



# **Sustainable and Healthy Communities Research Program**

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

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National Program Director

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# The Ceiling of Environmental Protection

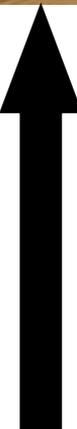
- Traditional approaches have set a “high floor”
- Systems approach necessary for sustainable environmental, economic and social outcomes

**SHC research will develop science-based tools, data, and information to support sustainable regulatory and non-regulatory approaches**

## The Floor of Environmental Protection



CAA  
CWA  
RCRA  
CERCLA



The 70 & 80's  
Command & Control



SDWA  
TSCA  
FIFRA  
MPRSA  
FFDCA

# Sustainable and Healthy Communities Research Program

*Hypothesis: Community-based decisions using a sustainability paradigm (i.e., a systems approach) will result in positive environmental, social & economic outcomes*

## Vision

SHC produces actionable science and technology to effectively and equitably promote human health and well-being, environmental quality, and economic vitality to foster community sustainability and regulatory compliance



# Communities

- A real unit of study
- EPA priority
- Appropriate level of governance for sustainability
- Community Types – may be an important variable
  - geography (is Denver different than New Orleans?)
  - economic base (industrial vs service orientation)
  - size (population; areal extent)
  - education level
  - Infrastructure
- Interest in sustainability varies
- Generalization/extrapolation
- Adaptation to climate change

# SHC Supports EPA Priorities and Mandates

## SHC Alignment with EPA Fiscal Year 2014-2018 Strategic Plan

Strategic Goal	SHC Action
<b>Goal 3</b> <b>Cleaning Up Communities and Advancing Sustainable Development</b>	Technical support and research for Superfund sites, Brownfields, and sustainable materials management
	Research-based tools, data, and information access to support sustainable regulatory and non-regulatory approaches
<b>EPA Cross-Cutting Strategy: Working Toward a Sustainable Future</b>	A “sustainability toolbox” that includes a suite of tools for use in Sustainability Assessment and Management Research on the “science of sustainability”
<b>EPA Cross-cutting Strategy: Working to Make a Visible Difference in Communities</b>	Science supporting environmental justice: Cumulative assessment, vulnerable populations and lifestyles, environmental health disparities
<b>EPA Cross-cutting Strategy: Launching a new era of state, tribal, local, and international partnerships</b>	Collaborations with tribes and tribal organizations
	Standards and guidance for interoperable systems
	Research and tools to the Environmental Council of the States Environmental Research Institute of the States
	Research –based tools and databases to provide relevant, robust, and transparent scientific data to support Agency, state, and local policy and decision-making needs.

# EPA Mandates

## Drivers

- President's Executive Orders
  - Children's Environmental Health
  - Environmental Justice
  - Environmental, Energy, and Economic Performance
  - Impacts of Climate Change
- National Environmental Policy Act 1969
- Comprehensive Environmental Response, Compensation and Liability Act (Superfund) 1980
  - SARA 1986
  - "Brownfields Law" 2002
- Resource Conservation and Recovery Act 1976, 1986
  - Hazardous and Solid Waste Amendments 1984
- Oil Pollution Act 1990
- Clean Air Act 1970
- Clean Water Act 1977



# SHC Scope

## Research and Development to Support:

- **Sustainability**
  - NetZero
  - HIA, EIA, EEA → Sustainability Impact Assessment
  - Ecological services classification & linkage to well-being, market and non-market valuation
  - Sustainability indicators
  - Systems models to facilitate full cost accounting
- **Vulnerability Assessment and Remediation of Contaminated Sites & Oil Spills, Brownfields**
  - Contaminated sediments, groundwater, vapor intrusion
  - Underground storage tanks, pipelines, dispersants, National Contingency Plan, Deep Water Horizon follow-up
  - Remediation to Restoration to Revitalization
- **Sustainable Materials Management**
  - Life-cycle analysis, beneficial use of industrial wastes
  - Renewable energy from organic wastes, re-use of construction and demolition debris
- **Health & Well-Being, Environmental Quality**
  - Nitrogen deposition and 2° NAAQS
  - TMDL prioritization, watershed integrity
  - Cumulative assessment, including chemical and non-chemical stressors, vulnerable lifestages, and overburdened communities

# Examples: SHC – Regional Interactions

## Regions 9 and 10

- Lead exposure modeling collaboration
- RESES KPI – Tacoma
- RARE EJ project - CA
- Tribal PFC training – numerous SW tribes
- Soil Bioavailability – W Oakland and other communities Regions 2, 4, 5, 7, 10
- Vapor Intrusion pilots and tech support
- EnviroAtlas Tribal pilots (AZ, NM)

## Region 1

- Pleasant Point Passamaquoddy ME T-FERST Pilot
- Springfield MA school HIA; C-FERST beta testing

## Region 5

- CCAT beta testing
- Great Lakes Contaminated Sediments research

## Region 2

- RARE/RESES – citizen science & air sensors
- Brooklyn NY C-FERST Pilot
- HIA training

## Regions 6, 7, 8

- Net Zero Ft Riley - KS
- Net Zero Ft Carson - CO
- T-FERST and Atlas tribal pilots

