

# EPA Goal 4

## Healthy Communities and Ecosystems

Strategic Planning Futures Workshop  
5 October, 2005  
Summary Report

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## Background

To facilitate the integration of futures analysis into Agency strategic planning, OCFO organized a futures workshop with Goal 4 planning team to support the consideration of emerging issues that are likely to affect environmental quality and have significant impacts on the Agency’s ability to achieve its goals.

During the time period leading up to the current strategic plan revision, OCFO identified 20 potential emerging issues related to Goal 4 through consultations described below. In the spirit of preliminary exploration of these issues workshop participants discussed some of their potential impacts.

## Speakers

**Robert Olson**

**National Advisory Council on Environmental Policy and Technology (NACEPT), Institute for Alternative Futures**

In a presentation entitled, "Why Think Ahead?" Olson discussed past revolutions in industrial technology and argued that EPA was created "facing the past" with responsibilities for dealing with the damages caused by an aging technological order. Now, however, a new revolution in industrial technology is underway, based on emerging developments in areas like materials science and nanotechnology, biotechnology and genomics, information, communications, and energy. EPA needs to devote more resources to "facing the future": understanding emerging technologies, heading off potentially serious environmental problems they could pose, and helping to steer their evolution toward a more advanced technological order in harmony with nature.

**David Rejeski**

**Foresight and Governance Project, Woodrow Wilson International Center for Scholars**

There is a comfort zone for typical strategic planning where highly probable outcomes occur at a steady pace – and the speaker urged Goal Team members to challenge each other to think beyond this zone. It takes determined efforts to garner public and political attention to problems that involve slow rates of change, like aquifer depletion and climate change. On the other hand, it is hard to keep up with the kind of rapid advances occurring in some area, such as information technology that is creating new opportunities. An "adaptive planning" approach is needed to deal with uncertainties, rapid change, and the possibility of encountering "black swans" – highly unlikely but possible and "game changing" developments.

## Prioritizing Emerging Issues

The Futures team worked with the EPA Innovation Action Council, the Agency futures network, members for the Environmental Council of the States, and participants in a symposium entitled, "*Forecasting Environmental Change*," held by the National Council for Science and the Environment and consulted the new book edited by Robert Olson & David Rejeski, *Environmentalism and the Technologies of Tomorrow* to generate a list of emerging issues.

OCFO provided the following list of emerging issues to the Goal 4 workshop participants for Goal 4 to guide focus for the brainstorming session:

- Unintended negative impacts of nanomaterials
- Unintended negative impacts of genetically engineered organisms
- Accelerating development and proliferation of chemicals with unknown properties and effects
- DNA arrays for better, faster, cheaper testing of chemicals; problem of many “new risks” being identified, but difficult to judge their level of significance
- Growth of citizen/community environmental monitoring using inexpensive sensors, public access to satellite imagery, local volunteers, etc.
- Degradation of the oceans
- Acceleration of climate change with passing of critical thresholds like methane released from melting permafrost
- Planning preventive strategies or responses to predictable effects of climate change
- Population shifts to water-stressed and environmentally sensitive areas where severe problems are predictable
- Impacts of growing demand for second homes in coastal and mountain ecosystems
- Habitat destruction with loss of biodiversity resulting from low density development
- Progress in sensor technology; distributed sensor networks
- Spread of invasive species
- Growing oil and gas exploration in wilderness areas
- Regeneration of damaged ecosystems such as coastal forests
- Biotechnology for targeted pest control and a new generation of more benign pesticides
- Large-scale development of biofuels industry (pesticide use and run-off) [the new energy bill will promote the growth of this industry]
- Potential to package biofuels production, wind generation, and more energy-efficient farming practices as a new, economically attractive model
- Emerging diseases affecting crops, animals and people resulting from habitat disruption, global travel, and climate change and the need to approve related pesticide uses
- “New industrial revolution” of emerging energy, bio, nano, info technologies; need for faster, better assessment of potential impacts and new ways to work with companies early-on to minimize or design-out negative impacts

Participants reviewed and supplemented the list and then narrowed the focus down to the following issues:

- Land development and urban sprawl
- Biofuels, wind generation, and renewable energy
- New industrial revolution of nanotechnology, biotechnology, and information technology
- Emerging diseases and ecosystem disruption
- Sensor technology
- Ecosystem services

Participants then joined breakout groups for each of these issues. Highlights of the breakout group discussions are set out below, and full notes on the discussions are provided in the workshop report.

### Highlights

The section contains a summary of topics from the breakout sessions. Participants were encouraged to discuss issues candidly, not necessarily from the affected programs' perspective.

**Land Development and Urban Sprawl** – Pursuing this issue could lead to a strategic objective that integrates community environmental health, restoration, improvement, and prevention using a community place-based approach. The strategic plan revision could aim to establish new measures to raise visibility and create accountability for performance progress – the National Coastal Conditions Report is a good model, with a series of indices that can be aggregated. New research is needed to develop appropriate measures, especially measures of ecosystem services at different scales. This approach suggests new EPA strategies are possible that allow capture of multiple outcomes and force better integration of programs.

- Use a “Community Environmental Health Index” as an indicator of overall uniform environmental quality.

**Perform Research to Evaluate the Environmental Trade-Offs and Economics of Increased Bio-Fuels Production, Wind Generation and More Energy-Efficient Farming Practices** – The strategic plan revision can be used as an educational/informational tool to encourage this integrated approach to agriculture and energy. This issue, or even biofuels alone, demands a multi-media focus and may influence sub-objectives that apply to NEPA,

Regional agriculture teams, air pollution, habitat/wetlands/ecosystems, water, and pesticides. There are implications for resources, shifts in air, water and pesticide program focus, policy development, and partnerships. New research is needed for supporting pollution reducing technical approaches and for life cycle analysis of implications for health, the environment, economics and energy.

