

Sustainable and Healthy Communities

Strategic Research Action Plan, 2016-2019 Preliminary Draft

U.S. EPA
Office of Research and Development
Washington, DC 20460

PRELIMINARY DRAFT NOTICE: This Strategic Research Action Plan, 2016–2019 is a preliminary draft. It has not been formally released by the U.S. Environmental Protection Agency (EPA) and should not at this stage be construed to represent Agency policy, nor the final research program.

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I. Executive Summary

TO BE COMPLETED IN FINAL STRATEGIC RESEARCH ACTION PLAN

II. Introduction

How do we meet today's needs without compromising the ability of future generations to meet their needs? And more specifically, how can we take action to protect our shared environment—air, water, land, and ecosystems—in ways that are economically viable, beneficial to human health and well-being, and socially just in the long-term?

EPA's Sustainable and Healthy Communities research program is working to provide the knowledge, data, and tools needed to answer those questions. The program is expressly focused on providing the information that EPA Program and Regional Offices and U.S. communities seek to develop and advance sustainable practices.

Under the Sustainable and Healthy Communities research program, Agency scientist and engineers are working to better understand the three pillars of sustainability: environment, society, and economy. Their transdisciplinary work is developing decision tools, models, and other resources that local communities need to make strategic, informed, and long-term decisions to achieve a prosperous and sustainable future.

To support that program, EPA produced this *Sustainable and Health Communities Strategic Research Action Plan, 2016-2019*. It was developed using considerable input and support from partnerships within EPA program offices and regions, as well as from outside stakeholders such as sister federal agencies, nonprofit organizations, private industry, and colleagues across the scientific community. The plan builds upon and continues to advance the research outlined in the action plan released in June 2012: *Sustainable and Healthy Communities Strategic Research Action Plan 2012-2016*.

EPA's strategic research action plans lay the foundation for EPA's research staff and their partners to provide focused research efforts that meet the Agency's legislative mandates, as well as the goals outlined in the Agency's *Fiscal Year 2014 – 2018 EPA Strategic Plan*. They are designed to guide an ambitious research portfolio that at once delivers the science and engineering solutions the Agency needs to meet such priorities, while also cultivating a new paradigm for efficient, innovative, and responsive government and government-sponsored environmental and human health research.

This *Strategic Research Action Plan* outlines the approach designed to achieve EPA's objectives for sustainable and healthy communities research. It highlights how the Sustainable and Healthy Communities research program integrates efforts with other research programs across EPA's Office of Research and Development (ORD) to provide a seamless and efficient overall research portfolio aligned around the central and unifying concept of sustainability.

The Office of Research and Development (ORD) is the science arm of the U.S. Environmental Protection Agency. No other research organization in the world matches the diversity and breadth represented by the collective scientific and engineering staff of ORD and their grantees and other partners. They are called upon to conduct research to meet the most pressing environmental and related human health challenges facing the nation, and the world.

III. Program Purpose

III.A. Problem Statement

EPA is pursuing a cross-Agency strategy to advance optimized, sustainable environmental, economic and social/health outcomes through Agency decisions and actions, recognizing that the Agency's traditional approaches to risk reduction and pollution control cannot always fully achieve long-term and broad environmental quality and human health and well-being goals¹.

Reaching these goals will require science and focused innovation to support solutions that will advance sustainable outcomes that:

1. Recognize that while many environmental problems are global, national and regional in nature, their impacts are experienced most acutely at the community level – like increased flooding, heat stress, contaminated water supplies, and ozone alerts;
2. Conserve, protect, restore, and improve the supply and quality of natural resources and environmental media (energy, water, materials, ecosystems, land, and air) over the long term to foster and sustain human health and well-being;
3. Align and integrate tools, incentives, and indicators to achieve as many positive outcomes as possible in environmental, economic, and social systems, especially for communities with contaminated sites or that are underserved and overburdened;
4. Consider the full life cycles of multiple natural resources, processes, and pollutants in order to prevent pollution, reduce waste, and create a sustainable future.
5. Will, in many cases, employ systems approaches to identify and assess alternative approaches to more efficiently meet statutory mandates.

III.B. Program Vision

The Sustainable and Healthy Communities Research Program (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.

¹ Fiscal Year 2014-2018 EPA Strategic Plan http://www2.epa.gov/sites/production/files/2014-04/documents/epa_strategic_plan_fy14-18.pdf

SHC is focused on science and tools that provide access to high quality scientific information and guidance that integrate environmental public health and environmental quality, define trade-offs and synergies, and identify potential unintended consequences of actions for decision makers at all levels to support communities in achieving sustainability and regulatory compliance.

IV. Research Supports EPA Priorities and Mandates

IV.A. Statutory and Policy Context [to be expanded in future draft]

SHC research, development, and technical support for EPA’s authorizing legislation and executive orders is illustrated in Figure 1.

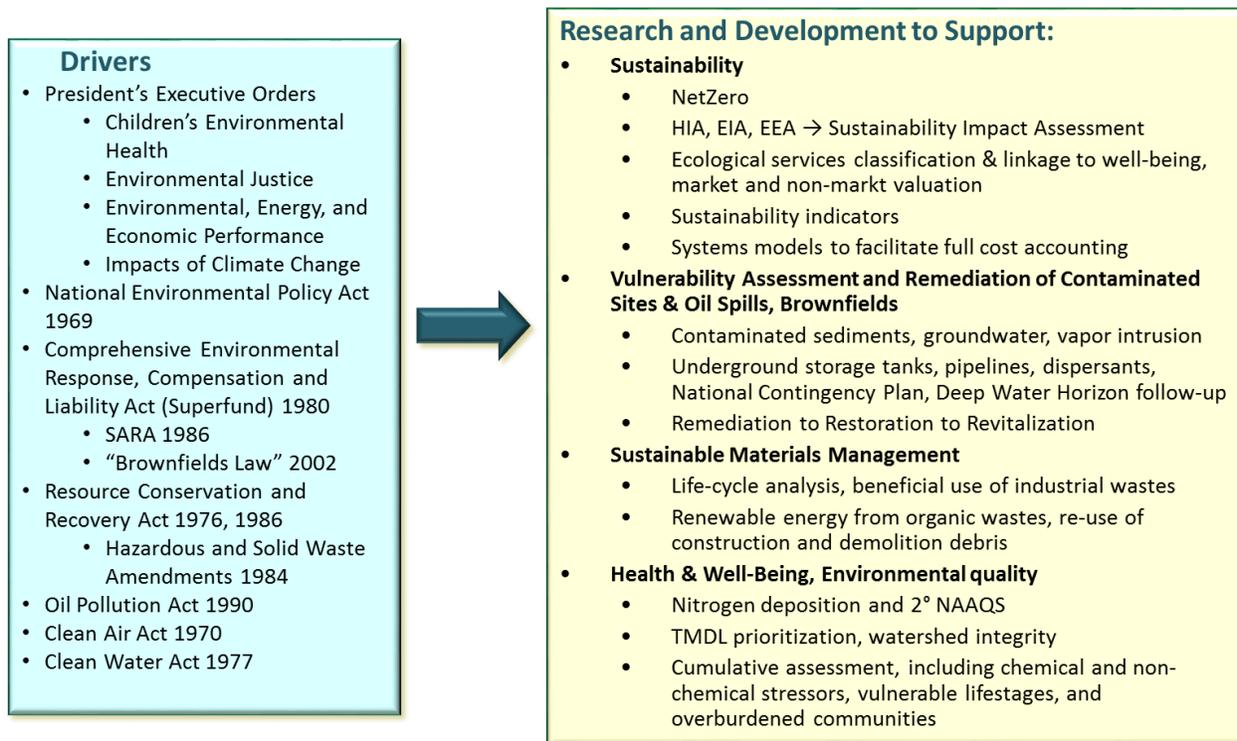


Figure 1. Sustainable and Healthy Communities research program is responsive to EPA’s authorizing legislation and executive orders on the left, with examples, right, to illustrate the scope of SHC activities with respect to these drivers. SARA: Superfund Amendment Reauthorization Act; HIA, EIA, EEA: Health, Environmental, and Economic Impact Assessment; NAAQS: National Ambient Air Quality Standards

IV.B. EPA Priorities

SHC directly supports²:

EPA's Strategic Goal 3: Cleaning up communities and advancing sustainable development

- SHC's research and development program includes technical support and research for near term issues such as cleaning up Superfund sites, remediation, restoration and revitalization of Brownfields, and sustainable materials management.
- SHC's broader efforts are focused on providing decision support based on a systems understanding of the built and natural environments including their influences on human health and well-being to facilitate community sustainability and sustainable development.

EPA Cross-Cutting Strategy: Working Toward a Sustainable Future

- SHC will build a sustainability toolbox to help the EPA to implement the recommendations from the NRC report, "Sustainability and the US EPA,"³ to adopt a comprehensive sustainability framework, focusing on sustainability assessment and management.
- SHC research will help EPA meet its mission in America's communities by developing research-based tools, data, and information access to support sustainable regulatory and non-regulatory approaches.

EPA Cross-cutting Strategy: Working to Make a Visible Difference in Communities

- Science supporting environmental justice, including cumulative risk assessment, identification and spatial mapping of ecological services linked to health impacts and potential health disparities
- Research on vulnerable populations, lifestages, and environmental health disparities
- Development of decision support tools for community stakeholders

EPA Cross-cutting Strategy: Launching a new era of state, tribal, local, and international partnerships

- SHC is collaborating with tribal groups through Science to Achieve Results grants and its intramural research program to directly support tribal environmental science and decision support.
 - Examples of this include the Tribal Well-Being Index, Tribal-Focused Exposure Risk and Sustainability Tool, STAR grants on Science for Sustainable and Healthy Tribes.
- SHC development of standards and guidance for interoperable systems links to the Agency's E-enterprise initiative

² Strategic Goal 3 and Cross-cutting Strategies are drawn from EPA Strategic Plan, *ibid*.

³ NRC, 2011. Sustainability and the US EPA. Washington DC: National Academies Press.

- Research-based tools and databases provide relevant, robust, and transparent scientific data to support Agency, state, and local policy and decision-making needs.

V. Research Objectives

1: Decision Support and Innovation

Research Objective: To assist community stakeholders in decision-making,⁴ develop methods and tools of decision science, interactive social media, spatial analysis, and sustainability assessment. These tools will be useful to frame their decisions, increasing community-engagement, holistic problem formulation, issue prioritization, and identification of solution alternatives.

Science Challenges:

Developing 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.

How does SHC provide science-based decision support to the broad range of community sizes, demographics, locations, and cultures in America?

How can information pertinent to community sustainability-relevant decisions be effectively captured and conveyed to decision makers, including information about the communities themselves, ecosystems goods and services, and changing environmental, economic and social conditions within communities?

How can community characterization, typology, ecosystem beneficiaries, and understanding about decision processes be used to tailor assessment and decision tools to widely-shared or disparate needs?

What are effective methods for framing community decisions about sustainability?

2: Community well-being: Public Health and Ecosystem Goods & Services

Research Objective: Provide scientific knowledge of ecosystem services and human health to enable community stakeholders to better assess and predict the interactions between the natural and built environment, and to promote individual and community well-being, maintain or restore high environmental quality, and apply community sustainability metrics.

Science Challenges:

⁴ SHC uses the term “Community stakeholders” as an umbrella term to include parties inside and outside of the EPA whose decisions have an impact on or who have a vested interest in communities.

Providing the science foundation on ecological services, environmental public health, and metrics to expand EPA’s toolbox so it may complement regulation and compliance assurance to advance sustainability.

