

## **Sustainable and Healthy Communities Research Program Background Materials**

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## SUSTAINABLE AND HEALTHY COMMUNITIES RESEARCH

### Background

Community sustainability is often defined by the desire to meet today's needs without compromising the quality of life for future generations. As communities face increasingly complex problems, making progress toward sustainability requires the right mix of policies and investments that protect our environment, are socially just, improve public health, support economic vitality, make the most efficient use of public dollars, and enhance the quality of life for community residents.

Providing science that can help communities make better decisions is at the heart of EPA's Sustainable and Healthy Communities (SHC) Research Program. SHC provides useful science and tools for decision makers at all levels to help communities advance sustainability as well as achieve regulatory compliance. SHC is collaborating with partners to conduct research that will result in science-based knowledge to guide decisions that will better sustain a healthy society and environment in America's communities. The research is intended for decision-makers at the federal, regional, state, and community levels. SHC's outputs will help inform decision-makers as they make choices that meet regulatory mandates and will sustain positive human health outcomes and well-being, environmental quality, and economic resilience. SHC is using systems approaches to address current issues and anticipate future problems within the sustainability paradigm.

SHC tools and approaches can help decision makers understand potential benefits and consequences of their decisions. For example, it is important for communities to recognize how their actions may affect the vital functions of ecosystems such as pollution removal, stormwater control, heat mitigation, or habitat for pollinators. In addition, they should consider the relationship between the built and natural environments and potential impacts on the health and well being of their residents and the economic well being of their community.

SHC research is developing indicators and indices, maps of land cover and demographics, health data, and information on relationships between nature and well-being. This type of information along with user-friendly decision support tools can be used by decision makers to set goals and measure progress toward improved environmental quality and well-being.

SHC is pioneering a Total Resource Impact and Outcomes (TRIO) approach. TRIO is an integrated way to holistically evaluate how decisions will impact community sustainability. TRIO is a suite of models, new indicators, and tools such as Health Impact Assessments, Economic Impact Assessments, and Environmental Impact Assessments.

Through the use of these integrated data, tools and approaches, EPA is helping community stakeholders make decisions that better protect human health and well-being while preserving ecosystems and the vital services that they provide.

#### Example SHC Products:

- The [Eco-Health Relationship Browser](http://www.epa.gov/research/healthscience/browser/introduction.html) illustrates scientific evidence for linkages between human health and ecosystem services—benefits supplied by Nature. This interactive tool provides information about several of our nation's major ecosystems, the services they provide, and how those services, or their degradation and loss, may affect people.  
<http://www.epa.gov/research/healthscience/browser/introduction.html>
- The EnviroAtlas, a web-based mapping system, will display and allow interactive analysis of spatial data on environmental conditions, human health statistics, and socio-economic factors for communities across the country. More detailed data for urban areas can be used to identify local issues and evaluate potential solutions. <http://enviroatlas.epa.gov/enviroatlas>
- C-FERST, the Community-Focused Exposure and Risk Screening Tool) is being developed as a community mapping, information access, and assessment tool designed to help assess risk and assist in decision making with communities. <http://www.epa.gov/heads/c-ferst/>
- T-FERST, the Tribal-Focused Environmental Risk Screening Tool, is a web-based geospatial decision support tool being designed to serve as a research framework to provide tribes with easy access to the best available human health and ecological science. <http://www.epa.gov/heads/research/tferst.html>
- A report, “Framework for Sustainability Indicators at EPA” supports the use of sustainability indicators for evaluating the sustainability of programs, projects, and activities related to air, water, energy, products, communities, human health risks, and national security. DOSII (Directory of Sustainability Indicators and Indices) lists and describes existing measures.  
<http://epa.gov/sustainability/docs/framework-for-sustainability-indicators-at-epa.pdf>
- EPA’s Report on the Environment (ROE) is a comprehensive source of scientific indicators that describe the trends in the nation’s environmental and human health condition. The indicators help to answer important questions about the current status and historical trends in US air, water, land, human health and exposure, ecological systems, and sustainability at the national and regional levels. The ROE indicators provide timely information to help EPA and others make decisions about environmental policy, education, and monitoring priorities. <http://www.epa.gov/ncea/roe/index.htm>

#### Web links:

SHC Research Updates: <http://www.epa.gov/research/newsflash/index.htm>

SHC program information:

<http://www.epa.gov/research/ecoscience/>

<http://www.epa.gov/research/healthscience/>

<http://www.epa.gov/research/landscience/>

<http://www.epa.gov/sustainability>

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## APPLICATION OF A STRUCTURED DECISION MAKING PROCESS FOR INFORMING WATERSHED MANAGEMENT IN GUANICA BAY, PUERTO RICO

The report, *Application of a Structured Decision Making Process for Informing Watershed Management in Guanica Bay, Puerto Rico* demonstrates the application of a structured decision-making (SDM) process in the Guánica Bay watershed (GBW) in southwestern Puerto Rico. SDM is an organized approach for identifying and evaluating alternatives and making defensible choices in complex decision situations.

SDM has six steps:

- 1) clarify the decision context;
- 2) define objectives and evaluation criteria;
- 3) develop alternative(s);
- 4) estimate consequences;
- 5) evaluate trade-offs and select alternative;
- 6) and implement and monitor.

A key aspect of SDM is the engagement of stakeholders, experts and decision-makers to create a deliberative environment that deals rigorously with both facts and values in decision-making.

The Guánica Bay watershed has been the focus of a U.S. Coral Reef Task Force (USCRTF) research initiative involving multiple agencies assembled to address the effect of land management decisions on coastal resources. Municipal and agricultural growth in the Guánica Bay watershed has provided social and economic value but has led to changes in forest cover (highly valued for biodiversity, endangered species and ecotourism), declining quality and availability of drinking water and increased sediment and nutrient runoff that adversely affects coastal seagrasses, mangroves and coral reefs. Communities in the coastal region, such as the city of Guánica, rely partially on fishing and tourism economies, both of which are adversely affected by diminishing coastal water quality. The Center for Watershed Protection developed a Watershed Management Plan (WMP) that included a suite of proposed management actions to reduce sediment runoff and effects in the coastal zone. The WMP served as the initial decision context for EPA's research to generate tools and procedures to better inform the decisions made across the watershed and to facilitate complementary actions.



Application of SDM in Guánica Bay included archival research on social and economic history of the region and three workshops with stakeholders, experts and decision-makers to explore past decisions, characterize the decision landscape for the WMP, and better understand what stakeholders value in the watershed. The workshops included detailed discussions of the effects of human activity in the watershed on downstream environmental condition and ecosystem services. The outcomes of this investigation and these workshops include:

- An improved understanding of the values and perceptions of citizens in different communities of the watershed,
- A broader decision landscape (beyond coral reef protection),
- A clearer understanding of the decision alternatives and how they might support or conflict with different objectives, and
- Important insights to the value of engaging stakeholders early and often in the decision process.

Contact William Fisher, [Fisher.william@epa.gov](mailto:Fisher.william@epa.gov)

EPA-NIMHD CENTERS OF EXCELLENCE  
ON ENVIRONMENT AND HEALTH  
DISPARITIES RESEARCH

CENTERS AND PRINCIPAL INVESTIGATORS  
SHORT PROFILES



*Working to Solve Environmental Health Disparities*

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### For More Information

EPA Environment, Health and Society

[www.epa.gov/ncer/ehs](http://www.epa.gov/ncer/ehs)

EPA Health Research

[www.epa.gov/research/healthscience](http://www.epa.gov/research/healthscience)

NIMHD

[www.nimhd.nih.gov](http://www.nimhd.nih.gov)

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## 1. EPA-NIMHD Centers of Excellence on Environment and Health Disparities Research

### Principal Investigators

- Columbia University Medical Center, New York – José Luchsinger
- Meharry Medical College, Tennessee – Paul Juarez
- Georgia State University, Georgia – Michael Eriksen
- University of Illinois at Chicago – Elizabeth Calhoun
- University of Kansas Medical Center – Christine Daley
- University of Michigan – Ana Diez-Roux
- University of New Mexico – Robert Williams
- University of South Carolina, Columbia – Sandra Glover
- University of Texas, El Paso –Elias Provencio-Vasquez
- Weill Cornell Medical College, New York – Carla Boutin-Foster

## 2. Map of Center Locations

## 3. EPA and NIMHD Program Staff

### EPA-NIMHD Centers of Excellence on Environment and Health Disparities Research

**EPA** United States Environmental Protection Agency

**NIMHD** National Institute on Minority Health and Health Disparities

**UNIVERSITY OF MICHIGAN**

**UNIVERSITY OF SOUTH CAROLINA**

**MEHARRY** MEDICAL COLLEGE

**COLUMBIA UNIVERSITY** IN THE CITY OF NEW YORK

**UNIVERSITY OF TEXAS**

**WEILL CORNELL MEDICAL COLLEGE**

**UNIVERSITY OF ILLINOIS**

**UNIVERSITY OF FLORIDA**

**UNIVERSITY OF NEW MEXICO** Albuquerque, NM

**THE UNIVERSITY OF TEXAS** at El Paso

**UNIVERSITY OF KANSAS** Medical Center Kansas City, KS

**MEHARRY MEDICAL COLLEGE** Nashville, TN

**GEORGIA STATE UNIVERSITY** Atlanta, GA

**UNIVERSITY OF SOUTH CAROLINA** Columbia, SC

**UNIVERSITY OF ILLINOIS** at Chicago Ann Arbor, MI

**UNIVERSITY OF MICHIGAN** Ann Arbor, MI

**COLUMBIA UNIVERSITY** New York, NY

**WEILL CORNELL MEDICAL COLLEGE** New York, NY

**Columbia University**  
Environmental Health Disparities in the  
Northern Manhattan Center of Excellence in  
Minority Health and Health Disparities



**José Luchsinger**

**RESEARCH QUESTIONS INCLUDE**

- What are the respective contributions of Health Disparity Environmental Factors (HDEF) in health outcomes such as cardiovascular conditions and mental health?
- How do HDEFs at the national, state, city, neighborhood and individual levels modify responses to community-based interventions?

