

ORD's Strategic Directions and The Administrator's Priorities

Kevin Y. Teichman, Ph.D.
Deputy Assistant Administrator for Science
EPA Office of Research and Development





The Administrator's Guiding Principles and Priorities

Guiding Principles

- Science must be the backbone for EPA programs.
- EPA must follow the rule of law.
- EPA's actions must be transparent.

Priorities

- Improving Air Quality
- Assuring the Safety of Chemicals
- Cleaning Up Our Communities
- Protecting America's Waters
- Taking Action on Climate Change
- Building Strong State and Tribal Partnerships
- Expanding the Conversation on Environmentalism and Working for Environmental Justice



Recent Exemplary EPA Accomplishments

EPA Accomplishments

Improving Air Quality

- New NAAQS Process: In May 2009, EPA reintroduced the development of staff-level documents describing its NAAQS policy assessments. These documents lay out the policy-relevant science from ORD's Integrated Science Assessments, the results of the OAR's Risk and Exposure Assessments, and staff recommendations for whether and how to revise the NAAQS. CASAC reviews these document before their final publication.
 - ORD Contributions:
 - ORD develops the Integrated Science Assessments, which address both health (primary) and welfare (secondary) NAAQS.
 - ORD supports much of the research informing these assessments, e.g., the finding that smaller air particles affect the cardiovascular system, while larger air particles impact on the lungs. We also supported research showing that reductions of ambient particulate matter lead to increased life expectancy.
 - This month, we announced the Health and Environmental Research Online (HERO) database.

EPA Accomplishments (2)

Assuring the Safety of Chemicals

- Toxic Substances Control Act (TSCA) Reform: In September 2009, Administrator Jackson announced a set of principles to guide reform of TSCA, resulting in the application of a risk-based standard for chemical reviews, strengthening EPA's ability to collect data and take action once risks are identified, and promoting "green" innovations and sustainability.
 - ORD Contributions:
 - Last June, ORD launched Phase II of ToxCast to screen 700 additional chemicals, including 100 chemicals provided by the pharmaceutical industry to EPA that were shown to be toxic in clinical trials.
 - ORD is leveraging interagency and international research on the implications of nanomaterials (e.g., carbon nanotubes, silver, fullerenes, cerium oxide, iron, and titanium oxide).
 - A compendium of EPA and others' studies on perfluoroalkyl acids (PFAAs) was published in a special issue of *Reproductive Toxicology*.

EPA Accomplishments (3)

Assuring the Safety of Chemicals, cont.

- New Integrated Risk Information System (IRIS) Process: In May 2009, EPA announced reforms to the IRIS assessment process to ensure its scientific quality, integrity, transparency, and timeliness. For example, written interagency comments are now made available to the public. All IRIS assessments continue to undergo public comment and subsequent independent, external peer review.
 - ORD Contributions:
 - ORD leads the IRIS program. By the end of FY10, we expect to have released 21 assessments for external peer review / public comment and posted 24 completed assessments on the IRIS database under the new process.
 - For example, ORD has released, or is expected to release, several major health assessments either for external review / public comment (TCE, methanol, formaldehyde) or posting on the database (acrylamide, carbon tetrachloride) during this time period.
 - ORD has also focused on the human health risks from exposures to dioxin. EPA's Science Plan for Activities Related to Dioxins in the Environment (2009) details an estimated timeline for completion of the Agency's dioxin reassessment by the end of 2010.

EPA Accomplishments (4)

Cleaning Up Our Communities

- Managing Coal Ash: The Administrator has committed to publishing a proposed rule that will address the management of coal combustion residuals (CCRs) from electric utilities; it is expected to include on-site inspections and assessments of the structural integrity of CCR impoundments.
 - ORD Contributions:
 - ORD published reports on the characterization of, and metal availability in, coal combustion residue.
 - We are conducting probabilistic assessments of plausible CCR-management scenarios to illustrate how data can be used in decision-making to evaluate the range of conditions for management of CCR.
 - Our researchers are also helping OSWER identify potential beneficial uses of CCR and the associated potential risks to human health and the environment.