## Region 3

- IEM & MIRA (RARE)

## Region 4

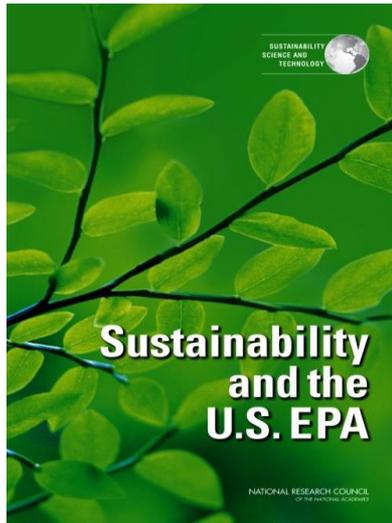
- Durham Pilot
- RESES – Proctor Creek
- Wildfires & Health Disparities

## Decision Support Tools – Widespread Beta Testing

EnviroAtlas  
C(ommunity)-FERST  
Tribal-FERST

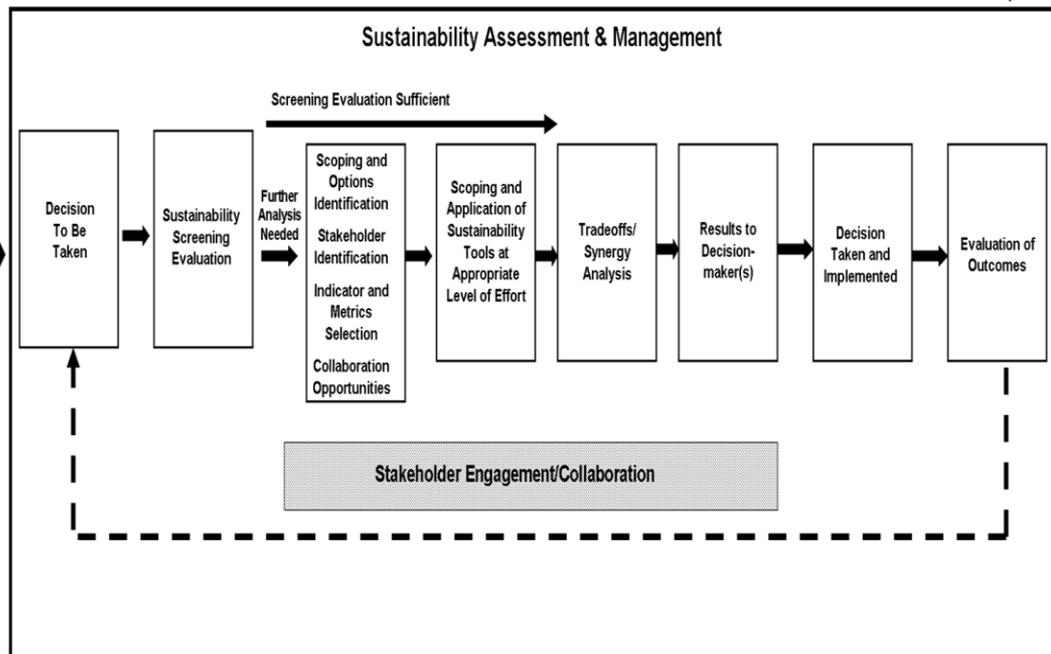
RESES & RARE: Regional competitive projects; HIA: Health Impact Assessment; C&T-FERST: Community Focused Enviro Risk Screening Tool; CCAT: Cumulative Risk Assessment Tool