How can case studies demonstrating transfer from one location or scenario to others of final ecosystem goods and services production functions and identification of beneficiaries inform future decisions affecting community sustainability?

How do the impacts of social, economic and environmental drivers, particularly climate change impacts, on final ecosystem goods and services affect community decisions about sustainability?

How can we reach a better understanding of the impact of changes to the built and natural environment on community public health help to inform community decisions about sustainability?

What is the impact of social, economic, and environmental drivers on community public health, and how can this understanding be incorporated into decisions about sustainability?

How can case studies assessing environmental health disparities in vulnerable groups, including children, better ensure the inclusion of critical environmental public health information in future community decisions on sustainability?

How are linkages between ecosystem goods and services (EGS) and human health and well-being identified and integrated for use in risk or health impact assessments and community decisions? How are the impacts from these linkages informed by actionable science?

3: Sustainable Approaches for Contaminated Sites and Material Management

Research Objective: SHC will provide the science needed for community stakeholders to improve the efficiency and effectiveness of addressing contaminated sediments, land, groundwater, and vapor intrusion and to enhance sustainable materials management, thus supporting goals with respect to community public health, clean water, restoration and revitalization of Brownfields sites, and better management of materials.

Science Challenges:

For communities with contaminated sites, the first step toward sustainability is often remediation of contaminated ground water, soils, sediments, and the resulting vapor intrusion into human living spaces. SHC’s challenge is to provide the science and technical support to prevent the development of further contaminated sites through alternatives based on life cycle analysis and sustainable materials management, work toward greater resource and energy efficiency, and expedite the trajectory from remediation to restoration to revitalization.

What is the state-of-the-practice and associated performance of remediation strategies to manage contaminated sites that can inform future remediation strategies?

What methods can be developed or applied to assess contaminated sites and to measure the short-and long-term effectiveness of remediation?

How can we best determine the temporal and spatial impacts of materials management on public health and the environment, including climate change?

How can materials be reduced, reused, recycled and disposed or managed in order to conserve land; minimize contamination of land; minimize emissions to air, land, and water; and yield equitable co-benefits throughout a community?

4: Integrated Solutions for Sustainable Communities

Research Objective: SHC will provide community stakeholders with a systems approach to identify actions that are based on a full accounting of the costs, benefits, tradeoffs, and synergies among social (including public health), economic, and environmental outcomes of alternative decisions, especially for common community actions that have significant potential to impact community sustainability.

Science Challenges:

Link research from SHC objectives 1-3 to 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 (Figure 2). This challenge corresponds with that presented by the National Research Council: Build “a ‘sustainability toolbox’ that includes a suite of tools for use in the Sustainability Assessment and Management approach. Collectively, the suite of tools should have the ability to analyze present and future consequences of alternative decision options on the full range of social, environmental, and economic indicators. Application of these tools, ranging from simple to complex, should have the capability for showing distributional impacts of alternative options with particular reference to vulnerable or disadvantaged groups and ecosystems.”⁵

⁵ NRC 2011, *ibid.*

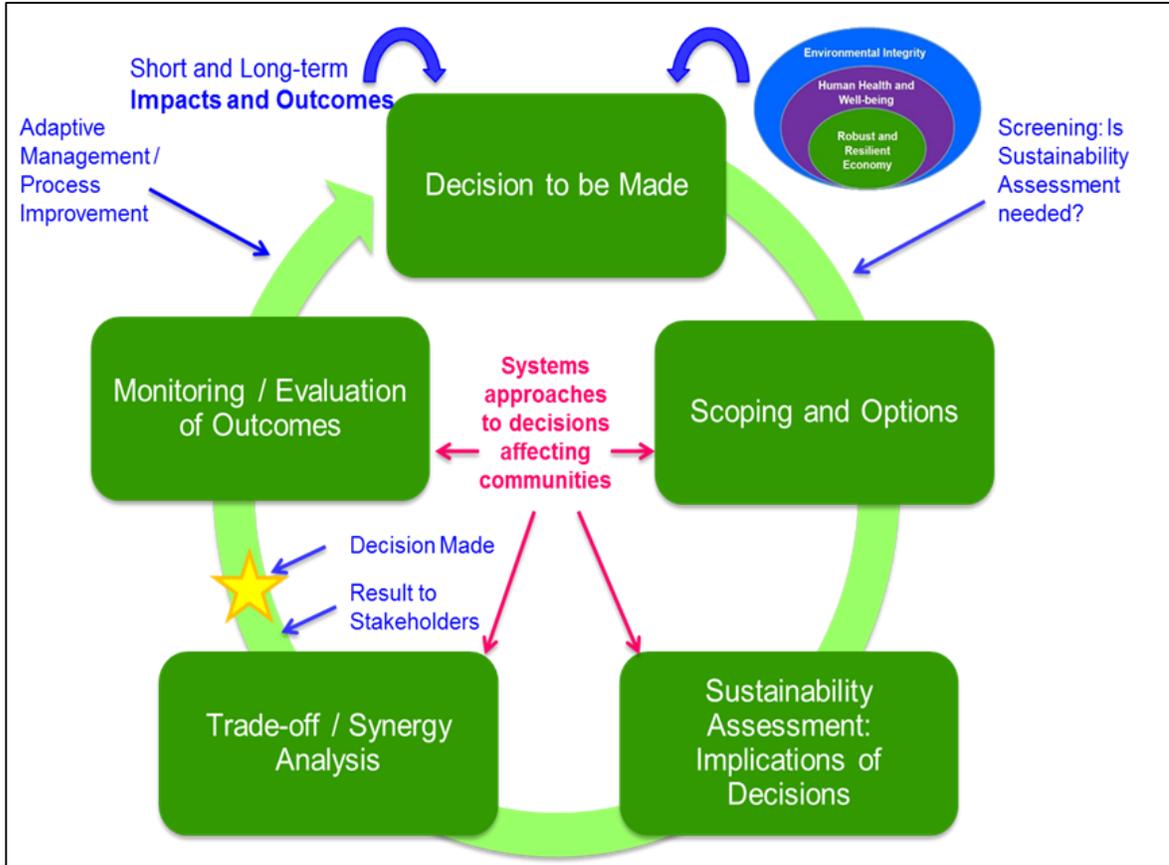


Figure 2. Sustainability Assessment and Management cycle for integrated solutions. SHC research and development from all of its objectives feed into this cycle. SHC’s goal is to expand community stakeholders’ capabilities to consider impacts of decision alternatives.

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

How can communities and community stakeholders holistically evaluate their alternatives for common actions such as (but not limited to) decisions on land use, transit, buildings and infrastructure, and waste management to optimize economic, societal, ecological, and human health outcomes (minimizing adverse impacts and costs, while maximizing co-benefits, in the short and long terms)?

VI. Anticipated Research Accomplishments

Evaluation of the effectiveness of using systems approaches in community decision making for sustainable outcomes.

Develop the Community Sustainability Analysis System, a web-based information portal to help understand and analyze sustainability options for communities.

Develop methods for cumulative, integrated assessments of chemical and non-chemical stressors and pilot application of these assessments to reduce community environmental health risks (e.g., childhood lead exposure, asthma and mold) and promote community health and well-being.

Scientific support for addressing US EPA environmental justice goals, including understanding biological, social, spatial and environmental factors associated with vulnerable populations in affected communities and developing decision support tools, information, mitigation and prevention strategies for EPA and community decision-making.

Report on the Environment – 2017 with Interpretation of Trends

EnviroAtlas that allows for community-scale visualization, analysis, and valuation of ecosystem service demand, supply, and beneficiaries as defined by an internationally recognized and accepted final ecosystem goods and services classification system. The EnviroAtlas also contains the Ecosystem Services Production Function Library and an Ecological Production Function Transferability Tool to allow for the calculation and user-uploaded mapping of local-scale ecosystem goods and services for decision-support on community and regional scale issues; and alternative futures tools to consider industrial, community and regional-level planning decisions and decisions affecting climate change vulnerability and preparedness.

Total Resources Input and Outcomes (TRIO) is SHC's sustainability assessment and management toolbox (see Figure 2). It provides an integrated suite of 1) sector-based impact assessment tools (Health Impact Assessment, Environmental Impact Assessment, Economic Impact Assessment); 2) integrated assessment tools (Life Cycle Assessment, ecological risk assessment, cumulative risk assessment) 3) spatially-explicit scenario analysis tools covering environmental, economic, and social changes; 4) holistic system dynamics models; 5) and processes for structured decision-making.

Applications of TRIO toolbox to community-based case studies to demonstrate, evaluate, and refine this family of approaches.

Development of new methods for characterizing and remediating contaminated ground water, vapor intrusion, and sediments impacted by singly- and multiply-contaminated sites to improve community public health and their resources and facilitate revitalization.

Tools for evaluating temporal and spatial impacts of fuels/oils site cleanup on public health and the environment, for use in site remediation, restoration and revitalization.

Evaluation of sustainable materials management options for industrial, construction/demolition, and municipal materials including reduction, reuse, and recycling/repurposing to protect community public health and the environment.

VII. Program Design

VII.A. Existing Research Program Connection

SHC builds on the Office of Research and Development’s historic strengths in human health, contaminated sites and materials management, and ecosystem services to move toward integrated, systems approaches to achieve community sustainability (Figure 3). The topic areas of SHC 2016-2019 remain similar to those in the earlier StRAP, but the proposed research Outputs are designed to drive greater integration of research and development across SHC and streamline communication of the program (see Appendix 2, Summary Tables). The research objectives, described above, will be implemented through four research Topics that comprise 12 research projects, described below.

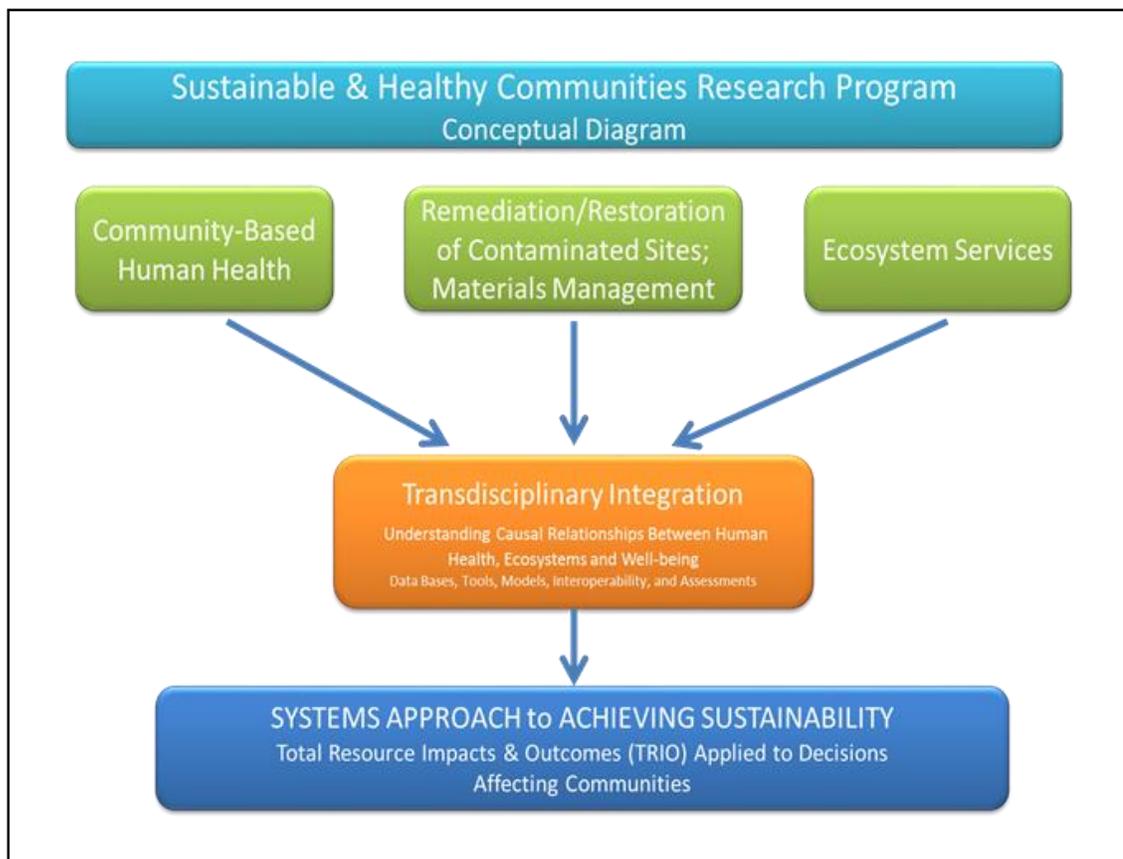


Figure 3. Conceptual integration of components of the SHC Program.