<b>Environmental Focus</b>	Multilevel social and environmental risk and protective factors
<b>Local Community</b>	New York City

**Abstract**

This Center is establishing a Contextual Health Disparities Core in the Northern Manhattan Center of Excellence in Minority Health and Health Disparities at Columbia University, in partnership with the Center for Study of Social Inequalities and Health. Research focuses on the multilevel determinants of cardiovascular conditions (diabetes, hypertension) and mental health (cognition, depression) in urban minorities. Social and environmental factors interact with individual-level factors to determine health outcomes, and we are collecting measures of Health Disparity Environmental Factors (HDEF) in 4 ongoing studies, including a prospective cohort study and 3 RCTs. We expect to obtain information about how HDEF modify the association between cardiovascular and mental health outcomes, to design and implement community-based interventions.

**Dr. José Luchsinger** is Associate Professor of Medicine and Epidemiology at New York Presbyterian Hospital/Columbia University Medical Center.

**Weill Cornell Medical College**  
Environmental Health Disparities Core



**Carla Boutin-Foster**

**RESEARCH QUESTIONS INCLUDE**

- How can we increase community awareness of priority environmental health issues?
- How can we strengthen community capacity to address environmental health disparities?
- How can we increase community trust and participation in environmental health research?

<b>Environmental Focus</b>	Community-led culturally tailored environmental health outreach
<b>Local Community</b>	New York City

**Abstract**

The Center of Excellence in Disparities Research and Community Engagement (CEDREC) Environmental Health Disparities Research Core is a community-academic collaboration to advance and accelerate the development of trans-disciplinary environmental health disparities research and strengthen community capacity to address environmental health issues through education, research and policy. The Environmental Health Core brings together a multidisciplinary team of community and academic experts, and is guided by both a city-wide Community Steering Committee and a multi-disciplinary, inter-university Scientific Steering Committee. The Core will: develop a set of community-led culturally tailored EH outreach initiatives; increase community awareness of priority environmental health issues; strengthen community capacity to address EH disparities; and increase community trust and participation in CEDREC EHDR Core research.

**Dr. Carla Boutin-Foster** is Associate Professor of Medicine at Weill Cornell. Her research activities focus on identifying the psychological and social determinants of health outcomes in cardiovascular disease and the social epidemiology of health disparities in cardiovascular disease.



**University of Texas**  
Environmental Health Disparities Research



**Elias Provencio-Vasquez**

**RESEARCH QUESTIONS INCLUDE**

- What are the individual- and neighborhood-level contributions to disparities in children’s lung health?
- How do patient characteristics modify the relationship between air pollution and respiratory and cardiovascular hospitalizations?

<b>Environmental Focus</b>	Air pollution, respiratory and cardiovascular health outcomes
<b>Local Community</b>	El Paso, Texas

**Abstract**

This Core is envisioned to: advance knowledge of interrelationships between environmental and social determinants of health disparities, particularly within heterogeneous Hispanic populations, through a commitment to transdisciplinary research; and utilize this knowledge to influence policy change, public health practice and community-based interventions to reduce disparities.

There are three Specific Aims: (1) Conduct research to evaluate complex interactions between social, built and natural environmental systems, while clarifying which aspects of Mexican-origin/Hispanic status are most important, as determinants of environmental health disparities; (2) Build research and training capacities to examine and address environmental health disparities; (3) Facilitate the translation of environmental health disparities research into policy, public health practice, and community-based engagement.

**Dr. Elias Provencio-Vasquez** is dean of the School of Nursing at The University of Texas at El Paso. He is a pioneer in creating innovative nursing approaches for mothers with substance use disorders and their children.



**Meharry Medical College**  
Environmental Context of Health Disparities



**Paul Juarez**

**RESEARCH QUESTIONS INCLUDE**

- How can we grow our understanding of relationships between the environment and health disparities?
- How can we understand the geographic, environmental and temporal dimensions of health disparities at a county and sub-county level?

<b>Environmental Focus</b>	Built, social and policy environments
<b>Local Community</b>	Alabama, Arkansas, Georgia, Indiana, Kentucky, Louisiana, Mississippi, North Carolina, South Carolina, Tennessee, and Virginia

**Abstract**

The overall goal of this project is to expand the capacity of health services researchers and other biomedical scientists to use a trans-disciplinary systems approach to study the environmental context of health disparities. To achieve this goal, we are expanding our current research center to: (1) incorporate data on the physical, built, social and policy environments that will supplement currently funded health disparities research; (2) use High Throughput Analyses (HTA) and geo/spatial and temporal analyses to examine the relationships between health disparities and environmental factors; and (3) provide training in public participatory geographic information systems (PPGIS) and interactive mapping that supports community participation in the research process and in the translation, implementation and evaluation of targeted public health interventions.

**Dr. Paul Juarez** is Professor of Preventive Medicine at the University of Tennessee Health Science Center and was previously Professor and Vice Chair, Department of Family and Community Medicine, Meharry Medical College.

## Georgia State University Environmental Health Disparities Core



**Michael Eriksen**

### RESEARCH QUESTIONS INCLUDE

- What is the syndemic burden on populations experiencing health disparities in urban Atlanta? (Syndemic refers to the aggregation and interaction of two or more diseases in a population which tend to develop under conditions of health disparity.)
- How can we strengthen and expand research and mitigation activities focused on the community's environmental health priorities?

<b>Environmental Focus</b>	Air and water pollutants in urban, natural, physical and built environments
<b>Local Community</b>	Atlanta, Georgia

### Abstract

The focus of this Center is understanding the syndemic burden on populations experiencing health disparities in urban Atlanta and integrating environmental health disparities and environmental injustices into our understanding of the syndemic burden. Objectives include: (1) Develop a coalition of organizations, agencies and institutions focused on environmental health, environmental justice and disparities in the Atlanta area. (2) Work to build capacity to evaluate and mitigate environmental health risks specific to urban natural, physical, and built environments. (3) Develop a comprehensive analysis of syndemic effects and burdens within current Center projects. (4) Strengthen and expand research and mitigation activities focused on the environmental health priorities of our community partners.

**Dr. Michael Eriksen** is Dean of the Institute of Public Health and Director of the Partnership for Urban Health Research at Georgia State University.

## University of South Carolina Analysis and Action on the Environmental Determinants of Health and Health Disparities



**Sandra Glover**

### RESEARCH QUESTIONS INCLUDE

- What is the extent of environmental health disparities in South Carolina?
- What is the community perception of cancer risk and disparities in South Carolina?
- How can the block assessment methodology be used to identify ecological stressors and opportunities for interventions to address disparities?

<b>Environmental Focus</b>	Environmental health disparities and environmental stressors in South Carolina
<b>Local Community</b>	Rural and urban communities in South Carolina

### Abstract

The environmental health core (EHC) expands the scope of the Coordinating Center of Excellence in the Social Promotion of Health Equity through Research, Education and Community Engagement (CCE-SPHERE) and builds on expertise in engagement of health disparity populations and development of community-university research partnerships. The EHC is focusing on environmental justice (EJ) and environmental health disparity issues. Goals include: (1) Build a program to assess environmental health disparities in South Carolina; (2) Assess community perception of environmental determinants of cancer risk and disparities in rural and urban communities in South Carolina; and (3) Engage and train members of community-based organizations that represent EJ communities and environmental health disparity populations in the use of block assessment methodology to help identify ecological stressors and intervene to address disparities in burden, exposure, and health.

**Dr. Sandra Glover** is Professor, Associate Dean for Health Disparities and Social Justice and Associate Director, SC Rural Health Research Center and Director, Institute for Partnerships to Eliminate Health Disparities at the University of South Carolina.

**University of New Mexico**  
New Mexico Center for Advancement of  
Research, Engagement, & Science on Health  
Disparities



**Robert Williams**

**RESEARCH QUESTIONS INCLUDE**

- How can we reduce health disparities among Hispanics and Native Americans?
- What interventions and solutions can we discover to socioeconomic, natural, chemical and built environment issues contributing to health disparities among Native American and Hispanic Communities in New Mexico?

<b>Environmental Focus</b>	Socioeconomic issues, the natural, chemical and built environment
<b>Local Community</b>	Native American and Hispanic Communities in New Mexico

**Abstract**

The scope of NM CARES HD (New Mexico Center for Advancement of Research, Engagement, & Science on Health Disparities) Center has been expanded to inform research, health care and policy decisions that reduce EH disparities in New Mexico (NM) and advance EH equity knowledge and interventions that are not only scientifically-based, but also culturally-centered and community-partnered. Research is focused on reducing health disparities among two of the most underserved populations in the United States: Hispanics and Native Americans. The Core is advancing the scientific base of knowledge about interventions and solutions to socioeconomic, natural, chemical, and built environment issues contributing to the health disparities faced by Native Americans and Hispanic communities in NM and is working to ensure these results are used to inform policy, clinical, social and behavioral interventions to reduce disparities.

**Dr. Robert Williams** is the Principal Investigator/Director of the New Mexico Center for the Advancement of Research, Engagement & Science on Health Disparities.

**University of Illinois at Chicago**  
Improving Environmental Health Disparities:  
A Fundamental Cause Approach



**Elizabeth Calhoun**

**RESEARCH QUESTIONS INCLUDE**

- What are the potential mechanisms to explain racial differences in exposure to environmental hazards, access to care and in health outcomes?
- What are the effects of racial residential segregation on exposure to environmental hazards and other health-related factors?
- What are the trends in distribution of environmental and health disparities over time?

<b>Environmental Focus</b>	Environmental hazards, physical and social environment
<b>Local Community</b>	Cook County, Illinois

**Abstract**

This Center Core is exploring mechanisms explaining racial differences in exposure to environmental hazards, in access to care, and in health outcomes. Researchers are compiling neighborhood-level data on environmental hazards and access to care in Cook County and plan to link them to other social determinants data using 3 approaches examining: (1) Effects of racial residential segregation on physical and social environment (presence of environmental hazards and access to health care facilities); (2) Incidence and late-stage diagnosis of breast, cervical, and lung cancer in relation to environmental risk factors; (3) Changes in environmental conditions on health outcomes and the effects of changes in racial composition and socioeconomic status between 2000 and 2010 (relocation of racial/ethnic minorities who moved from inner-city Chicago to suburban Cook County).

