposure. EPA should correct this and provide a method to account for these existing and elevated disease burdens.

Ensure that risk evaluations under the Toxics Substance Control Act truly reflect potentially exposed or susceptible subpopulations

When evaluating risk in compliance with the Toxic Substance Control Act, EPA must identify any "potentially exposed or susceptible subpopulations" and eliminate their unreasonable risks, including aggregate and cumulative risks. EPA is also required to consider risks of chemicals across their lifecycle, or their "conditions of use", including formation and breakdown products. This will require EPA to include factors that relate to higher exposures or make people more susceptible to harm from that exposure including consideration of existing health conditions, material hardship, racial discrimination, lack of access to adequate healthcare, housing or healthy foods. Since susceptibility and exposures increase if chemicals are stored in the body over long periods of time, special emphasis must be put on chemicals that are highly persistent, bioaccumulative, and mobile in the environment (e.g. PFAS, PCBs, mercury, and dioxins). These characteristics are especially concerning, and these risks are unreasonable.

Recommendations to accelerate progress by integrating cumulative impacts into EPA culture.

Integrate cumulative impacts across offices, programs, assessments, and decision-making, and make this work public.

As EPA continues to develop the cumulative impacts framework and associated action plans, EPA should press forward with conducting cumulative impact assessments and integrating cumulative impacts into all its work, whether EPA is the lead implementing agency or is supporting and providing technical assistance. The City of Chicago Cumulative Impact Report shares a promising model with steps oriented toward reducing pollution and decreasing disproportionate exposures. EPA should follow this lead.

EPA needs to communicate about its cumulative impact work to increase understanding in communities that aren't fully engaged with EPA. As it does this, EPA should make public a cumulative impact framework that shows how EPA thinks about, will continue learning about, and currently understands cumulative impacts. Like the City of Chicago's cumulative impact assessment, EPA should make public its commitment to progress toward assessments, regulations, and research that fully considers cumulative impacts. A clear first step is an EPA cumulative impact website that promotes a public participation plan around its cumulative impact framework, action plans, who is leading cumulative impact work at EPA, and

description of EPA cumulative impact demonstration projects. This allows groups outside of EPA to learn from the work and provide suggestions for how to strengthen it.[46]

Use existing cumulative impacts mapping tools and develop new ones for regulatory decision-making, and not only for information or prioritization.

EPA must not let the perfect get in the way of the good. EPA should use the results from existing environmental justice and cumulative impact tools to set relevant comparison groups and make decisions related to cumulative impact magnitudes and disparities. As EPA maximizes the use of existing tools and guidance to accelerate progress, new approaches will also be necessary. In many cases, those new approaches may leverage existing tools, expanding how those tools are applied and how they are integrated. So, for example, when a tool indicates that a community is overburdened, EPA should have already stated what actions it will take to reduce the burden. In other words, cumulative impact assessments must be biased for action, including regulatory and collective action with other government and non-governmental organizations to drive systemic change, especially in light of the many studies documenting disproportionate and cumulative impacts.[47] This aligns with EPA's commitment to measurably reduce emissions in overburdened communities in EPA's FY 2022–2026 Strategic Plan, which emphasizes the need for action to reduce disproportionate impacts and the *unacceptability* of delaying action because of uncertainty:

> *Many of the problems that need to be addressed have been well-known but unsolved for decades. Communities that have multiple industrial and energy facilities and are saturated with legacy pollution want to see EPA realign its enforcement in a way that provides action, accountability, and guidance for taking CI and risks into account, even if they cannot be measured with precision.*[48]

Develop training on cumulative impacts and cumulative impact assessment.

Several groundbreaking cumulative impact policies, programs, and projects are described in these recommendations. Training will be essential if EPA is to instill a cumulative impact mindset throughout all of EPA and to encourage and support states and local governments to follow suit. EPA should play a leading and active role in disseminating cumulative impact policies, programs, and projects by and creating a national Cumulative Impacts Community of Practice focused on how to assess, address, and reduce harm caused by cumulative impacts. The role of such a Community of Practice would include the following:

- Gather information on laws, regulations, and projects pursuing cumulative impact-driven solutions to protect overburdened communities. This could include links to model ordinances and bills.[49]
- Organize and catalog this information, prepare structured case studies, and publish information on these programs, including the scope, key features, and points of contact.

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46. Executive Office of the President. National Science and Technology Council. Environmental Justice Science, Data and Research Report. July 2024.

47. Cushing, Lara J. et al., "Historical red-lining is Associated with Fossil Fuel Power Plant Siting and Present-Day Inequalities in Air Pollutant Emissions," *Nature Energy* 8, (2003): 52–61; Tessum, Christopher W. et al., "$PM_{2.5}$ Polluters Disproportionately and Systemically Affect People of Color in the United States," *Science Advances* 7, no. 18, 2021.

48. EPA, *FY 2022 –2026 USEPA Strategic Plan*, 35.

49. Sabin Center for Climate Change Law and West Harlem Environmental Action (WEACT for Environmental Justice). "Dismantling Injustice: A M.O.D.E.L. (Model for Optimizing and Designing Environmental Legislation) For Empowering Communities." https://climate.law.columbia.edu/news/model-environmental-justice-bills-published-we-act-environmental-justice-and-sabin-center, https://dismantlinginjustice.org/ 2023.

- Ensure that information is widely available and accessible through the EPA website and public forums and update this information regularly, highlighting new efforts.
- Track the progress of programs where consideration of cumulative impacts affected outcomes. Tracking should include specific examples in which permitting decisions and enforcement actions were taken to reduce cumulative impacts in communities.
- Convene representatives of cumulative impact-driven programs to share information and lessons learned on progress, successes, and challenges.
- Provide technical resources to the Cumulative Impacts Community of Practice to solve challenges.
- Create a Cumulative Impacts Resource Center designed to serve state and local governments seeking to create or strengthen cumulative impact-focused laws and regulations.
- Create standardized (and interactive) training materials and requiring designated staff and leadership to take the training and conduct a cumulative impact assessment to be certified as a cumulative impact practitioner.
- Recognize success and progress by creating a platform for sharing the cumulative impact assessment work and celebrating gains in addressing health disparities.

Furthermore, these trainings aimed at pivoting agency culture will require brief annual progress reports and updates to ensure sustained advancement and annual workshops to social learnings, promote innovation, and address challenges. Moreover, these trainings need to bring together Federal, State, Local, and Tribal governments for shared learning and to build cross-government Communities of Practice. This will help to set the conditions for more consistent, systematic, and sustainable whole of government action to address cumulative impacts in collaboration with community leaders and advocates.

Theme 4. EPA should determine and communicate a set of principles to guide the practice of cumulative impact assessment.

EPA must articulate a set of principles to frame practice and set up mechanisms to support that practice. A set of principles will be the foundation to guide the development, operationalization, and implementation of cumulative impacts guidelines, methods, and decision-making criteria. These principles are not a set of values, but rather serve as guardrails around the overarching "what and how" of cumulative impacts. These principles will suggest criteria to determine when new ideas align with them and when they do not. It will be important for EPA to ensure that its method of creating these principles (or modifying the NEJAC recommendations) is transparent and available to the public.

Align cumulative impact assessments with the principles of equity and justice.

EPA's cumulative impacts work must be strongly tied to equity and justice. The City of Chicago cumulative impact assessment work is an example of centering the experiences of the most impacted communities to embed the assessment in the principles of equity and justice. (See appendix C.)

Like other justice- and equity-centered work, the EPA could frame its cumulative impacts work by considering different types of justice; including procedural, distributional, and restorative.[50] For example, we recommend that EPA advance cumulative impacts from the perspective of distributive justice with a goal of reducing the disproportionality in impacts and burdens. In addition, we suggest that cumulative impact assessments have a bias for action, which evokes the tenets of restorative justice to reduce existing and historic harms.

These types of justice can be considered when determining how to make decisions based on cumulative impact assessments. Our workgroup recommends that environmental decision-making move toward equity-based criteria, aligning with distributive justice. This in part means a move from a model of "acceptable level of risk" and threshold comparisons to making decisions that decrease disproportionate impacts, health disparities, disproportionate exposures, etc. States have provided several examples of equity-based policies, some in the form of state statutes, but many types of policies would be useful and are implementable now under existing authority. The New Jersey Environmental Justice Law (see appendix C) uses equity-based decision-making as it considers that one location might have more stressors than another, such as known contaminated sites or permitted air sites, and there is a limit to adding more. In comparison, cumulative impact laws in Minnesota and Massachusetts provide authorization to limit or deny permits based on a threshold, or a significant or "substantial" impact. The 2023 draft Albuquerque Bernalillo County, New Mexico, air quality board rule proposed both approaches, in which a facility's cumulative air emissions must be below a specific risk threshold and must also not increase disproportionate and cumulative impacts compared to the county.[51]

Cumulative impact assessments should address substantive equity, meaning that they consider issues such as discrimination, marginalization, and unequal legal access to safeguarding basic human rights, equal opportunities, and access to goods and services.[52] In other words, substantive equity requires

50. University of Michigan School for Environment and Sustainability, *Energy Equity Project*, Ann Arbor, University of Michigan, 2022.

51. Albuquerque/Bernalillo County Air Quality Control Board Draft Petition for updating Chapter 72, Part 20.11 draft, 2020.

52. Barnard, Catherine and Bob Hepple, "Substantive Equality," *Cambridge Law Journal* 59, no. 3, (2000): 562–585.

environmental policies to result in equitable distribution of costs and benefits. Environmental policies up until this point have not had this result.[53]

Procedural equity is the inclusive, accessible, authentic engagement and representation in decision-making processes regarding programs and policies. Communities with more cumulative impacts have more barriers to procedural equity. When there are more sources of pollution, community members must attend more permitting meetings and comment hearings, track more legislative hearings, work with multiple governmental agencies with responsibility for parts of the decisions, and understand more types of regulations and data than people in places with less pollution, to name a few.[54] It should come as no surprise that states that have passed cumulative impacts laws have included enhancements in public participation and engagement opportunities. Incorporating the concepts of procedural equity into cumulative impacts processes and policies can begin to address this. It has been in this vein that the workgroup has recommended a whole government approach and coordinated cross-media programming in other themes.

Develop criteria for cumulative impact assessments and acknowledge where assessments and decisions fall short.

EPA must acknowledge that some methods and processes fall short of a cumulative impact assessment, and how they fall short. There are currently no criteria or standards for what a cumulative impact assessment entails. There is not an official EPA methodology that one should follow, which is needed both for community-focused whole of government initiatives that overarch multiple decisions; and for specific regulatory decision-making processes (such as permitting). Qualitative data may or may not be collected; communities may or may not be engaged; historical disparities may or may not be integrated - because there are few established protocols. For example, some air-quality programs in EPA regions refer to compliance demonstrations for NAAQS as cumulative impact assessments because they include background pollutants as well as nearby facility air impacts, making it a combined, not cumulative, score for multiple facilities. Yet, they are still only using a single pollutant analysis that considers impacts in one environmental media; they are not as comprehensive as what the NEJAC would consider to be a cumulative impact assessment.