# Integrated Solutions = A Sustainability Assessment Toolbox

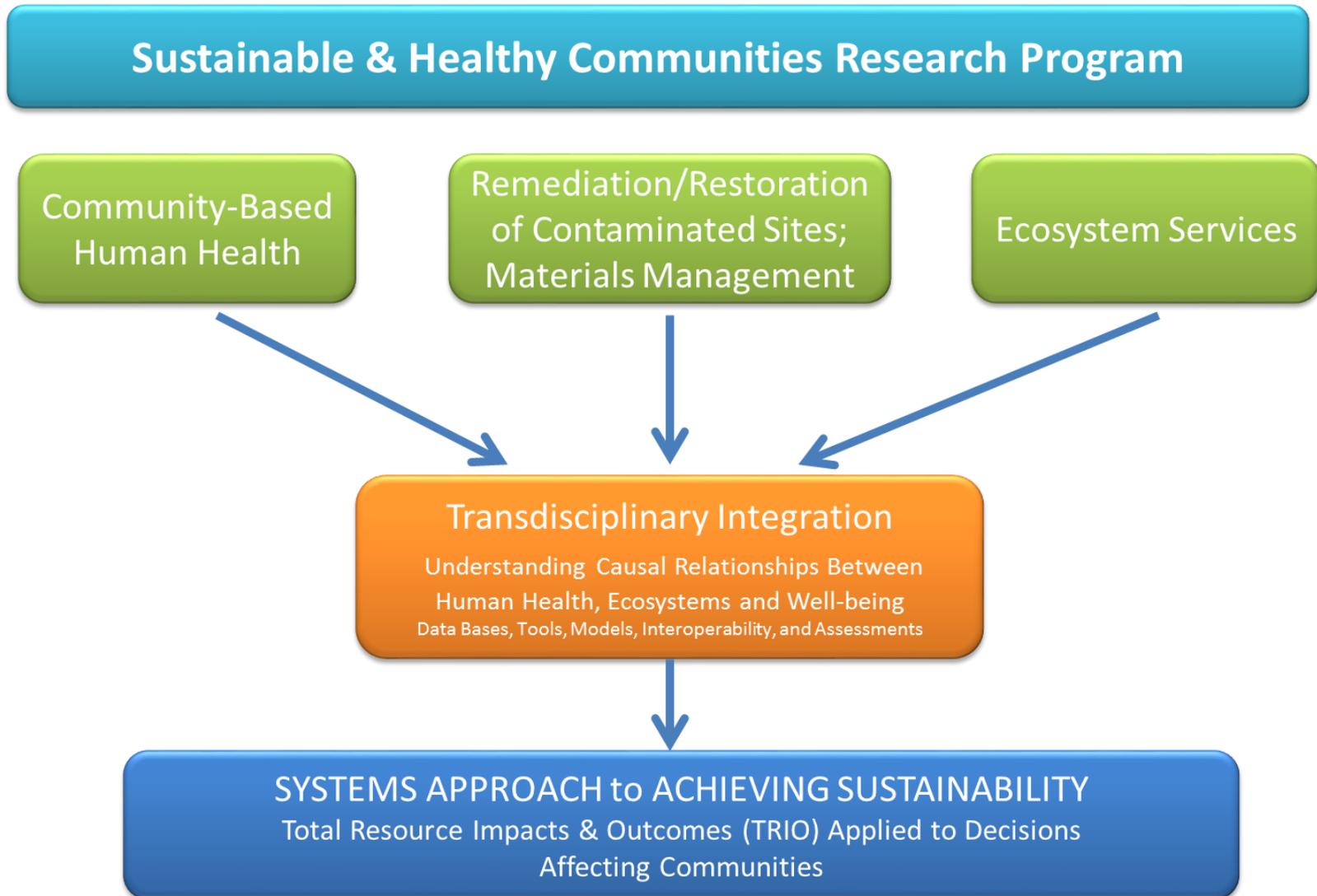


The National Academy of Sciences  
Recommends:

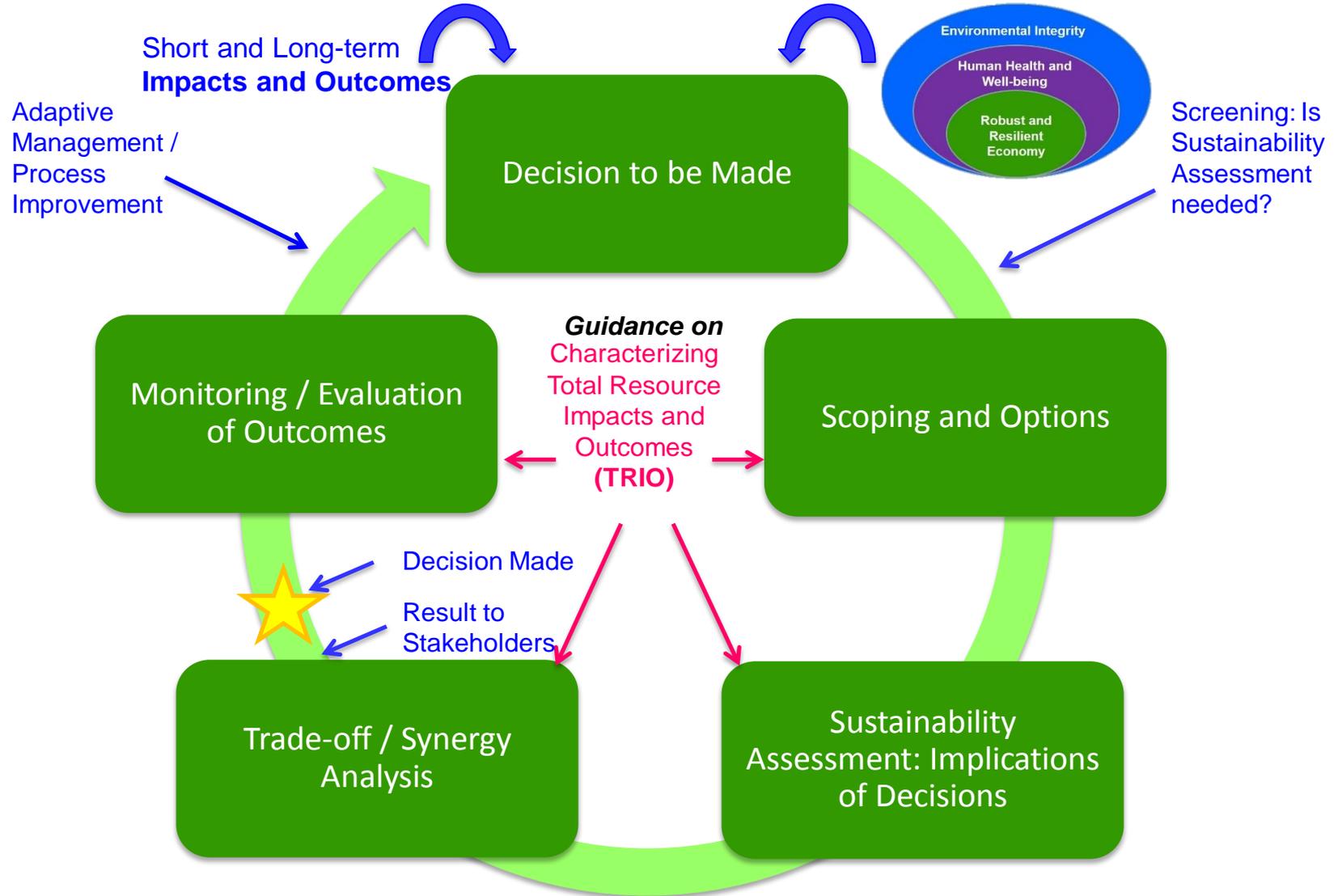
- Sustainability Assessment and Management toolbox
- Analyze consequences of alternative decision options on the full range of social, environmental, and economic indicators
- Show distributional impacts to vulnerable or disadvantaged groups and ecosystems