**Dr. Elizabeth Calhoun** is Professor of Health Policy and Administration in the School of Public Health at the University of Illinois at Chicago.

**University of Kansas Medical Center**

Central Plains Center for American Indian Community Health (CAICH)



**Christine Daley**

**RESEARCH QUESTIONS INCLUDE**

- What is the state of housing conditions in the Native American community?
- How can community members be linked to programs that will help them solve the problems?
- What is the extent of American Indian exposure to environmental tobacco smoke and how can we address this health concern?

<b>Environmental Focus</b>	Housing problems, environmental tobacco smoke
<b>Local Community</b>	Native Americans in the Central Plains

**Abstract**

American Indians (AI) suffer some of the greatest health disparities in the U.S. Many conditions, including asthma, obesity and diabetes, are prevalent among this population and are influenced by the environment. In addition, AI have high rates of severe physical housing problems and the highest rates of smoking of any ethnic group in the U.S. This Center is using community-based participatory research (CBPR) methods to understand how to address health disparities faced by this population. The Environmental Health Subcore is addressing the critical issue of poor housing conditions in the AI community, identifying the problems and linking community members to programs to help alleviate the problems. We are also providing significant environmental health education. We are looking to understand AI exposure to environmental tobacco smoke and how we can address this important health concern.

**Dr. Christine Daley** is Associate Professor in the Department of Family Medicine at the University of Kansas Medical Center in Kansas City and Director of the center for American Indian Community Health at KUMC.

**University of Michigan**

Center for Integrative Approaches to Health Disparities, Environment Assessment Core



**Ana Diez-Roux**

**RESEARCH QUESTIONS INCLUDE**

- How do neighborhood race/ethnicity and socioeconomic composition affect cardiovascular disease-related outcomes?
- To what extent can we improve measures of specific neighborhood features such as access to healthy foods, recreational facilities and built environment data and draw causal links to cardiovascular disease?

<b>Environmental Focus</b>	Food access, built environment
<b>Local Community</b>	Ann Arbor, Michigan

**Abstract**

The goal of the Center for Integrative Approaches to Health Disparities (CIAHD) at the University of Michigan is to investigate the multilevel determinants of health disparities in cardiovascular risk by integrating social and biologic factors. We have added an environmental assessment core in order to enhance the environmental measures available in the Jackson Heart Study (JHS) and the Multi-Ethnic Study of Atherosclerosis (MESA). The specific aims are: (1) To enhance the neighborhood-level data available in MESA by adding novel data on food price and various built environment measures that can be better used to study the impact of neighborhoods on changes cardiovascular risk; (2) To create comparable time-varying measures of access to healthy foods, recreational facilities and other price and built environment data for JHS; (3) To promote analyses of neighborhood effects on cardiovascular risk that take advantage of the new environmental data in MESA and JHS.

**Dr. Ana Diez-Roux** is Professor and Chair of the Department of Epidemiology at the University of Michigan School of Public Health and Director of the Center for Integrative Approaches to Health Disparities.

## Community-Focused Exposure and Risk Screening Tool (C-FERST) SUPPORTING SUSTAINABLE AND HEALTHY COMMUNITIES

### Issue:

Community groups want to understand their exposures and potential risks from environmental pollutants. They also want to know how to effectively reduce exposures to pollutants with the highest risks. If relevant science-based tools are not readily available, decisions may be based solely on the perception of exposures and risk. In addition, communities are faced with cumulative exposures and potential risks from chemical and non-chemical stressors, which are scientifically challenging to evaluate and assess.

Community involvement is crucial in defining and prioritizing environmental health issues for specific areas or groups of people. Community groups and members can supply local values and information, and they can interpret and use results in the context of local decision-making. Because of this, communities are playing an increasingly central role in defining environmental problems and identifying the information needed to address these problems. Involvement of communities is equally important where evidence indicates disproportionate exposures or risks are caused by localized contaminants or other environmental conditions.

To support communities with this process, user-friendly tools are needed that provide environmental exposure and health-related information. To ensure these tools are scientifically sound, research is necessary to advance the science to take into account the many factors that may impact human exposure and health risks within a community — including chemical and non-chemical factors.

### Science Objective:

EPA is developing the Community-Focused Exposure and Risk Screening Tool (C-FERST)—a web-based community mapping, information access, and assessment tool to inform environmental public health decisions. It is designed to help communities find out more about issues they've already identified, identify new issues, and prioritize these issues to promote health and well-being in their communities. C-FERST supports EPA's priorities for cleaning up communities and working for environmental justice to protect vulnerable groups of people.

C-FERST provides a framework for collaborative research and information sharing to understand community-based exposures and risks. It is anticipated that the tool and science that populates it will empower environmental managers and community residents to make better-informed decisions about environmental issues specific to their location.

### Application and Impact:

C-FERST links to and builds upon other community-focused tools to help identify human exposures and potential risks within a community, and help prioritize issues for further assessment and for taking action to improve public health. EPA scientists are partnering with Agency community programs, American Indian tribal groups, and other community programs and agencies to design and

refine C-FERST through collaborative pilot projects and beta testing. During C-FERST's development, EPA scientists have listened to community residents and local officials to test and refine the tool.

C-FERST is included in EPA activities for the White House Open Government initiative, under Science-Based decision support tools. The National Prevention Council (composed of the heads of 17 federal agencies and chaired by the Surgeon General) Action Plan highlighted C-FERST as an EPA Exemplar Story under the Empowered People Strategic Direction Plan. In 2014, C-FERST underwent scientific peer review and full public release is planned by early 2015.

C-FERST users should have some expertise in public health and risk assessment, and could include federal, state, or local agencies working with community partners. C-FERST contains various modules (roadmaps, guidance, maps, reports, fact sheets, best practices, potential solutions) and links to other tools for public health decision-making. C-FERST users can view maps and community reports for environmental issues such as air toxics, diesel exhaust, lead, water pollution, and beach advisories. The C-FERST tool will be continually refined and populated with improved and updated information and assessment tools, allowing users to:

**Follow walk-through guidance for conducting community assessments, including:**

- EPA's CARE Roadmap
- NACCHO's Protocol for Assessing Excellence in Environmental Health
- A new Health Impact Assessment roadmap

**Consider/identify environmental issues by:**

- Viewing guidance, and learning about issues other communities have considered
- Accessing information about environment, health, and socioeconomic issues
- Accessing methods for local monitoring

**Visualize exposure/risk via mapping tools that allow users to:**

- Map environmental concentrations, human exposures, and health risks
- Overlay pollutant sources
- Overlay demographic data for identifying vulnerable populations
- Overlay (but not necessarily share) local data onto EPA data sets
- View potential impact of solutions

**Generate environmental issue profiles with the help of:**

- Fact sheets, web-links, local exposure estimates, maps, and community solutions available in a consistent report format for each selected issue

**Prioritize your community's issues by:**

- Viewing community data table
- Accessing examples of risk ranking approaches

**Explore potential solutions including:**

- Links to fact sheets on exposure/risk reduction actions and best practices
- Information on promising practices for sustainable community solutions

**Link to other community-relevant tools including:**

- A searchable compendium of community-relevant tools.

**References:**

V.G. Zartarian, B.D. Schultz, T.M. Barzyk, M. Smuts, D.M. Hammond, M. Medina-Vera, A.M. Geller (2011). "The EPA's Community-Focused Exposure and Risk Screening Tool (C-FERST) and Its Potential Use for Environmental Justice Efforts." *American Journal of Public Health*. 101 (S1): S286-S294.

V.G. Zartarian, B.D. Schultz (2011). The EPA's human exposure research program for assessing cumulative risk in communities. *Journal of Exposure Science and Environmental Epidemiology*. 20, 351-358.

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July 2014



## A Decade of Tribal Environmental Health Research: Results and Impacts From EPA's Extramural Grants and Fellowship Programs 2013 Tribal Synthesis Report Summary

*Message from the National Center for Environmental Research  
Director:*

*The Environmental Protection Agency (EPA) released a report this month titled **A Decade of Tribal Environmental Health Research: Results and Impacts from EPA's Extramural Grants and Fellowship Programs**, which highlights the accomplishments and impacts of more than a decade of supporting Tribal Environmental Health Research.*

*The report, available for download at [www.epa.gov/ncer/tribalresearch](http://www.epa.gov/ncer/tribalresearch), summarizes not only the results of this EPA-funded research for tribes across our nation, but also the future direction for the Agency's program to ensure that it continues forward in supporting the advancement of health protection while maintaining the tribal way of life.*

*American Indian and Alaska Native (AI/AN) communities have been tied inextricably to their environments for millennia. Because of their reliance on natural resources to maintain traditional diets, life ways, customs and languages, there is a unique need for tribal-focused research to identify the impacts of pollution, dietary exposures, cumulative risks and climate change, as well as to inform decisions to reduce health risks in these areas. EPA strives to support this research need and ensure the well being of tribal communities.*

*James H. Johnson, Jr., PhD*

*Director*

*National Center for Environmental Research*

*Office of Research and Development*

*U.S. Environmental Protection Agency*

### 2013 Tribal Synthesis

EPA established the Tribal Environmental Health Research Program in 2000 through the Science To Achieve Results (STAR) grants and fellowships programs. This report captures the methods and findings for all tribal research that this program supports. Since its inception, the program has funded 10 STAR grants for tribal environmental health research, many of which are conducted on tribal lands by researchers from tribal colleges and universities. This EPA-supported research has helped tribes understand and

manage toxic chemicals and other risks. The STAR graduate fellowship program (STAR Fellowship) supports master's and doctoral candidates in environmental studies. The report also captures tribal-related research conducted under other EPA-funded programs. The Greater Research Opportunities fellowship program supports both undergraduate studies and internships. The unique People, Prosperity and the Planet (P3) Student-Design Competition for Sustainability provides an opportunity to take classroom learning into the real world. The Small Business Innovation Research program provides incentive funding for small businesses advancing sustainable solutions.