EPA has significant authority to assess and address cumulative impacts, but in some laws and rules EPA must continue environmental media-specific assessments and decisions until those legal structures change. EPA's cumulative impacts work must push to include components such as multiple pollutants, sources, environmental media, social adversity, and existing health conditions. For this reason, the NEJAC recommends that EPA describe results, for example in drinking water standards, with clear acknowledgement that multiple real-life hazards and risks remain unaccounted for. The EPA could use the list of components named in the Health Impact Assessment (HIA) phases below as a checklist for what could be reflected in a truly protective standard or assessment.

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53. Bullard, Robert D. et al., "Toxic Wastes and Race at Twenty: Why Race Still Matters After all of These Years," *Environmental Law* 38, no. 2 (2008): 371–411.

54. Minovi, Darya, "For Real Environmental Justice We Need Community Input," The Equation blog, Union of Concerned Scientists, 2023, accessed June 7, 2024. https://blog.ucsusa.org/dminovi/for-real-environmental-justice-we-need-community-input-into-federal-rules.

Ensure cumulative impact assessments inform regulatory decision-making.

EPA must move forward to ensure that each assessment at EPA is as comprehensive (that is, cumulative) as the regulatory authority allows and requires.[55] Congressional statements regarding America's environmental policy and the purpose of foundational environmental laws arguably provide both explicit and implicit direction to assess and address cumulative impacts. These include:

The National Environmental Policy Act - "recognizing the profound impact of man's activity on the interrelations of all components of the natural environment"; and establishes the Federal government's responsibility to "use all practicable means, consistent with other essential considerations of national policy, to improve and coordinate Federal plans, functions, programs, and resources" in order to "assure for all Americans safe, healthful, productive, and esthetically and culturally pleasing surroundings." 42 U.S.C. 4331.

The Clean Air Act implicitly recognizes the reality of cumulative impacts in finding "that the growth in the amount and complexity of air pollution brought about by urbanization, industrial development, and the increasing use of motor vehicles, has resulted in mounting dangers to the public health and welfare." Among its four central purposes are "to protect and enhance the quality of the Nation's air resources so as to promote the public health and welfare and the productive capacity of its population." While restricted to air, this purpose is otherwise systemic. 42 U.S.C. § 7401

The Clean Water Act implicitly recognizes the reality of cumulative impacts in setting the objective "to restore and maintain the chemical, physical, and biological integrity of the Nation's waters." To achieve this objective, among other things it sets an "an interim goal of water quality which provides for the protection and propagation of fish, shellfish, and wildlife and provides for recreation in and on the water" and a "national policy that the discharge of toxic pollutants in toxic amounts be prohibited." It further sets national policy to address both point and nonpoint sources of pollution in order to meet its goals. 33 U.S. Code § 1251

The Solid Waste Disposal Act responds to cross-media, cumulative impacts in finding, among other things, that "as a result of … federal and state laws respecting public health and the environment, greater amounts of solid waste (in the form of sludge and other pollution treatment residues) have been created. Similarly, inadequate and environmentally unsound practices for the disposal or use of solid waste have created greater amounts of air and water pollution and other problems for the environment and for health." 42 U.S. Code § 6901(b)(3)

While these authorities exist, and EPA has acknowledged this in writing,[56] a strong agency-wide cumulative impacts frameworks has yet to be presented and implemented. There are many examples of cumulative impacts or environmental justice screening tools and maps being used to prioritize community engagement, information sharing, and resource allocation. And although there are many examples of legal language describing regulatory authority, there are fewer examples of cumulative impact assessments used in regulatory decisions. This is a growth area and necessary for sustained cumulative impacts reductions to occur. As an example, a cumulative impacts or environmental justice screening tool could be used in part to prioritize inspections, inspections could be coordinated and multi-media, and community lived experience and complaints and past compliance violations could be leveraged to inform violations. This could all be implemented now. But until this type of cross-program and cross-media

55. EPA, *EPA Legal Tools to Advance Environmental Justice*.
56. EPA. EJ legal tools cumulative impacts addendum.

approach is required, these types of programs will not be consistent and will languish in the pilot phase of cumulative impacts implementation, remaining piecemeal and "fringe." Furthermore, without integration into regulatory systems, these changes to the way work are done are vulnerable to short-term switchbacks with new administrations or when markets change.

Acknowledge community harm and trauma in cumulative impacts work.

EPA must acknowledge that although the current environmental protection system has reduced pollution, it does not adequately protect everyone. EPA has made steady efforts to improve health protections and must continue doing so. Part of pivoting to a more connected and comprehensive system means first acknowledging that the current system has gaps, limits, and inadequacies. Many people who enter the field of environmental protection do with a sense of having a mission, and acknowledging past harms of the current system is especially challenging for mission-driven staff. Moreover, many people who work in environmental protection have worked a lot of hours, navigating more-than-average competing priorities, and without adequate resources in leadership, funding, and staffing. Nonetheless, moving forward means figuring out what improvements must be made without becoming overwhelmed by the enormity of the task or being defensive. This means that there must be acknowledgement of the past and current harm that the current environmental protection system has caused low-income and communities of color.

There is a lot of focus at EPA on making decisions less susceptible to litigation, and there is an assumption that cumulative impacts—and particularly the inclusion of qualitative data—will counter that goal. A cumulative impact assessment, if conducted in a robust manner with extensive community engagement, can strengthen the Agency's case for more protective rulemaking, as well as for permit conditioning or denial, by providing additional evidence of historic, current, and future harm to communities overburdened by chemical and non-chemical stressors. In some instances, EPA will need to collect lived experience from a community overburdened by environmental pollution. However, in many cases, agencies already have some information from the community in the form of past comments, filed complaints, and other forms of information. This information took time and courage for communities to provide, and this experience may have taken courage to talk about because it is associated with their health. Agencies must balance updating lived experience with learning from what communities have already provided. EPA Region V's environmental justice docketing program will support the level of coordination that is needed to improve inclusion of past community input.[57]

A **health impact assessment** is a process to identify how a project, policy, or program might influence health. HIA uses a combination of procedures, methods, and tools to systematically judge the potential—and sometimes unintended—effects of a proposed project, plan, or policy on the health of a population and the distribution of those effects within the population. The HIA also produces recommendations to enhance the health benefits of the project, policy, or program and to mitigate potential harms.
Source: Society for Practitioners of Health Impact Assessment, 2024.

Build upon established processes and practices to develop Cumulative Impact Assessment.

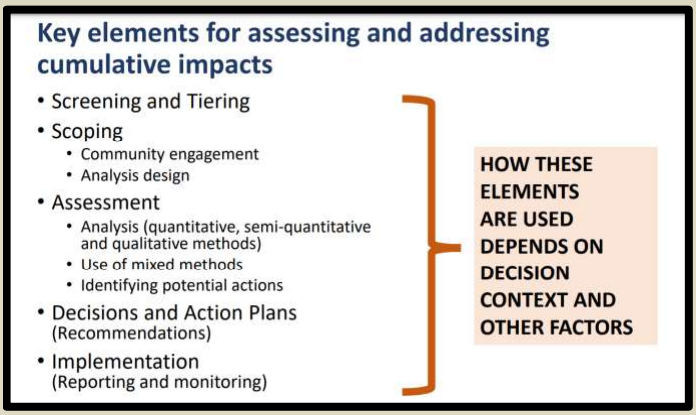
EPA is not starting this work from zero, as there are decades of research, practice, and methods development that should be used to build cumulative impacts practices into EPA programs. **Health Impact Assessments** are one of these processes and come out of environmental impact assessments and public

57. Robin Collin, "EPA's Approach to Advancing HIA and Action," presentation to the Cumulative Impacts Workgroup on February 22, 2024.

health practice. They are a mature form of assessment steeped in public engagement. Cumulative impact assessment should be a deeper, more robust form of HIAs. HIAs look at the possible health impacts of an impending decision and are set up to examine and address historical as well as existing disparities with a goal of reducing harm while (at a minimum) doing no further harm. HIAs have proven successful as a tool for including communities in decision-making and are tested methods to assess many types of disparate data. In fact, EPA staff has proposed to develop cumulative impact assessments following the phases of a HIA (see figure 1), but this model has not been adopted as an official methodology nor has it been shared with the public.

To do so properly, the EPA should work with outside experts such as the Society of Practitioners of HIA to create a standard methodology, guidance, and evaluation criteria. The NEJAC provides a new element, trust building, and offers some considerations and principles under the proposed cumulative impact assessment phases.

Figure 1. EPA Staff's Cumulative Impacts Process



Source: Robin Collin, presentation to the NEJAC Cumulative Impacts Workgroup on February 22, 2024, "EPA's Approach to Advancing cumulative impact assessment and Action."

Screening. Screening must be a data-driven process and follow EPA's scientific integrity policy.[58] Screening facilities or activities into a process is a balancing act between being too inclusive and not inclusive enough. Indicators that reflect the structural factors of bias and racism, such as differential and historical health and pollution burden, and increased susceptibility, are all important in determining when a cumulative impact assessment would be useful in environmental decision-making. EPA must develop screening criteria for cumulative impact assessments that are clear and simple, so it is not more onerous than completing the assessment itself. These guidelines should focus more on the reasons cumulative impact assessments are important than on providing unsubstantiated offramps. There was a significant emphasis in the EPA Cumulative Risk Assessment Planning and Problem Formulation Guidance on which facilities and activities would not require a Cumulative Risk Assessment, but very little information on how, why, and when to do one. EPA should keep in mind that rather than spend resources on screening, sometimes it is just as efficient to spend the resources on the assessment and resulting action. In fact, if an assessment is set up such that pollution release is limited or eliminated, the practice of assessing rather than "screening out" better aligns with the mission of EPA. The NEJAC suggests that "screening in" should align with a process that directly impacts a community that experiences disproportionate impacts or is already burdened.

Scoping. The process of scoping a cumulative impact assessment must be developed in a public process and lay out scoping decision-making ahead of time. The NEJAC recommends that EPA carry out a public scoping process to determine indicator and data inclusion criteria and not allow case-by-case negotiation

58. EPA, *Scientific Integrity Policy for Transparent and Objective Science*, Washington, DC: EPA, 2012.

with permit applicants on which cumulative impact stressors and burdens to include. Case-by-case negotiation tends to be time consuming and results in inconsistent analyses and results. A variety of practices exist to facilitate the inclusion of communities in scoping cumulative impact assessment data and indicators, or in determining health endpoints or outcomes. Since the purpose of cumulative impact assessments is to fundamentally align regulations with real-life experiences of frontline communities, a public process at this development stage is crucial. The state of New Jersey went through a public scoping process to assess conditions for permit conditions and denials. Similarly, the state of California used a public scoping process to choose indicators for CalEnviroScreen. Over time, California has continued to use public processes to choose, develop, and modify indicators.

The state of Minnesota, in their first cumulative impact law, used health endpoints to scope in environmental health data for inclusion in cumulative impact permitting reports. Minnesota found that this scoping methodology encouraged regulated parties to condition and limit their permit up front to reduce the analysis scope further into the process.[59] However, this scoping process did not include the impacted community.