SHC conducts actionable research on problems formulated at the stakeholder level to better understand sustainability drivers and to improve EPA-developed tools.

When possible and practical, SHC will conduct research through participative and collaborative case studies to build on stakeholder expertise and to focus research and development on the end-user.

SHC research will, when possible, include the following design characteristics:

Conduct fundamental research that is translated through the development of generalizable tools used to support decisions that support sustainability.

Consider the inextricable link between the natural environment, the built environment, and human well-being.

Employ systems thinking in order to avoid unintended consequences and maximize valuable co-benefits.

Focus on preventative strategies that optimize management of multiple chemical, material, and energy streams in order to achieve the most environmental benefit, economic resilience, and promote health and well-being.

VII.B. Producing an Integrated Program

SHC is a full partner in ORD's cross-cutting research roadmaps: Children's Environmental Health, Nitrogen, Climate Change, and Environmental Justice.

SHC additional interactions across the National Research Programs include:

1. CSS – Children's environmental health; Life cycle analysis for pre- and post-consumer-use materials management
2. SSWR – NetZero approaches; sustainable watershed management; Integrated nitrogen management
3. HSRP – Development and spatial visualization of community resilience and vulnerability to climate change; Emergency response; Regional Sustainability and Environmental Science (RESES) program
4. ACE – Ecological impacts of atmospheric deposition of nitrogen and co-pollutants; Public health impacts of air pollutants and susceptible populations, especially asthmatics; Development/application of air quality modeling tools; Influence of climate change on public health; Planning tools for transportation networks and ports
5. HHRA – Cumulative risk assessment; Health and ecology linked to well-being

Examples of SHC's collaborations outside of the US EPA include:

- Joint sponsorship of EPA and NIEHS Centers of Excellence in Children's Environmental Public Health, Centers of Excellence in Environmental Health Disparities.
- SHC's EnviroAtlas has been developed with Federal partners (including US Geological Survey, US Forest Service, and USDA Natural Resources Conservation Service), the non-governmental organization Landscape America, and has drawn

from data sources throughout the Federal government, non-governmental organizations, and industry.

- EPA’s Report on the Environment (ROE) has been developed by SHC in partnership with EPA’s Program Offices and other Federal Agencies including CDC, and draws from data sources throughout the Federal government, including USGS, NASA, NOAA, FWS, NPS, USDA, DOI, HHS (CDC&NCI), US Census, BEA, EIA. The ROE also draws extensively from non-federal sources.
- Research on Environmental Release of Oils and Fuels is conducted in collaboration with EPA’s OSWER (Office of Emergency Response and Office of Underground Storage Tanks), Office of Enforcement and Compliance Assurance, Office of Water, Regions 1-10. Additional collaborations include Federal Agencies: NOAA, US Coast Guard, DOI, USGS; and state and tribal agencies.
- Joint sponsorship of EPA and NIEHS Centers of Excellence in Children’s Environmental Public Health, Centers of Excellence in Environmental Health Disparities.

VII.C. Partner and Stakeholder Involvement

SHC meets regularly with representatives of EPA Offices, including OSWER, OW, OAR (OAQPS, ORIA, OTAQ), OCHP, OEJ, EPA’s Regions, and OSC, to provide research updates and collect information on stakeholder research needs and ORD’s response to these needs. These meetings are both plenary, with multiple program and regional offices, and separate, with specific Program Office or Regional Office representatives (Regional Science Liaisons), or working groups within Program Offices, e.g., OSWER – Community Engagement; Groundwater; Underground Storage Tanks.

In addition, SHC Project development teams have engaged directly with Program and Regional Office partners in the development of Project planning documents.

SHC supports ORD collaborations with Regional partners by supporting research in the Regional Applied Research Effort (RARE) and Regional Research Partnership Program (R2P2).

SHC directly funds Regional partners in collaborations through SHC’s Regional Sustainability and Environmental Science (RESES) Program to support transdisciplinary development of SHC’s research and tools while addressing high priority regional needs.

VIII. Research Topics

Sustainable and Healthy Communities Research Program is organized in four main topics as described by the Research Objectives and Challenges above. The descriptions below contains the proposed projects associated with each topic and the focus areas of each proposed project. These focus areas and their connections to SHC Strategic Outputs are summarized in the series of schematics in Appendix 1 (N.B.: Numbering reflects EPA accounting system.)

Topic 1: Decision Support and Innovation

Project 1.61 Decision Science and Support Tools

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- a) *Decision-focused Design and Use of Tools* – Integrating current and future knowledge of group/organizational decision-making, community typology, and user decision needs into the design, identification, and application of tools by communities
- b) *Software Re-Configuration for Community-based Use* – Devising novel re-combinations of existing software and interaction platforms serving community needs for data analysis, sustainability assessments, and decision-making
- c) *Evolved Tool Development, Support, and Delivery* – Working through Agency and community partnerships to identify new areas for tool development, capitalizing on emerging support infrastructure, and providing user-defined search and delivery mechanisms

Project 1.62 EnviroAtlas

- a) *Research and development leading to improved functionality and user experience* – Crosswalk ecosystem service indicators and indices from EnviroAtlas, EPA Final Ecosystem Goods and Services-Classification System, and National Ecosystem Services Classification System; Real-world applications
- b) *Research and development of new tools and data layers* – Development of nationally-consistent data layers for tracking of local to national community conditions; Development of data for community scale metrics
- c) *Communication and outreach* – Development of publications, such as journal articles, to support the dissemination of EnviroAtlas data, in addition to presentations and workshops to inform governmental agencies, academia, professional groups, Tribes, and other end users and stakeholders

Project 1.63 Environmental Innovation and Sustainable Education

- a) *Fellowships* – STEM competence through the Greater Research Opportunities and Science to Achieve Results Fellowships to defray costs associated with advanced, environmentally-oriented study, leading to a bachelor's, master's or doctoral degree
- b) *People, Prosperity, Planet (P3)* – Innovative student design competition for sustainability and to move ideas toward demonstration or the marketplace
- c) *Small Business Innovation Research (SBIR)* – Awards to small, high-tech companies to help develop and commercialize cutting-edge environmental technologies

Topic 2: Community well-being – Public Health and Ecosystem Goods & Services

Project 2.61 Community-Based Final Ecosystem Goods & Services

- a) *Final Ecosystem Goods and Services (FEGS)* – Quantifying the linkages between the production of ecosystem goods and services to changes in human health and other measures of human well-being

- b) *Benefits of FEGS* – Identifying how the supply and benefits of FEGS are delivered to different sectors of a community’s populace (including vulnerable populations)
- c) *Climate/Stressors* – Quantifying the effects of climate change and co-occurring stressors on the production, delivery and benefits of FEGS to the populace within communities, with particular attention to human health endpoints
- d) *Coordinated Case Studies* – Advancing the development (including the utility) and application of transferable and scalable conceptual frameworks, mathematical models, assessment methods, metrics and indicators relating to the identification, sustainable production and delivery, demand and benefits of a core group of community-relevant FEGS under a coordinated case studies umbrella

Project 2.62 Community Public Health & Well-being

- a) *Community engagement and assessment tools for sustainable decision- making* – Refinement, development, and enhancement of EPA tools and community engagement resources to help communities and tribes use their limited resources to identify and prioritize risks based on scientific data and analyses balanced with expert community knowledge
- b) *Environmental drivers of community health and well-being* – Research to improve the understanding of causal relationships between community health and well-being, ecosystem goods and services and community environmental (including non-chemical) stressors and conditions
- c) *Improving community health, well-being and exposure assessments* – Activities to provide improved data and access to health and exposure data, inform and ground-truth existing SHC tools, as well as explore innovative approaches to better understand and assess environmentally driven community health and well-being conditions
- d) *Cross-cutting research* – Research which is included in ORD’s cross-cutting research programs on climate change, environmental justice, and children’s environmental health

Project 2.63 Assessing Environmental Health Disparities in Vulnerable Groups

- a) *Children’s environmental health* – Susceptibility and vulnerability associated with early life exposures that contribute to health impacts both early and later in life
- b) *Disproportionately impacted communities* – Influence of social and economic factors as modifiers of environmental exposures and associated responses to chemical contaminants, including resiliency at the individual and community levels
- c) *Tribal research* – Examine the influence of cultural factors and beliefs that impact environmental quality, health outcomes, and sustainability and incorporate these into tribal decision support tools.

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These focal areas are aligned with and address problems defined in ORD's Children's Environmental Health and Environmental Justice Research Roadmaps (under development) which are based on drivers defined by Agency regulatory requirements and stakeholder priorities.