EPA Accomplishments (5)

Protecting America's Waters

- Drinking Water Strategy: In her recent remarks to the Association of Metropolitan Water Agencies, the Administrator announced the four elements of EPA's new Drinking Water Strategy: (1) address water contaminants in groups; (2) engage private innovators, entrepreneurs, and small businesses to improve drinking water technologies; (3) leverage all authorities—such as pesticide and chemicals laws—to confront and preempt drinking water contaminants; and (4) work closely with State, Tribal, and local partners on information-sharing, monitoring, and analysis.
 - ORD Contributions:
 - ORD received an R&D Magazine Award for a device that rapidly concentrates microbes in drinking water samples, so they can be easily and safely transported to a laboratory for further analysis.
 - ORD's technology demonstration program has enabled small systems to develop cost-effective and sustainable approaches to reduce health risks associated with waterborne contaminants such as arsenic.
 - ORD's water infrastructure research is providing tools to prevent the contamination of water supplies; our homeland security research is assisting municipalities protect their drinking water distribution systems.

EPA Accomplishments (6)

Taking Action on Climate Change

- GHG Endangerment Finding: In December 2009, EPA issued its finding that GHGs endanger public health and welfare. This finding responded to the Supreme Court's 2007 decision that EPA has the authority to regulate GHGs from motor vehicles.
 - ORD Contributions:
 - ORD studies were cited by Administrator Jackson in her finding that GHGs endanger public health, e.g., our research that demonstrated climate-change-driven changes in ozone air pollution endanger public health.
 - ORD scientists served as authors, contributors, and reviewers for the Technical Support Document that accompanied the finding decision.
 - More generally, ORD developed a nine-region MARKet ALlocation (MARKAL) model of the United States to explore future energy scenarios and produced a database to account for regional variation in resource availability, transportation costs, and end-use demands.

EPA Accomplishments (7)

Building Strong State and Tribal Partnerships

- Reducing Nutrient Impacts: Last August, EPA published a report, titled “An Urgent Call to Action: Report of the State-EPA Nutrient Innovations Task Force Group.” This report evaluates the scope of nutrient impacts and recommends innovative ways to address nutrient pollution.
 - ORD Contributions:
 - ORD is developing tools to help the EPA Office of Water, States, Tribes, and local communities select and apply green infrastructure options (e.g., rain gardens, permeable pavement, bioswales).
 - Preliminary results from our Chesapeake Bay “proof-of-concept” study for meeting phosphorus and nitrogen total maximum daily loads (TMDLs) suggest that there may be significant cost savings by combining *green* with *gray* infrastructure, plus significant ecosystem services co-benefits from carbon and water storage.
 - ORD is collaborating with the Regions, States and Tribal nations to collect and communicate information about how cultural practices influence exposure pathways to help assess any impacts on public health.

EPA Accomplishments (8)

Expanding the Conversation on Environmentalism / Environmental Justice

- Initiating the Conversation: EPA hosted a Symposium on the Science of Disproportionate Environmental Health Impacts, “Strengthening Environmental Justice and Decision Making” in Washington, DC on March 17-19, 2010.
 - ORD Contributions:
 - ORD co-organized and co-sponsored the Symposium. EPA committed to responding to proposed actions from EJ groups, including recommendations for science / research.
 - ORD collaborated closely with EPA Region 4 and the Office of Enforcement and Compliance Assurance to conduct a preliminary assessment of water quality in low-income regions of central Appalachia near mountaintop-mining operations.
 - ORD, in collaboration with Region 1 and New Haven, CT, developed predictive tools and data that informed critical risk-management decisions to promote the health in the community. Region 1 anticipates applying this model to additional EJ communities.