A variety of practices exist to facilitate the inclusion of communities in scoping cumulative impact assessment data and indicators, or in determining health endpoint/outcome focus. Since the purpose of cumulative impact assessments is to fundamentally align regulations with real-life experiences of frontline communities, a public process at this development stage is crucial. Community engagement in the scoping process can help to identify types of health impacts that may not be on the EPA's radar, as well as important compounding impacts that may not be visible from afar. For example, the Agency may intend to focus an assessment on air quality but expand it to incorporate community concerns heard in the scoping phase about water quality so that intersections between impacts from air and water become part of the assessment plan.

Trust Building. EPA's development of a cumulative impact assessment must include trust-building. Community organizers often say, "trust happens at the speed of relationships." EPA may benefit from working with individuals and organizations who have already built trust in their communities. Docketing experience with communities will facilitate coordinating and developing trusted connections over time. Other practices that support trust building include ensuring community representatives are chosen by the community and using approaches like the Protocol for Assessing Community Excellence in Environmental Health (PACE EH), Rapid HIA, and other community problem-solving techniques. EPA should communicate with communities using plain language and engage communities by working with trusted community liaisons such as community health workers (*promotores de salud*). Researchers should never come into a community, conduct an assessment, and then leave, without ever reporting back. The City of Chicago modeled many trust building approaches during the development and communication about their Cumulative Impact Assessment (see Appendix C).

Assessment. Cumulative impact assessments are integrated, comprehensive to the extent of the law and related decisions, and reflect those most impacted by the decision. A part of EPA's framing and guidance will need to include a clear definition of expected elements or steps to be included in the process to make it transparent, relevant, and impactful for community members. Overall, the NEJAC recommends that cumulative impact assessments be more integrated than cumulative effects assessments in

59. Ellickson, Kristie M. et al., "Cumulative Risk Assessment and Environmental Equity in Air Permitting: Interpretation, Methods, Community Participation and Implementation of a Unique Statute," *International Journal of Environmental Research and Public Health* 8, no. 11 (2011): 4140–4159.

environmental impact statements under National Environmental Policy Act (NEPA), or in Superfund assessments.[60] A cumulative impact assessment must have some level of cross-media integration and not be a series of unconnected environmental media-specific chapters of information; it is more than a multi-media assessment.

A cumulative impact assessment must consider or include indicators, burdens, and stressors related to the following components:

- Multiple pollutants or harmful chemicals.
- Multiple pathways of exposure.
- Multiple sources of stressors.
- Intergenerational impacts should be addressed so as to not unfairly burden future generations. Intergenerational impacts may include relationships with the land over time, land, culture, and language appropriation.
- Combined impacts across non-chemical stressors. Non-chemical stressors must include the social determinants of health, including mental and physical health.
- External and systemic factors that make a community more susceptible to harm. In some instances, using the phrase *vulnerable communities* could suggest that the person or community—rather than the systems and policies—are responsible for barriers to good environmental health. These may be like or the same as non-chemical stressors and include social and public health stressors like access to healthy food and healthcare, income, educational attainment, voting rights, and access to affordable housing.
- Intrinsic susceptibility (age, existing disease, genetics). This is already commonly implemented in the traditional risk assessment process. However, great care must be taken so that race is not included as a part of this consideration. Race is a sociopolitical construct and must never be conflated with biological sensitivity.
- Existing pollution and health conditions and burdens, including mental health. For example, inclusion of existing pollution concentrations, chemical burdens in populations, and health incidence and prevalence in a community. This might include assessing the lifecycle of the project and product.

Assessment has historically assumed that technical experts are best positioned to evaluate data and draw conclusions from it to create solutions. It is important for EPA staff to remember that all assessment—and indeed all science—relies on interpretation, and this in turn relates to how the results are reported publicly. Because of community members' unique perspective on the origins and intersections of impacts, they can often contribute to the interpretive aspect of assessment, thus allowing that conclusions are shaped in part by community members' priorities and value judgements. For example, absence of evidence of impact is often presented to communities as evidence of absence, without adequate emphasis on limitations and uncertainties. Community members may have strong opinions about how these limitations and uncertainties are characterized. The way it currently works, the Agency alone determines these parameters which can give the community the impression that there is no danger.

Decisions and Action Plans. Cumulative impact assessments must be biased toward action. There is an urgent need to lower pollution in overburdened areas. Cumulative impact assessments must influence

60. EPA, Office of Inspector General, "Report: Investigation of Allegations Concerning Environmental Justice Issues in EPA Region 4," Report #10-N-0145, June 14, 2010.

decisions about cleanup and determine the need for pollution control, permitting limits, conditioning, or denials, etc. Decisions and action plans should have a known and mandated time period between an analysis and a decision. As stated in other recommendations, it is important to consider who benefits from the decisions and action plans and who bears most of the burdens and negative impacts.

Implementation (reporting and monitoring). Cumulative impact assessments must be followed by an evaluation and a cycle of continuous improvement that engages those impacted by the decision to make the process more effective and responsive to their needs. Activities that are pursued because of cumulative impact assessments must be appropriate, effective, and adequate. These activities must also be enforceable, and once an action or proposal is implemented, the Agency must transparently monitor, report changes in impacts, and evaluate with the community to determine if changes need to be made. Like all other programs and actions, an evaluation is crucial to understanding how the program should be revised, especially with respect to ensuring beneficial environmental health outcomes. As already mentioned, community members themselves must be the ultimate judges of whether the outcomes of an assessment process fulfill these criteria.

It is important to consider who benefits from the decisions and action plans and who bears most of the burdens and negative impacts.

Theme 5. EPA should validate lived experience and incorporate it into assessments and processes through co-design and shared leadership.

Cumulative impact assessment is a step toward an environmental regulatory system informed by real-life conditions in frontline communities. Residents of these communities often possess essential knowledge about local environmental quality, health issues, and other relevant matters. While some community members may have professional skills that enable them to acquire and communicate this knowledge in a technical manner, often community knowledge is derived from lived experience and conveyed qualitatively, particularly through stories and descriptions of life on the ground in impacted areas. Traditionally, lived experience has not been adequately incorporated into environmental assessments because tools for capturing it and using it have been underdeveloped, because it has been regarded as less useful and less reliable relative to other sources of knowledge, or simply because it can make assessment more challenging and complicated.

Leveraging the strength of ORD's research capacity to integrate experiential knowledge into environmental assessments will be critical in the implementation of cumulative impacts assessments Agency-wide. To move in this direction, the EPA should develop best practices for collecting, analyzing, and acting upon such knowledge. Best practices should include provisions for involving community members in the assessment process—not just as information providers, from whom data is harvested by assessors—but as co-designers of research agendas and active participants who exercise meaningful control over assessment outcomes. Community members must also be integrally involved in the development of long-term solutions to problems identified through the cumulative impact assessment, and treated as the ultimate judges of whether an intervention has been successful or sufficient.

Define *lived experience* and related terms for the purposes of cumulative impact assessment.

Lived experience is a term that is often used loosely and inconsistently. EPA should develop a clear definition of lived experience for Agency purposes and strive to ensure that it is used consistently across Agency offices and programs. The EPA should consult resources provided by the Department of Health and Human Services' Office of the Assistant Secretary for Planning and Evaluation (ASPE) resources on this topic and consider how its definition overlaps with, or departs from, other definitions in use at the federal level.[61] Unlike ASPE, we suggest that the EPA differentiate between *lived experience* and *experiential knowledge*; that is, knowledge derived from lived experience. We offer the following considerations for any Agency definitions of these terms.

Lived experience. A "lived" experience is an experience that is direct and first-hand–as opposed to, say, spectatorship of an event or phenomenon from a distance.[62] Moreover, it is an experience of an incident or situation to which people have an intimate connection, either because they are being affected personally, or because people or environments close by (both physically and emotionally) are being affected. Lived experience is "embodied" in that it depends on being close in time and space to what is happening and involves not just the cognition of a phenomenon but the full-bodied experience of it. When speaking of lived experience in a general way, it means the totality of their experiences meeting the above criteria. Often, lived experience is thought of as being geographically grounded in everyday environments in which people spend large amounts of time. However, lived experience can also derive from an

61. U.S. Health and Human Services Office of Human Services Policy, "What is Lived Experience?" Accessed June 7, 2024.

62. In describing lived experience as "direct," we mean relatively so–experience of the world is inevitably mediated in various ways by pre-existing perceptual frameworks. These frameworks arise out of diverse influences, including cultural norms, personal identities, and education.

individual's cumulative experience of a particular condition (for example, cancer), an institution or set of institutions (for example, the health care system), or a social phenomenon (for example, systemic racism).

Experiential knowledge. Experiential knowledge consists of knowledge derived from lived experience. Given that the body and the subconscious (as well as conscious) mind are involved in lived experience, experiential knowledge will consist partially of tacit knowledge, or intuitive understandings. While tacit knowledge may be reflected in an individual's thought and behavior, it may be difficult to articulate or even perceive. However, this does not make it any less real. When an individual reflects upon their lived experience, the latter may also yield another layer of knowledge, consisting of more defined and communicable insights. In practice, these insights will often draw from other sources of knowledge and perspective beyond lived experience itself. For example, an individual's educational background may help them to identify and understand something about their experience. However, to qualify as experiential, knowledge (whether tacit or explicit) must have its roots in lived experience. Because lived experience is often anchored in a particular geographical context, it overlaps substantially with the concept of local knowledge.

Experiential knowledge can be usefully distinguished from other kinds of knowledge. For example, in its directness, experiential knowledge differs from professional knowledge, which is usually derived from "discursive reasoning, observation, or reflection on information provided by others."[63] Furthermore, while professional knowledge is "developed, applied, and transmitted by an established specialized occupation,"[64] experiential knowledge is not associated with any kind of structured professional training or role, and it is more likely to arise incidentally, as a byproduct of everyday activities, rather than as a product of concerted study. Experiential knowledge also differs from academic knowledge in that it is not detached but is often intimately bound up with the emotions and interests of those who possess it.

Specify who has lived experience and where to find it.

In conjunction with defining lived experience, the EPA should also specify who has it and where to find it. While everyone has lived experiences, some experiences are more relevant than others from the standpoint of cumulative impact assessment. Most important are the experiences of those who have been directly impacted by an issue related to the assessment, or who are closely related to or acquainted with someone who has been impacted (for example, a child). This includes, of course, people whose primary residence is in an impacted area. But the impacted population may be considerably larger, such as in northern latitudes for persistent bio accumulative toxicants. For example, during the Flint water crisis, the impacted population included not only Flint residents, but those who worked in the city, took their children to childcare facilities in the city, and spent extended time visiting friends and relatives in the city. The lived experiences of these individuals are important from a cumulative impact assessment perspective. Also relevant are the experiences of people who have been affected by people or institutions implicated in the creation, perpetuation, and remediation of environmental and health impacts. For example, community elders who have experienced systemic racism or economic disinvestment may have insight into how contemporary problems intersect with longstanding structural inequities.

The EPA should also specify how personal experiential knowledge relates to community knowledge. In what ways is community knowledge more than just the totality of personal experiential knowledge? When has a community reached shared understandings that offer more general insights about its condition? For

63. Borkman, Thomasina, "Experiential Knowledge: A New Concept for the Analysis of Self-Help Groups," *Social Service Review* 50, no. 3, 445–456.