Project 2.64 Indicators, Indices and the Report on the Environment

- a) *Synthesis* – Assist communities in assessing the sustainability of decision options through communication to EPA program offices and regions, researchers and community stakeholders, the current state of practice for environmental indicators in sustainability research and identify research needed to fill information gaps
- b) *Indicators of Ecological and Community Resilience* – Advance the field of resilience science by exploring the interdependence of human and natural systems to inform TRIO approaches for community sustainability planning
- c) *Interpreting environmental conditions in terms of ecological relevance, public health outcomes, and well-being endpoints* – Utilize holistic approaches for assessing human health and well-being in the interpretation of changes in environmental conditions for evaluating the utility of full suites of indicators in the ROE, SHC decision support tools and TRIO approaches
- d) *Report on the Environment (ROE)* – Evolve the ROE program in both form and substance to meet changing programmatic needs, to respond to new scientific information and to incorporate new indicators researched and developed by SHC and other National Research Program staff in collaboration with EPA program offices
- e) *Utility of indicators for SHC tools* – Evaluate current and new indicators for appropriate application in decision support tools (includes meeting inclusion criteria for SHC tools)

Topic 3: Sustainable Approaches for Contaminated Sites and Materials Management

Project 3.61 Contaminated Sites

- a) *Technical support for ground water, engineering, site characterization/monitoring, soils, sediments, and vapor intrusion* – Provide technical support to EPA's Regions and report on best practices, providing an assessment of methods to address contamination by media and of remediation strategies for major site types, including support for remedial project managers through development of technology transfer products
- b) *Research on characterization, remediation and site management for contaminated ground water, site characterization/monitoring, sediments and vapor intrusion* – Technical support and research on site characterization, remediation, and site management to support redevelopment and reuse, including broader community revitalization efforts

- c) *Research on the evaluation of temporal and spatial impacts of contaminated sites with an emphasis on community water supplies* – Provide tools to determine the temporal and spatial impacts of contaminated sites on community public health, including impacts to community drinking water quality and quantity from contaminated ground water and reuse of sites

Project 3.62 Environmental Releases of Oils and Fuels

- a) *Oil spill science and response* – Spill preparation via product testing protocols and sophisticated spill response options, including sustainability dimensions of competing actions
- b) *Leaking underground storage tank (LUST) science and management* – Understanding, modeling, and remediating contaminant plumes resulting from leaks from underground storage tanks, and their impacts on buildings and water supplies, both private and public
- c) *Community public health and ecosystems* – Translation of Oil Spill and LUST research into spatial and other tools to improve decision-making for sustaining environmental and public health

Project 3.63 Sustainable Materials Management

- a) *Life Cycle Management of Materials* – The long term goal is to assist stakeholders in decision making and implementation of effective and affordable materials management strategies at the product level to advance community sustainability, fostering improved public health and economic stewardship of resources
- b) *Organics and Materials Reuse* –Data, reports and tools for communities and regulatory officials to evaluate options for sustainable materials management at the national and local level
- c) *Regulatory Support* – Translate SHC science through Strategies for Sustainable Materials Management and provide technical support to the OSWER and other Agency stakeholders for decision-making

Topic 4: Integrated Solutions for Sustainable Communities

Project 4.61 Systems-based Assessment Methods for Community Sustainability

- a) *Evaluation and Refinement of Existing Tools* – Provide for an oversight role on gap analysis, and feedback for improving existing tools supplied from other SHC projects and from academic, private sector, and other sources outside EPA
- b) *Synthesis of Best Practices and Needs that Result in Decision Outcomes that are More Sustainable* – Research to provide methodologies and guidance for communities in the use of sustainability assessment and management cycle (Figure 1) for framing, assessment, and decision-making in order to assist communities in improving sustainability outcomes

- c) *Reconciling Trade-offs and Quantifying Synergies across Multiple Dimensions* – Produce a turnkey method with the appropriate tools to allow the stakeholders of a community to evaluate the net risk/benefits of proposed alternatives and to evaluate the contributions of those alternatives to community sustainability goals
- d) *Net Zero* – Phased, collaborative systems approach in developing, integrating, evaluating, and applying tools in the Net Zero toolbox, extending ongoing efforts with the military and partnering with others in EPA (e.g. SSWR, OW, OSWER, and Regions), other Federal Agencies, and community decision-makers in collaborative community demonstration. NetZero is the US military definition for sustainability, and generally refers to approaches that emphasize linkages between sustainable materials management, water use and treatment, and energy use and recovery

Project 4.62 Application of Systems-based Approaches to Achieve Sustainability

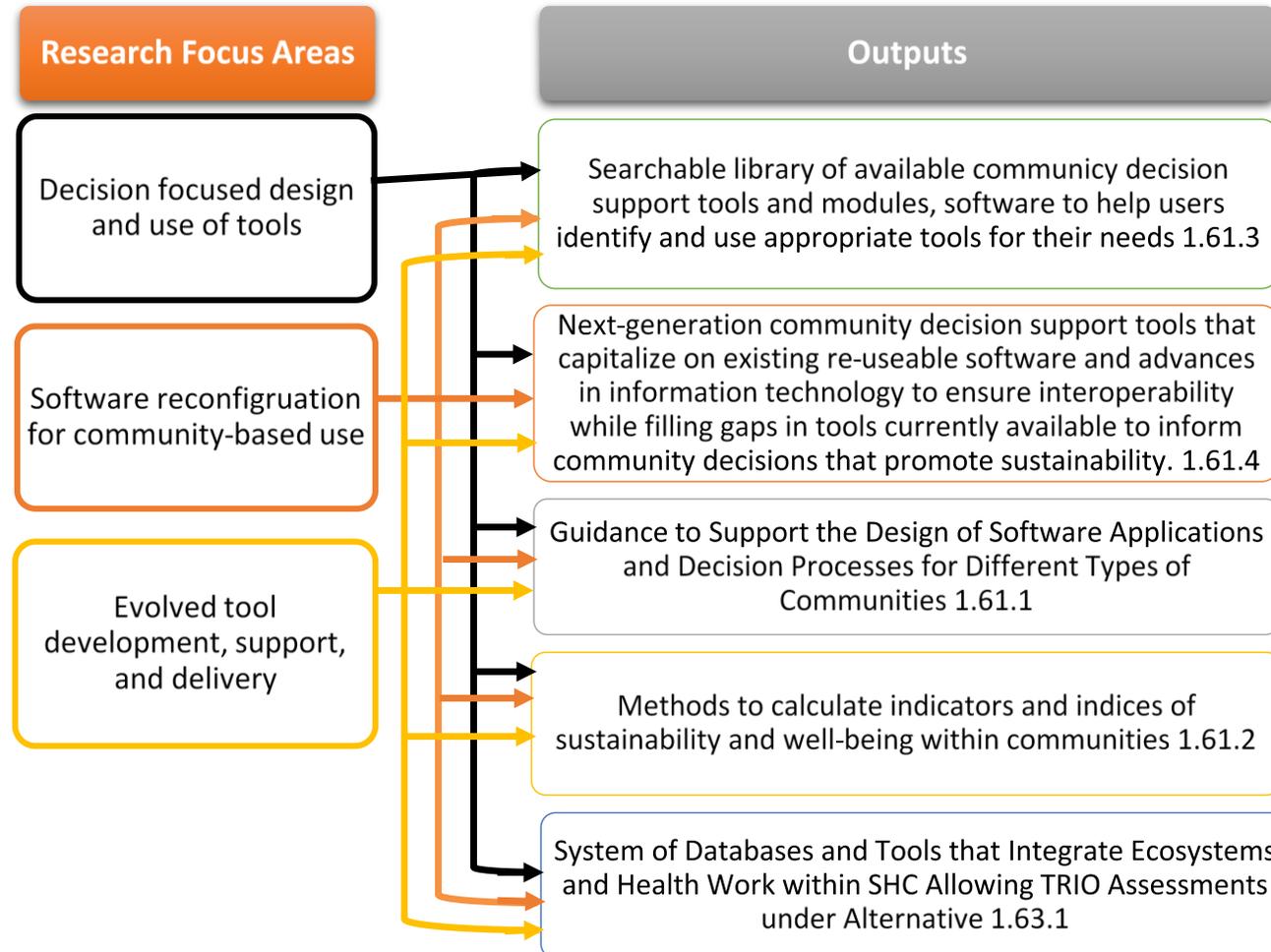
- a) *Integrated Nitrogen Management* – Research to provide and/or apply relevant decision-making approaches to address a range of environmental decision-making, recognizing that the effects of nitrogen on human well-being and ecosystem services interact with other co-pollutants and will provide a basis to more fully capture the positive benefits of nitrogen use while limiting the negative impacts on human health, well-being and ecosystems
- b) *Developing Integrated Approaches to Sustainability* – Research using dynamic systems approaches and modeling to assess the outcomes of community case studies. The project looks at primary and secondary outcomes of decisions including those on land use change, the built environment, green infrastructure and ecological services, and water resources. Outcomes of interest include climate change impacts, air emissions, health & well-being, equity/affordability, jobs, regional GDP, quality of place, public revenues, and open space access
- c) *Sustainable Ports* – A Ports project requiring the integration of existing and planned SHC products to analyze cumulative risk, exposed populations, and the extent to which ecosystem services (or their absence) provides (or fails to) mitigation of stressors and/or access to services that promote well-being
- d) *Sustainable Watershed Management* – Demonstration of SHC’s sustainability assessment approach and its tools to inform communities in their decisions concerning water management integrated at the level of watersheds, addressing all three dimensions of sustainability, considering aspects of community health and well-being and the energy, waste, and materials sectors as they interface with water management

IX. Conclusion

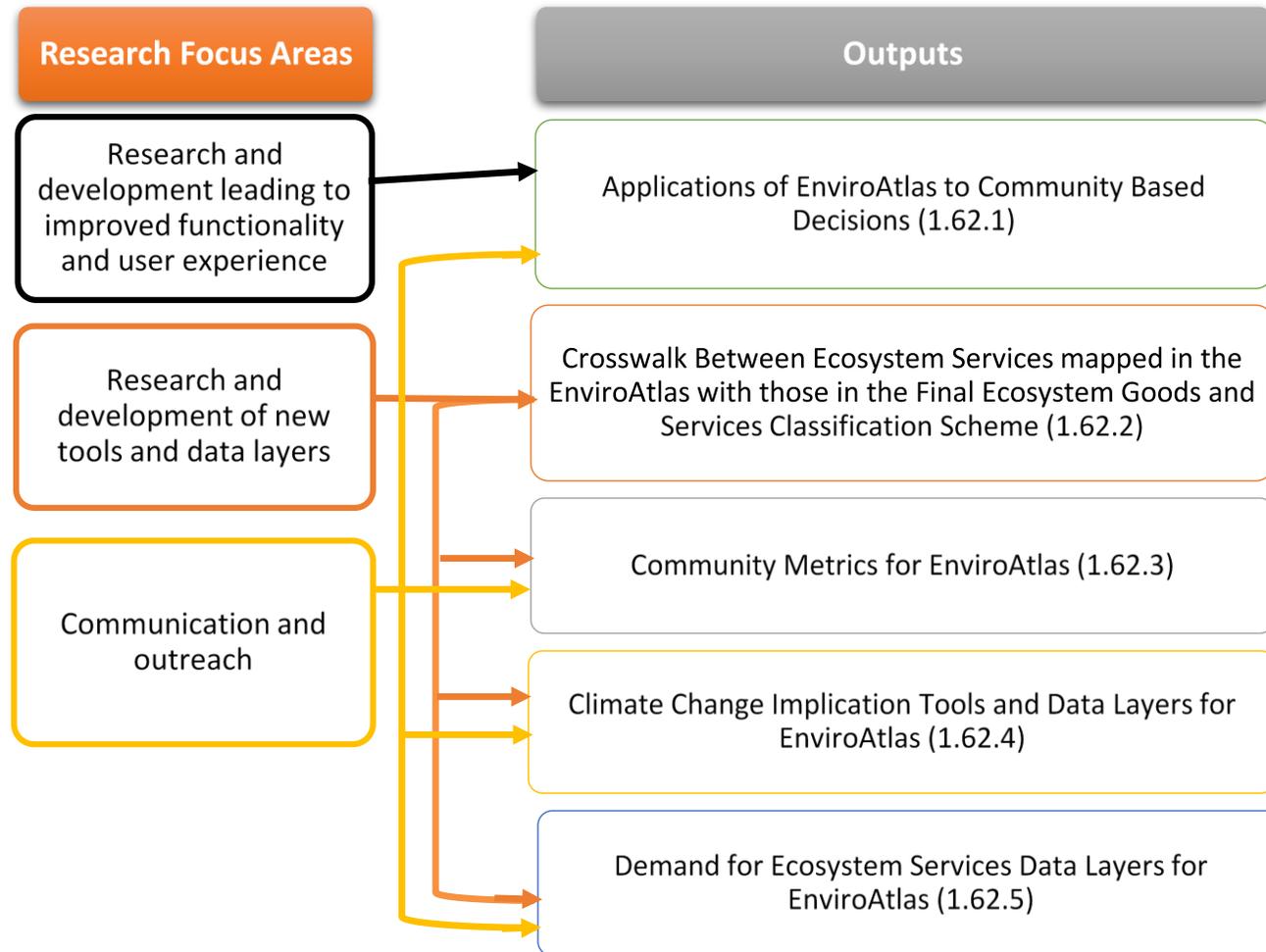
TO BE COMPLETED IN FINAL STRATEGIC RESEARCH ACTION PLAN