# Program Design: SHC Builds on ORD's Historic Strengths



# Program Design: Sustainability Assessment & Management for Integrated Solutions



# SHC's Themes & Projects

## 1. Decision Support & Innovation

(1) Decision Science & Support Tools

(2) Enviro Atlas: A Geospatial Analysis Tool

(3) Environmental Innovation and Education

(STAR Fellows; P3 – People, Planet, Prosperity; SBIR)

## 2. Community Well-Being

(4) Community-Based Ecosystem Goods & Services

(5) Community Public Health & Well-being

(6) Assessing Health Disparities in Vulnerable Groups

(7) Indicators, Indices & the Report on the Environment

# SHC's Themes & Projects

## 3. Sustainable Approaches for Contaminated Sites and Materials Management

(8) Contaminated Sites

(9) Environmental Releases of Oils and Fuels

(10) Sustainable Materials Management

## 4. Integrated Solutions for Sustainable Communities

(11) Systems-based Assessment Methods

(12) Application of Systems-based Approaches

# Program Design: Sustainability Assessment for Integrated Solutions

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M

- Indicators, Indices, & Report on Environment (ROE)
- Decision Science & Support Tools
- EnviroAtlas
- Community Public Health and Well-Being
- Systems-based Assessment Methods for Community Sustainability



Screening: Is Sustainability Assessment needed?

**Scoping and Options**

Stakeholder Engagement	Improved Communication
	Management Alternatives
	Forecasting & Conceptual Models
Structured Decision Making	
Remediation Options	Current Conditions & Context

**Sustainability Assessment: Implications of Decisions**

# Program Design: Sustainability Assessment for Integrated Solutions

Adapted from  
M...  
r...

- EnviroAtlas
- Assessing Environmental Health Disparities
- Indicators, Indices, & ROE
- Community-Based Final Ecosystem Goods and Services
- Systems-based Assessment Methods for Community Sustainability
- Community-Based Final Ecosystem Goods and Services
- Contaminated Sites
- Sustainable Materials Management
- Community Public Health and Well-Being



Screening: Is Sustainability Assessment needed?

ing and Options

Sustainability Assessment: Implications of Decisions

Systems Dynamics Models	
Valuation of Ecosystem Services	
Forecasting Models	
Spatial Visualization	Life Cycle Assessment
Health Disparity Assessment	Sector-based Impact Assessments
Data, Metrics, Indicators	Cumulative Risk

# Program Design: Sustainability Assessment & Management for Integrat

Short and Long-term  
Impacts and Outcomes

Adaptive  
Management /  
Process  
Improvement

Monitoring / Eva  
of Outcom

Trade-off / Synergy  
Analysis

SHC Tools

- Contaminated Sites
- Environmental Releases of Oils and Fuels
- Sustainable Materials Management
- Systems-based Assessment Methods for Community Sustainability
- EnviroAtlas
- Community-Based Final Ecosystem Goods and Services