64. Borkman, "Experiential Knowledge," p. 447.

example, Indigenous knowledge is derived from the extensive experience native people have interacting with specific environments. It represents an integrated body of knowledge belonging to the community as a whole and is difficult to disaggregate into the personal experiences of individual community members, in part because it is built up over long periods of time and incorporates ancestral knowledge. Recognizing and respecting Indigenous knowledge within cumulative impact assessment processes and decision-making is related to, but distinct from, respecting the individual voices of community members who participate directly in assessment.

Recognizing and respecting Indigenous knowledge within cumulative impact assessment processes is related to, but distinct from, respecting the individual voices of community members who participate directly in assessment.

Explain the value of lived experience.

Lived experience is not always recognized as a critical or even significant source of knowledge. Impact assessments often consist overwhelmingly, or even entirely, of technical analyses that privilege quantifiable data. Traditional scientific norms assign higher value to knowledge that is objective comparable to other data points and arrived at through the scientific method. This can create a bias against knowledge that fails to meet these criteria. Consequently, environmental assessors may not seek out and make use of experiential knowledge even when it is available. At the very least, it may not be clear why it is a worthy investment of time and effort to acquire, process, and make use of experiential knowledge, especially given the challenges associated with doing so.

Although lived experience has been accorded more respect in recent years, there are still strong indications that, for official purposes, experiential knowledge is considered far inferior to professional, academic, and scientific knowledge. Indeed, evidence suggests that some EPA employees may see consultation of lived experience as conflicting with the Agency's explicit commitment to making decisions based on the "best available science." This creates the risk that, even if the EPA strongly affirms the importance of lived experience, many within the Agency would continue to question its relevance to Agency analyses and decision-making. Consequently, the EPA should not only endorse lived experience in a general way, but it should explain its epistemological value.

Experiential knowledge can help to enhance the understanding of impact in at least two ways. First, **lived experience is a critical source of information** not easily accessible in other ways. People with lived experience often have information, for example, about specific impacts to their environments, their bodies, and the people around them that stem from direct observation. This information tends to be more fine-grained and locally specific than what is available from other vantage points. People with lived experience also often have information relevant to tracing the causes of impacts, in part because they can observe changes to conditions over time or are intimately familiar with the geographies and human-built

infrastructures in the locations where problems can arise (for example, the household water tap). People with lived experience can also speak directly to the effectiveness of interventions, given their observations of how these are or are not working on an everyday level.

Second, people with lived experience may have **distinctive perspectives** on the origins, nature, and possible solutions to environmental and health problems. People with lived experience often have strong intuitions about what kinds of causal explanations of impact are plausible, for example, as well as the likelihood that a particular kind of remediation will be effective. Crucially, from a cumulative impact assessment standpoint, people with lived experience can also help others to understand the intersections of different kinds of impacts and the reasons why a particular impact may take on more significance because of its interaction with other impacts.

It is important to recognize that all forms of knowledge have strengths and limitations. For example, experiential knowledge is not ideal for capturing impacts that are not empirically detectible, such as invisible environmental contamination (except insofar as it is associated with observable changes to the body). Additionally, while the perspectives of people with lived experiences are invaluable, they may not be sufficiently comprehensive or impartial to evaluate impacts on a comparative basis. Furthermore, as mentioned above, insights associated with lived experience may be difficult to articulate with precision, which can make it challenging to relate them to other data and derive concrete conclusions and prescriptions from them.

However, while it is not possible to learn everything we may wish to know about impact from experiential knowledge, the same is true of other kinds of knowledge. Scientific data collection and analysis methods also suffer from blind spots and are often employed too far from everyday life to capture the texture of what people are experiencing. Experiential knowledge should be seen as an essential piece of a larger picture that we compile with the help of a variety of methods.

Develop and institutionalize guidance and training around lived experience.

Because accessing and using experiential knowledge can be challenging, and because many Agency employees lack experience in this area, the EPA should develop and institutionalize guidance for incorporating such knowledge into the cumulative impact assessment. Currently, few Agency-developed or -endorsed resources of this kind are available to EPA employees. The EPA report *Cumulative Impacts: Recommendations for ORD Research*, for example, does not use the term "lived experience," does not offer any definitions of experiential, local, or community knowledge, and does not provide substantive direction around how to make use of such knowledge.[65] This leaves EPA employees in the position of having to determine for themselves what these terms mean and how they connect to their work. EPA employees are not likely to be convinced of the Agency's commitment to lived experience, or of the relevance of lived experience to their own roles and responsibilities, unless they see lived experience consistently emphasized and operationalized within Agency briefs, reports, and resources.

An important part of institutionalizing best practices around lived experience is building lived experience training into professionalization. The ability to engage meaningfully with lived experience should be framed as a professional skill important to a wide range of Agency positions and initiatives. While not everyone can be expected to have expertise in lived experience, all EPA employees should be familiar with the concept and should be encouraged to think about its relevance to their work at the Agency. Any EPA employee whose role involves direct contact with communities, or who is engaged in analysis and

65. *Cumulative Impacts Research: Recommendations for EPA's Office of Research and Development*, 2022.

decision-making of direct interest to communities, should receive more extensive training. Training should stress the need to consider community testimony with an open mind, whether it aligns with one's technical intuitions. EPA personnel should be aware of the potential for epistemic injustice to arise when testimony is disbelieved or doubted because of the characteristics of the individual testifier, or the manner in which testimony is delivered (for example, when it is infused with strong emotions).[66] Training in active listening should be combined with implicit bias training to mitigate the potential for unconscious prejudices to affect how testimony is received. EPA employees should also be trained in the importance of avoiding a defensive posture when lived experience testimony is combined with implicit or explicit criticisms of the Agency. EPA employees who interface with community members should be chosen based on a combination of training, experience, and demonstrated competence in this area.

The ability to engage meaningfully with lived experience should be framed as a professional skill important to a wide range of Agency positions and initiatives.

Educate the Agency and increase use of the tools for capturing lived experience.

With the development of qualitative methods in the social sciences over the past several decades, many proven tools now exist for capturing experiential and community knowledge. Some of these tools are already familiar to those involved in public-facing work; for example, soliciting public comment in oral or written form. Public comments can be collected in diverse ways, including at public meetings, by phone, and through the internet or mail. The main limitation is that there is not always much concerted analysis of this information, so public comment can accumulate without having much impact on understanding.

Coding of main and recurring themes can also be applied to data derived from more in-depth discursive settings, like focus groups. Settings like these allow individuals to go into more detail, and for facilitators to prompt elaborations upon and explanations of comments that might otherwise be poorly understood. Mind mapping tools, available in pay versions and open source, can help with synthesizing discrete data points and connecting distinct themes.

Tools like Photovoice also allow community members to add a visual component to the stories they tell and the issues they wish to highlight. Offering community members an opportunity to supply visual information is important given the many difficulties inherent in capturing context in language.

Using experiential knowledge in assessment often requires comparing it to or integrating it with other kinds of data, particularly quantitative data. Practitioners of mixed methods approaches in the social sciences have developed a variety of strategies for bringing together qualitative and quantitative data and assuring the quality and validity of the conclusions reached by doing so.[67] Lived experience can be used,

66. Fricker, Miranda, *Epistemic Injustice: Power and the Ethics of Knowing*, Oxford Academic, 2007.
67. See, for example, University of Michigan Mixed Methods Program, https://www.mixedmethods.org.

for example, to corroborate quantitative data by checking to see whether it correlates with experiences on the ground. In cases where qualitative and quantitative data conflict, the EPA should specify how the different kinds of data are being weighted relative to one another, and why. When the EPA reaches conclusions that contradict community experiences, community members are owed a careful explanation that acknowledges the contradiction and, when possible, tries to account for it.

Theme 6. EPA should support comprehensive, solution-oriented, community-driven programs.

The NEJAC reviewed many comprehensive, solution-oriented, community-driven approaches (see appendix D) that were particularly promising in reducing cumulative and disproportionate impacts. These types of approaches have many names including environmental impact areas, environmental improvement areas, community action plans/roadmaps, green zones, and ecozones. Some members of the NEJAC Cumulative Impacts Workgroup have been deeply immersed in or have led these programs and their experience strengthens these recommendations. Overall, comprehensive, community-based approaches allow a holistic and cumulative look at an area to improve environmental and community health.

Advance comprehensive community approaches by integrating the regulatory toolkit with pollution prevention and reduction initiatives.

Cumulative impact assessments should not be reduced to a multi-factor prioritization process to inform voluntary pollution reduction actions. When there are many existing sources of pollution in an area, any proposed increase from a single pollution source will be relatively minor compared with the whole pollution burden. EPA should stop justifying proportionally small increases in emissions and instead set a firm limit based on cumulative indices that will force agencies to act if thresholds are exceeded.

One way to make this transition is to tie cumulative impact assessments to regulatory actions. For example, an outcome of the California Green Zone's initiative was holding polluting industries accountable through increased regulation and enforcement. This entailed that the designation of green zones and the information gathered in the related activities were integrated into regulatory decisions, such as rules or permit conditions.[68] The NEJAC strongly recommends that EPA expand community-driven approaches, implement community-driven approaches with environmental justice principles in mind, and link these approaches to regulatory actions to avoid the back-sliding that can occur when pollution prevention is purely voluntary.

Accelerate approaches that align with the Agency's structure and culture.

The community action plans and roadmaps developed by EPA Region V are especially compelling to the NEJAC because they align strongly with EPA's organizational structure and culture. For example, the development of standard operating procedures and performance metrics will ensure consistent and outcomes-oriented implementation within EPA offices and programs. There simply should be no barriers to the broad implementation of these plans.

Use the idea of management zones to address cumulative impacts.

The EPA should adopt more work aimed at area-wide management zones to address cumulative impacts in overburdened areas. A management zone strategy leverages stationary or floating eco-districts co-developed by local stakeholders and governments that aim to reduce chemical and non-chemical stressors and other harmful environmental degradation. Area-wide management zones also provide guidance as a planning tool for incentivizing environmental best practices and disincentivizing known and perceived environmental burden drivers.

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68. California Environmental Justice Alliance, California Greenzones, About the Green Zones Initiative, 2018, accessed June 7, 2024, https://calgreenzones.org/about-the-green-zones-initiative.

Embed accountability to the impacted community in EPA's comprehensive community approaches.
More than community engagement, accountability to the results of community visioning is crucial. Otherwise, communities may waste their limited time and resources working on these efforts. Some tools to promote accountability include memoranda of understanding, Community Benefits Agreements, Good Neighbor agreements, and community benefits ordinances.

Require metrics to track the outcomes of comprehensive community approaches.
The outcomes currently used to track Agency success are tied to budget decisions. Outcome tracking is often not implemented in community-focused approaches, but it must be implemented to provide project sustainability. As EPA is framing their cumulative impact assessments around HIA processes, this type of outcome tracking would be integral in the reporting and monitoring phase.