- Evaluate and compare environmental impacts of renewable and non-renewable energy production and distribution and storage infrastructure.
- Characterize multi-media emissions from biofuels production.

**New Industrial Revolution of Nanotechnology, Biotechnology and Information Technology** – The concept of a New Industrial Revolution should be set out in the strategic plan revision. It calls attention to opportunities to head off new environmental problems posed by emerging technologies and to encourage environmentally advanced applications. To help companies design-out potential environmental problems, the plan should direct EPA to develop new tests and tools that industry can use in R&D and product/process design. Examples include customized DNA arrays and tools for modeling and virtual prototyping. A major new objective is to encourage a culture in industry of enlightened problem-prevention, with much more emphasis on Design for Environment-type activities. The Safe Chemicals objective, in particular, needs to be made more proactive, promoting a “Look before you Leap” concept to industry. This approach requires new in-house expertise, partnerships with industry, and more strategic approaches to sharing research between agencies and other organizations. Program offices need to make requests to ORD for cutting-edge R&D (in our labs and through grants to others), and ORD needs to redouble efforts to communicate results throughout the Agency.

Three common themes: identifying risks, partnering with businesses during development to promote more benign technologies and leveraging our research with others and the broader federal community.

- Identify novel chemical risks, sensitivities, and benefits associated with new and emerging technologies.
- Effectively communicate EPA research results to program offices to proactively integrate the results into program goals and strategies.

- Develop leading indicators of technology change and environmental consequences that could serve as an early warning system of potential risks.
- Conduct outreach and active cooperation with companies that are implementing new technologies to foster product stewardship.
- Develop tools for companies to help them anticipate environmental risks and direct their investments in early research.

**Emerging Diseases and Ecosystem Disruption** – This topic is so multifaceted that it is difficult to deal with as stated, but it is extremely important, with major implications for EPA and other agencies. The strategic plan revision can highlight the reality that the emergence and spread of infectious diseases are influenced by environmental factors such as climate change, habitat disruption, development in sensitive or water-stressed areas, introduction of invasive species, excessive pesticide use, and new farming practices such as industrial-scale Concentrated Animal Feeding Operations (CAFO). Pursuing this topic would involve changes in both objectives and strategies, with a much stronger focus on Agency outreach and collaboration with other government experts. For example, OPP assessment experts should cooperate with USDA scientists to better understand the role of pesticide use in the emergence of crop diseases. OWOW wetlands specialists, acid rain specialists in OAR, MDs and epidemiologists at CDC and HHS, and veterinarians and wildlife experts in USFWS and other DOI offices should coordinate to develop a research agenda on causal links between environmental alterations and infectious diseases.

- Assess and communicate to the public what we know about the potential relationship of ecosystem disruption and emerging diseases.
- Improve EPA monitoring capabilities to forecast emerging diseases.

**New Sensor Technologies** – Emerging sensor technologies that are cheaper, lighter, smaller, more accurate, more rugged, and more plentiful can form the information foundation for EPA's new, unifying strategic goal that connects real world environmental conditions, environmental stewardship practices, and human and ecological health outcomes. A network of physical, chemical, and biological sensors would feed into an environmental central nervous system of sorts, creating "on the fly" feedback intelligence. The resultant sensory data would be an important enabler of multi-media, inter-disciplinary, and cross-Program collaborations at EPA – cutting across all Strategic Goals – creating a data picture that mirrors reality. Better sensors enable truly strategic planning that is based on

concrete and measurable environmental outcomes. Given more reliable information, and the capacity for real-time analysis, EPA's Report on the Environment could become a living document that could be updated monthly, weekly, or even daily. Ultimately, the goal is to advance EPA's environmental foresight capabilities in order to (1) capitalize on opportunities to improve the environment and (2) prevent degradation in the first place. Integrated sensor networks and data analysis will fill data gaps, adding greater reliability to predictive models, decision support tools, and prospective environmental stewardship decisions.

- Develop more accurate baselines using empirical data instead of self-reporting, for annual and strategic planning. Use more comprehensive information to supplant current indices and cover large gaps in information with reliable and real-time trend analysis.
- Identify the opportunities for sensor technologies to cross-goals and "bust silos." Develop maps and real-time data, and distributed sensors to link local, national, and international environmental issues. Integrate data on air, land, water, ecosystems, materials, etc., to enhance EPA's multimedia understanding and effectiveness.
- Facilitate local and regional stewardship, using distributed sensors to provide information and models that communicate risk estimates to specific populations and individuals.
- Employ biosensors to identify risks from invasive species, especially vector species.
- Use sensors to track and analyze the flow of materials and elements throughout the industrial and consumer life cycle.
- Employ cheap, inexpensive groundwater and drinking water sensors, or robotic drone boats to create an early warning system for drinking water contamination, and support homeland security concerns.

**Ecosystem Services** – The strategic plan revision can be used to emphasize the need for a better understanding of ecological health and place-based health. Moving in this direction will require greater coordination between environmental and human health research and public health, as well as a stronger role for local partnerships. Better understanding of ecological conditions and ecosystem services will improve EPA's ability to provide assessment tools to place-based decision makers. Improved ecological assessment will aid in the parallel construction of strategic plans, annual reporting, and the Report on Environment. Shifts in strategy will be needed to put more focus on ecological health and develop stronger roles for local partnerships. Greater coordination between ecological and human health research will be needed to tease out public health outcomes from environmental programs.