Sustainable and Healthy Communities (SHC) Research Program

U.S. EPA's Office of Research and Development

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EPA Strategic Priorities

Working to Make a Visible Difference in Communities

Cleaning Up Communities and Advancing Sustainable Development

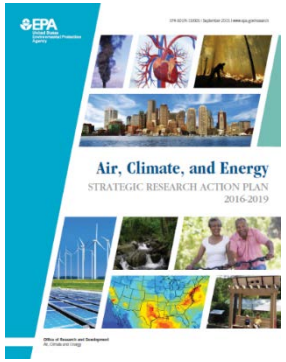
Working Toward a Sustainable Future

Strategic Research Action Plans

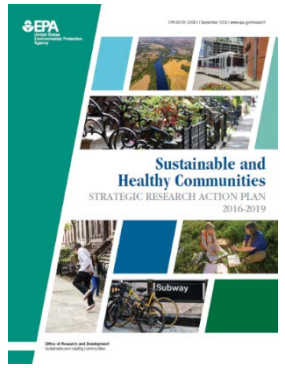
What is a Strategic Research Action Plan (StRAP)?

- Describes ORD's research program for internal and external audiences
- Serves as our guide for resource planning activities
- First generation covered 2012-2016
- 2nd generation completed covering FY16-19
- Developed in consultation with advisors (Science Advisory Board and Board of Scientific Counselors), EPA partner offices, other stakeholders