Appendix A – Summary Diagrams of Sustainable and Healthy Communities Research Program Project Foci and Strategic Outputs

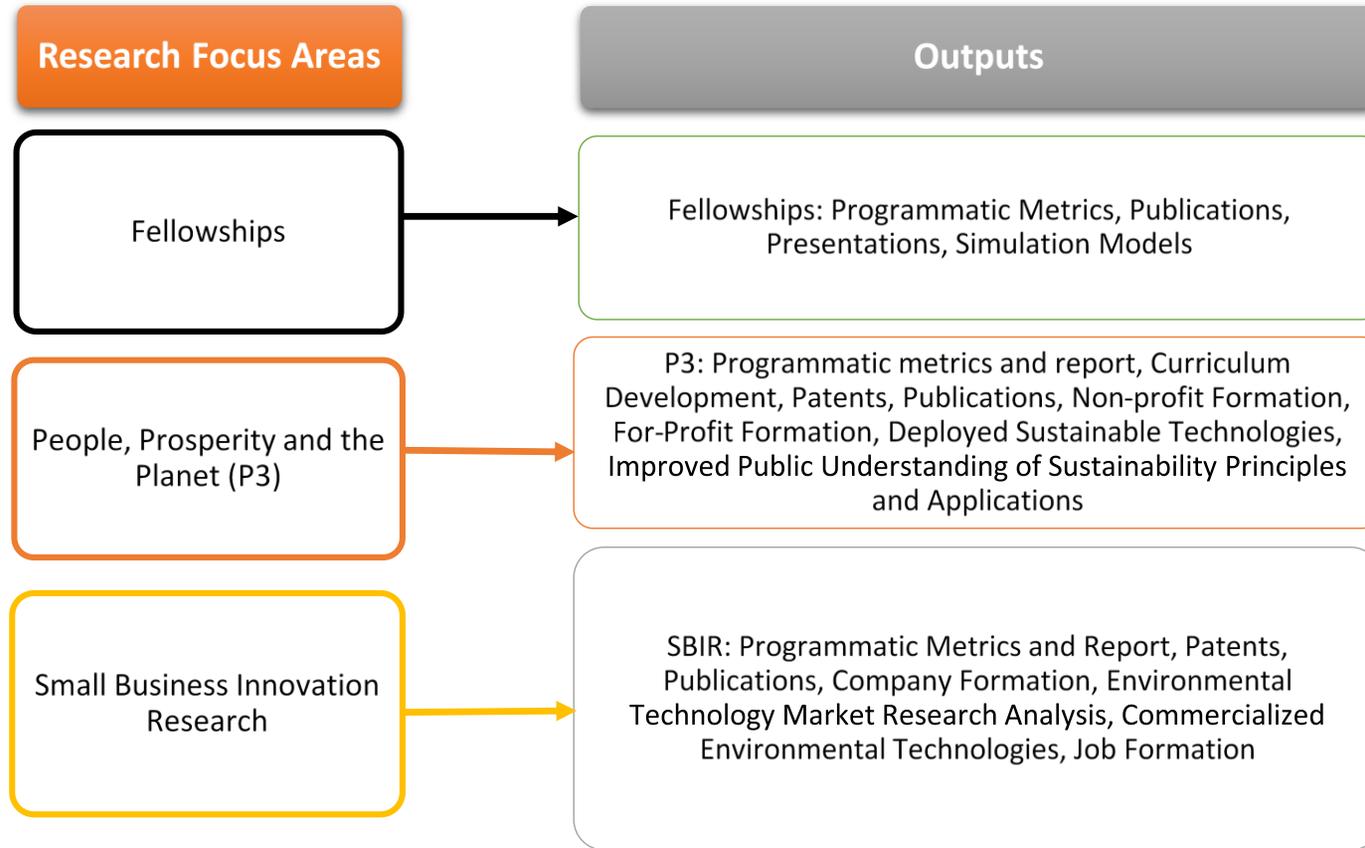
Decision Science and Support Tools: SHC Project 1.61



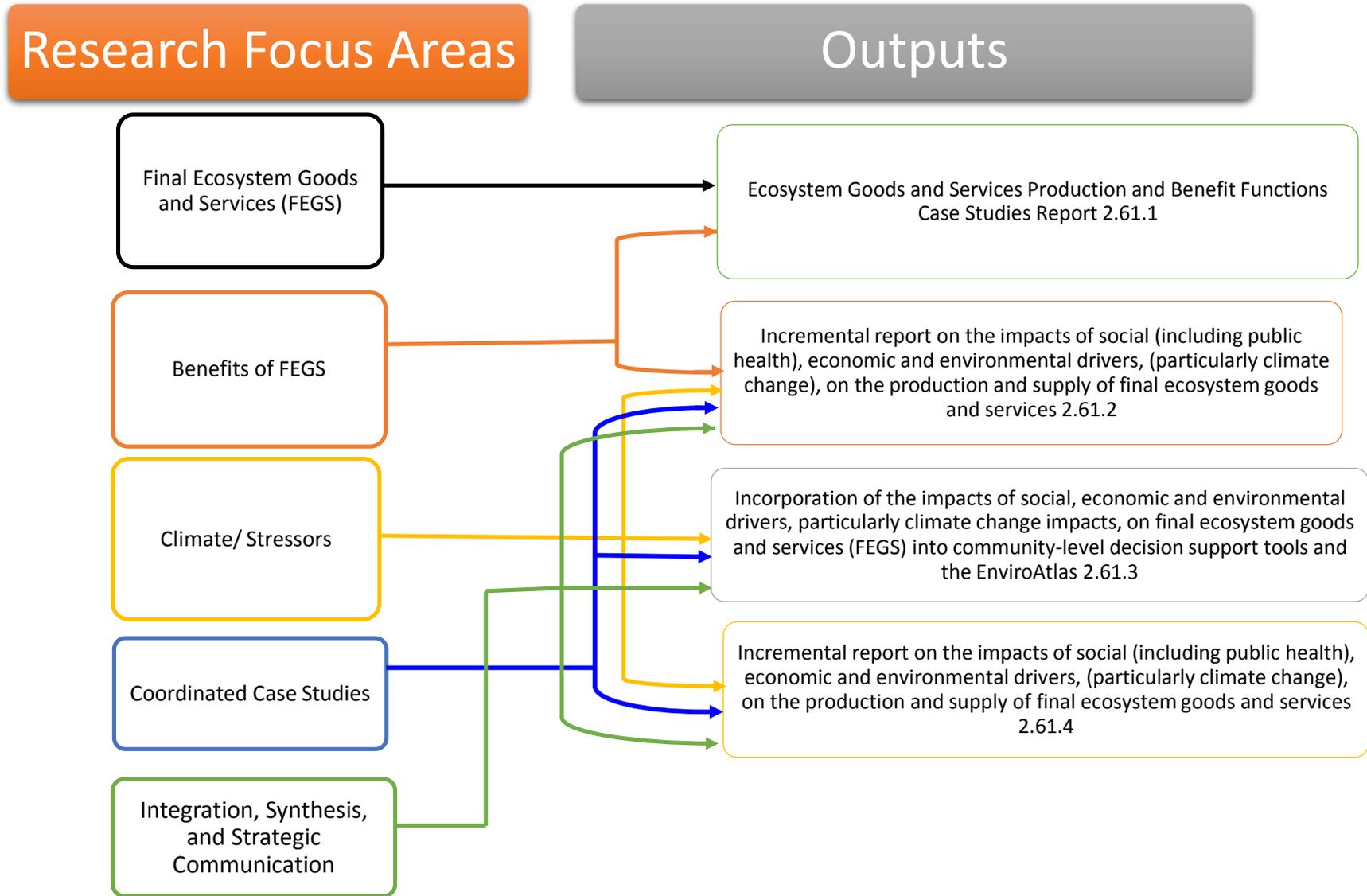
EnviroAtlas: SHC Project 1.62



Environmental Innovation and Sustainable Education (EISE): SHC Project 1.63



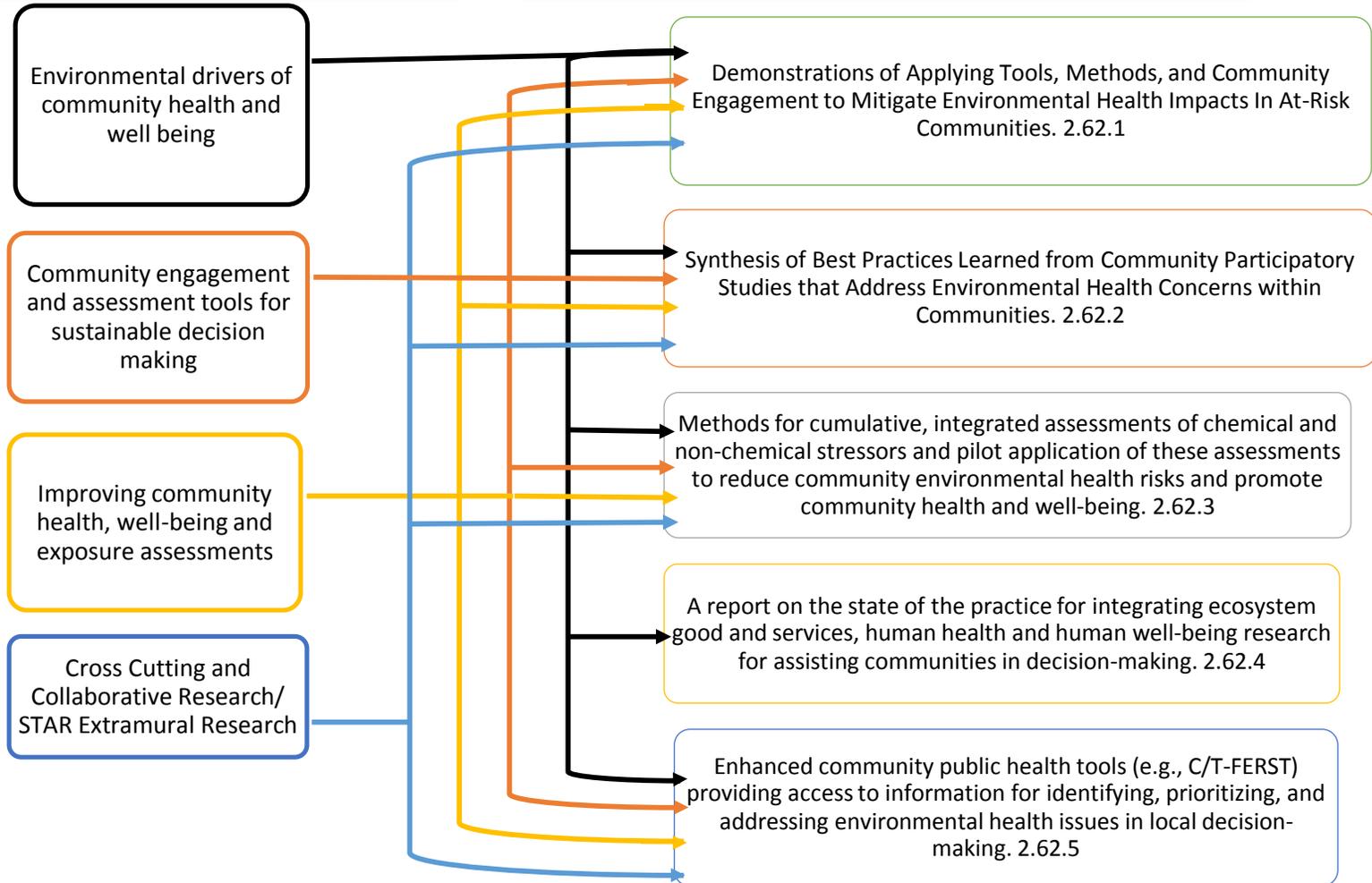
Community Based Final Ecosystem Goods and Services: SHC Project 2.61