Improve inter- and intra-agency coordination so that comprehensive community approaches result in pollution reductions.
In some instances, the findings from cumulative impact assessments might inform the work of other agencies or organizations. Therefore, barriers for interagency collaboration must be removed. For example, the City of Chicago set up a shared governance structure that included environmental equity working groups, multiple offices within city departments, and local community organizations, which resulted in a more holistic approach that applied to transportation and regulating industry. EPA and other agencies need to develop mechanisms to track the work of multiple agencies in one community to better coordinate services. Building stronger joint planning and coordination mechanisms takes dedicated focus, staffing, and resources. The Thriving Communities Network is meant to foster federal interagency collaboration, but long-term support must be sustained at the regional level and supported by national offices. In addition to activities, coordination across multiple authorities is also crucial. EPA should not ignore the cumulative risks of chemicals merely because other agencies or officials have the ultimate authority to address them. The EPA should ask what *could* be done, not just what must be done, and implement this work as a whole-of-government approach.

Finally, there needs to be more coordination among media-specific EPA offices with a goal of preventing the unmanaged and uncontrolled movement of pollution from one environmental media to another. This includes coordinating people, data, and programs. When the air program is permitting air pollution emissions that impact surface water, the water program must know about it in a way that is seamless, automatic, and coordinated. Furthermore, research and regulatory offices must communicate. EPA researchers who are investigating cumulative impacts must have no barriers to check in with on-the-ground regulators and permit engineers to ensure that their findings and inferences can inform actionable pollution reduction.

When the air program is permitting air pollution emissions that impact surface water, the water program must know about it in a way that is seamless, automatic, and coordinated.

Move forward with comprehensive community approaches while avoiding unintended and negative outcomes.

Implementation of comprehensive community approaches needs to include intentional and evidence-based plans to avoid displacement of residents such as through gentrification. Implementation will also involve paying close attention to avoid providing waivers, loopholes, and exemptions that enhance or do not decrease disproportionate cumulative impacts and burdens. Regulations that apply to permitting, for example, often include locations, facilities, or sources exempt from key requirements. Again, some of these efforts will involve coordination with other agencies.

Continue to work in community engagement, co-design, and shared leadership.

People in communities with stories of environmental and health harm deserve the opportunity to take a leading role in solving their own problems. For this to become a reality, the EPA should emphasize true and meaningful engagement, co-design, and shared leadership at every stage of assessment. In-person conversations are often key to successful collaboration and cogeneration of knowledge. These conversations and collaborations must be treated as partnerships, and both partners (communities and EPA) must have the opportunity to refine ideas and terms as they experiment and learn from their collaboration. Communities are a source of innovation and new ideas which are so desperately needed in protecting human health and the environment. Creativity and innovation are fundamental features of the scientific method and EPA will accelerate this work by working with communities as full partners where all can reframe, evolve, share, and refine the processes and substance of this work.

True and meaningful community engagement must align with the "trinity of voice" and afford public participants access, standing, and influence. At one extreme of the spectrum, assessment can proceed without any community involvement at all and merely allow those impacted by a decision to comment toward the end of an assessment. This decide–announce–defend model of public participation is common but has not been shown to enhance public participation or meaningful change.[69] Even in the best of circumstances, the influence that communities have in EPA regulatory decision-making is opaque at this time and must be communicated transparently.[70]

At the other end of the spectrum, assessment can be community-driven and community-led, with community members in full control of the process (e.g. EJ academy).[71] Realistically, most assessment processes will fall somewhere between these extremes. EPA can more efficiently and effectively do its work along with other government agencies and researchers – whose work should be centered around communities. The EPA may, for example, initiate an assessment then bring community members to the table as active participants, rather than merely informing or consulting them. Conversely, community members may initiate an assessment, and then request EPA expertise. In such cases, the EPA should seek to realize the community's vision as much as possible, even if EPA exercises final say over certain aspects

69. Depoe, Stephen P. and John W. Delicath, Introduction, in *Communication and Public Participation in Environmental Decision Making,* ed. Stephen P. Depoe, John W. Delicath, and Marie-France Aepli Elsenbeer, New York: SUNY Press, 2011.

70. Severson, Gary, *Understanding Decision Authority and Decision Space in Collaborative Conservation*, Colorado State University Center for Collaborative Conservation, 2022.

71. Key, Kent D., et al. "The Continuum of Community Engagement in Research: A Roadmap for Understanding and Assessing Progress," *Progress in Community Health Partnerships: Research, Education, and Action* 13, no. 4 (2019): 427-434.

of the process. As EPA works toward more and better practices of community-based science, these efforts must be focused on action and include and be informed by lived experiences.

Theme 7. EPA should incorporate structural drivers such as colonialism and racism into its cumulative impacts practice and framework for implementation.

The CDC identified racism as a public health threat in 2021, meaning that the CDC had enough information to identify racism as significantly impacting the health of millions of Americans. One definition of a public health threat is "a condition or behavior that can reasonably be expected to place others at significant risk of exposure to a toxic agent or environmental hazard or infection with a notifiable disease or condition."[72] Racism has interpersonal dynamics, from overt to implicit, as well as structural and systemic drivers that pose barriers to services and protections from some parts of the population compared with others. Some describe racism as an iceberg,[73] with overt practices visible above the surface of the water and structures and systems hidden below. When it comes to public health, ignoring threats, misinforming the public, or maintaining the status quo does not allow or drive improvements. Good public health requires truthful and clear communication from trusted partners, unrestricted education, action, developing guidance, and policy enactment. Environmental pollution disproportionately impacts low-income communities and communities of color and brings about a serious detriment to public health. Systemic and structural barriers for communities of color must be considered in environmental regulations and decision-making to counteract these challenges and provide adequate protections for everyone. Some researchers describe the inclusion of structural drivers of injustice in analyses as understanding the pathway from racism to health outcomes, which requires viewing race not as a confounding factor in studies but rather as a way to inform outcomes and solutions.[74] The NEJAC has framed this recommendation around improving how barriers and biases related to race and ethnicity (exposure to racism) are understood and integrated in EPA strategic planning, and how EPA assesses and addresses cumulative impacts.

Acknowledge and evaluate the root causes and structural drivers of disproportionate and cumulative impacts.

To understand the root cause of an issue or problem, a group must first acknowledge the problem exists and agree on the scope, details, and dimensions of the problem. This means that disproportionate impacts must continue to be assessed to identify where work is needed, as well as to evaluate if the work has had its intended impact – i.e., evaluating whether the disproportionate impact was lessened or eliminated. However, this work cannot stop at the problem identification stage.

Root cause analysis of disproportionate and cumulative impacts involves understanding how and why low-income and communities of color were placed proximate to sources of pollution and why they still live there. Fundamentally, it is an analysis method to determine how the current situation came about. There is not usually a single cause of disproportionate impacts in environmental justice areas, as disproportionate impacts tend to be a compounding of multiple practices and policies over time that range from overt to implicit racism. The proximity of low-income and communities of color to high-density, heavy industry did not happen by chance; rather, intentional, and lawful programs and policies propelled this injustice. These make up the social, economic, and political conditions in which community

72. *Law Insider*, public health threat definition, accessed June 7, 2024, https://www.lawinsider.com/dictionary/public-health-threat.

73. Gee, Gilbert C., Annie Ro, Salma Shariff-Marco, and David Chae, "Racial Discrimination and Health among Asian Americans: Evidence, Assessment, and Directions for Future Research," Epidemiologic Review, 31 (2009):130–151.

74. Alson, Julianna G., Whitney R. Robinson, LaShawnDa Pittman, and Kemi M. Doll, "Incorporating Measures of Structural Racism into Population Studies of Reproductive Health in the United States: A Narrative Review," *Health Equity* 5, no. 1 (Feb. 2021): 49–58.

members live and include policies with underlying and sometimes unintentional motivations of colonialism, racism, and economic disinvestment.

Redlining, blockbusting, and predatory lending are symptoms of a system rooted in racism and bias. Eminent domain laws, the remaining racial covenants in home titles, neighborhood Chapter 99 descriptors, and requirements around blight perpetuate disproportionate impacts and differential burdens. These inequities can even be influenced by natural land structures, such as flooding or spill zones in low-lying regions. In some cases, the impacts of disinvestment are worsened by additional decisions like choosing not to control odors and letting trash pile up. EPA should continue to learn and dig deeper into these root causes and structural drivers of disproportionate and cumulative impacts.[75] In short, EPA needs to include measures of racism in cumulative impact assessments for them to be relevant and reduce disproportionate outcomes.[76]

Many times, assessing cumulative impacts uncovers a variety of stressors and burdens that impact a community, and all of these may be regulated or controlled by different agencies and have a variety of contributing factors. Systems-informed tools for organization and visualization will be helpful to get beyond the problem identification stage. There are tools that EPA could borrow, modify, and improve upon from other professions that apply root cause analyses, such as engineering, education, and organizational culture change. Fishbone diagrams allow a user to visualize the problem and identify several possible contributors. Driver diagrams provide a similar approach and allow the contributors to be categorized as primary, secondary, etc. There are also system improvement maps and "investigating the whys" that might be useful to better understand which department office or program could modify their practices to better dismantle structural barriers. All these practices require a move toward a focus on disparities and the possible contributors to them.

> The proximity of low-income and communities of color to high-density, heavy industry did not happen by chance; rather, intentional and lawful programs propelled this injustice.

Incorporate the root causes and structural drivers of injustice into program and strategic planning. Structural injustice comes from the systems that impose barriers to equity and justice for large groups of people. These systems and structures exist within and outside of EPA. Acknowledging and accounting for these barriers in assessments and decision-making provides greater—and even real—power for communities. This starts with planning. EPA must institute changes to identify, address, and avoid internal systems and structural drivers of injustice through organizational and cultural change. Planning along these lines might mean developing a diverse panel or webinar policy or prioritizing work to identify structural drivers where EPA decisions are associated with the highest levels of disproportionality. There

75. Gee, Gilbert C. and Chandra L. Ford, "Structural Racism and Health Inequities: Old Issues, New Directions," *Du Bois Review* 8, no. 1 (2011): 115–132.

76. Kapadia, Farzana and Luisa N. Borrell, "Structural Racism and Health Inequities: Moving from Evidence to Action," *American Journal of Public Health* 113, no. S1 (2023): S6–S9.

are also structural drivers external to EPA (i.e., access to high-quality, culturally competent healthcare), and likely outside of EPA's authority and control. Planning on this end would mean that assessments include an investigation for structural drivers such that these external structural drivers are identified, acknowledged, and ultimately considered in decision-making like standard development, or rulemaking.

Incorporate root causes and structural drivers of inequality into cumulative impact assessments and support index development.

CIAs must not be conducted as "race neutral" exercises because environmental burdens and impacts are concentrated in low-income and communities of color. Many cumulative impact analysis tools are geographic and based on quantitative indicators for environmental, health, and social stressors. Some of these tools include race and ethnicity to serve as a proxy for the stressors and barriers related to exposure to marginalization from racism and colonialism, and sometimes race and ethnicity are not included.[77]

One way of undoing past harms is to include what led to those harms—including the structural drivers and root causes of injustice—in an analysis.[78] Currently, few tools exist to measure these structural factors and root causes directly, so researchers use proxy measures like degree of segregation in a city, the degree a community was influenced by redlining and other residential segregation practices, levels of affordable housing, material hardship, access to healthy food, voter turnout demographics, and tree canopy cover. These indicators are then overlaid in health disparities maps (such as heat maps) to describe and locate disinvested communities. Some researchers have directly developed indicators of structural racism, aggregating a variety of disparity data.[79] Incorporating indices of social adversity will lead more directly to policy and practice changes, rather than potentially blaming the people themselves, but more work is needed to expound the underlying root causes and structural drivers.