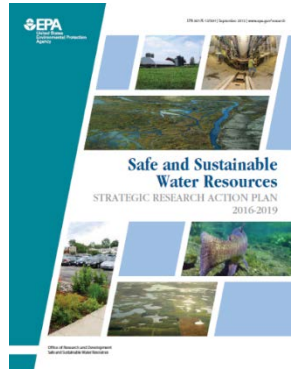
Air, Climate & Energy



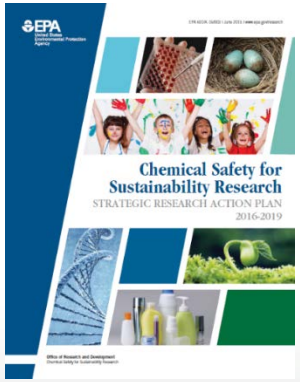
Sustainable & Healthy Communities



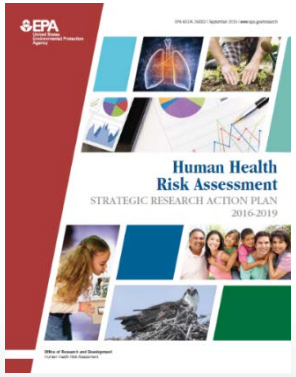
Safe & Sustainable Water Resources



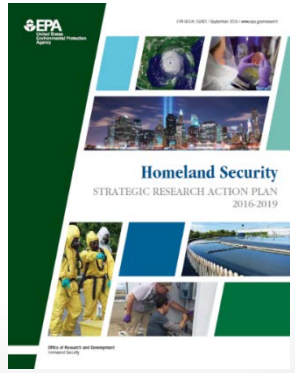
Chemical Safety for Sustainability



Human Health Risk Assessment



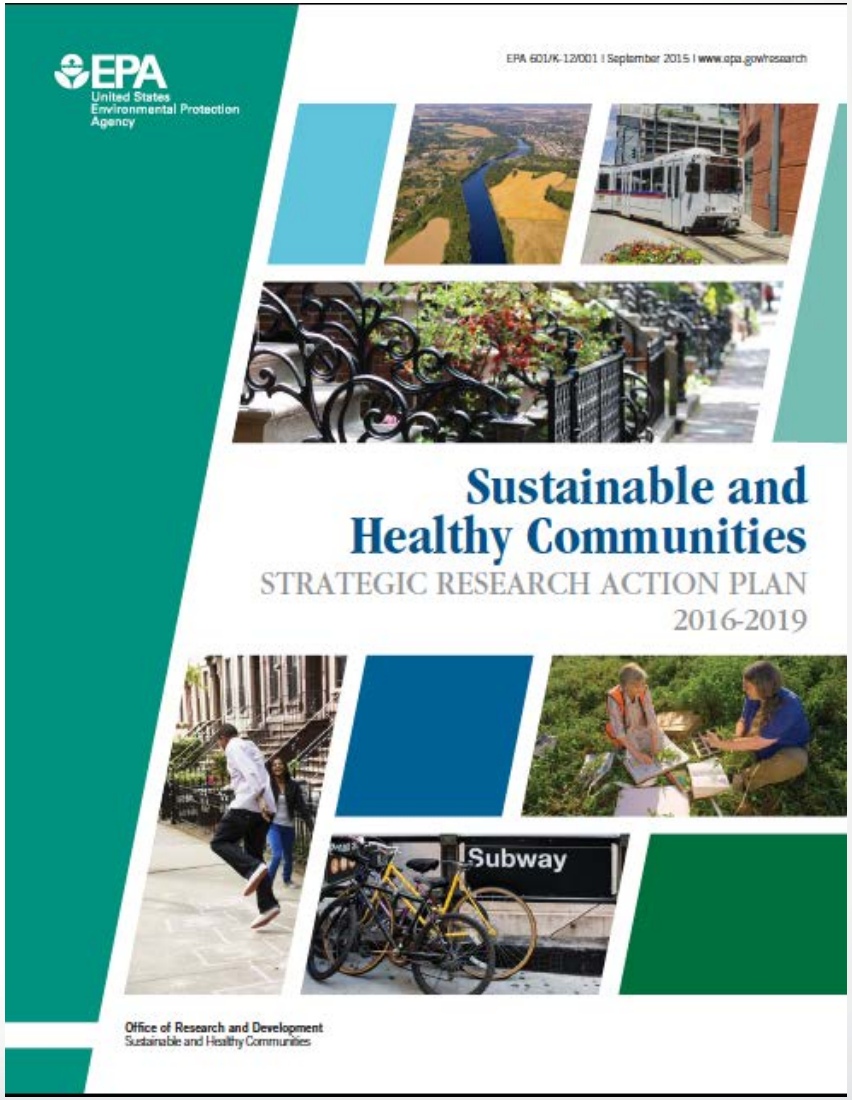
Homeland Security



SHC's Strategic Research Action Plan (StRAP) of FY 16 - 19

Program Objectives

1. The social, economic, and environmental impacts of decision alternatives on community well-being
2. Causal relationships between human well-being and our environment
3. Cleaning up communities, ground water, and oil spills; restoring habitats and revitalizing communities; advancing sustainable waste and materials management.
4. Sustainability assessment methods to build a sustainability framework



Research to Harmonize Nature and Communities

To understand the causal relationships between public health, well-being, and ecosystem services

Research and tools to offer solutions to community-based decision makers

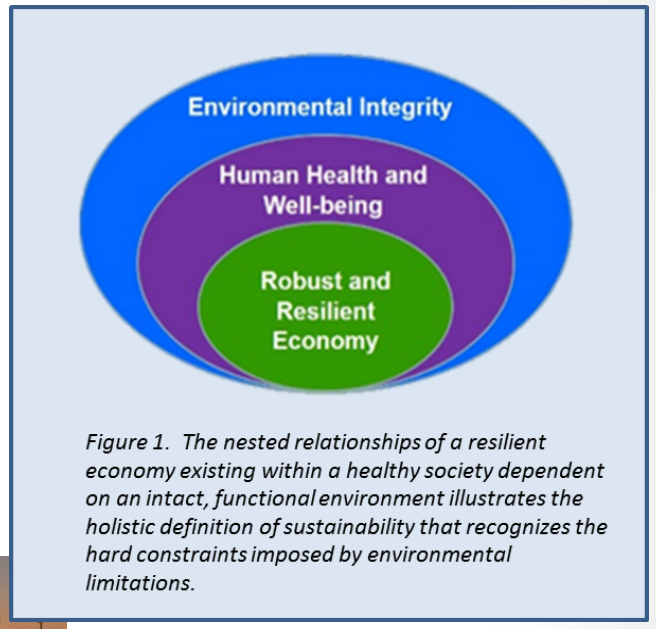
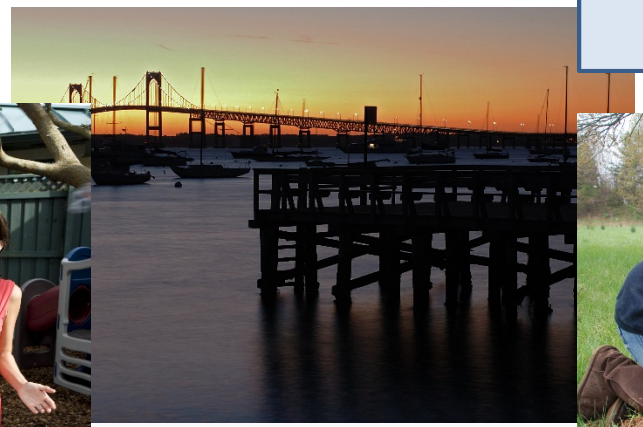


Figure 1. The nested relationships of a resilient economy existing within a healthy society dependent on an intact, functional environment illustrates the holistic definition of sustainability that recognizes the hard constraints imposed by environmental limitations.