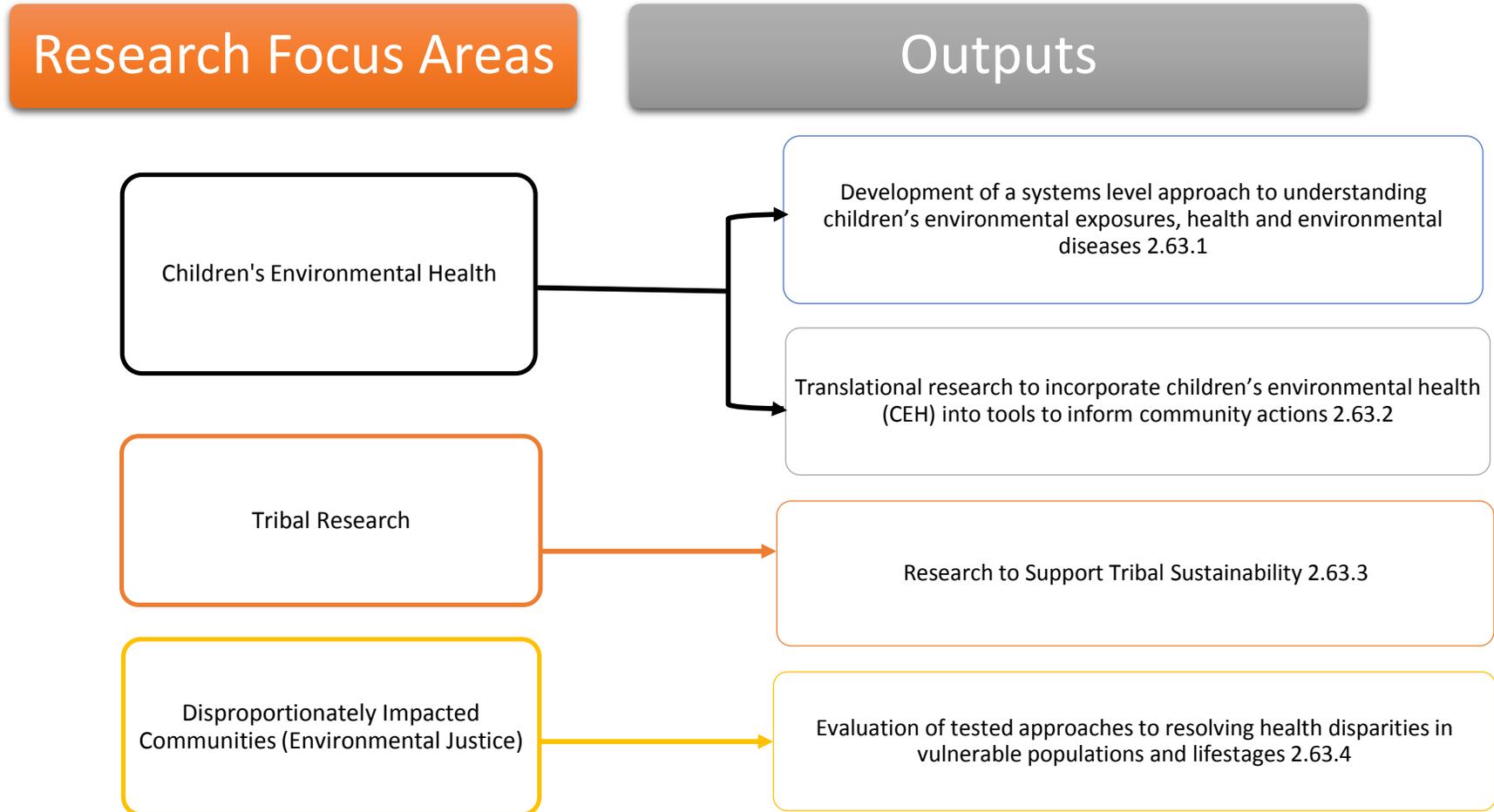
Community Public Health & Well-Being: SHC Project 2.62

Research Focus Areas

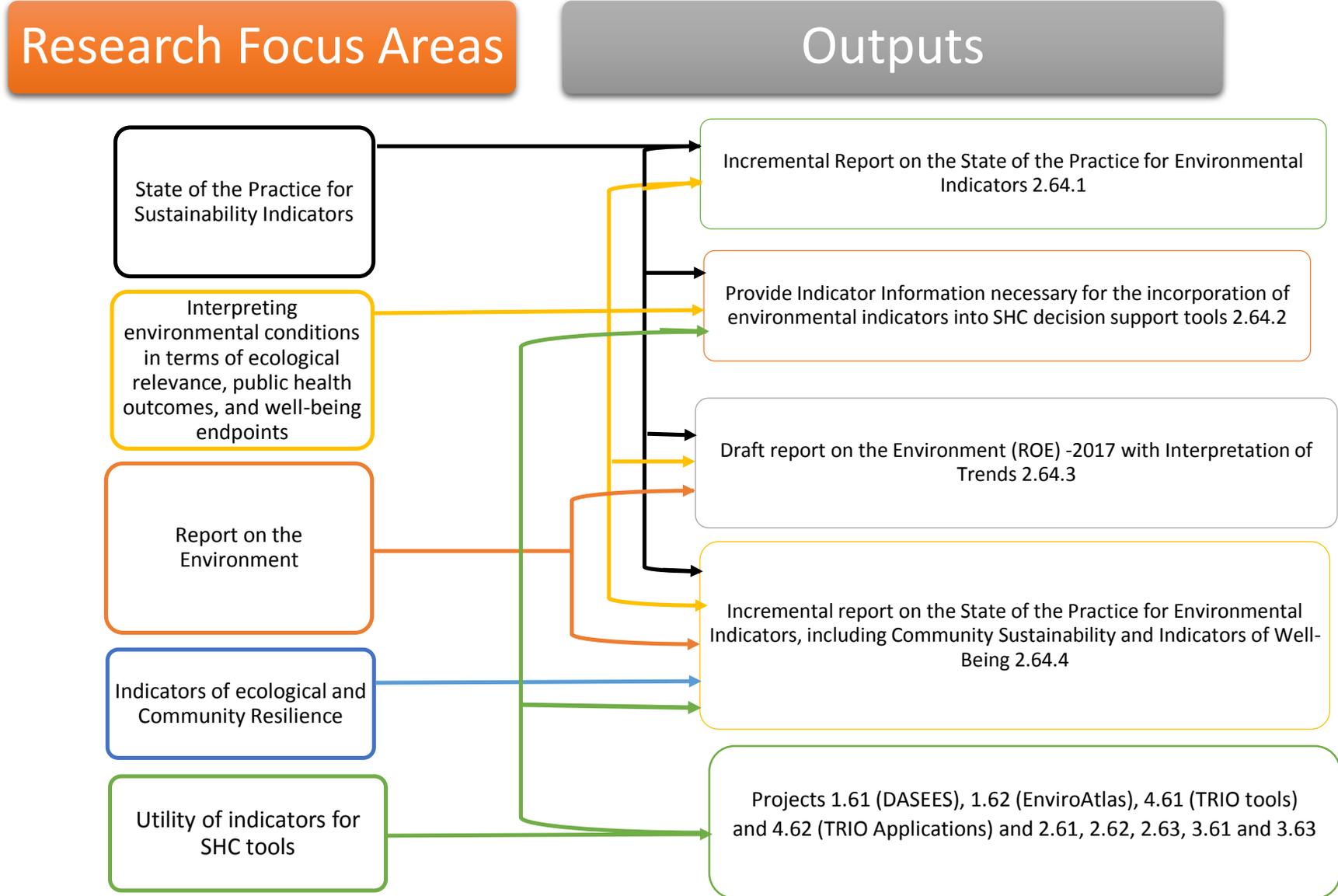
Outputs



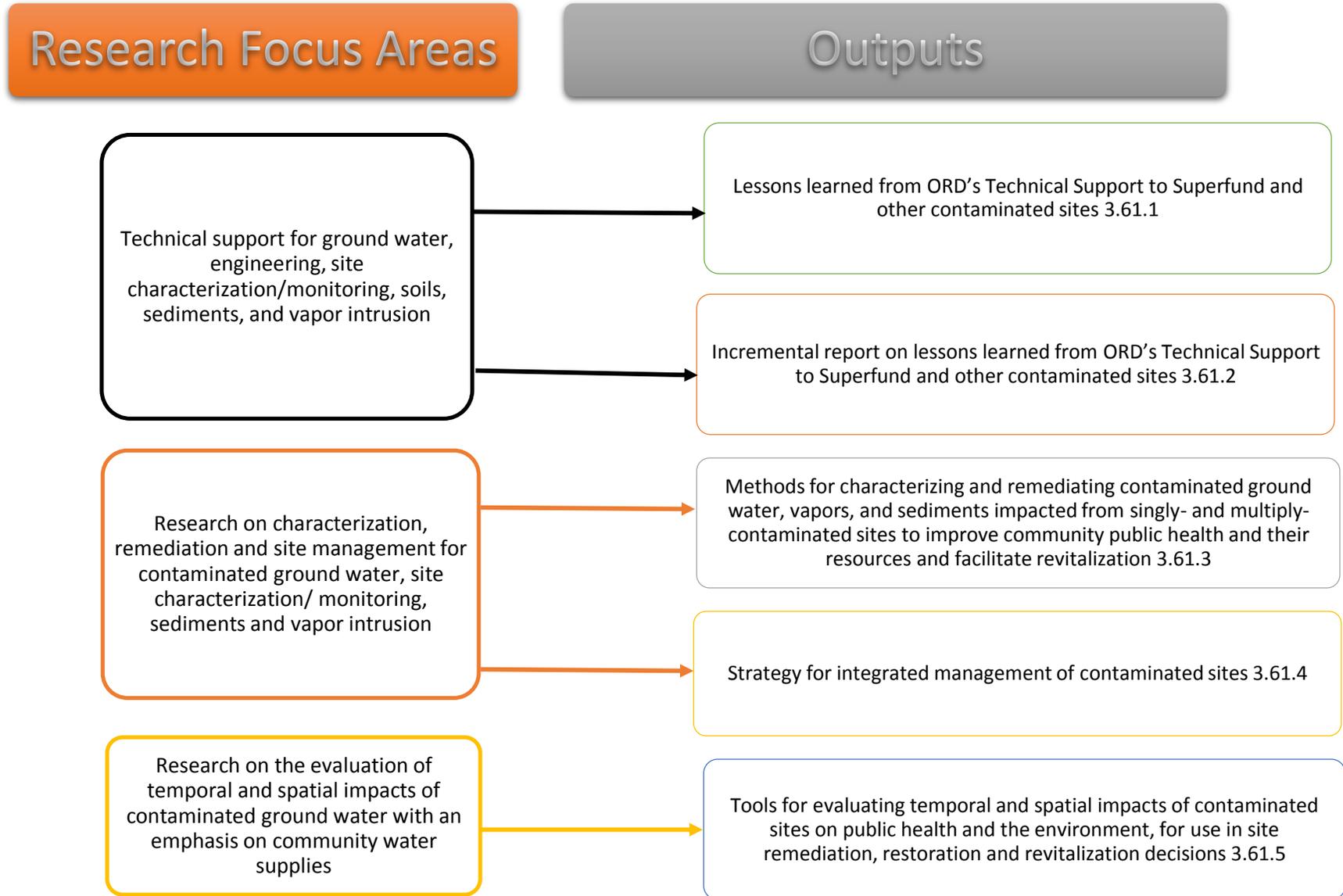
Assessing Environmental Health Disparities in Vulnerable Groups: SHC Project 2.63