EPA Accomplishments (9)

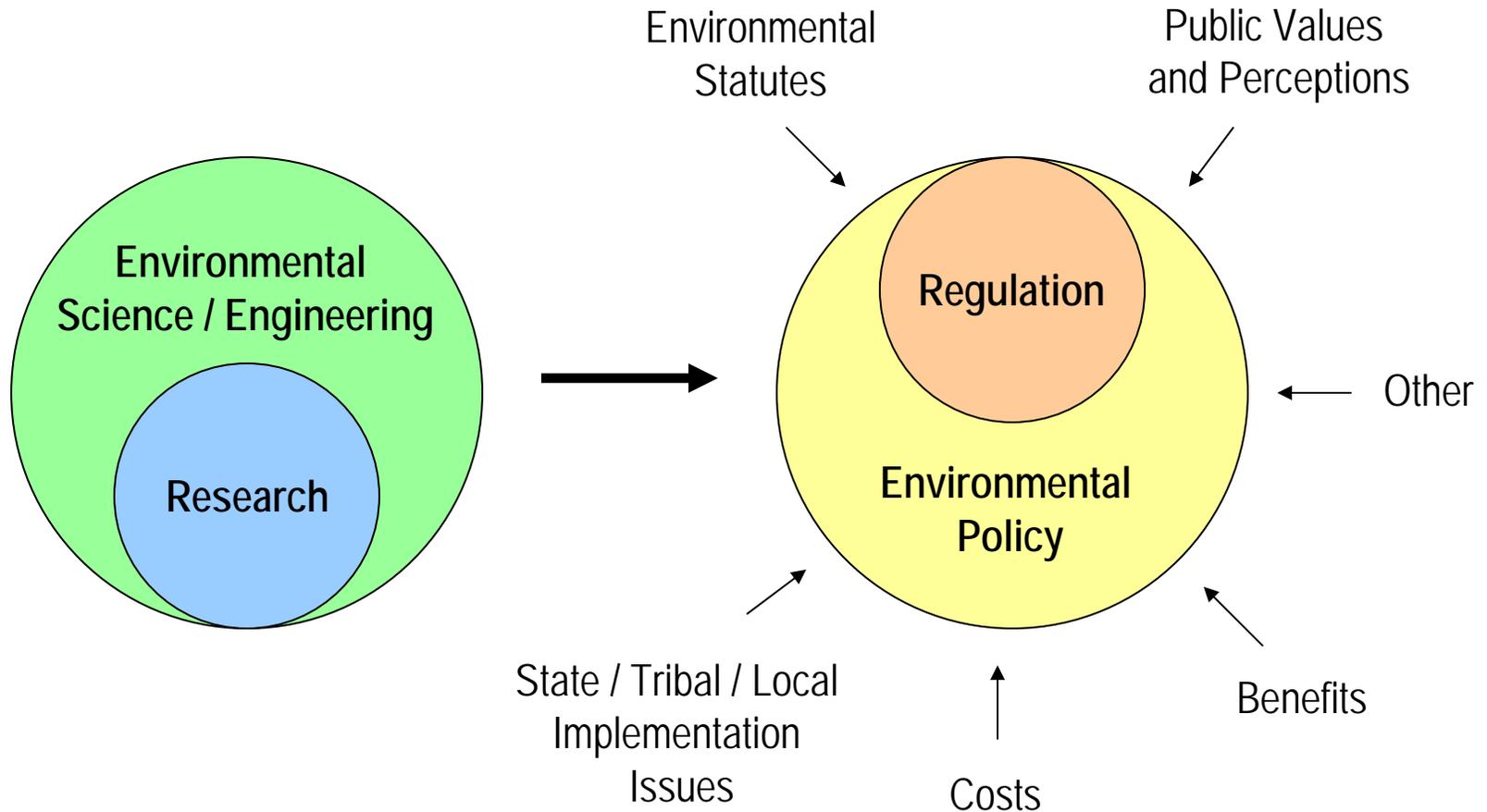
Innovation for Sustainable Growth

- Innovation: In her March 2010 speech to the National Press Club, Administrator Jackson stressed, “Well-conceived, effectively implemented environmental protection is good for economic growth.” Also, “Innovation is the ‘sweet spot’ where our economic and environmental interests meet.”
 - ORD Contributions:
 - ORD’s Small Business Innovation and Research (SBIR) Program provides incentive funding for small businesses to translate their innovative ideas into commercial products that address environmental problems.
 - Our Environmental Technology Verification (ETV) Program collaborates with public- and private-sector organizations to bring objective information to the environmental technology marketplace.
 - Our People, Prosperity, and the Planet (P3) Design Competition motivates undergraduate- and graduate-student teams to develop innovative technical solutions that address sustainability challenges in both the developed and developing world.