EPA's STAR tribal research can be categorized by five themes:

- Cultural practices, language and traditional ecological knowledge.
- Subsistence foods and water resources.
- Community-based participatory research (CBPR) and community outreach and education.
- Risk assessment and incorporating sensitive populations.
- Impacts on regulations and management plans.

### Outcomes and Practical Applications

After more than a decade of funding research that addresses the unique needs of AI/AN communities, the program has yielded key data, tools, products, methods and knowledge. These help to better define and reduce the health risks faced by tribal populations, protect natural resources essential to cultural and spiritual practices, and support ecological knowledge and tribal practices for protecting and preserving the earth for future generations. Select outcomes and practical applications are described by theme below.

Each AI/AN community has its own unique set of **cultural practices, language and traditional ecological knowledge**.

Several STAR grants strive to support tribal citizens' cultural practices while reducing health risks. These projects also help to strengthen native language skills and increase culturally relevant communication of traditional ecological knowledge. For example, a library of resources in the Mohawk language was created for the Haudenosaunee Confederacy to enhance education about toxic substances and foster the practical empowerment of the community to protect the health of its citizens while practicing traditional subsistence lifeways.



AI/AN communities often follow traditional diets that include an abundance of freshwater fish and seafood. Water, considered sacred, plays an important role in tribal cultural and spiritual practices. Several STAR grants focused on reducing the health effects associated with the consumption of contaminated traditional **subsistence foods and water resources**. These research projects have resulted in fish advisory maps for inland lakes in the Midwest that allow tribal citizens to pursue their traditional subsistence fishing practices while reducing their risk of mercury exposure.



The Makah Nation used STAR data to support its claim that its citizens had significantly higher contaminant exposures from locally caught fish than had been determined previously via contaminant-exposure models. This is one example of how tribal research has led to the practical use of data on contaminant levels to help community members protect their health while following their traditional diets.

Indigenous populations sometimes have experienced trauma as a result of historical unethical research imposed on them. Using CBPR in tribal research ensures that AI/AN populations have a voice. **CBPR and community outreach and education** continue as longstanding, important components of STAR grants and fellowships funded under the Tribal Environmental Health Research Program. Most of the grants use community outreach and tribal consultations to obtain input that guides the research projects. Tribal citizens learn about the results of the grants through community presentations, training



and workshops, books, DVDs, maps, radio interviews and other means. Based on STAR results, researchers produced a traditional food book, coloring book and documentary that promote safe Swinomish fish and shellfish consumption.

Tribal citizens experience unique risks because of their traditional lifestyles and use of natural resources. As a result, risk assessments and exposure scenarios must be tailored to the distinct practices and exposures of each AI/AN community. There have been several notable outcomes of the STAR research efforts that have focused on **risk assessment and incorporating sensitive populations**. For example, a *Traditional Tribal Subsistence Exposure Scenario and Risk Assessment Guidance Manual* was published to help tribal communities identify their specific exposure risks. Using this manual helps tribes to avoid or reduce exposures and better protect their health.



Results from STAR grants and fellowships have influenced state and tribal **regulations and management plans**. For example, the states of Washington and Oregon have used STAR data to reexamine and revise their state water quality standards. These revisions offer greater protection of tribal populations whose cultural practices and traditional lifeways could result in higher exposures to water contaminants. The Cherokee Nation used results from research by a STAR fellow to design its Tribal Integrated Resource Management Plan for natural resource planning and management on Cherokee lands.



## Future Directions

Future STAR tribal research will explore new strategies, methods and tools to assess environmental health exposures among tribal populations. The program also will identify other research opportunities for advancing health protection while maintaining traditional tribal lifeways. The program released its latest Request for Applications (RFA), "Science for Sustainable and Healthy Tribes," in February 2013 using tribal input about current tribal environmental challenges to help determine the RFA's focus. STAR Graduate Fellowship solicitations now include a topic focused specifically on native populations. The goal of this category is to protect the environment and these communities, with a specific focus on

related environmental health, sustainability and pollution prevention/remediation strategies and issues.

As it has done for more than a decade, EPA's Tribal Environmental Health Research Program will continue to engage and collaborate with AI/AN communities and partners to support them in maintaining their long-standing, intricate relationships with the natural environment, even in the face of the myriad stressors threatening their health, wellness and lifeways.

## EPA Growing DASEES (Decision Analysis for a Sustainable Environment, Economy, & Society) – to Aid in Making Decisions on Complex Environmental Issues

### Research Value:

A family’s decision to buy a car involves the needs of a number of people (mom, dad, kids), and multiple concerns (cost, safety, maybe even climate change). In making decisions that involve ecosystems, both the number of people involved and the number of concerns/ factors increases greatly over personal decisions. Environmental issues often affect multiple groups of people (often referred to as *stakeholders*) in a community or society. Environmental issues also involve many physical, chemical, and biological factors. Local issues such as a eutrophic lake, to global ones such as climate change, all involve many people interacting with complex ecosystems. All these factors raise these decisions to a higher level of difficulty than decisions in our daily lives, such as family making a decision about buying a car. Just as a calculator is useful for complex calculations, can tools be developed to handle all the factors in these complex decisions?

Having a framework and tools to help sort through complicated environmental issues in an objective way would be useful to communities and risk managers, and all the stakeholders affected by these issues. This is one need that **DASEES** (Decision

Analysis for a Sustainable Environment, Economy, & Society) can help fill.

The environment provides us with many ecosystem *services*, which sustain us and provide us with quality of life. These include the air we breathe, the water we drink, plants and animals that sustain us and add to our quality of life, and provide the raw materials on which all of our economy is based. The vast majority of environmental decisions are made without consideration of the roles that ecosystem services play and how long they can be sustained into the future. DASEES can also help those tasked with making decisions about complex environmental problems, to incorporate ecosystem services into their decision making processes and more fully account for the tradeoffs, both positive and negative, in these services and how they affect economic and social decisions.

The DASEES project can be looked at as “formalized common sense for big issues”. It creates a formal framework so the same common sense decision-making principles that we use in our daily lives, can be applied to more complex environmental issues.



### Research Details:

DASEES is an open-source, web-based decision analysis framework, being developed by an integrated trans-disciplinary research team of EPA, university, and private company researchers. It focuses on sustainable systems and communities. It is flexible but rigorous, transparent and auditable, and adapts to new information.

The last part of the DASEES acronym, ‘EES’ acknowledges that this approach takes into account the *environmental*, *economic*, and *societal* aspects of what have traditionally been

defined as just environmental issues. This formalized common sense, is referred to in technical circles as “multi-attribute decision analysis”. These attributes include the many stakeholders that decisions on environment issues usually involve, and the many physical, chemical, and biological aspects of ecosystems. A major strength of this approach is that it is inclusive and incorporates input from many stakeholders. This framework consists of 5 steps:

Let’s take a look at just the first step in this process. First, we must define and understand the ‘context’ or the boundaries of the issue. This will include both the physical boundaries, as well as defining the groups and individuals involved. Let’s say that the issue is algal blooms that are robbing a lake ecosystem of oxygen. Do you draw your physical boundary at the lake’s edge, at the outskirts of the community next to the lake, at the boundary of the watershed that the lake is in? You would also need to define boundaries in terms of which groups and persons to include, and to characterize relationships among decision makers, management options (responses), stakeholders, and scientific information

DASEES uses tools like Social Network Analysis, and a DPSIR analysis to define the physical and social context or boundaries of the issue. DPSIR is named after its components: Drivers, Pressures, States, Impacts, and Responses. It is a key tool that can be used to help

decision-makers understand the systems context of issues. Using consistent tools and processes, DASEES can take an objective look at complex environmental issues. This process can then generate several options for potential solutions, involving such things as policies, land-use strategies, and behaviors. It can evaluate the options in terms of costs and benefits.

Finally it can make projections of alternative futures for the various options.

### Outcomes and Impacts:

The DASEES framework is currently being used as part of cooperative efforts to address real-world ecological problems such as nutrient loads in Albemarle-Pamlico Watershed and Florida Keys, and sediment runoff into Guánica Bay, Puerto Rico.

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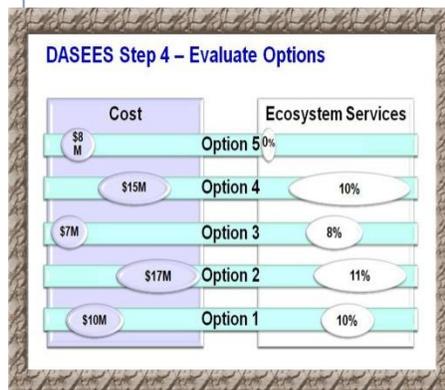
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### RELATED WEB SITES:

[www.epa.gov/nrmrl/lrpccd](http://www.epa.gov/nrmrl/lrpccd)  
<http://www.epa.gov/ord/esrp>

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## DEVELOPMENT OF AN ECOSYSTEM SERVICE PRODUCTION FUNCTION LIBRARY

### Science Issue

Economists have long applied the term *production function* to mathematical expressions that show how economic inputs (such as land or raw materials) combine to produce outputs. Production functions are essential for managing economic processes that combine these inputs that are vital to the economy.

Recently we've become increasingly aware that our health and economy depend on goods and services that are produced, in whole or in part, by ecosystems. For example, ecosystems help to regulate the cleanliness and the flows of air and water and the production of foods and other essential materials. However, our understanding of the underlying *ecosystem service production functions* (ESPFs) that explicitly describe these relationships is limited, making it hard to maximize or even maintain these contributions to societal health and well-being.

To deal with this gap in information, EPA is building a library of ESPFs to assist the development of decision tools that can help communities and environmental decision-makers preserve and improve the health and well-being of society.