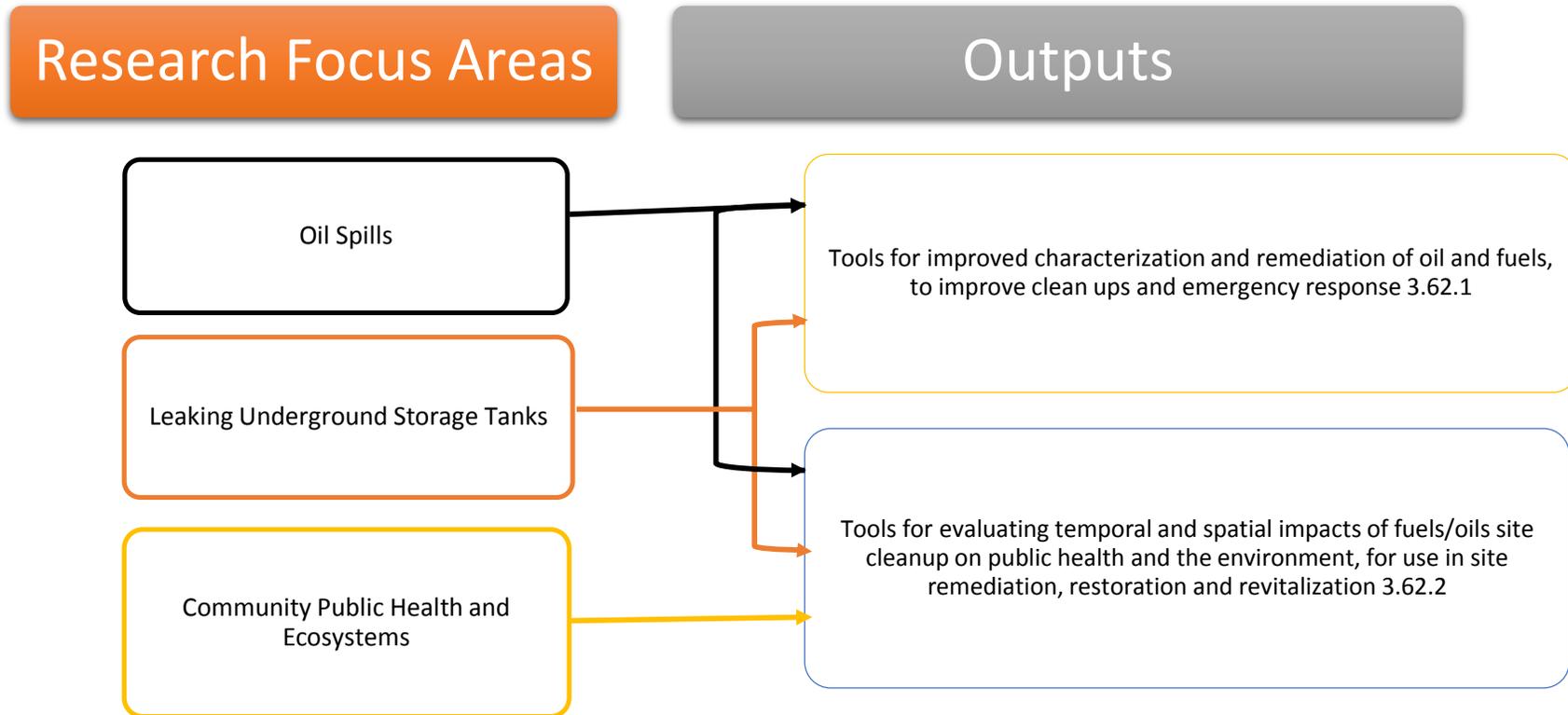
Indicators, Indices and the Report on the Environment: SHC Project 2.64



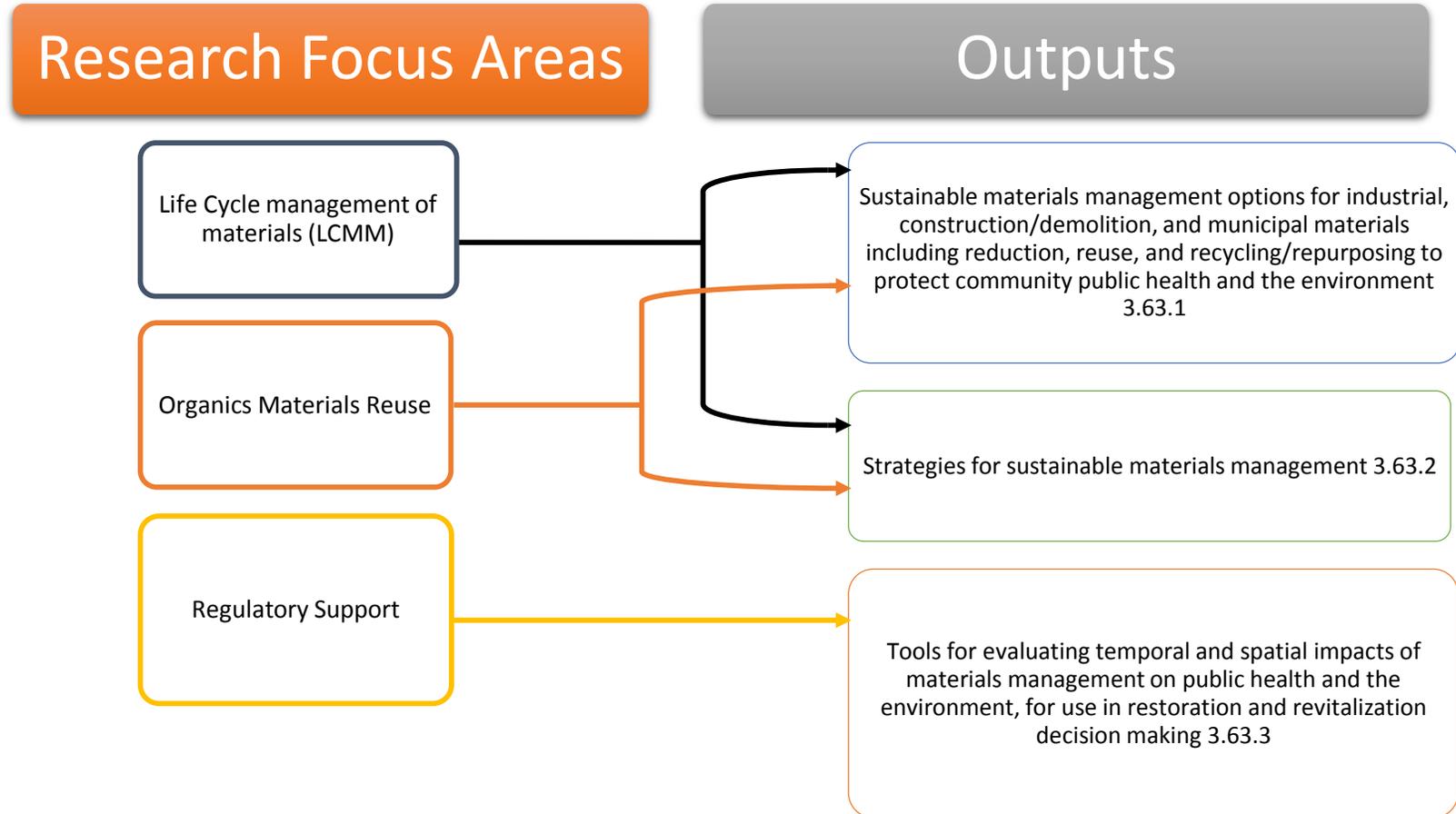
Contaminated Sites: SHC Project 3.61



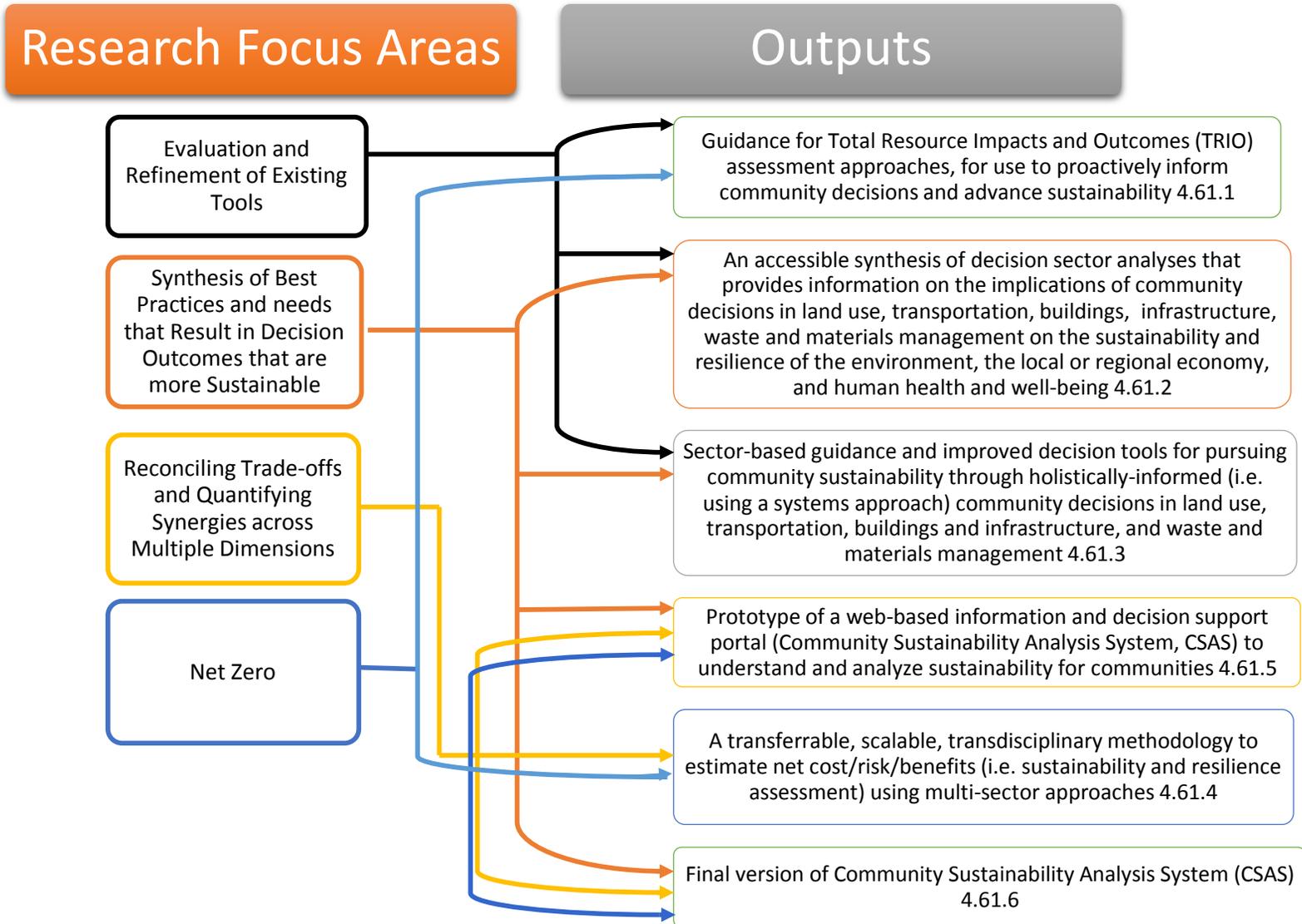
Environmental Releases of Oils and Fuels: SHC Project 3.62