Thoughts from the ORD "Science Guy"

Science, Research, and Environmental Policy



ORD Research Areas and the Administrator's Priorities

ORD Research Areas

(examples)

- Air
- Drinking Water
- Water Quality
- Land Preservation and Restoration
- Safe Pesticides and Products
- Homeland Security
- Human Health
- Ecosystem Services
- Human Health Risk Assessment
- Global Change
- Endocrine Disrupting Chemicals
- Computational Toxicology
- Nanotechnology
- Science and Technology for Sustainability

Administrator's Priorities

- Improving Air Quality
- Assuring the Safety of Chemicals
- Cleaning Up Our Communities
- Protecting America's Waters
- Taking Action on Climate Change
- Building Strong State and Tribal Partnerships
- Expanding the Conversation on Environmentalism and Working for Environmental Justice

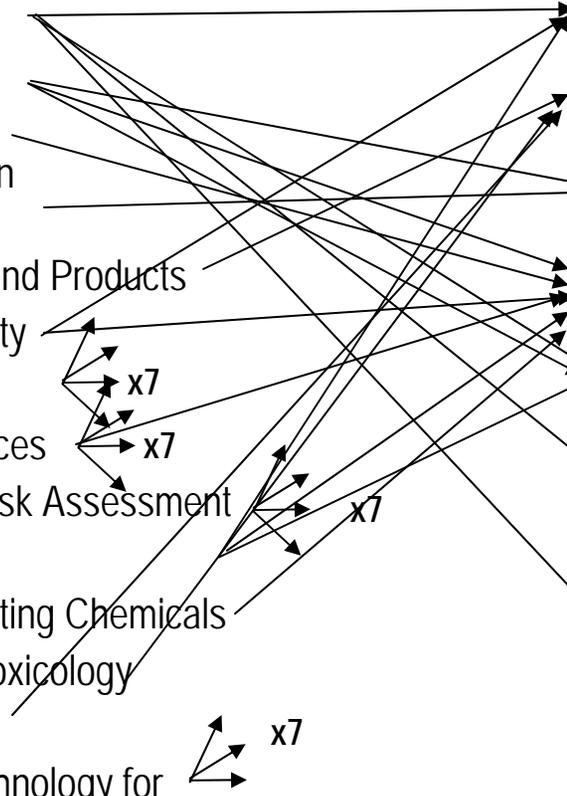
ORD Research Areas and the Administrator's Priorities

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≤ 7 x 14 = 98 arrows!



Touchstones for this Meeting

- This is a strategic planning meeting—not a budget meeting.
- We will be discussing strategic plans for ORD **research**, not EPA **science**.
- To get where you want to go, you need to know where you are.
- Arraying the current ORD research areas by the Administrator's Priorities is a "work in progress."



Current ORD Research Activities and Strategic Directions

Cross-Walked with the

Administrator's Priorities

Improving Air Quality

Examples of Current ORD Activity

- Providing underlying science for and developing the Integrated Science Assessments (ISAs) that support the timely review of the primary (health-based) and secondary (environmental effects-based) National Ambient Air Quality Standards (NAAQS)
- Providing IRIS assessment for several Hazardous Air Pollutants (HAPs)
- Establishing a framework to assess the impacts of the realistic, multipollutant ambient environment on human health
- Developing strategies to address climate-change impacts on air quality; analyzing reductions in other air pollutants (ozone, PM, air toxics) associated with broad-scale use of various greenhouse-gas reduction technologies and strategies
- Evaluating the extent to which vegetation can reduce the concentration of air pollutants in urban (particularly near-road) and suburban settings, and the impacts of land-use change on air quality
- Undertaking field and lab testing of different fuel blends and assessing any human health or air quality impacts resulting from the increased use of biofuels