Prevention/Mitigation  
Strategies

Net Benefits/Risk

Next Generation Tools

Spatial Visualization

Life Cycle Assessment

Valuation of Ecosystem  
Services

# Program Design: Sustainability & Management for

Short and Long-term Impacts and Outcomes

Adaptive Management / Process Improvement

Monitoring / Evaluation of Outcomes

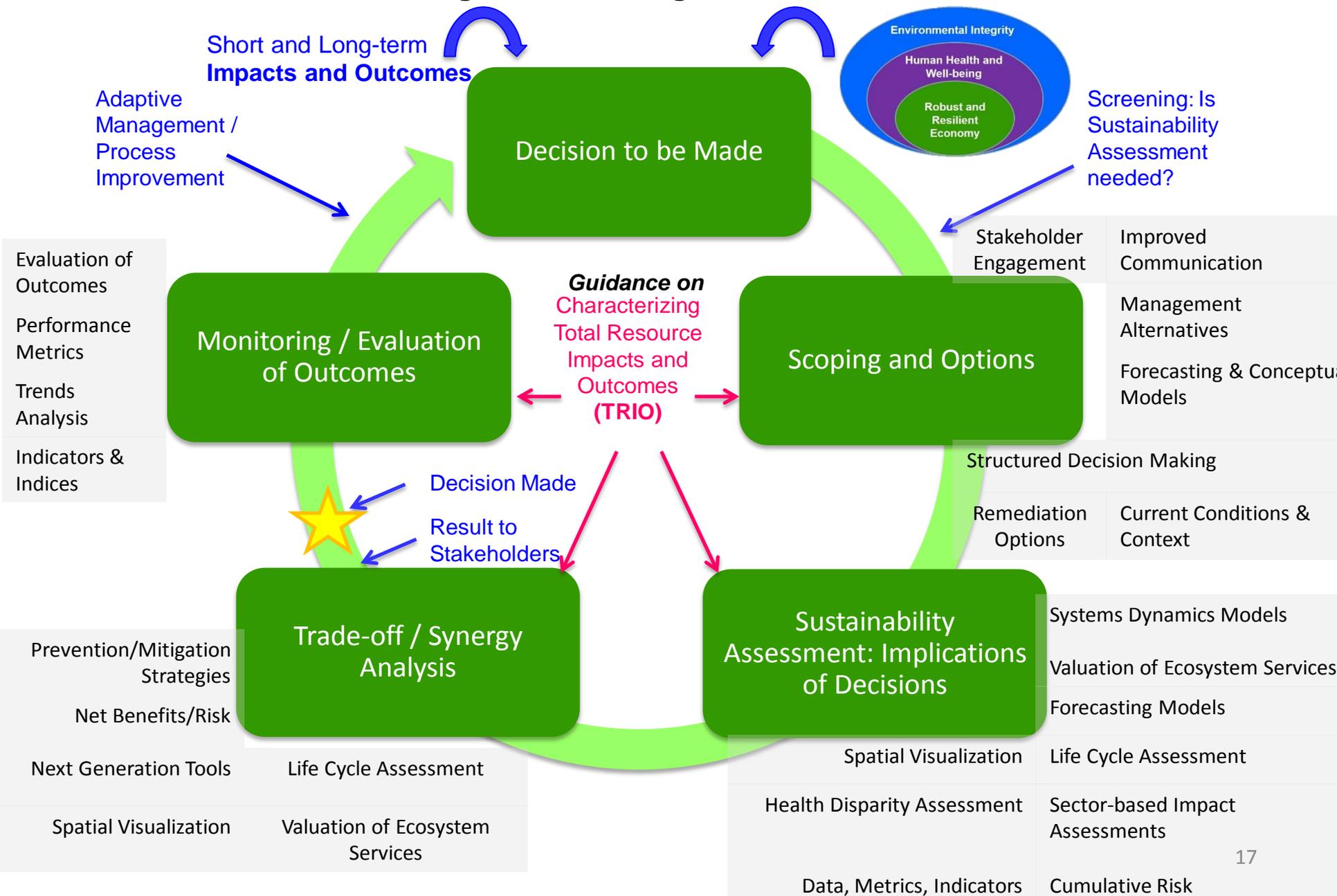
SHC Tools

Trade-off Analysis

- Indicators, Indices, & ROE
- Contaminated Sites
- Sustainable Materials Management
- Community Public Health and Well-Being

- Evaluation of Outcomes
- Performance Metrics
- Trends Analysis
- Indicators & Indices