In addition to recommending the inclusion of these indices, the NEJAC acknowledges that EPA should also support and participate in their development. Some indicators are more quantitative and therefore more visible in their impacts. Redlining, for example, has been included in many disproportionate impacts and exposure analyses due to its specific geographic nature, yet other barriers existed and still exist. Some metrics have already been published in scientific literature, and other metrics are in development.[80] Furthermore, many of the tools where these metrics are applied are still in a descriptive rather than an actionable phase. EPA should support and participate in researching and developing more direct and currently unquantified indices of structural drivers and root causes. These, together with direct metrics for pollution, will support cumulative impact assessments to point to policies that need changing.

Apply an anti-racist lens to its work and support recruitment and retention related to DEIA.

Agencies that provide adequate environmental protection for everyone must do so by decreasing barriers to full governmental protection. Part of this is seeing and acknowledging those barriers, and this takes ongoing work for individuals, for the agency internally, and externally implemented programs.

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77. See, for example, McKenzie, Ben et al., "Technical Documentation for the Environmental Justice Index 2022," (Atlanta, GA: CDC): n.d., accessed June 10, 2024, https://www.atsdr.cdc.gov/placeandhealth/eji/docs/EJI-2022-Documentation-508.pdf; and the Climate and Economic Justice Screening tool, accessed June 10, 2024,https://screeningtool.geoplatform.gov/en/#3/33.47/-97.5.

78. Payne-Sturges, Devon C., Gilbert C. Gee, and Deborah A. Cory-Slechta, "Confronting Racism in Environmental Health Sciences: Moving the Science Forward for Eliminating Racial Inequities," *Environmental Health Perspectives* 129, no. 5 (2021).

79. Aldina Mesic et al, "The Relationship Between Structural Racism and Black–White Disparities in Fatal Police Shootings at the State Level," *Journal of the National Medical Association* 110, no. 2 (2018): 106–116.

80 Alvarez, Camila H, "Structural Racism as an Environmental Justice Issue: A Multilevel Analysis of the State Racism Index and Environmental Health Risk from Air Toxics," *Journal of Racial and Ethnic Health Disparities* 10, no. 1 (2023): 244–258.

Operationally, the EPA may just be at a point of acknowledging and teaching about the impact of racism in the United States and how it is perpetuated in the current system of environmental protection. Science and scientists have an important growth opportunity here, as much of the history of science has been dominated by a very narrow perspective. Different ways of looking at the questions we ask, and the way we ask them, are essential to refining and reframing scientific structures. This expansion in how scientists envision and implement science happens all the time in scientific debate, and EPA's scientific culture must learn to embrace this. Knowing, acknowledging, communicating, and repeating historical experiences of overburdened communities can facilitate this change.

Part of successfully developing, implementing, and administering programs that address disproportionate exposures and impacts will come from including DEIA practices.[81] EPA should seek representation and understanding from overburdened communities. This may involve continued job training work, inclusive recruiting and hiring practices, and internal efforts for staff retention across many types of identities. On the surface, this may not seem to relate to cumulative impacts, but because of the strong connection between cumulative impacts and disproportionate impacts, any activities that uplift equity, however indirectly, are part of the solution to reduce disproportionate cumulative impacts.

Acknowledge and address power imbalances in cumulative impacts work.

There will always be a power imbalance between someone who works in a government agency and someone who does not, even between those with similar formal credentials and personal experiences. EPA should maintain its vigilance and not allow power imbalances to increase gaps between the protected and the unprotected, those who enjoy clean air and those who breathe unhealthy air. For example, EPA's mission is to protect *human* health and the environment and not *citizen* health and the environment. There are many types of power imbalances, and EPA should maintain its understanding of these and work to acknowledge and make them visible so that they do not pose undue harm. An important tool for this, and for the recommendation immediately above, is to provide more extensive and substantive cultural competency trainings along with supporting policies and structure to drive EPA employees to practice what they are learning. This should be integrated into the cumulative impact trainings recommended above. The agency needs to specifically invest in culture change to become truly anti-racist and create a culture of belonging rather than othering.

Avoid erecting barriers to laws and policies that attempt to repair past harm and repair justice.

Even if the current paradigm of environmental protection were fully implemented—considering all the law, technology, and science available—there would potentially still be racial and ethnic inequities in environmental pollution burdens and stressors.[82] Undoing the harm from disproportionate and cumulative impacts requires new and updated direct policy actions, such as was attempted in the Community Reinvestment Act, which attempted to repair harm from redlining. [83] This direct action must be taken on the part of government agencies and include those most impacted by the policy.

As an executive agency, EPA cannot, of course, actively support the passage of U.S. laws like the A. Donald McEachin Environmental Justice for All Act. On the other hand, EPA should also not provide information

81. Desikan, Anita, Jacob Carter, F. Abron Franklin, Raechel McKinley, Jennifer Orme-Zavaleta, and Andrew A. Rosenberg, *Diversifying the Federal STEM Workforce*, Cambridge, MA: Union of Concerned Scientists, 2023.

82. Donoghoe, Manann, Andre M. Perry, and Hannah Stephens, commentary, "The US can't achieve environmental justice through one-size-fits-all climate policy," Brookings Institute, (2023) accessed June 10, 2024, https://www.brookings.edu/articles/the-us-cant-achieve-environmental-justice-through-one-size-fits-all-climate-policy.

83. Jenkins, Alan, "Racial Equity and U.S. Law," *Health Equity* 7, no. 1 (2023): 61–69.

that would present barriers to the passage of this law, such as by providing heavily overestimated fiscal notes for the costs related to implementation. The NEJAC observes that it is important for EPA to not only support states' work in enacting environmental justice and cumulative impact laws, but to adopt a national policy on cumulative impacts that would apply to all U.S. jurisdictions.

Theme 8. EPA should promote climate justice.

Make more transparent, holistic, and connected decisions.

The intent of most cumulative impact policies is to reduce environmental burdens in disinvested communities and ultimately to decrease disproportionate impacts. Much of the time those who experience the largest and most frequent negative impacts from climate change also experience higher incidence of environmental, social, and public health stressors—or cumulative impacts. Understanding and incorporating the intersections between climate justice and cumulative impacts into cumulative impact assessments and decisions require deep consideration of the complex history of social and climate inequities. This includes considering how corrective actions and acts toward resilience may inadvertently and unjustly magnify disproportionate impacts. Although daunting, it is necessary to protect community health and the environment. Communities need additional resources to address the disparate impacts of climate change.

Several general principles of climate justice (from a U.S. perspective) are:[84]

- respecting and protecting human rights
- sharing benefits and burdens equitably
- ensuring participation transparency and accountability
- ensuring a fast, fair phase-out of all fossil fuels
- acting now
- protecting future generations
- invoking caution in the face of uncertainty

EPA must consider how corrective actions and acts toward resilience may inadvertently and unjustly magnify disproportionate impacts.

As EPA works on climate change mitigation, adaptation, and climate justice, the work must be public and transparent. EPA websites with information and updates are helpful, as well as posted reports and webinars. The resilience hubs concept offers approaches for overburdened communities to access climate-related programming and services. In fact, the COVID-19 pandemic highlighted the need in the United States for comprehensive community resilience. Networks of resilience hubs could deliver local

84. Mary Robinson Foundation Climate Justice, website, accessed June 10, 2024, https://www.mrfcj.org/.

programs and public services to meet community-identified resilience needs. To create a network of resilience hubs, the public sector has a major role to play in equitably allocating resources, providing needed services, and facilitating local resilience networks.

Learn about and acknowledge historic and currently biased policies.

During its July 2023 public meeting, the NEJAC was fortunate to converse with environmental experts from Puerto Rico, who discussed the continued impacts of colonialism in their country. Underlying biased systems and structures in government and decision-making perpetuate and worsen climate impacts similarly to pollution impacts. Furthermore, default assumptions in assessments that are based on the people or land of the majority population cannot always be generalized everywhere and to everyone. This is why it is crucial to consider the impacts of colonialism and racially biased systems as a compounding stressor. Climate-impacted events will have greater negative effects on disadvantaged communities if environmental protection is not changed to consider the whole system. These assessments could pull from system dynamic modeling expertise, and from the ecological and economic fields, in which complexity is more easily assumed and accepted. This expertise offers helpful insights into addressing the sometimes-invisible systems and structures that lead to greater harm from disproportionate and cumulative impacts and from the threats of climate change.

Work to mitigate and adapt to the impacts of climate change so as not to prolong or amplify chemical stressors.

The NEJAC discussed the NEPA process several times with environmental justice experts in Puerto Rico. Three topics emerged with respect to NEPA and climate justice, especially with respect to non-mainland projects:

1. The need for stronger emphasis on the environmental justice aspects of decisions
2. Integration of the different environmental media impacts
3. Greater consideration of the climate impacts of projects that attempt to address climate adaptation

The environmental justice experts offered two prime examples: non-permeable flood control projects (that is, decreased permeable ground cover and reduced tree canopy); and providing air conditioners to address heat impacts; that without accompanying climate mitigation actions potentially increase fossil fuel consumption. Cumulative effects and environmental justice are required analyses in a NEPA review. Many proposals with a high potential to indirectly or directly increase greenhouse gas emissions (e.g., large energy projects, pipelines, and highway projects) require this type of review. But there is more work needed to include these greater systemic impacts, and we need to consider these proposals from the perspective and experiences of people most marginalized and without basic needs.

In the urgent and much needed transition away from fossil fuels and adoption of climate mitigation and adaptation programs, the EPA should drop barriers for low-income communities to receive climate-based benefits like weatherization, energy audits, and access to solar power. At the same time, the EPA should avoid expedited or less stringent permitting for facilities that provide the materials for weatherization since many of these facilities (those that produce insulation, for example) are in overburdened communities and emit air pollution. These are some of the hidden consequences of “urgency.” It is important and necessary for EPA to always think about intersectionality in its programs and policies, including climate impacts, equitable outcomes, and perpetuating historically biased systems that under-resourced, low-income communities, and communities of color.

EPA's Risk Management Plan rule is an excellent example of the need for connections between climate justice and disproportionate and cumulative impacts. This rule requires facilities with extremely hazardous substances to develop risk management plans and submit them to EPA. An analysis found that a third of these facilities are at risk of in-land flooding, storm surge, sea level rise, or wildfires.[85] Hazardous chemicals are released to the air, water, and land during these events. A striking example is that most air emissions events in East Texas were unanticipated and predominantly due to impacts from Hurricane Harvey.[86] The Agency cannot look at chemical risks without acknowledging the increased potential for exposures due to climate change, and vice versa. One way EPA can address this is to include important climate-related stressors, like mental health indicators and extreme heat, in cumulative impact and environmental justice mapping tools. The inclusion of extreme heat in any mapping tool would require a consistent science-based definition that is in alignment with health studies and community validation. Yet another example of this would be to include chemical stressor or risk language in the FEMA risk management training in identifying hazards, profiling hazard events, and inventorying assets.