SHC's Research Topics and Project Areas

Decision Support and Innovation

1.61 Decision Science and Support Tools

1.62 EnviroAtlas: A Geospatial Analysis Tool

1.63 Environmental Workforce and Innovation

Community Well-Being

2.61 Community-based Ecosystem Goods & Services

2.62 Community Public Health & Well-Being

2.63 Assessing Health Disparities in Vulnerable Groups

2.64 Indicators, Indices, & the Report on the Environment

Sustainable Approaches for Contaminated Sites and Materials Management

3.61 Contaminated Sites

3.62 Environmental Releases of Oils and Fuels

3.63 Sustainable Materials Management

Integrated Solutions for Sustainable Communities

4.61 Systems-based Assessment Methods

Understanding the Interrelationships Between Ecological & Human Health for Tribal Sustainability

Fish consumption and climate change impacts on Tribal health and well-being

Proper functioning condition of ecosystems which provides ecological assessments centered on Tribal culture and values to help manage ecosystem and human health issues

Forecasting natural toxin blooms on Tribal lands.

Cumulative effects of chemical and non-chemical exposures on stressors of issue to Tribes: interactions of arsenic, microcystin exposures, and dietary fat levels

Chemical and non-chemical stressors measured in licensed child care centers in Portland Area Indian Country

Factors that confer greater environmental public health risk in Tribal areas and Native American communities

Research & Grants

Research

- Examining Tribal dietary practices
  - Assessing risk with the goal of Tribes restoring heritage diets
  - Exposure assessments based on fish consumption patterns

- Creating GIS-based mapping tools to build environmental assessment and management capacity of tribes
  - Tribal-Focused Environmental Risk and Sustainability Tool (T-FERST)
  - Tribal Well Being Index

EPA grants

- Tribal health: Indoor air quality and asthma associated with building and cookstove practices
- Issues tribes and small communities face with their water distribution systems
- Adaptation to Climate Change
  - Assesses water and aquatic resources, food security, and tribal health

Final Ecosystem Goods and Services

"components of nature, directly enjoyed, consumed, or used to yield human well-being" *(Boyd & Banzhaf 2007)*

Environmental Class + Beneficiary → FEGS

Estuaries and Near Shore Marine

Recreational Food Pickers and Gatherers

Flora and fauna, such as mussels, seaweed, crabs, etc.

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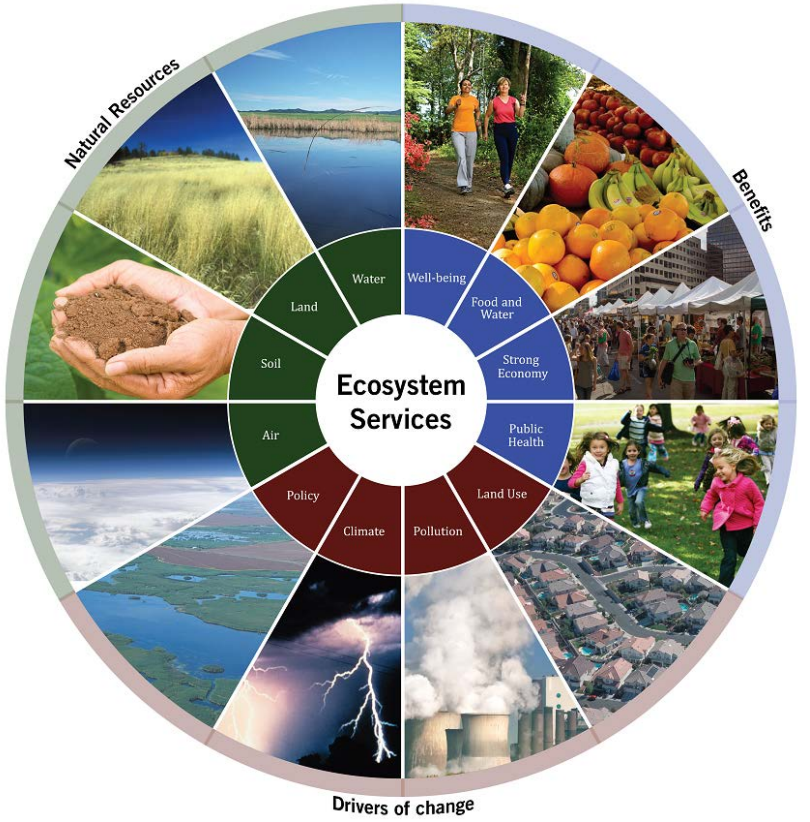
EnviroAtlas

An online decision support tool giving users the ability to view, analyze, and download geospatial data and other resources; designed to inform decision-making, education, and additional research

EnviroAtlas includes:

- Geospatial indicators
- Supplemental data (e.g., boundaries, land cover, soils, hydrography, impaired water bodies, wetlands, demographics, roads)
- Analytic and interpretive tools



Developed through cooperative effort amongst multiple Federal agencies and other organizations