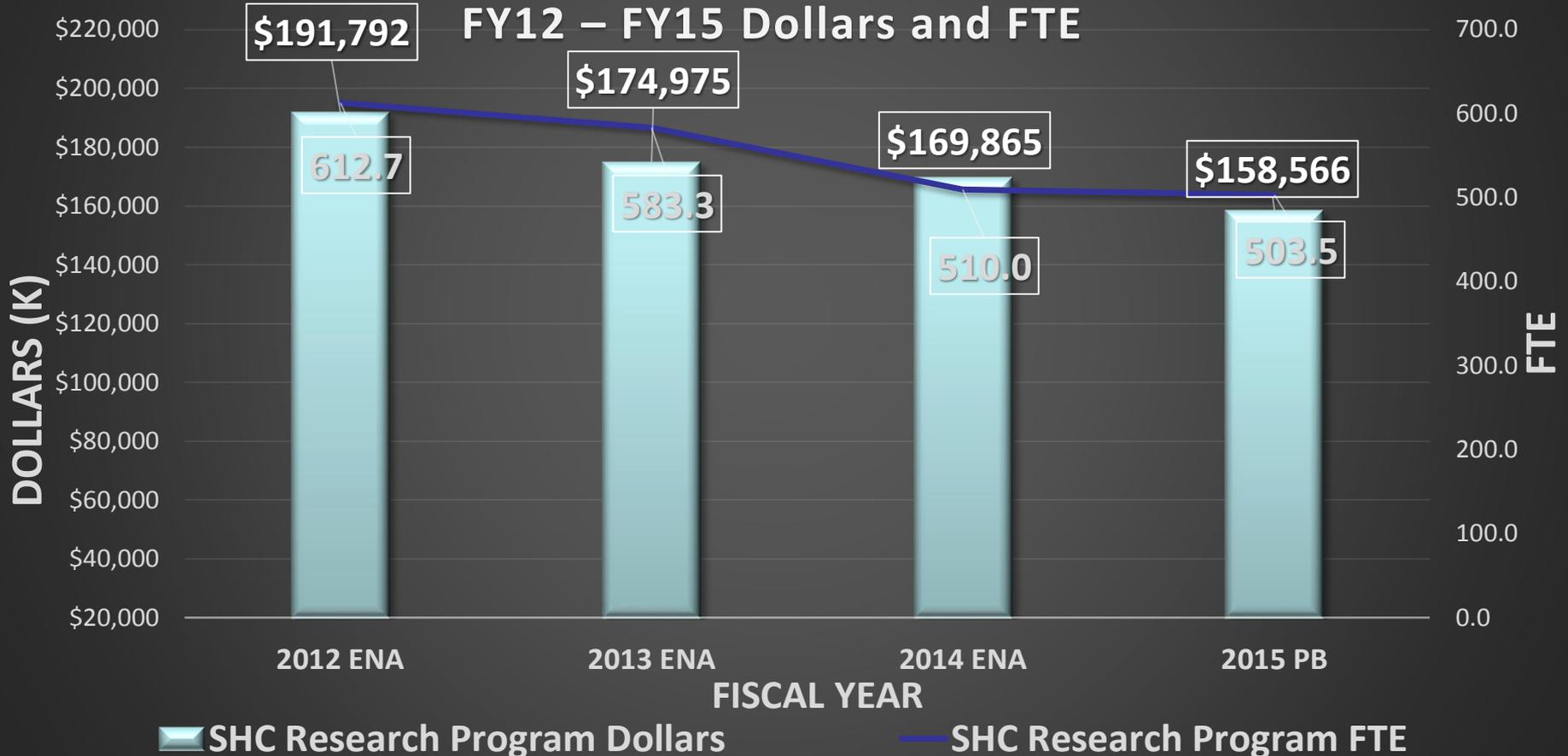
# Program Design: Sustainability Assessment & Management for Integrated Solutions



# Resources: FY 2012 – FY 2015

## ORD – Sustainable and Healthy Communities Research Program Resources

FY12 – FY15 Dollars and FTE



# Opportunities for a Systems Solution

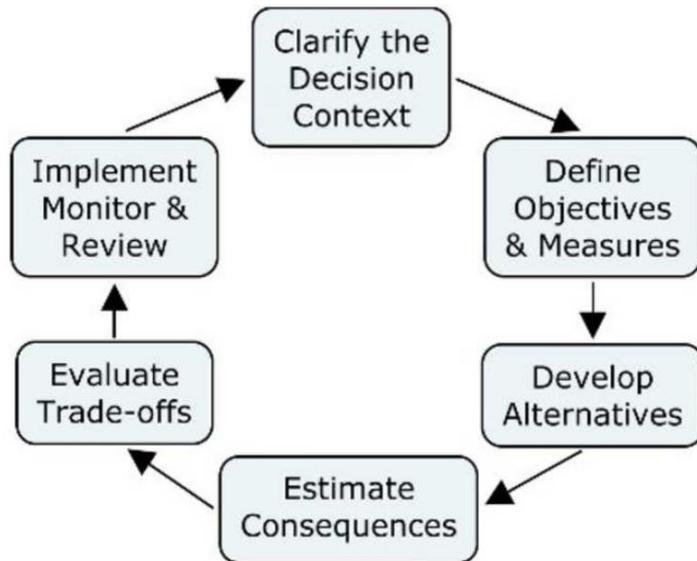
1. **Generalizability:** Develop approaches and tools that can be generalized to the broad range of community types for the broad range of environmental decisions made by community stakeholders.

Technology: Interoperability

Categorization, Classification, Typology

Structured Decision Making

Community values, engagement



2. Provide the **science foundation** for ecological services, environmental public health, and metrics to expand EPA's toolbox so it may complement regulation and compliance assurance to advance sustainability.



Linking the natural and built environments for community environmental public health for high priority health outcomes, holistic well-being, and cumulative risks and impacts.

Making, mapping, and analyzing connections between environmental conditions, natural amenities, EGS, and environmental sustainability for regulatory and non-regulatory support.