Finally, EPA policymaking and analyses must not always be focused on the temperate mainland. While there are common threads, every community will be different. There must be consideration of how climate impacts will vary across the diverse geography of the United States, including the U.S. Virgin Islands, Puerto Rico, Hawaii, and Alaska. Many EPA policies and assessments were designed to serve the mainland and temperate conditions. Cumulative impact and climate vulnerability tools must be developed such that stressors that are important to U.S. states and territories outside of the mainland are represented. This could be in the form of directly adding these stressors, or providing the ability to add data that is uniquely important to these locations. An example that is easily imagined is that rodent infestation may increase due to climate change, and housing authorities cannot base climate justice plans and recommendations fully on communities that don't experience these issues. Furthermore, many assessments and actions do not address or consider the issues of climate change in the Arctic such as the melting permafrost, erosion of land, and loss of human habitat.

85. Flores, David, Michelle Mabson, and Darya Minovi, *Preventing "Double Disasters": How the U.S. Environmental Protection Agency Can Protect the Public from Hazardous Chemical Releases Worsened by Natural Disaster,* Center for Progressive Reform, Earthjustice, and Union of Concerned Scientists, 2021.

86. Union of Concerned Scientists, fact sheet, "Community Impact: Chemical Safety, Harvey, and Delay of the EPA Chemical Disaster Rule," Cambridge, MA: 2017.

Appendix A. NEJAC Cumulative Impacts Charge

At the March 30, 2023, NEJAC meeting, the NEJAC Cumulative Impacts Workgroup was formed and asked to respond to the following charger questions:

- What can be learned from recent approaches for assessing and addressing cumulative impacts that should be used or promoted by EPA?
- What can be learned from community efforts to assess and address cumulative impacts that should be used or promoted by EPA?
- What can be learned from recent community and stakeholder engagement processes during the development of cumulative impacts analysis protocols at the state or local level that should be promoted or used by EPA?
- What can be learned from work on indicators of cumulative impacts, including those related to climate change, that should be used or promoted by EPA?
- What steps, methods and practice standards are critical when assessing and addressing cumulative impacts? What integrated approaches, such as Health Impact Assessment or Protocol for Assessing Community Excellence in Environmental Health, can be utilized to inform these steps and develop standards of practice?
- How can EPA better utilize community knowledge, and account for their lived experience?
- How can EPA build capacity within overburdened communities to ensure that they play a meaningful role in the process?
- How can EPA better consider historical and structural drivers, including redlining, for concentration of environmental burden and lack of benefits?
- How can EPA incorporate climate justice concerns in its efforts to assess and address cumulative impacts?
- What innovative concepts should EPA pursue to better integrate consideration of cumulative impacts in its programs?

Appendix B. Basic Comparisons Between State Implementation Plans and Total Maximum Daily Load Assessments

Element	Total Maximum Daily Load (TMDLs)	State Implementation Plan (SIPs) + Good Neighbor Laws
Short description	A multi-source approach to estimate allowable loadings such that a waterbody can maintain a pollutant/multiple pollutant below a surface or drinking water quality standard.	A multi-source approach to estimate allowable emissions to ambient air such that ambient air can be maintained below a national or state ambient air quality standard (there are 6 NAAQS, they are all single pollutant-based).
Relationship between EPA and states	States develop various water quality standards, including surface water, drinking water, and aquatic life. EPA then approves these standards.	EPA develops standards and states implement them through its air quality programs.
Goal/objective	Getting a waterbody from an impairment list by maintaining a water quality standard (surface or drinking water)	Attainment with NAAQS
Initial trigger	A waterbody is classified as impaired. This can happen based on a water quality measurement that indicates a chemical, pollutant, or group of pollutants are above a standard. It can also be triggered by an impacted biological organism, or an outcome trigger (aquatic life)	EPA requires all states to develop a SIP for how they will maintain attainment with ambient air quality standards.
Trigger for update	Not as applicable as SIPs	Measurement of ambient air that indicates non-attainment with an ambient air quality std. Results are in the form of the standard, i.e., multiple measurements taken over time period. For example, the $PM_{2.5}$ annual standard is a 98th percentile of the mean over three years.
Inclusion of point & nonpoint sources	General inclusion of both nonpoint (run off) and point (effluent from “pipes”)	Do not always include non-point sources. The NE ozone SIP is an exception and includes tail pipe (nonpoint) emissions.
Single chemical, single pollutant, multiple pollutant	Can be aimed at multiple pollutants, like “nutrient loads” or single pollutants like chloride or mercury.	Are aimed at criteria pollutants.

Geographic area	Sources of pollutant come from watershed; analysis is directed at a waterbody (lake, river)	Initially a state. But for findings of non-attainment (an updated SIP) can be addressed as an airshed by bringing in Good Neighbor laws. Some states regulate air based on air quality management districts (e.g. OH, CA). The geography of updated SIPs is smaller than a state; larger geographies would bring in more sources.
Consistency across states	Implemented differently across states	Dependent on air pollution in and near states.
Implementation	Companies can estimate and negotiate individual loadings to a waterbody based on their water release. There are examples where one company will take a more stringent limit and others can be weaker. Implemented through permitting.	Implemented through air quality permits.
Some examples & links	The Redwood River TMDL covers multiple pollutants. https://www.pca.state.mn.us/sites/default/files/wq-iw7-59e.pdf	The Non-Attainment and Ozone Transport Region SIP includes multiple states. https://www.epa.gov/air-quality-implementation-planas/nonattainment-and-ozone-transport-region-otr-sip-requirements

Appendix C. Cumulative Impact Laws and Rules

Chicago Department of Public Health

The specific practices of the City of Chicago Department of Public Health (CDPH) are the most robust and inclusive cumulative impact assessment in existence to date.[87] These practices are:

- The cumulative impact assessment was co-designed, co-developed, and co-led with frontline community leaders, building upon a long history of environmental justice activism in Chicago.
- Adopted the Project Values of Anti-Racism, Equity-focused, First voice, Accountability, and Transparency.
- Community representatives were compensated through the Illinois Public Health Institute for their involvement throughout the cumulative impact assessment process at a rate of $100/hour.
- Based on community feedback, the city analyzed existing community input before engaging with environmental justice communities anew.
- The environmental justice leaders drafted a community input summary to consolidate qualitative data demonstrating the lived experience of cumulative impacts to inform scoping.
- Working groups were formed to produce deliverables, and they began by drafting charters that included goals, community agreements, and a decision-making process that protected community power.
- The project management team, consisting of representatives from each workgroup, provided day-to-day oversight.

The Environmental Equity Working Group

The Environmental Equity Working Group (EEWG) included a group of environmental justice leaders and advocates convened by the City of Chicago Office of Climate & Environmental Equity. The EEWG served as the accountability body throughout the scoping, assessment, and reporting phases of the work outlined below:[88]

Phase 1: Scoping

- CDPH reviewed and analyzed existing community input from past public engagement, comments, complaints, and other source.
- The City of Chicago and the EEWG developed a Community Input Summary to consolidate qualitative data demonstrating the lived experience of cumulative and disproportionate impacts of low-income, Black and Latinx neighborhoods in the South and West sides of Chicago. The summary described impacts that are not always quantified including
    - environmental health outcomes,
    - trade-offs between economic benefits and community burdens, and
    - impacts of government-community processes and decision-making.
- Scoping documents included the list below, which were summarized into a Landscape Assessment Report.
    - The People and Process Landscape Assessment explored community participation and co-design.

87. City of Chicago, *Chicago Cumulative Impact Assessment 2023 Summary Report*, accessed June 10, 2024, https://www.chicago.gov/content/dam/city/depts/cdph/environment/CumulativeImpact/oct-update/CIA_ExecutiveSummary_9.17.23_v3.pdf

88. City of Chicago, *Chicago Cumulative Impact Assessment 2023 Summary*.

- The Data and Methods Landscape Assessment reviewed data sources and methodologies of existing federal, state, and local assessments and indicators.
- The Policy Landscape Assessment discussed state and local EJ and cumulative impacts policies.

Phase 2: Assessment

A cumulative impact assessment website and Engagement Event Goals were developed with the oversight of the co-chairs from each working group. Other assessment phase activities included:

- Developing an engagement plan and materials (posters, handouts, etc.) and soliciting and reviewing feedback for continuous improvement.
- Coordinating and implementing a strategy to collect and analyze qualitative data.
- Monitoring and Evaluation, including publishing *Community Co-Design Lessons Learned Assessment Plan*, which answered the questions:
  - Is there evidence that we are accomplishing the work we set out to do?
  - How and to what degree are various partners and stakeholders participating?
  - How has the process aligned with values and principles?

An Interdepartmental Environmental Justice Work Group (IEJWG) was formed to work environmental justice principles into daily City of Chicago work by:

- reviewing City data
- learning about national efforts
- meeting with community partners to understand cumulative impacts
- providing input on cumulative impact policy recommendations
- exploring community feedback
- producing a City of Chicago EJ Action Plan
- developing a City-wide environmental justice goal: “All City of Chicago depts will work together and use their powers to improve the environment, health, and quality of life in EJ communities through changes to internal decision-making processes, city wide policy, meaningful community engagement, and equitable distribution of benefits and burdens of City actions.”

Phase 3: Reporting

The Data & Methods Working Group developed the Chicago Environmental Justice Index and Map reflecting combined environmental, health, and social stressors.

The Policy Working Group developed City Policy & Practice Change Recommendations and outlined recommendations for an environmental justice & cumulative impact ordinance, such as that governance systems and structures ensure that City policies and processes promote environmental justice; that the City is required to consider environmental health, and social stressors in decision-making, and that people who live in environmental justice neighborhoods directly benefit from local developments.

New Jersey

After more than a decade of advocacy from groups that represented environmental justice communities in New Jersey, the first statewide cumulative impact law was enacted on April 17, 2023. This was a law aimed at stopping additional pollution and reducing existing pollution in historically overburdened communities and communities of color subjected to disproportionately high environmental and public health stressors.

Similar requirements were enacted by local municipalities such as Camden in 2015, and Newark in 2016, giving these cities more authority to reject additional industrial facilities.

The New Jersey Department of Environmental Protection ("NJDEP") was required to write regulations (rules) to implement the law. During this process, the NJDEP held public hearings around the state and online. Many individuals, organizations, academia and the NJ Environmental Justice Advisory Council provided comments.

The NJ environmental Justice law required that the NJDEP consider multiple environmental and public health stressors when issuing new permits from new sources of pollution or when considering renewal or modification of permits for existing sources of pollution. The rule sets up how the assessment must be done and public participation requirements during permitting. It also requires consideration of all information gathered for decision-making. The law and administrative rule gave NJDEP more authority to limit and deny major source permits.

Under the new law, major source permit applicants must prepare an environmental justice impact statement and engage with members of local communities by hosting a public hearing. The applicant must collect public comments and then respond to the comments in writing. NJDEP then must determine whether the proposed permit will cause or contribute to environmental and public health stressors at disproportionate levels when compared with lesser burdened communities. The rule requires that applicants avoid and minimize stressors, such as by using additional pollution control technologies. If disproportionate impacts are unavoidable, permits can be denied, limited, or conditioned. The NJ environmental justice law applies to eight types of facilities:

- resource recovery facilities or incinerators;
- sludge processing facilities;
- sewage treatment plants with a capacity of more than 50 million gallons (about 189270500 L) per day;
- transfer stations or solid waste facilities;
- recycling facilities that receive at least 100 tons of recyclable material per day;
- scrap metal facilities;
- landfills; and
- medical waste incinerators, except that attendant to hospitals and universities.