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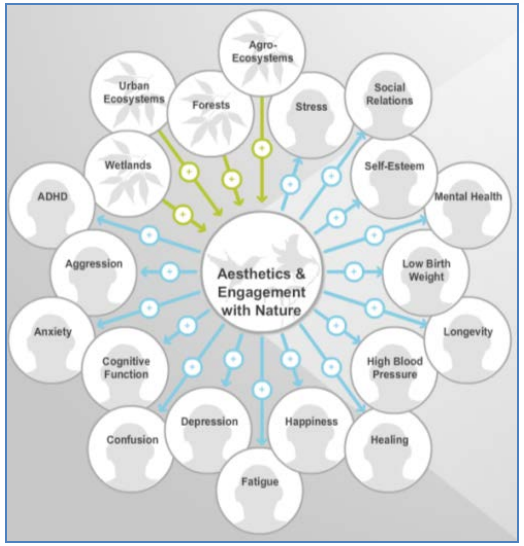
Version 1 Released May 2014

The Eco-Health Relationship Browser

http://enviroatlas.epa.gov/enviroatlas/Tools/EcoHealth_RelationshipBrowser/introduction.html

4 ecosystems:

- Forests
- Urban Ecosystems
- Wetlands
- Agro-Ecosystems



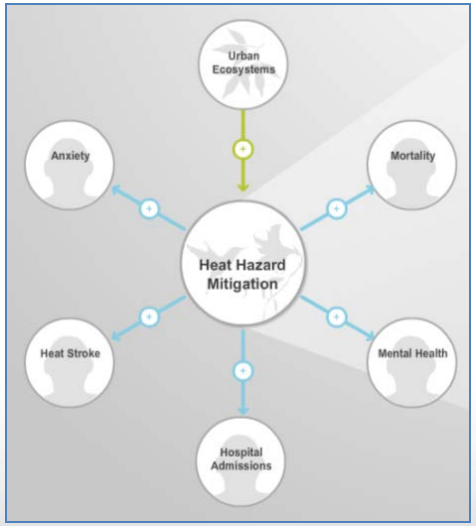
6 Ecosystem Services:

Health promotional services

- Aesthetics & Engagement with Nature
- Recreation & Physical Activity

Buffering services

- Clean Air
- Clean Water
- Heat Hazard Mitigation
- Water Hazard Mitigation



30+ health outcomes:

- Asthma
- ADHD
- Cancers
- Cardiovascular diseases
- Heat stroke
- Healing
- Low birth weight
- Obesity
- Social relations
- Stress

… many more

Incl. extensive bibliography (n ~ 300)

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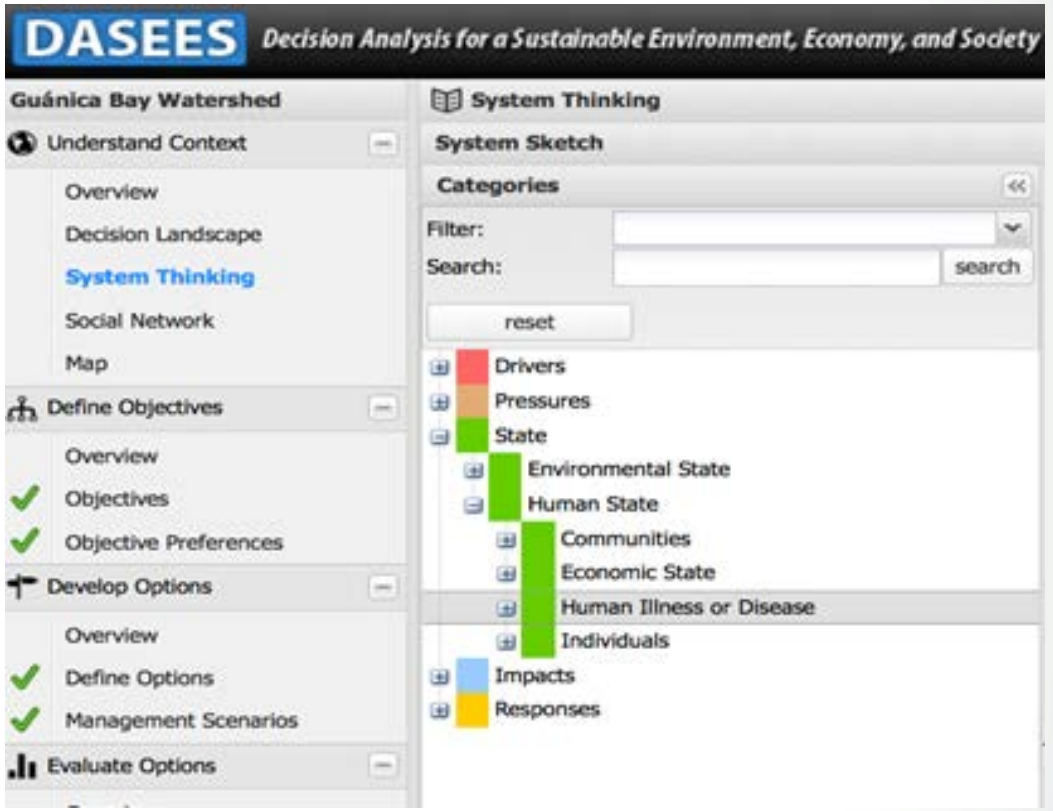
Structured Decision-Making