Environmental Class + Beneficiary → FECS



Estuaries and Near Shore Marine



Recreational Food Pickers and Gatherers

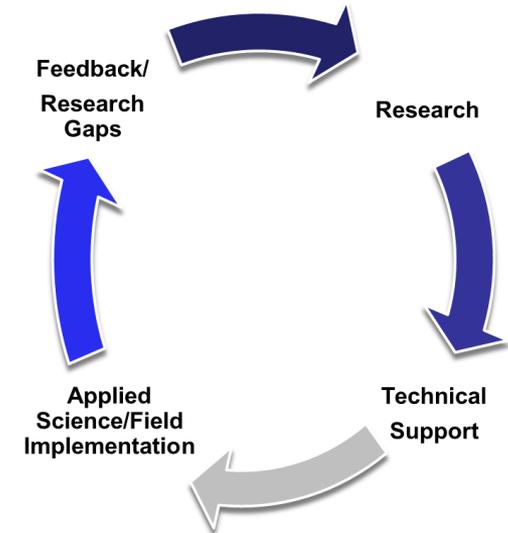
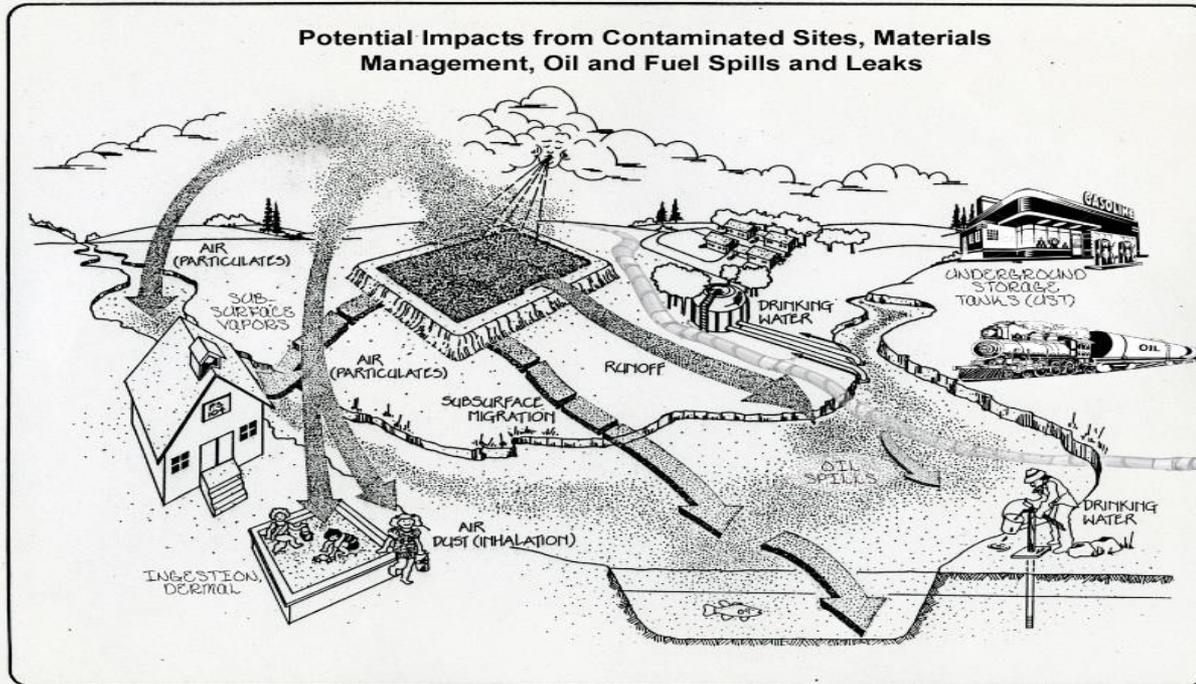


Flora and fauna, such as mussels, seaweed, crabs, etc.

FECS:  
Final  
Ecosystem  
Goods &  
Services

**What do people care about?**

3. **Clean up contamination** and prevent the development of further contaminated sites, work toward greater resource and energy efficiency, and build the capacity of communities to attain their goals with respect to Brownfields



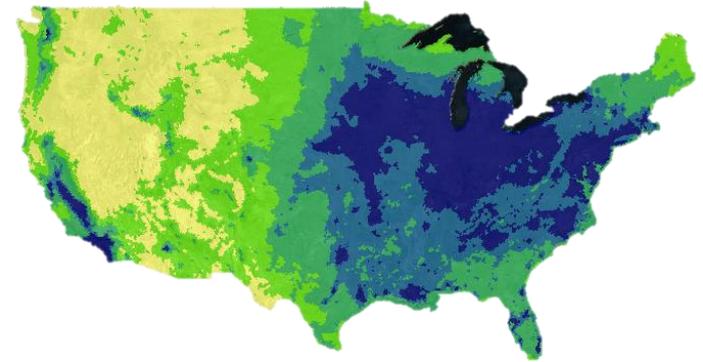
Science and technical support: Greater efficiency and effectiveness in addressing contaminated sediments, land, groundwater, and vapor intrusion

Approaches to expedite Brownfield remediation → restoration → revitalization

Resource and decision alternatives based on life cycle analysis and sustainable materials management