Sustainable Uses of Wastes and Materials Management: SHC Project 3.63



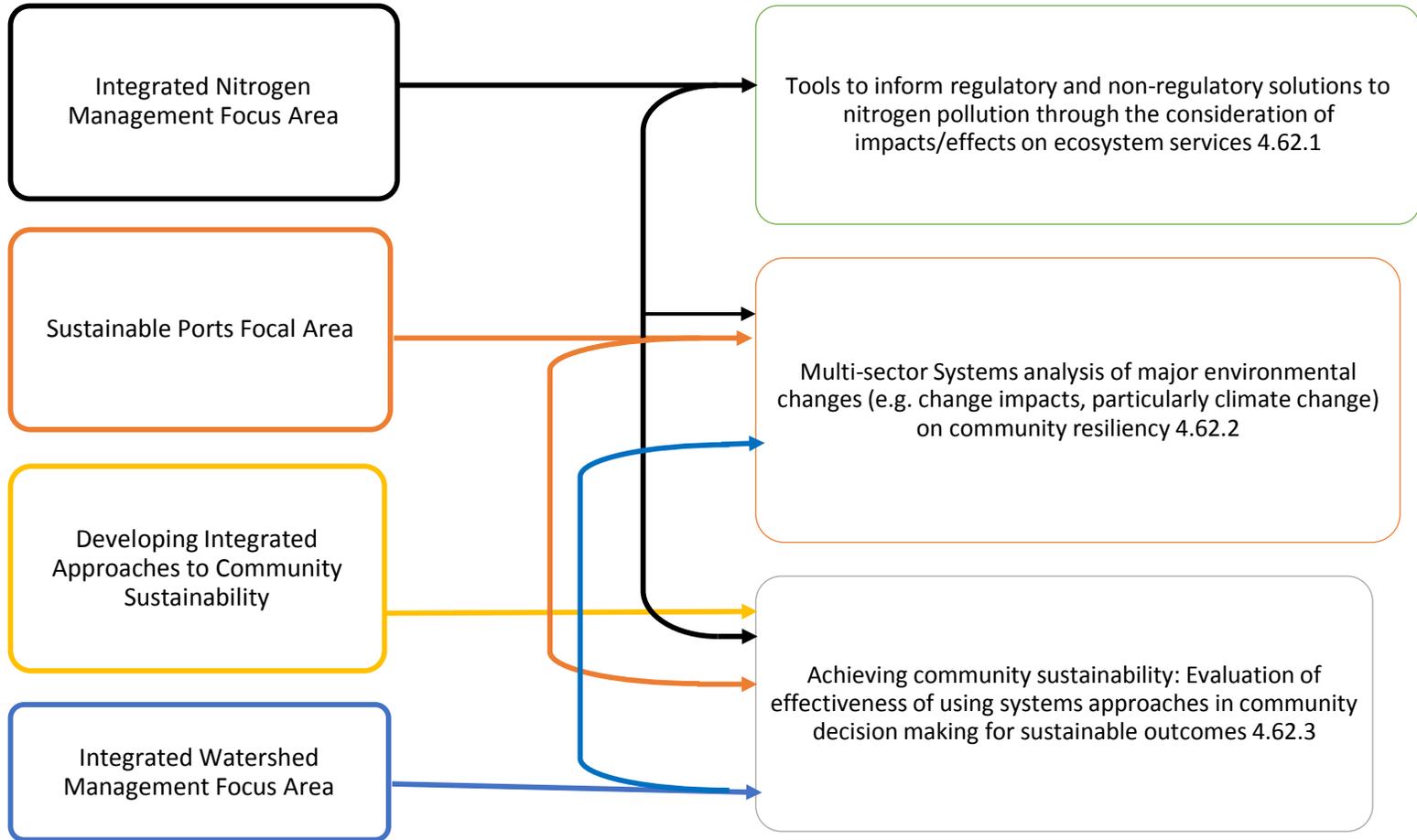
Sustainable Assessment Methods and Tools: SHC Project 4.61



Application of Systems-Level Approaches to Achieve Sustainability: SHC Project 4.62

Research Focus Areas

Outputs



Appendix B. Table of Proposed Outputs

Table of Proposed Outputs, Sustainable and Healthy Communities Research Program FY16-19 (Colors differentiate between Projects)

Theme	Proposed New SHC Projects	Proposed SHC FY16-19 Outputs			
		FY16	FY17	FY18	FY19
1. Decision Support and Innovation	1.61 Decision Science & Support Tools	1.61.1 Guidance to Support the Design of Software Applications and Decision Processes for Different Types of Communities	1.61.2 Methods to allow communities to calculate indicators and indices of sustainability and well-being using local data	1.61.3 Searchable Library of Available Community Decision Support Tools and Modules; Software to Help Users Identify and Use Appropriate Tools for Their Needs	1.61.4 Next-generation web-based community public health tools that incorporate cumulative exposure and risk research and guidance, additional decision support capabilities, and other user needs identified by case studies and peer review.
			1.61.5 System of Databases and Tools that Integrate Ecosystems and Health Work Within SHC Allowing TRIO Assessments under Alternative Scenarios		
	1.62 EnviroAtlas: A Geospatial Analysis Tool	1.62.1 Applications of EnviroAtlas to Community Based Decisions	1.62.3 Community Metrics for EnviroAtlas	1.62.5 Demand for Ecosystem Services Data Layers for EnviroAtlas	
		1.62.2 Crosswalk Between Ecosystem Services mapped in the EnviroAtlas with those in the Final Ecosystem Goods and Services Classification Scheme	1.62.4 Climate Change Implication Tools and Data Layers for EnviroAtlas		

Theme	Proposed New SHC Projects	Proposed SHC FY16-19 Outputs			
		FY16	FY17	FY18	FY19
	1.63 Information Technology and Innovation	1.63.2 A Synthesis of Innovative ideas from the SBIR and P3 Programs			
2. Community Well-Being: Public Health and Ecosystem Goods & Services	2.61 Community-Based Ecosystem Goods & Services (EGS)	2.61.1 Ecosystems Goods and Services Production and Benefit Functions Case Studies Report	2.61.2 Incremental report on the impacts of social (including public health), economic and environmental drivers, (particularly climate change), on the production and supply of final ecosystem goods and services.	2.61.3 Incorporation of the impacts of social, economic and environmental drivers, particularly climate change impacts, on final ecosystem goods and services into community-level decision support tools and the EnviroAtlas	
	2.62 Community Public Health and Well-Being	2.62.1 Demonstrations of Applying Tools, Methods, and Community Engagement Mitigate Environmental Health Impacts In At-Risk Communities	2.62.2 Synthesis of Best Practices Learned from Community Participatory Studies that Address Environmental Health Concerns within Communities	2.62.4 A report on the state of the practice for integrating ecosystem good and services, human health and human well-being research for assisting communities in decision-making	2.62.5 Enhanced community public health tools providing access to information for identifying, prioritizing, and addressing environmental health issues in local decision-making
		2.62.3 Methods for cumulative, integrated assessments of chemical and non-chemical stressors and pilot application of these assessments to reduce community environmental health risks and promote community health and well-being			

Theme	Proposed New SHC Projects	Proposed SHC FY16-19 Outputs			
		FY16	FY17	FY18	FY19
	2.63 Assessing Environmental Health Disparities and Vulnerable Populations				2.63.2 Translational research to incorporate children’s’ environmental health (CEH) into tools to inform community actions
					2.63.3 Research to support tribal sustainability
					2.63.4 Interim report on evaluation of tested approaches to resolving health disparities in vulnerable populations and lifestages
	2.64 Indicators, Indices and the Report on the Environment	2.64.1 Incremental Report on the State of the Practice for Environmental Indicators	2.64.2 Incorporation of Environmental Indicators into SHC Decision Support Tools		2.64.4 Incremental report on the State of the Practice for Environmental Indicators, including Community Sustainability and Indicators of Well-Being.
			2.64.3 Draft report on the Environment (ROE) -2017 with Interpretation of Trends		

Theme	Proposed New SHC Projects	Proposed SHC FY16-19 Outputs			
		FY16	FY17	FY18	FY19
3. Sustainable Approaches for Contaminated Sites and Materials Management	3.61 Contaminated Sites	3.61.3 Methods for characterizing and remediating contaminated ground water, vapors, and sediments impacted from singly- and multiply-contaminated sites to improve community public health and their resources and facilitate revitalization	3.61.4 Strategy for integrated management of contaminated sites	3.61.2 Incremental report on lessons learned from ORD's Technical Support to Superfund and other contaminated sites	
			3.61.5 Tools for evaluating temporal and spatial impacts of contaminated sites on public health and the environment, for use in site remediation, restoration and revitalization decisions		
	3.62 Environmental Releases of Oil and Fuels	3.62.1 Tools for improved characterization and remediation of oil and fuels, to improve clean ups and emergency response	3.62.2 Tools for evaluating temporal and spatial impacts of fuels/oils site cleanup on public health and the environment, for use in site remediation, restoration and revitalization		

Theme	Proposed New SHC Projects	Proposed SHC FY16-19 Outputs			
		FY16	FY17	FY18	FY19
	3.63 Sustainable Management of Materials to Support Community Sustainability	3.63.1 Sustainable materials management options for industrial, construction / demolition, and municipal materials including reduction, reuse, and recycling/repurposing to protect community public health and the environment	3.63.2 Strategy for sustainable materials management		
			3.63.3 Tools for evaluating temporal and spatial impacts of materials management on public health and the environment, for use in restoration and revitalization decision making		
	4.61 Systems-based Assessment Methods for Community Sustainability	4.61.3 Sector-based guidance and improved decision tools for pursuing community sustainability through holistically-informed (i.e. using a systems approach) community decisions in land use, transportation, buildings and infrastructure, and waste and materials management			4.61.1 Interim and updated Guidance for Total Resource Impacts and Outcomes (TRIO) assessment approaches, for use to proactively inform community decisions and advance sustainability
4. Integrated Solutions for Sustainable Outcomes		4.61.4 A transferrable, scalable, transdisciplinary methodology to estimate net risk/benefits (i.e. sustainability assessment) using multi-sector approaches			4.61.6 Final Community Sustainability Analysis System

Theme	Proposed New SHC Projects	Proposed SHC FY16-19 Outputs			
		FY16	FY17	FY18	FY19
	4.62 Application of Systems-Level Approaches to Achieve Sustainability			4.62.1 Tools to inform regulatory and non-regulatory solutions to nitrogen pollution through the consideration of impacts/effects on ecosystem services	4.62.3 Achieving community sustainability: Evaluation of the effectiveness of using systems approaches in community decision making for sustainable outcomes.
				4.62.2 Multi-sector Systems analysis of major environmental changes (e.g. change impacts, particularly climate change) on community resiliency	