Improving Air Quality (2)

Vision: *EPA science will provide the fundamental knowledge needed to appropriately address air-quality issues with innovative and strategic solutions.*

Suggested Strategic Directions / Examples of Anticipated Accomplishments

- **Provide the science and tools needed for sound decision-making and efficacious implementation of rules and strategies to improve air quality**
 - Develop an accountability framework to assess AQ Decisions
- **Enhance and leverage existing relationships and create new ones**
 - Develop a Multipollutant Research Program in collaboration with the Office of Air and Radiation
 - Enhance partnerships with industry, academia, and other governments to share technology advances to monitor, assess, and control air pollution
- **Complement, support, and inform ORD programs that address other Administrator priorities**
 - Promote Environmental Justice through considered inclusion in study designs and assessments specific to respective needs and concerns

Assuring the Safety of Chemicals

Examples of Current ORD Activity

- Creating virtual models of the human liver and embryo (and other organs in the future) that integrate toxicity pathways and predict chemicals risks
- Conducting research to understand which nanoparticle properties may cause risk, and how green chemistry and other approaches can be used to develop safe nanomaterials
- Developing and implementing methods for the next-generation of human health risk assessments
- Researching effects, exposures, and risk-management options related to perfluorinated chemicals and other toxic substances and pesticides
- Helping to characterize and reduce exposure to endocrine-disrupting chemicals (EDCs) by creating new exposure-assessment and risk-management tools; and developing standardized protocols to screen and test chemicals for their potential endocrine-mediated effects
- Developing ecosystem-service models for integrated pest management and pesticide fate and transport
- Developing ecological probabilistic models to assess risks (i.e., spatially-explicit, population-level) to wildlife populations and non-target plants from pesticides, toxic chemicals, and multiple stressors

Assuring the Safety of Chemicals (2)

Vision: *EPA science will lead the sustainable development, use, and assessment of chemicals.*

Suggested Strategic Directions / Examples of Anticipated Accomplishments

- **Provide smarter and more efficient testing, risk-assessment, and risk-management options**
 - Provide much higher throughput tools for the prioritization and screening of chemicals based on exposure and toxicity pathways
 - Support research into alternative product formulations using green chemistry and green engineering principles, leading to the design of safer chemicals / products
- **Enhance and leverage existing relationships and create new ones with industry, academia, NGOs, and other agencies in the United States and other countries to speed up and share data generation, life-cycle assessment, and green chemistry / safety-by-design approaches**
 - Develop new approaches for assessing risks, by integrating computational toxicology approaches into risk prediction for new and existing chemicals at the screening stage

Cleaning Up Our Communities

Examples of Current ORD Activity

- Developing technologies to treat contaminated sediments and ground water
- Applying the “Community-Focused Exposure and Risk Screening Tool” (C-FERST) to assist communities in prioritizing risks and clean-up options
- Applying multipollutant air strategies and source-to-health-outcome research to minimize exposure to pollution and to inform planning / zoning
- Producing a national atlas of ecosystem services and associated variables through an interagency project initiated by ORD; the output will be available through the web at a Nature Serve / National Geographic site focused on communities
- Promoting sustainable communities by providing decision-support tools at the neighborhood scale that integrate water supply, water quality, air quality, and food and fiber production
- Developing Provisional Peer-Reviewed Toxicity Values (PPRTVs) to support decision-making by OSWER, EPA Regions, and States on cleaning up sites
- Developing and disseminating methods to decontaminate outdoor areas and building materials impacted by homeland security emergencies



Cleaning Up Our Communities (2)

Vision: *Expand interactions between restoration, sustainable materials management, and land-use research strategies to apply scientific tools and support sustainable community decisions.*