Prevention and preparation for environmental releases of oils and fuels

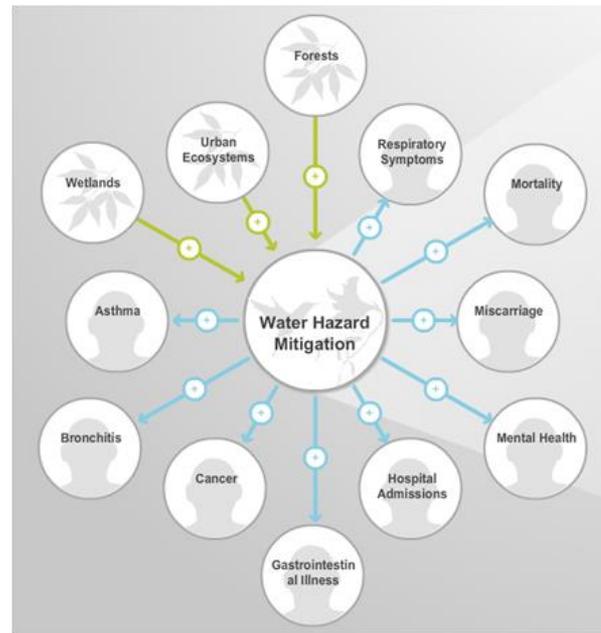
4. **Integrated Solutions** for Sustainable Outcomes: Build systems-level understanding into an approach that supports decisions that have long-term, broad and beneficial impact on community environmental quality, health and well-being, and economic resilience



Total annual N deposition



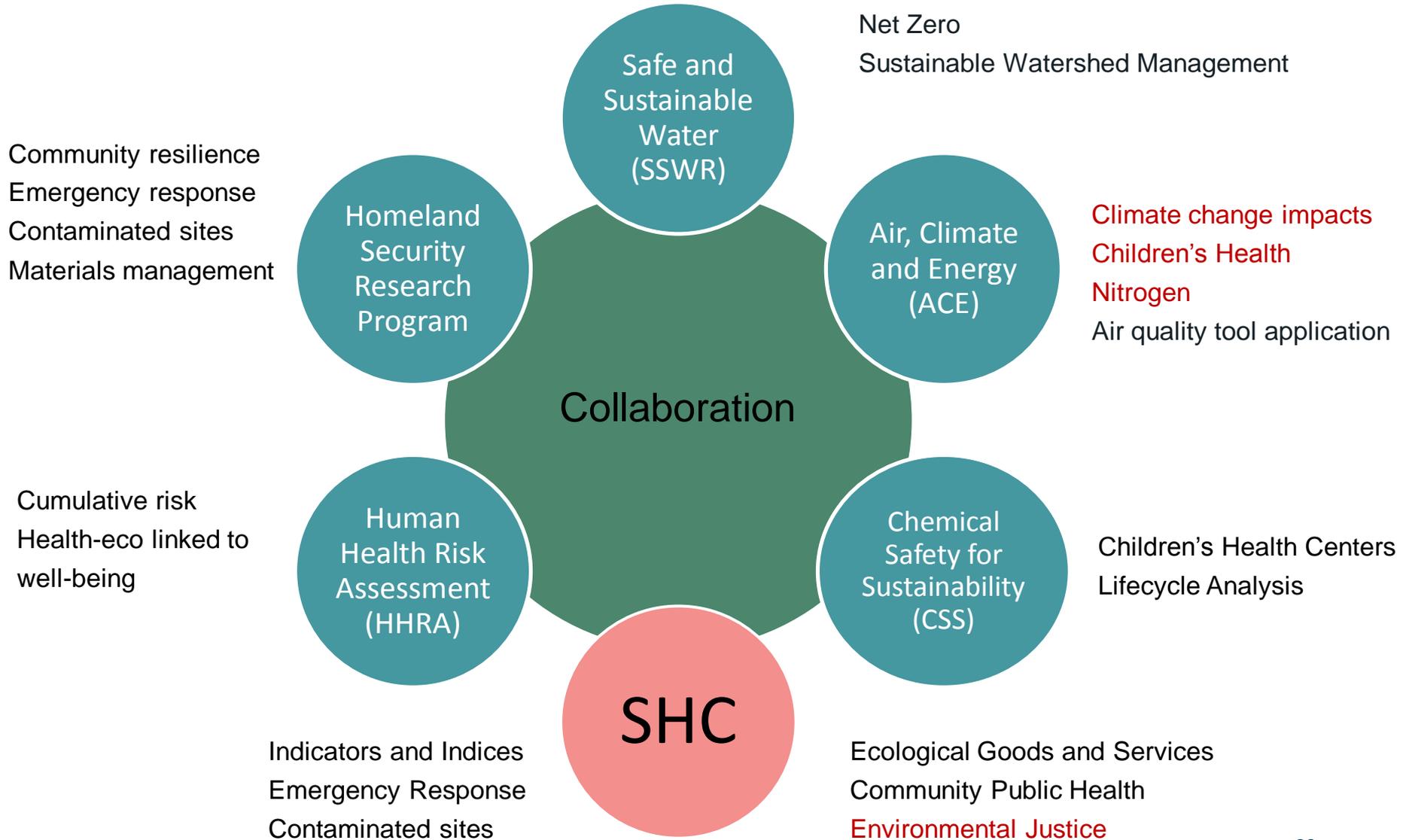
EnviroAtlas



Eco-Health Browser

Combine assessment of human health impacts, environmental impacts, and economic impacts into a process for evaluating the full set of costs, benefits, tradeoffs, and synergies associated with decisions that affect community sustainability

# SHC Interactions



Thank you for your advice