### Benefits of the ESPF Library

EPA's body of research on ecological services has addressed many different kinds of ecosystems, processes and



geographic locations, and has done so using a wide variety of methods for observation and analysis. This project is focused on organizing this information in a way that emphasizes and clarifies the potentially useful ESPFs that it contains.

The Ecosystem service production function Library (or ESPF-L) will describe a wide array of existing ESPFs, developed in EPA research or in studies conducted by the broader community. The ESPF-L will use a structure that highlights the inputs and the outputs of an ecological process. This structure will help show how human actions that use or manage the environment can affect the inputs of each process, and how society derives benefits from the outputs. By bringing

information from many studies into this library, the overall picture that emerges will help us understand the often complex links between specific actions and the benefits we derive as a society.

### The focus is on production of value, not value alone.

Several efforts have been made to compile information about the value of the goods and services provided by ecosystems. Other compilations of information on the value of ecosystem goods and services usually focus on value (economic value) without examining the underlying ecological processes (i.e., the ESPFs) that govern *how* a good or service is provided. These ESPFs may be critical for understanding how different ecosystems vary in their ability to

provide goods and services, or how production will respond to stress or to restoration efforts.

The ESPF-L will emphasize ecosystem service production functions rather than decision tools.

Decision tools use computer software to implement one or more ESPFs, often in a user-friendly format. The ESPF-L will instead focus primarily on the ESPFs that underpin each tool, and it will describe many ESPFs that have not been developed into tools. In this way, it will be particularly useful to tool builders, who may seek a particular function that can help address a problem for which existing tools are not suited.

The ESPF-L will locate each function along a spectrum that extends from human action, to resulting ecological change, and finally, to changes in human benefits.

As an innovation for handling the great variety in ecosystems, the Library's developing an ecoservice spectrum with eight defined "levels of service;" the major inputs and outputs of each ESPF are mapped on this spectrum so the user can quickly understand what each ESPF offers.

The ESPF-L will be coordinated with a new classification system for ecosystem services.

While the ESPF-L is being developed, EPA will also be completing a new, Final Ecosystem Goods and Services Classification System (FECS-CS), similar to existing classification systems for industrial production processes and functions. The FECS-CS will help statisticians, economists, and ecologists analyze the environment's role in promoting society's health and

well-being. When complete, the Library will use this new system to catalogue ESPFs, further simplifying future analyses.

The ESPF-L will examine the potential for transferability of each ecosystem service production function.

Functions that are shown to apply at a given location and geographic scale may not transfer well to other locations and scales. The ESPF-L will employ a transferability framework to guide users on the transferability of each ESPF.

Ongoing work is focused on developing the database structure for the ESPF-L and collecting ESPFs from the scientific literature, with a focus on information that is most needed by communities and other environmental decision-makers. ESPF-L development is expected to be complete by December 2014, with full online availability by March 2015.

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## EnviroAtlas: An interactive web-based tool with a wealth of data to help inform planning & policy decisions that protect our environment & economy

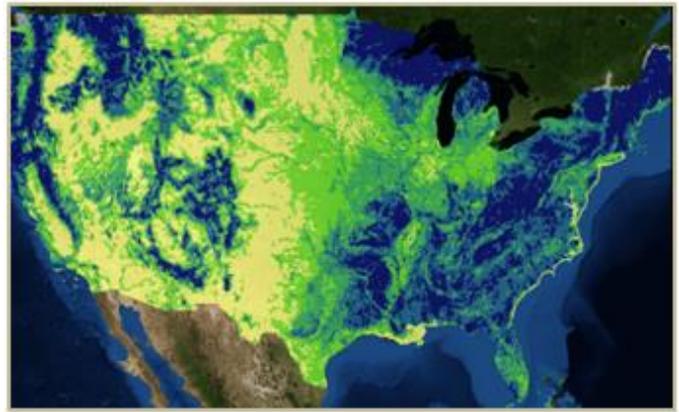
### What is EnviroAtlas?

EPA and partners have developed [EnviroAtlas](#) — an interactive web-based tool that states, communities, and citizens can use to help inform policy and planning decisions that impact the places where people live, learn, work and play.

EnviroAtlas combines maps, analysis tools, fact sheets, and downloadable data into an easy-to-use, web-based resource that allows users to understand the implications of various decisions and their potential impacts on ecosystems.

Communities are often faced with difficult decisions, such as trade-offs between the development of transportation, residential or commercial infrastructures and the maintenance of local water quality, wetlands, parks, and other urban green-spaces. EnviroAtlas helps communities better understand the potential benefits and drawbacks of their decisions by providing tools to analyze relationships between nature; health and well-being; and the economy. Health encompasses both physical and mental health while well-being refers to quality of life.

For instance, state and regional planners and advocacy groups considering routes for a proposed high-speed rail-line might use EnviroAtlas as a screening tool to see the potential effects and merits of each route. Conservation groups could note the presence of threatened and endangered species or intact habitats along proposed routes.



Local planners might use EnviroAtlas demographics to help cite a new rail station to maximize benefit to an economically-depressed sector of the community while also considering any impacts to close-by ecosystems. EnviroAtlas provides fine-scale data for select communities to help planners identify areas with low access to parks or to prioritize tree planting to benefit vulnerable or disadvantaged populations.

### What data & analysis tools are in EnviroAtlas?

The EnviroAtlas interactive map contains hundreds of data layers including census and land cover data; as well as information on stream and river locations, pollutant loads, impaired waters, threatened and endangered species, and wetland, climate and soil characteristics. EnviroAtlas presents data at two primary scales: national and community. Analysis tools embedded in the Interactive Map help users interpret the data.

The national component of EnviroAtlas summarizes data for the 48 mainland U.S. states by [12-digit hydrologic unit codes \(HUCs\)](#) of which there are about 90,000 in the United States. Each HUC covers approximately 40 square miles.

The [community component of EnviroAtlas](#) includes fine-scale data for five pilot communities: Durham, N.C.; Portland, Maine; Tampa, Fla.; Pittsburgh, Pa.; and Phoenix, Ariz. Data layers for a sixth pilot community — Milwaukee, Wis. — are being finalized. Most community data layers are summarized by census block group, providing data at a fine resolution that can be compared across select communities.

Communities included in EnviroAtlas were selected based on environmental and human health data availability, population size, geography, regional interest, and potential need for detailed spatial data analysis. By 2017, EnviroAtlas will feature fine-scale data for more than 50 U.S. communities.

EnviroAtlas also features an [Eco-Health Relationship Browser](#) that allows users to explore literature on the linkages between ecosystems, the services they provide, and their impact on human health and well-being.

## Protecting ecosystems & our economy

Healthy ecosystems are intertwined with our health and well-being, our economy and our security. Ecosystems provide us with many benefits like clean air and water, opportunities for recreation, and protection from severe weather like hurricanes and floods. They also provide habitat for plants, fish and wildlife, and materials we need to produce our food, clothing, shelter, and pharmaceuticals.

These and other benefits from nature are referred to as “ecosystem services.” The services provided by ecosystems are multifaceted, intertwined and often difficult to quantify.

The decisions we make individually and collectively can affect ecosystems and their ability to provide the goods and services that promote well-being and a healthy economy.

Using EnviroAtlas, people from a wide variety of disciplines and interests can access, view and analyze diverse information to better understand how to conserve, restore and sustain ecosystems.

## EnviroAtlas partners & availability

EnviroAtlas was developed collaboratively by EPA in partnership with the [U.S. Geological Survey \(USGS\)](#), [Landscape America](#), the U.S. Department of Agriculture’s [Forest Service](#) and [Natural Resources Conservation Service \(NRCS\)](#), and other federal and non-profit organizations, universities, and communities, including state, county and city-level stakeholders.

[EnviroAtlas](#) is available to anybody with a computer and an internet connection. No special software is needed. It is currently not optimized for smartphones or tablets, but a mobile-friendly version is planned for the future.

[EnviroAtlas](#) —connecting people, human health, ecosystems and the economy. Making informed decisions will ensure people can continue to enjoy the economic, social and environmental benefits of ecosystems for years to come.

**Find EnviroAtlas online at:**

<http://enviroatlas.epa.gov/enviroatlas>

**For questions about EnviroAtlas, email:**

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## FINAL ECOSYSTEM GOODS AND SERVICES CLASSIFICATION SYSTEM

The term *ecosystem services* is often used to describe, both in general and very specifically, benefits provided by nature and valued by people. However, many of the widely used definitions are not sufficiently specific for consistent and precise identification of such services (Nahlik et al., 2012).

The standardization that an accepted definition of ecosystem services would provide and the consistency that a classification system would offer are necessary to the discussion of ecosystem services similarly across disciplines. This, too, would enable ecosystem services to be measured, quantified, and valued in a reliable and repeatable manner, so that meta-analysis could be used to effectively compare various studies.

Ultimately, the consistency of a rigorous ecosystem services classification system is vital to inform policy development at multiple spatial scales and to incorporate ecosystem services into decision-making.

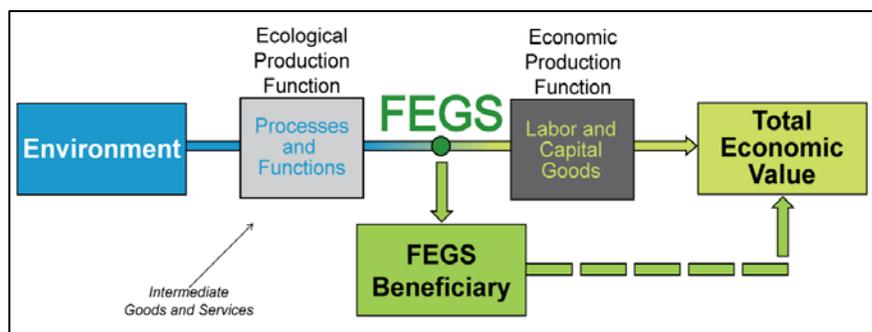
The concept of *final ecosystem goods and services* (FEGS), defined as the “components of nature, directly enjoyed, consumed or used to yield human well-being” (Boyd and Banzhaf, 2007), has been adopted by scientists at the U.S. Environmental Protection Agency as a foundation for defining, classifying, and measuring ecosystem services. The FEGS concept can be used to distinguish the production function that is predominantly ecological in nature from the other that is predominately economic (see figure below).