Suggested Strategic Directions / Examples of Anticipated Accomplishments

- **Restoration**
 - Evaluate the state of the science for groundwater remediation and long-term stewardship of hazardous-waste sites
 - Develop and test decontamination methods to address wide-area anthrax and radiological contamination
- **Sustainable Materials Management**
 - Focus life-cycle assessment research to better manage materials
 - Address the compatibility of biofuels in underground storage tanks and develop protocols for emergency response
- **Land Use**
 - Improve methods of “green” accounting, so the real costs of land-use change are apparent

Protecting America's Waters

Examples of Current ORD Activity

- Crafting strategies to address the nation's aging water infrastructure, including:
 - assessing future demands
 - producing state-of-the-technology reviews
 - demonstrating the most promising technology innovations
 - establishing a "center of excellence" through a cooperative agreement with the Water Environment Research Foundation
- Assessing the ecological impacts of mountain-top mining
- Characterizing the occurrence and impacts of endocrine-active compounds in drinking water, wastewater treatment plant effluents, biosolids, and releases from concentrated animal feeding operations
- Determining the effects on water quality and ecosystem services associated with the use of forests to store carbon (e.g., carbon offsets)
- Devising strategies to protect water resources and improve the resiliency of water systems in response to land-use changes and climate change

Protecting America's Waters (2)

Vision: *ORD will develop a "one hydrosphere" approach to conducting science and technology research that leads to the development of safe, resilient, and sustainable water resources.*

Suggested Strategic Directions / Examples of Anticipated Accomplishments

- **Microbial Water Quality:** Develop tools to characterize and manage health risks associated with exposure to waterborne contaminants pertinent to urban and rural water uses
- **Chemical Water Quality:** Provide science, technology, and support for innovation to protect human health, aquatic life, and dependent wildlife
- **Integrated Resource Management:** Provide science and engineering to make accountable water resource-management decisions in watersheds and groundwater basins; integrate energy and sustainability concepts; and strengthen the protection of drinking water sources
- **Ecosystem Services:** Protect and restore the water quality and quantity necessary to replenish the water supply, and support flood and drought mitigation, outdoor recreation, and ecosystem services valuation

Taking Action on Climate Change

Examples of Current ORD Activity

- Building a database on the availability, cost, performance, and environmental implications of GHG-reduction technologies for the power generation, transportation, industrial, and waste-management sectors
- Integrating models to investigate multi-pollutant air quality management under a changing climate and linking these changes to human health assessments
- Producing advanced modeling tools to assess the radiative forcing of short-lived air pollutants (such as black carbon, ozone, and precursors) as well as their impacts on regional climate
- Developing the next generation of decision-support tools, scenario data, and approaches to enable implementation of adaptation options under uncertainty (e.g., drinking water and wastewater utilities)
- Studying the water / energy nexus and the health / environmental implications of geologic sequestration and hydraulic fracturing
- Researching the effects of climate change on the delivery of ecosystem services, such as the natural removal of greenhouse gases from the atmosphere, provision of fish and game habitats, protection of shorelines, and production / filtration of water



Taking Action on Climate Change (2)

Vision: *ORD will be a key source for Program and Regional Offices on climate change impacts, adaptation, and mitigation research.*

Suggested Strategic Directions / Examples of Anticipated Accomplishments

- **Implement next-generation climate research and assessments**
 - Reduce uncertainties with respect to climate change impacts on air quality and water quality
 - Develop holistic assessment tools to guide climate mitigation and adaptation decisions
 - Assess the effectiveness of innovative solutions to adapt to the changing climate
 - Evaluate the technological and policy options to reduce greenhouse gases
- **Expand ORD's expertise in Earth system research**
 - Identify, through transdisciplinary teams, the most sustainable solutions and minimize the unintended consequences of climate change actions, including the implications of inaction
- **Enhance and leverage interagency relationships**