A process to elicit and organize key ***stakeholder values*** and relevant ***scientific knowledge*** for making decisions

DASEES (**D**ecision **A**nalysis for a **S**ustainable **E**nvironment, **E**conomy, and **S**ociety)

- a web-based tool supporting community decision-making
- Facilitates the application of Structured Decision Making (SDM) through organizing and processing information used for identifying common goals, and creating, evaluating, and implementing alternatives for complex environmental management and policy problems



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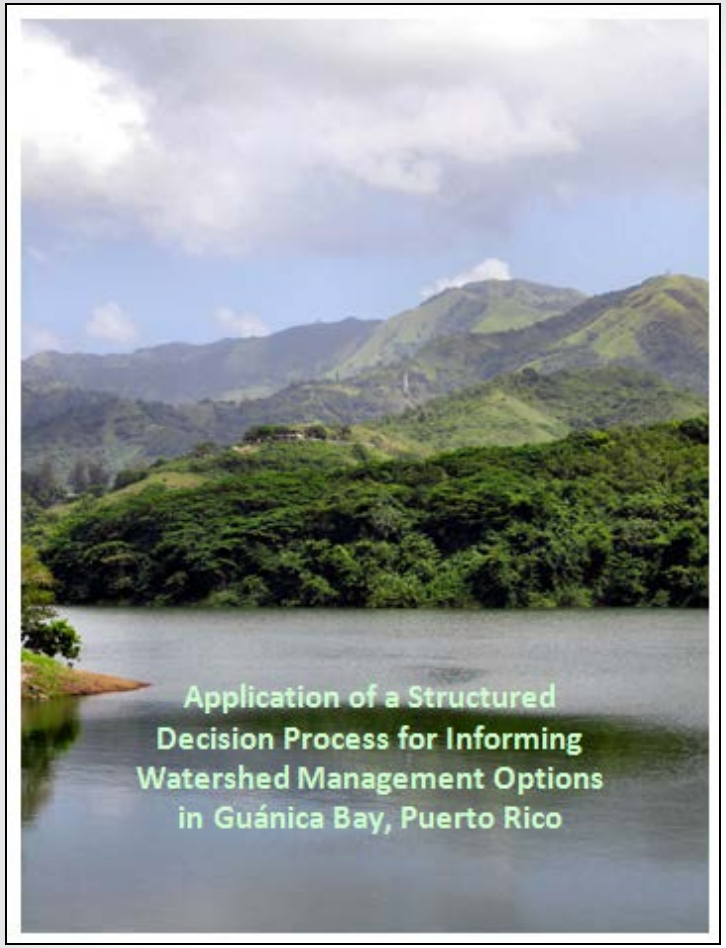
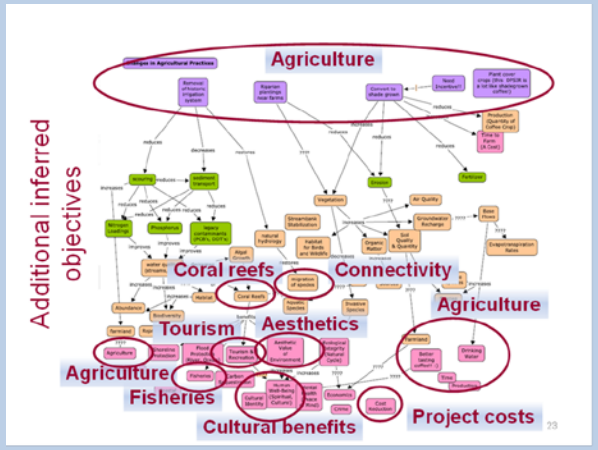
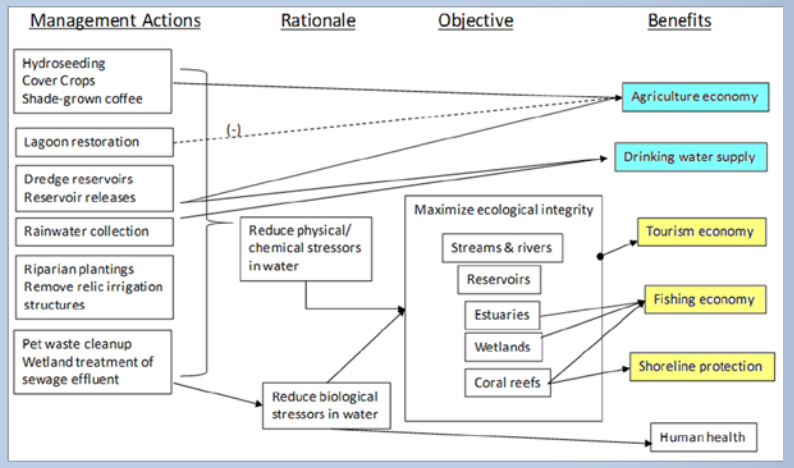