The ability to define and identify FEGS and the specific biophysical components of goods and services that are derived principally from

nature across the landscape is a considerable advancement in the understanding of ecosystem services.

The *Final Ecosystem Goods and Services Classification System (FEGS-CS)* (Landers and Nahlik, 2013) provides the detailed rationale for such a system and the principles on which the FEGS-CS was based. This new classification system is a critical foundation for measuring, quantifying, mapping, modeling, and valuing ecosystem services, as well as for other ecosystem-service-centric activities that are dependent on a defined and rigorous framework.

The FEGS-CS also serves as a solid foundation for defining specific FEGS relating to two independent components



derived from the definition of final ecosystem goods and services: (1) “environmental class” (i.e., “Where do the FEGS occur on the earth?”) and (2) “beneficiary category” (i.e., “Who is the beneficiary, and what are the FEGS?”). These two components are critical, because to measure, quantify, and map ecosystem services, it is important to accurately and precisely define those services present in such a way that the approach is repeatable in similar locations (i.e., the same types of environments) but can be adapted easily to different locations (i.e., different combinations of environments across the landscape).

In addition, to value ecosystem services (and perform cost-benefit and cost-effectiveness analyses), inform policy and management decisions that are relevant to human well-being, and effectively communicate, it is imperative to identify ecosystem services that are connected directly to what people value. Therefore, determining the connection of ecosystem goods and services to value is equally important as identifying their substantiation with nature.

The FEGS-CS is represented as a collection of tables called the “FEGS Matrices.” The matrices identify and categorize 352 specific FEGS provided by 15 environmental subclasses and utilized by 38 beneficiary subcategories. Each FEGS is represented by a six-digit code that signifies the environmental subclass and beneficiary subcategory with which the FEGS is associated.

The FEGS Matrices, which soon will be available on a Web site, were designed collectively to be a resource and tool for practitioners to use in consistently defining, identifying, quantifying, and valuing FEGS. In addition to serving as a forum for advancing the FEGS-CS, the Web site will enable users to query the FEGS Matrices and produce customized lists of FEGS specific to their interests.

## TO DOWNLOAD THE FULL EPA FEGS-CS REPORT

Go to the US EPA Science Inventory by typing “[cfpub.epa.gov/si/](http://cfpub.epa.gov/si/)” into your browser and search for “FEGS-CS”. Or, go directly to [http://cfpub.epa.gov/si/si\\_public\\_report\\_report.cfm?dirEntryId=257922](http://cfpub.epa.gov/si/si_public_report_report.cfm?dirEntryId=257922)

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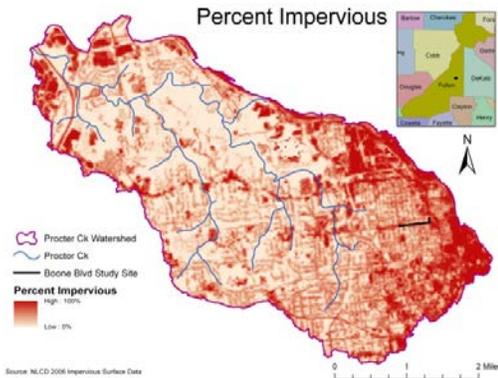
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# Proctor Creek's Boone Boulevard Green Street Health Impact Assessment (HIA)

U. S. Environmental Protection Agency, Region 4 and Office of Research and Development

## Proctor Creek Watershed



The Proctor Creek Watershed (HUC 12: 031300020101) is located in the municipal jurisdiction of Atlanta, Georgia (Fulton County) and drains over 10,100 acres of primarily urban residential and commercial lands to the Chattahoochee River. Proctor Creek is one of the most impaired creeks in metro-Atlanta and has been placed on the impaired waters list, because it does not meet state water quality standards for fecal coliform. The topography, prevalence of impervious surfaces in the watershed, and a strained combined sewer system have contributed to pervasive flooding in the Proctor Creek community and created environmental, public health, economic, and redevelopment issues.

The flooding hazard is high for much of Proctor Creek, and the Proctor Creek Watershed overall is approximately 33% impervious. However, there is considerable development in the headwaters, making the headwaters area surrounding the Boone Boulevard Green Street Project 1.5 - 2.5 times more impervious.

## Community Profile

This HIA will examine impacts to the community within ½ mile of the Boone Boulevard Green Street Project (an approx. 1.25 sq-mile area). The community in this area is a low-income, minority population:

	Total Population	% African American	Per Capita Income (last 6 months)	Median Household Income (per year)	Poverty Level
HIA Study Area	13,914	82.3%	\$16,756	\$28,857	< 18 yrs – 62% > 65 yrs – 21%

Source: U.S. Census Bureau, Census 2010 Summary File 1

### Proctor Creek Community Needs

- flood reduction and stormwater management to provide capacity relief for the combined sewer system;
- cleaner surface and ground water;
- improved streets and sidewalks; and
- economic revitalization

## Green Infrastructure Basics

### What is Green Infrastructure?

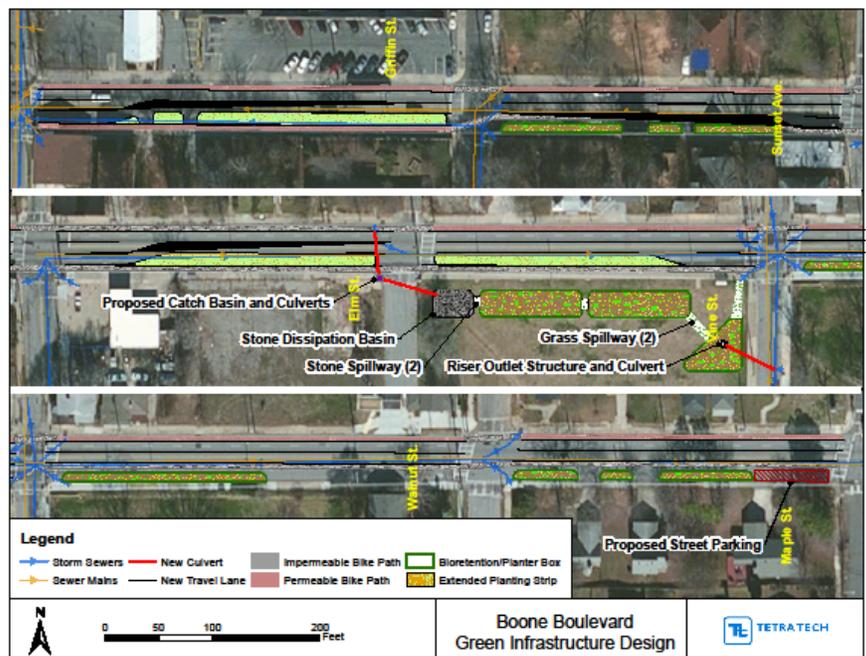
Unlike gray stormwater infrastructure, which uses pipes to dispose of rainwater, green infrastructure uses natural hydrologic features to manage water. By weaving natural processes into the built environment, green infrastructure provides not only stormwater management, but also flood mitigation, air quality management, and much more.

### What is a Green Street?

A Green Street integrates green infrastructure elements into the street design to manage stormwater and reduce stormwater runoff. Permeable pavement, bioretention areas, underdrains, planter boxes, and planting strips, are among the many green infrastructure features that may be woven into a green street design.

## Boone Boulevard Green Street Project

The City of Atlanta's Department of Watershed Management selected a green infrastructure project to implement in the Proctor Creek Watershed to address some of the community's needs. The overall vision for the Boone Boulevard Green Street Project involves implementing green infrastructure practices along Joseph E. Boone Boulevard between Northside Drive NW (to the east) and James P. Brawley NW (to the west) in collaboration with planned road diet improvements. The design and layout of the proposed green street was governed mostly by traffic and community needs, followed by water quality sizing criteria.



# Proctor Creek's Boone Boulevard Green Street Health Impact Assessment (HIA)

U. S. Environmental Protection Agency, Region 4 and Office of Research and Development

## Conceptual Design

The proposed design includes a combination of planter box and permeable pavement features, in addition to several bioretention systems proposed outside of the road right-of-way in Mims Park. Several extended planting strips are also proposed along the roadway to reduce impervious area and take advantage of underutilized areas created by the road diet.

Given the narrow footprint available for detention and treatment within the road corridor, planter boxes are generally limited to one side of the street. Since the existing road crest will be preserved during the planned street improvements, the planter boxes were

designed to treat the water quality volume from one half of the roadway. In areas where additional space is not available to treat the other half of the roadway with planter boxes, permeable pavement is proposed for the opposite bike lane to provide adequate treatment.

The stormwater control measures proposed for Boone Boulevard were designed to treat the runoff from 85% of storms in an average year and provide partial retention of larger storm events (e.g., a 1.2-inch rainfall) to reduce downstream flooding impacts.