Connecticut

In 2008, after eight years of sustained advocacy by groups such as CEEJAC, the state legislature of Connecticut enacted and the Governor signed into law Public Act No 08-94, "An Act Concerning Environmental Justice Communities and The Storage of Asbestos Containing Material." This was the state's first environmental justice law and instituted community engagement requirements for facilities seeking permits to operate in overburdened communities. This law impacted community participation and engagement, but it did not enhance regulatory authority and had few if any impacts.[89]

In December 2021, the Governor of Connecticut created a Connecticut Equity and Environmental Justice Advisory Council ("CEEJAC") within the Connecticut Department of Energy and Environmental Protection (DEEP) by Executive Order No. 21-3 in. The purpose and mission of the CEEJAC is "to advise the Commissioner of DEEP on current and historic environmental injustice, pollution reduction, energy equity, climate change mitigation and resiliency, health disparities, and racial inequity."[90]

On June 9, 2023, the legislature enacted Senate Bill 1147 to rectify historical environmental injustices by preserving the existing public participation processes for both new and expanded permits while providing additional regulatory authority to address cumulative impacts. The law was developed on the premise that changes must be made not just to individual projects or permits, but with consideration of other pollution sources in a community.

DEEP and University of Connecticut partnered to develop a tool to screen for multiple environmental and public health stressors to inform the law implementation.[91] The law prescribed public participation and engagement requirements for permit applicants, including types of signage, notice, languages other than English, etc. The governor's office has so far rejected DEEP's request that those representing environmental justice interests be paid, citing a lack of authority.

89. Weiss, Abby, "Connecticut Passed an Environmental Justice Law 12 Years Ago, but Not That Much Has Changed" *Inside Climate News: Justice and Health*, July 21, 2020.

90. Connecticut Department of Energy & Environmental Protection webpage on Connecticut Equity and Environmental Justice Advisory Council website, accessed June 10, 2023, https://portal.ct.gov/DEEP/Environmental-Justice/Connecticut-Equity-and-Environmental-Justice-Advisory-Council.

91. State of Connecticut, news release, "DEEP and UConn CIRCA Partner to Develop Mapping Tool for Environmental Justice Communities," October 27, 2021, accessed June 10, 2024, https://portal.ct.gov/deep/news-releases/news-releases---2021/deep-and-uconn-circa-partner-to-develop-mapping-tool-for-environmental-justice-communities.

Minnesota

In 2008, after significant organizing by South Minneapolis environmental justice activists, the Minnesota state legislature enacted a law requiring a cumulative impact analysis for any facility seeking an air permit in specific overburdened communities.

In 2019, a coalition of frontline community-based organizations, co-organized by Communidades Organizando el Poder y la Accion Latina MN (COPAL) and the Minnesota Environmental Justice Table, formed a coalition called the Frontline Communities Protection Coalition (FCP) to expand the 2008 law and protect more frontline communities across the state. Members of the FCP worked with Minnesota's Pollution Control Agency (MPCA) to develop cumulative impact bill language, adding significant regulatory authority in permitting new and existing sources.[92] The law was enacted on May 24, 2023. Given political pressures, the law was limited to the seven county Twin Cities metro area, Duluth, Rochester, and Tribal land.

The enacted MN cumulative impact law required rulemaking on the part of MPCA within three years of the law enactment, or May 24, 2026. The MPCA began community engagement for rulemaking with a Request for Comments. The MPCA's community engagement process began with several hearings around the state to gather information and solicit written comments, including information sharing sessions with various national experts. In conversations with NEJAC members, community representatives described several issues with the engagement process, such as a need for information to be more accessible and to help community representatives understand the rule making process in general. The biggest shortcoming cited by community groups was that MPCA did not have direct community relationships and relied on the efforts of unpaid community representatives from FCP to do the actual outreach and education with local coalitions. The online public input meetings had a lot of industry representation. Representatives from FCP voiced the following issues many times, and the workgroup has used these as takeaways:

- Accessibility: Provide childcare, food, and transportation support to enable community members to provide feedback.
- Outreach: MPCA should pay canvassers to go into frontline neighborhoods to collect feedback and do outreach. People need to know that their input is being incorporated and their concerns are being addressed.
- Scoping: Have clear criteria.
- Analysis: Make the analysis easily accessible and understandable for community members.
- Decision-making: There must be clear decision-making guidelines.

92. Minnesota Pollution Control Agency, "Cumulative Impacts Rulemaking," website, January–May 2024, accessed June 10, 2024, https://www.pca.state.mn.us/get-engaged/cumulative-impacts.

Appendix D. Comprehensive Community-Driven Approaches

Green Zones

Green zones provide examples of area-wide management targeted at areas that have been neglected and suffer from disinvestment, that are usually low-income and communities of color. Green zones are place-based strategies to create community-led solutions that will alter overburdened areas into healthy and flourishing neighborhoods.

The implementation of a green zone is community-specific, but the goal of all green zone projects is to provide a locally driven framework that protects the environmental and economic health, revitalizes and promotes sustainable practices, and addresses environmental impacts. Green zones, because they are community created, reflect the needs, priorities, and environmental justice issues in each community and intentionally incorporate the voices and visions of residents to ensure that the process is community-led, solution-oriented, and collaborative. This process examines cumulative impacts and land use patterns and is based on the principles of justice and sustainability. Plans may produce outcomes such as creating high-quality jobs, affordable housing, and providing parks and healthy food options.

Green Zones: California

Green zone initiatives are not new; residents in these areas proactively organize to create a positive vision for their communities. There are multiple municipalities in the state of California that have adopted the green zones approach including San Francisco (PODER) Richmond (APEN), East Oakland (CBE), San Joaquin Valley (CRPE), and Los Angeles (Clean Up/Green Up).

Green Zones: Minneapolis, Minnesota

Minneapolis benefits from a proactive green zone strategy aimed at addressing cumulative impacts derived from the environment, climate, chemical, non-chemical, and social stressors in neighborhoods. The initial objective of the Minneapolis Green Zones was to establish a comprehensive approach to community planning that includes the following outcomes:

- Align with federal, state, county, and park policies and resources to further support citywide geographic designations based on data on demographics, environmental inequities, institutional racism, and underinvestment.
- Ensure that the people and communities in areas who have experienced environmental injustice benefit directly from local and regional infrastructure investments.
- Advocate for regional investments that further reduce environmental and social inequalities.
- Ensure that sustainability investments in the green zones are carefully implemented to avoid gentrification, and the displacement of small, diverse, and locally owned businesses and low-income residents.
- Partner with residents and organizations experiencing environmental injustice to determine City investments and regulatory changes.
- Explore opportunities and implement strategies in all city businesses to address inequities related to environmental injustice.
- Prioritize cleanup of contaminated sites in areas that have experienced environmental injustices.
- Create and implement proactive predevelopment brownfield cleanup strategies and tools in areas that have experienced environmental injustice.
- Conduct inclusive and accessible engagement opportunities with communities that have experienced environmental injustices via all environmental health-related programs, regulations, and policies.

- Establish educational, technical and/or financial assistance for all environmental health-related programs, regulations, and policies with an emphasis on environmental justice areas that have historically experienced underinvestment.

Green Zones: Philadelphia

The City of Philadelphia followed a green zone-informed approach in its recovery and mitigation efforts to mitigate the damage from Hurricane Ida and work to avoid damage in the future. The U.S. Department of Housing and Urban Development allocated over $163 million to support Philadelphia's recovery effort hazard mitigation plan development to reduce and eliminate the risk from future natural, human-caused, or technological disasters. In addition to infrastructure considerations, Philadelphia's Hazard Mitigation Plan prioritizes actions that improve equity, address current and future hazard risk, and integrate the work and plans of multiple partners for mitigation. The Plan describes how Philadelphia will reduce or eliminate potential losses from natural and human-made hazards, and documents existing actions and adds new actions aimed at mitigating the effects of hazards on the city's population, economy, and infrastructure.

Mitigation actions will include programs, plans, projects, and policies that help reduce or eliminate the long-term risk to human life and property from natural hazards. The Federal Emergency Management Agency organizes mitigation actions into four categories: Education and Awareness Programs, Structure and Infrastructure Projects, Natural Systems Protection and Local Plans and Regulations; the latter action includes government authorities, policies, or codes that influence the way land and buildings are developed and built in and managed area wide.

Resilience Hubs

Resilience hubs are place-based approaches for climate-related disaster planning. They are rooted in improving environmental and health impacts through a co-development of community gathering spaces (e.g., places of worship, schools, libraries) to provide solar charging, food, water, and first aid before, during, and after disasters. They are trusted community gathering places to distribute resources, exchange information, and express community care. They shift power to the community by providing services and programming such as learning about water purification and water catchment systems, emergency community kitchens, and conflict resolution services.

According to the Urban Sustainability Directors Network, resilience hubs serve communities in three operating conditions: Normal, Disruption, and Recovery.[93]

To serve as a resilience hub, a community-serving facility will require a series of upgrades often including:

- Access to electricity, heating and cooling
- Food, tools, resources, and sometimes shelter
- Water
- Information, communication infrastructure, and a trusted set of "Hub managers" to streamline information sharing
- Logistical coordination with partner groups that provide aid and post-disruption support
- Access to basic health and medical supplies

93. Urban Directors Sustainability Network, *Guide to Developing Resilience Hubs*, (2019) http://resilience-hub.org/wp-content/uploads/2019/10/USDN_ResilienceHubsGuidance-1.pdf.

For more information about resilience hubs, see:

- Guide to Developing Resilience Hubs by the Urban Sustainability Directors' Network
- City of Berkeley, California, website
- Resilience Before Disaster: The Need to Build Equitable, Community-Driven Social Infrastructure by APEN, SEIU California, and BlueGreen Alliance

Combined Eco-zone/Green Zone Framework: West Philadelphia

Using eco-zone and green zone frameworks, Thomas Jefferson University's Landscape Architecture program and the Overbrook Environmental Education Center investigated the specific needs, priorities, and environmental justice issues in West Philadelphia. The team used knowledge co-production and resident's vision and voices to establish area-wide community planning. The study looked at cumulative (environment/climate) impacts to rethink the legacy of unhealthy land use planning. The project area, a section of Western Philadelphia, has faced decline and neglect, and was impacted by industrial pollution, discriminatory land use patterns, and poor capital attainment. The aim was to determine which place-based policy initiatives could be used to address these historic issues and promote health improvement and sustainable development, with specific focus on Air Quality Improvements and Vacant Land Reuse (as raised by community participants).

Specific principles in this study that interested the workgroup were: acknowledge of community needs, acknowledgement of disinvestment, flexibility in addressing impacts, development of community guiding principles and goals, and a review of many diverse data sets and policies from within and external to West Philadelphia, they utilized the 'live work and play concept', and the intention to understand and incorporate the physical, cultural and social identity of a place.