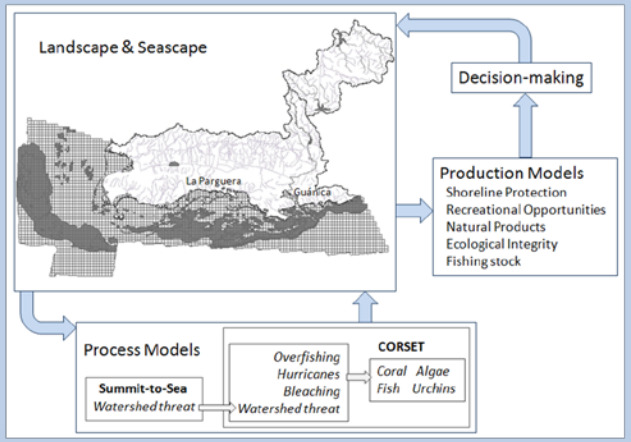
Guánica Bay, Puerto Rico Watershed Management



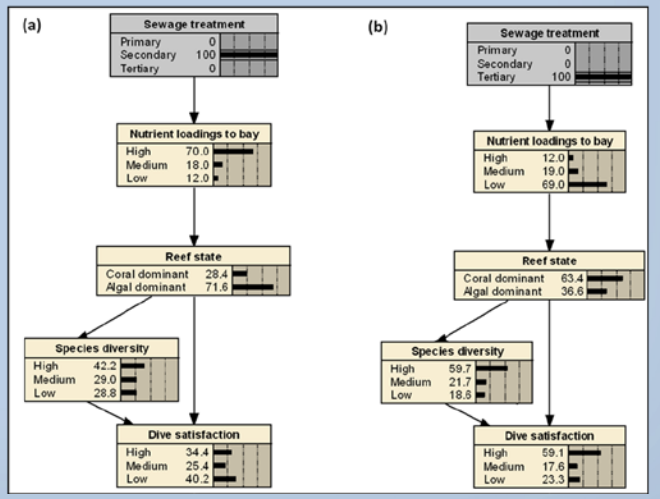
Decision Context – Conceptual Mapping



Objectives, Measures, Management Action



Scenario Modeling



Alternative Evaluation and Trade-offs

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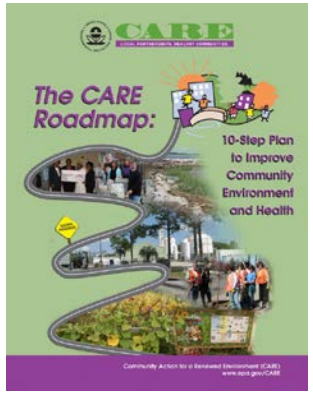
Decision Support Tools for Communities

C-FERST is a web-based "tool-kit" to help communities learn more about environmental health issues, gather information, and develop options



guidance, local exposures and risks, best practices, potential solutions

user-friendly interface, GIS maps, community reports

PACE EH
NACCHO's CEHA Program
Community-based Environmental Health Assessment

- Includes step-by-step guidance to inform community-based assessments
- Addresses challenges and needs identified by NRC, NEJAC, others
- Provides a venue for communicating science; EPA recommendations and options to address issues

Social Determinants of Environmental Health: Complementary animal and population-based approaches

Complementary animal and human approaches show how:

- Prenatal and early life environments impact children's growth, development, health, and future well-being as adults;
- Community stressors impact both individual and community resilience and well-being.