Building Strong State and Tribal Partnerships

Examples of Current ORD Activity

- Facilitating and sponsoring the National EPA-Tribal Science Council, the Regional Applied Research Effort (RARE), Regional Research Partnership Program, Regional Methods, and other programs
- Developing indicators at the local scale to update the Report on the Environment (ROE) indicators of national conditions and trends in air, water, land, human health, and ecological systems
- Updating the Causal Analysis / Diagnosis Decision Information System (CADDIS) to help Regions, States and Tribes find, access, organize, use, and share information to conduct causal evaluations in aquatic systems
- Conducting workshops and providing EPA Regions, States, and Tribes with decision-support tools to evaluate co-benefits and/or unintended consequences of different GHG-reduction strategies
- Coordinating a Regional sustainability network to identify priority research and collaborate on place-based projects such as the San Luis Basin Metrics Study (Region 8) and Sustainable Puerto Rico (Region 2)
- Collaborating on several RARE and Community Action for a Renewed Environment (CARE) projects to adapt the C-FERST (Community-Focused Exposure and Risk Screening Tool) to characterize specific community conditions and address Regional / local concerns



Building Strong State and Tribal Partnerships (2)

Vision: *EPA research will support State and Tribal environmental and health decisions by illuminating the connections between environmental stressors and human health at the State, Tribal, and local levels.*

Suggested Strategic Directions

- Understand the unique geographical and cultural factors that influence the potential exposures and health risks in Tribal communities
- Provide scientifically sound tools to meet the decision-support needs among environmental managers in the States and Tribal nations
- Facilitate the exchange of information to identify the highest priorities for scientific support at the State, Tribal, and local level



Expanding the Conversation on Environmentalism and Working for Environmental Justice

Examples of Current ORD Activity

- Conducting asthma research, with an emphasis on understanding the high prevalence of the disease among socio-economically disadvantaged and minority children
- Assessing the impacts of near-roadway pollution on children both at home and school
- Understanding the environmental determinants of childhood obesity, asthma, and neuro-developmental outcomes (e.g., diet, intrauterine stressors)
- Responding to the recommendations of the participants in the March 2010 Symposium on the Science of Disproportionate Environmental Health Impacts, "Strengthening Environmental Justice Research and Decision Making"
- Collaborating with other agencies (NIH, CDC, NIEHS) on the National Children's Study, including exposure factors for children, especially the very young (0-6 yrs), in different environments (e.g., homes, child-care facilities, schools) and the role of nonchemical stressors
- Developing a framework in which environmental justice issues, human health vulnerabilities, and ecosystem services are represented spatially and temporally (e.g., maps)



Expanding the Conversation on Environmentalism and Working for Environmental Justice (2)

Vision: *EPA research will support environmental and public health decisions in communities by illuminating the connections between environmental stressors and human health, especially for disproportionately affected populations and children.*

Suggested Strategic Directions

- Respond to the research actions proposed by EJ groups at the Symposium on the Science of Disproportionate Environmental Health Impacts
- Help communities characterize cumulative risk, identify communities at risk, and evaluate the effectiveness of risk-management strategies
- Understand the exposures and health impacts that are elevated in, or unique to, specific communities
- Conduct research to more fully understand the unique vulnerabilities of children to the effects of toxic chemicals in the environment



The Charge to the Bright Brigade

The Charge to the Bright Brigade

The SAB has been asked to address the following topics:

- The extent to which ORD's suggested strategic research directions address the Administrator's Priorities by providing the scientific information needed to inform environmental decision-making, especially decisions made by EPA's Program and Regional Offices
- Suggestions for key areas that ORD should leverage by working with other (non-ORD) science programs across EPA and with the science programs of other Federal agencies
- Areas for increased emphasis in ORD's research program over the next five years; areas for decreased emphasis over the next five years

The Charge to the Bright Brigade (2)

- Are there strategic research directions that ORD should pursue differently or undertake as it draws upon its unique expertise to conduct integrated, transdisciplinary research (ITR)?
- Where can research on socio-economics best contribute to ORD's ITR efforts?
- Where can we apply lessons learned from environmental research to protect human health and from human health research to protect the environment?