Planter Box



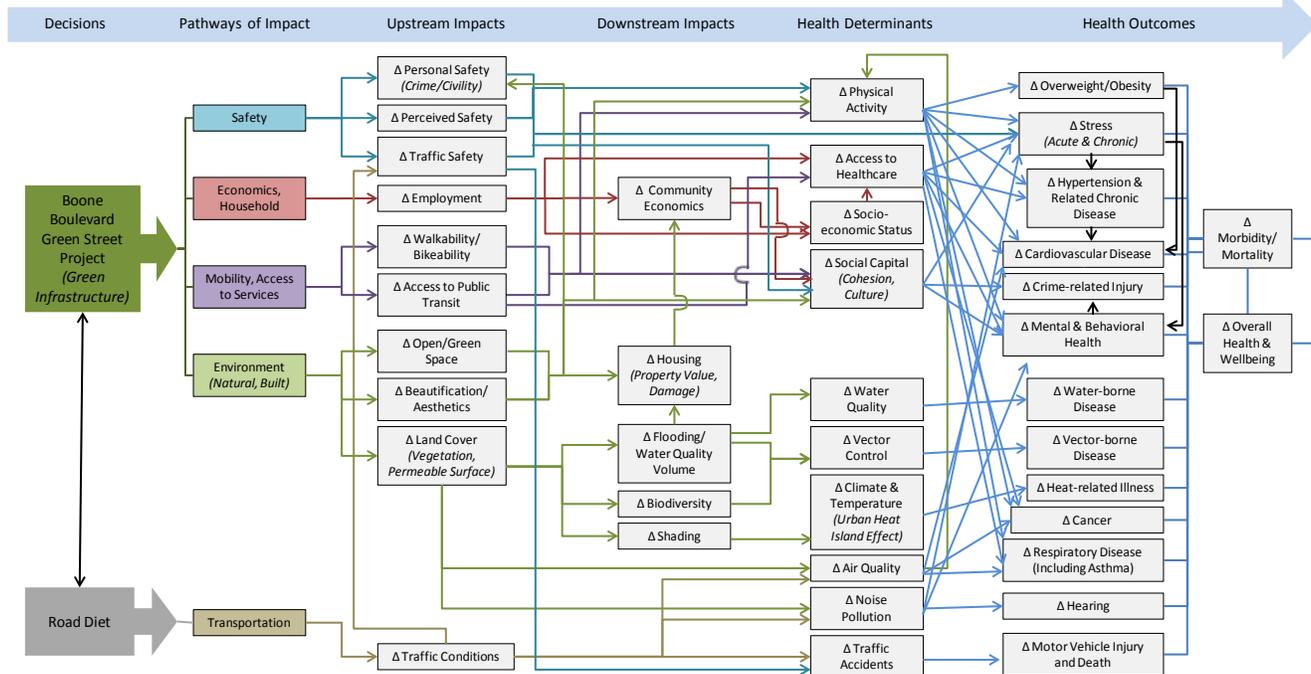
Bioretention Area



Permeable Pavement

## Causal Pathways – Boone Boulevard Green Street Project

The pathway diagram below shows various links between the proposed Boone Boulevard Green Street Project, road diet improvements, and health. The Green Street Project is expected to impact health through four major pathways (i.e., safety, household economics, mobility/access to services, and the environment), while the road diet improvements are expected to impact health through a single pathway (i.e., transportation).



## HIA Value Added

- Ensure health and equity in decision
- Engage impacted community members and stakeholders
- Assess community impacts and green infrastructure effectiveness
- Provide recommendations to mitigate negative impacts and promote positive impacts

## HIA Application and Future Direction

- Provide a model of interagency collaboration at the local, state, and federal levels
- Further enhance and test EPA's C-FERST HIA Roadmap under development
- Support future green infrastructure initiatives through documented benefits and impacts of the technology
- Gained experience in the use of HIAs can be applied to other environmental decision-making processes

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## EPA'S REPORT ON THE ENVIRONMENT 2014 (DRAFT)

Understanding trends in the condition of the United States' natural resources, human health, and ecological systems is an important part of making informed environmental protection decisions. The Report on the Environment (ROE) provides EPA and others with important information about trends in the environment and human health.

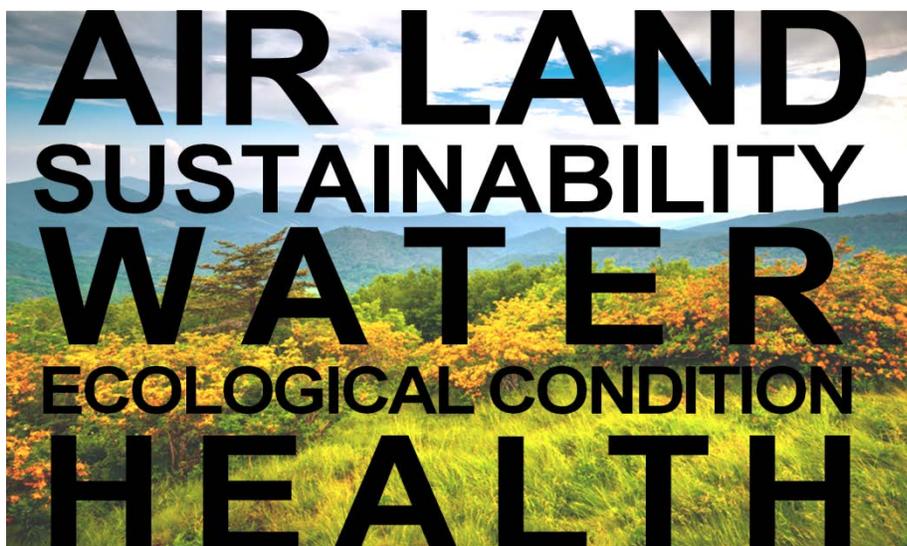
### What is the ROE?

The ROE is a comprehensive source of scientific indicators that describe the condition of and trends in the nation's environmental and human health. It compiles, in one place, the most reliable indicators currently available to help answer 24 questions that EPA believes are of critical importance to its mission.

ROE indicators provide information about the current status and historical trends in the nation's air, water, land, human health and exposure, ecological systems, and aspects of sustainability at the national and, where possible, regional levels.

### Why is the ROE important?

Data on environmental trends can inform EPA and the public about how well our nation is doing to protect



human health and the environment. These data also provide valuable information to EPA in developing its strategic priorities.

### What's new in the revised ROE?

ROE indicators are based on data generated by multiple agencies and are updated regularly. The revised ROE presents 86 indicators, all of which were peer-reviewed to meet high standards for accuracy, representativeness, and reliability. The ROE also includes four new sustainability indicators. Sustainability is defined as "conditions under which humans and nature can exist in productive harmony, and fulfill the social, economic and other requirements of present and future generations."

The ROE was last released in 2008 as a hard copy report. The new ROE is

entirely web-based with no printed version: [www.epa.gov/draftroe](http://www.epa.gov/draftroe).

### What are the next steps?

EPA is releasing the ROE as a draft at this time for public comment and external peer review by the Agency's Science Advisory Board. Once final, EPA's ROE will provide critical environmental and human health information that EPA and others will use to inform decisions to protect public health and the environment.

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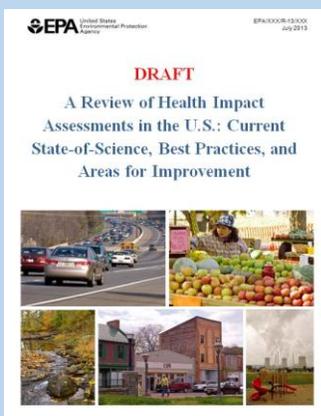
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## A Review of Health Impact Assessments in the U.S.: Current State-of-Science, Best Practices, and Areas for Improvement

A review was conducted of 81 HIAs from the U.S. to obtain a clear picture of how HIAs are being implemented nationally and to identify potential areas for improving the HIA community of practice. The review was focused on HIAs from four sectors that the U.S. Environmental Protection Agency's (EPA's) Sustainable and Healthy Communities Research Program has identified as target areas for empowering communities to move toward more sustainable states (EPA 2011). These four sectors are Transportation, Housing/Buildings/ Infrastructure, Land Use, and Waste Management/Site Revitalization.

The HIA Review systematically documented organizations involved in conducting the HIAs; funding sources; the types of community-level decisions being made; data, tools, and models used; self-identified data needs/gaps; methods of stakeholder engagement; pathways and endpoints; judgement and prioritization of impacts; decision-making outcomes/recommendations; monitoring and follow-up measures; HIA defensibility and effectiveness; attainment of the *Minimum Elements of HIA* (North American HIA Practice Working Group 2010); areas for improvement; and identification of best practices.

The results of the HIA review were synthesized to identify the current state of the HIA practice in the U.S., best practices in HIA, and areas for improvement (Rhodus et al. 2013).

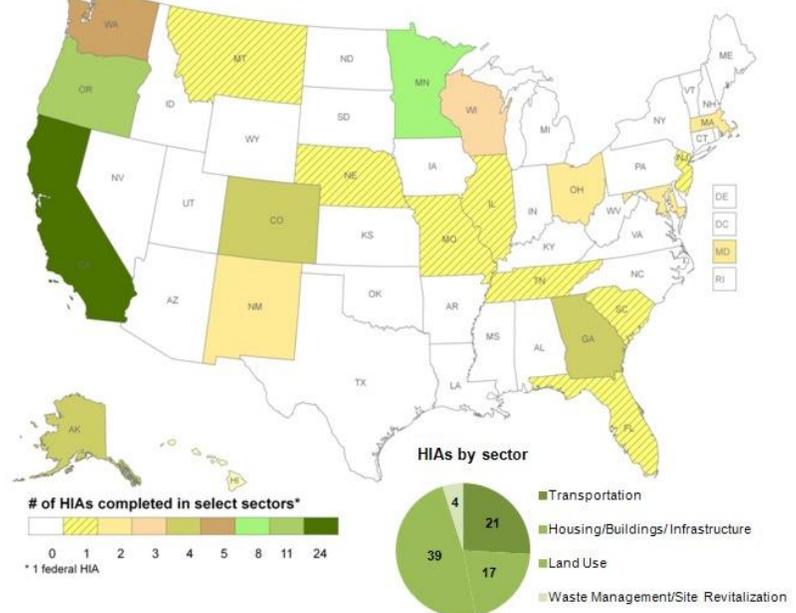


### Health Impact Assessment

The International Association of Impact Assessment (IAIA) defines health impact assessment (HIA) as:

a combination of procedures, methods, and tools that systematically judges the potential, and sometimes unintended, effects of a policy, plan, program, or project on the health of a population and the distribution of those effects within the population. HIA identifies appropriate actions to manage those effects (Quigley et al. 2006).