Factor Interactions & Lifecourse Impacts

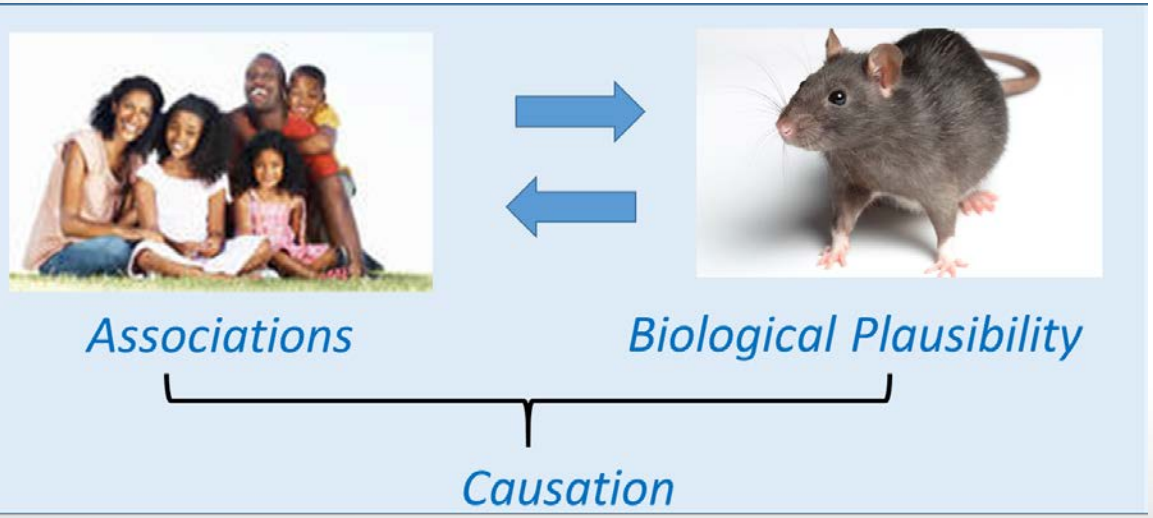
Healthy Food

Clean home & school

Exercise

Air Quality
Chemicals

Poverty
Stress



Animal Studies:

Reliable methods were developed and used to measure key health outcomes in rodent models, These experimental approaches will now be used to evaluate causation and attribution of risk for multiple stressors

Population-based studies:

Exposure to air pollution from wildfires was shown to have a greater impact on health in lower SES communities based on the frequency of emergency room visits for asthma and cardiovascular incidents.

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Health Impact Assessment

Proposed Decision → **Determinants of Health** → **Health Outcomes**

- National community of practice
- Strengthen the overall rigor of HIA practice
- Advance the use of HIA

HIA Core Values

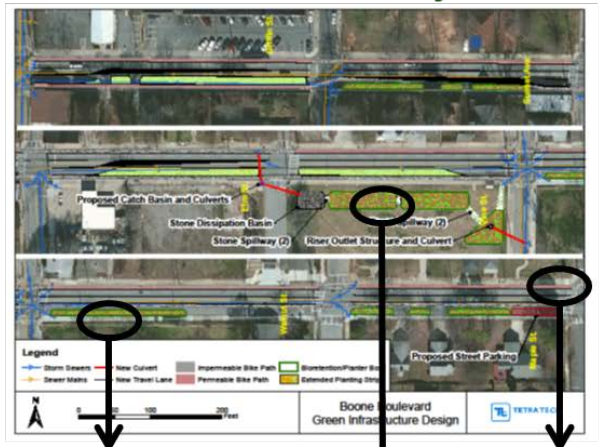
Democracy • Equity • Sustainability • Ethical Use of Evidence • Comprehensive Approach to Health

Issues Facing the Community:

- Pervasive flooding
- Impaired water quality
- Poverty
- Derelict properties
- Aging infrastructure

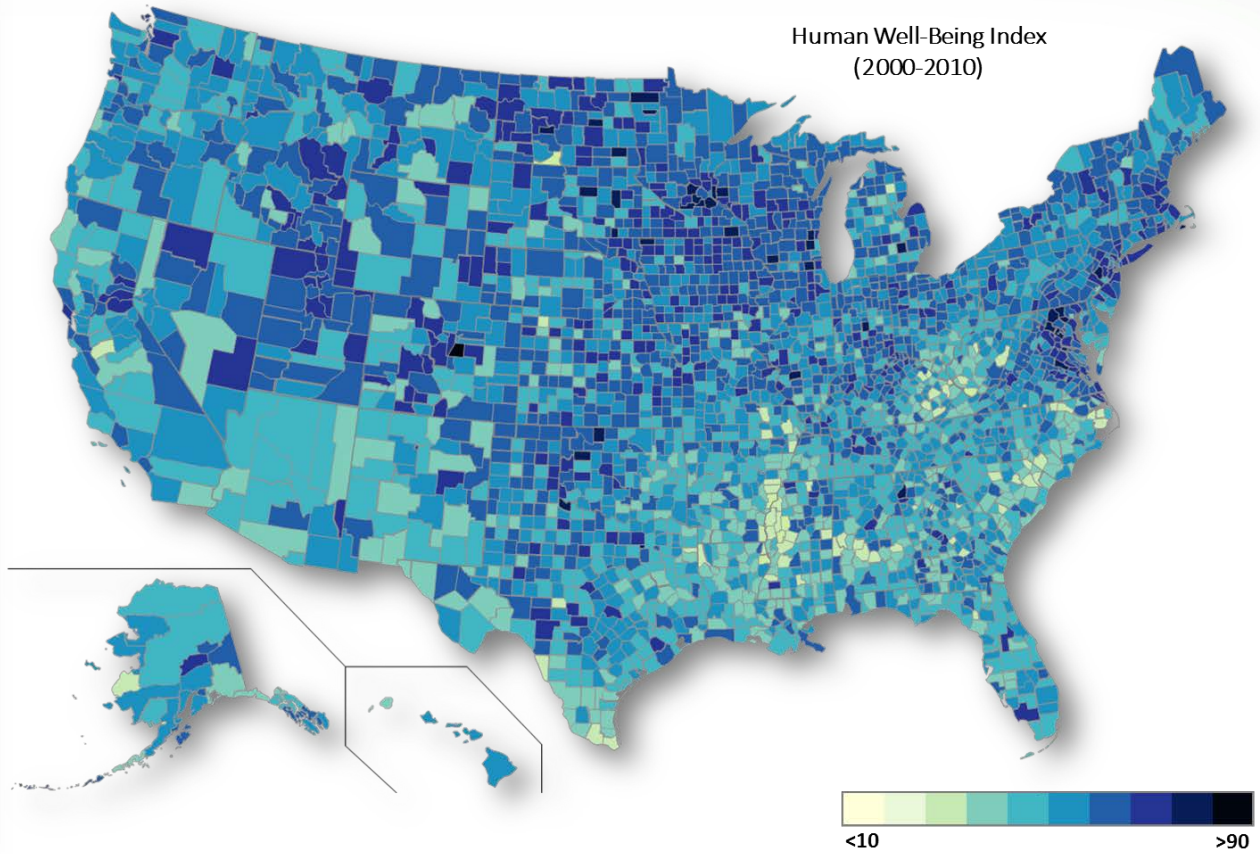
Potential Solution:

Boone Boulevard Green Street Project



Human Well-Being Index (HWBI)

Domain	Indicator	Metric Count
Connection to Nature	Biophilia	2
Cultural Fulfillment	Activity Participation	2
Education	Basic Educational Knowledge and Skills of Youth	3
	Participation and Attainment	4
	Social, Emotional and Developmental Aspects	4
Health	Healthcare	2
	Personal Well-being	3
	Physical and Mental Health Conditions	9
	Life Expectancy and Mortality	7
	Lifestyle and Behavior	4
Leisure Time	Activity Participation	2
	Time Spent [Amount of Time]	1
	Working Age Adults	3
Living Standards	Basic Necessities	2
	Income	3
	Wealth	2
	Work	2
Safety and Security	Actual Safety	4
	Perceived Safety	1
	Risk	1
Social Cohesion	Attitude Towards Others and the Community	5
	Democratic Engagement	6
	Family Bonding	3
	Social Engagement	3
	Social support	2



- A holistic approach to characterize the current state of well-being
- Relevant to any community at any spatial scale and over time
- Highlights the link between the flow of ecological, economic and social services, and human well-being
- Intended to inform and empower communities to equitably weigh and integrate human health, socio-economic and environmental factors to foster sustainability in their built and natural environments

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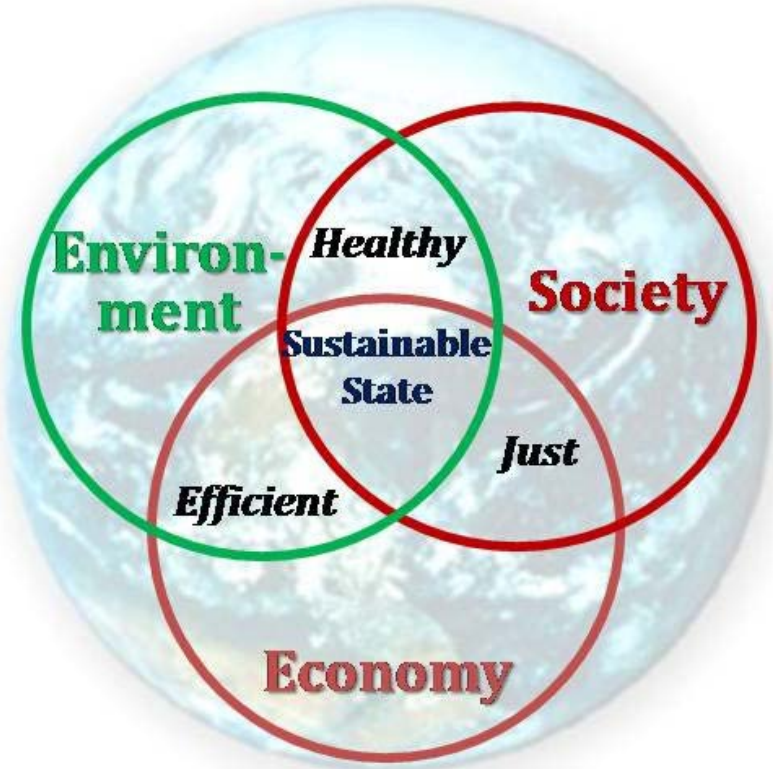
THANK YOU


Environ-
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Healthy
Society
Sustainable
State
Just
Efficient
Economy