### Findings



### State of HIA Practice

**Use of HIA to inform decision-making** is on the rise. Reviewed HIAs were implemented most frequently to inform decisions at the local level and less frequently at county, state, and federal levels.

**Implementation of the six-step HIA process** varied greatly among the HIAs, leading to large disparities in rigor and quality.

- **Screening** – Documentation of the screening process was often lacking, making it difficult to discern what factors went into making the decision to perform the HIA.
- **Scoping** – Documentation of the scoping process was inconsistent and often lacked details of the overall HIA plan (e.g., research questions, rationale for reductions in scope, etc).
- **Assessment** – The depth and defensibility of evidence is crucial to the effectiveness of impact assessment; however, considerable disparities existed in the depth of impact assessment, extent of data collection and analysis, and defensibility of evidence.

In addition, quantification of impacts was lacking throughout the HIAs, as was judgement of impact likelihood, magnitude, and permanence. Most HIAs qualitatively judged direction and distribution/equity of impacts.

- **Recommendations** – Recommendations sometimes stated support for or opposition to the proposed decision as-is, but most often proposed

modifications to the decision and/or mitigations of the decision's negative health impacts.

Prioritization of impacts and/or recommendations can be based on a number of factors, but those utilized most frequently in the HIAs included stakeholder/community input, literature and research, impact on health and relevance to project/decision interests, and equity of impacts.

- *Reporting* – Reporting and communicating the results of HIA is crucial to informing decision-making; yet, only 5% of the HIAs included a communication plan for reporting and disseminating findings, and over 35% of the HIAs lacked transparent documentation of the processes, methods, findings, sponsors, funding source(s), and/or participants and their roles.
- *Monitoring and Evaluation* – This step of the HIA process was severely lacking. Of the three forms of evaluation called for in HIA, process evaluation was found in only 6% of the HIAs and plans for impact evaluation and/or outcome evaluation were present in only 36% of the HIAs.

**Adherence to Minimum Elements of HIA.** Less than 20% of the HIAs met the *Minimum Elements of HIA*. Elements most often missing included complete judgement of impact (direction, magnitude, likelihood, distribution, and permanence), monitoring and evaluation, and transparency in documentation.

**Stakeholder/community engagement** in each step of the HIA process is ideal, but was rarely witnessed. In fact, approximately 20% of the HIAs did not engage stakeholders or the community at all in the HIA process.

**Judgement of environmental impacts** was included in many of the HIAs, but typically involved assessments of air quality impacts.

**Effectiveness of HIA** could not be discerned for almost 40% of the HIAs, but for those HIAs for which measures of effectiveness could be obtained, the vast majority showed direct or general effectiveness.

## Best Practices

Best practices identified in the HIA Review include:

- Use of the *Minimum Elements and Practice Standards of Health Impact Assessment*
- HIA in Environmental Impact Assessment
- Equity promotion
- Documented Screening & Scoping
- Rules of Engagement Memo/Memorandum of Understanding
- Communication/Reporting Plan
- Stakeholder involvement
- Transparent literature search/review
- Quality of evidence evaluation
- Identification of data gaps
- Use and/or adaption of existing tools, methods, and metrics
- Detailed documentation of data and methodology
- Geographic Information Systems
- Impact pathways/logic frameworks
- Clear summary of impact assessment
- Quantitative judgement of impacts
- Impact prioritization/ranking
- Confidence estimates of projected impacts
- Feasible/actionable recommendations

- Implementation plan for recommendations
- Clear/transparent HIA Report
- Process evaluation

## Areas for Improvement

The following areas for improvement, if addressed, would significantly advance the HIA community of practice:

**Adherence to Minimum Elements and Practice Standards** would ensure that the essential components of HIA are put in practice and would result in marked increases in rigor, quality, defensibility, and effectiveness. Essential components of HIA that are particularly lacking and should be targeted for improvement, include: judgement of impact, stakeholder and community engagement, transparency in documentation, and monitoring and evaluation.

**Use of HIA to inform decision-making at all levels**, including county, state, and federal decisions.

**Identification of data gaps** would provide transparency in HIA reporting, but could also be useful in helping to refine methods and approaches used in HIA and identify areas for future research.

**Broader utilization of existing tools and resources** could contribute to a more robust impact assessment and help to close some of the data gaps found in HIA.

**Closing the data gaps** and maximizing the evidence available for use in HIA would result in more robust assessments and improved efficiency in predicting health impacts.

**Consistency in HIA terminology**, like transparency, would help to advance HIA reporting and rigor.

## Conclusions

While HIAs have helped to raise awareness and bring health into decisions outside traditional health-related fields, the effectiveness of HIAs in bringing health-related changes to pending decisions in the U.S. varies greatly. The HIA Review found considerable disparities in the quality and rigor of HIAs being conducted. This, combined with the lack of monitoring, health impact management, and other follow-up could be limiting the overall utilization and effectiveness of HIA in the U.S.

Understanding the current state of practice and applicability of HIAs in the U.S., as well as best practices and areas for improvement, will help to advance the HIA community of practice, improve the quality of assessments upon which stakeholder and policy decisions are based, and promote healthy and sustainable communities.

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- Quigley, R., L. den Broeder, P. Furu, A. Bond, B. Cave, and R. Bos. 2006. Health Impact Assessment International Best Practice Principles. Special Publication Series No. 5. Fargo, ND: International Association for Impact Assessment.
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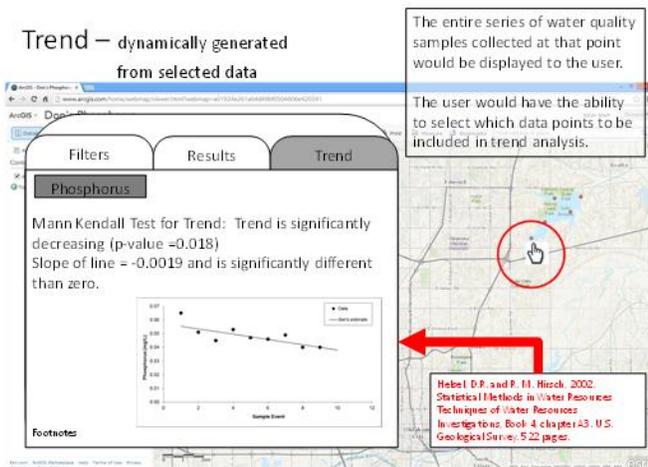
## Tribal-Focused Environmental Risk and Sustainability Tool (Tribal- FERST) SUPPORTING SUSTAINABLE AND HEALTHY AMERICAN INDIAN TRIBES

### The Issue

Tribes face unique and numerous environmental and human health challenges. As tribal leaders work to build and enhance environmental safeguards in their communities, user-friendly, science-based tools may contribute to sustainable solutions. Tribal-focused tools are needed to prioritize environmental issues, understand exposure pathways, and conduct comprehensive impact assessments - all of which are important in decisions to improve public health and the environment.

### A Collaborative Approach

The Tribal-Focused Environmental Risk and Sustainability Tool (Tribal- FERST) is a web-based geospatial decision support tool. Tribal-FERST serves as a research framework to provide tribes with easy access to the best available human health and ecological science. Tribes and partners throughout the United States, representing a wide range of interests and issues in Indian Country, are providing input on the design and content of Tribal-FERST. The United South and Eastern Tribes (USET) is partnering with EPA to develop the Tribal-FERST guidance document and connect its water quality exchange database and data transfer network with Tribal-FERST through the Open Water Viewer.



The Pleasant Point Passamaquoddy Tribe of Maine piloted Tribal-FERST as part of its sustainable and healthy community effort. This collaboration brought together tribal members, EPA, and the Tribe’s sustainable community planning consultants, in order to make informed environmental and economic decisions about solid waste, sea level rise, and subsistence diet. At the same time, the Pleasant Point Passamaquoddy Tribe provided input to improve Tribal-FERST and make it a more robust and user-

friendly tool. Tribal- FERST will be enhanced through information collected and lessons learned in this and other pilot studies, making it broadly applicable for other tribes as well.



Sample Tribal-FERST map for the Pleasant Point Passamaquoddy Tribe of Maine

## Developing Innovative Solutions for Sustainability

In Tribal-FERST, users are able to follow step-by-step guidance for identifying priority issues, compiling data, ranking and addressing risks, and assessing impacts of actions taken. At each step, relevant information is provided, such as:

- fact sheets and reports about environmental issues of concern
- a tribal environmental data table providing quantitative information to support risk prioritization
- decision-making guides integrating traditional ecological knowledge and western science
- a geospatial mapping component
- access to best practices and guidance for addressing risks
- links to other tools relevant to tribal environmental decision-making

The Tribal-FERST geospatial mapping component will enable the user to view and overlay demographic information with publicly available data, including environmental concentrations, human exposures, health risks, ecosystem services, sustainability indicators, and sources of pollution. In the future, tribes will have the option to overlay locally collected data--including their reservation boundaries--and determine whether or not to make it publicly available.

The planned products from Tribal-FERST include:

- a methodology to build capacity and match tribal issues with the best available science
- a user-friendly, science-based tribal environmental decision support tool
- a national tribal environmental data inventory to inform and populate Tribal-FERST

- results from phased pilot projects, providing answers to questions of tribal interest for priority environmental issues and best practices

### **Benefits of Tribal-FERST**

Tribal-FERST is being built in partnership with tribes, with support from EPA scientists. The tool is intended to empower tribes by providing access to relevant science that can be used to develop sustainable, cost-effective solutions for reducing environmental exposures and health risks. Using this web-based geospatial decision support tool, tribes may employ a holistic approach to address environmental concerns and plan for the future. This project directly supports the EPA Administrator's theme of launching a new era of state, tribal, and local partnerships<sup>1</sup> and EPA's commitment to protect tribal lands.

### **REFERENCE:**

<sup>1</sup> G. McCarthy. [September 4, 2013]. Seven Themes for EPA's future [Administrator McCarthy's Website] Retrieved from <http://www2.epa.gov/aboutepa/epas-themes-meeting-challenge-ahead#communities>

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