

Planning for the Environmental Future: Preliminary State Perspectives on the Challenges Ahead

One of the key goals of the US Environmental Protection Agency's (EPA) Futures work is to support the agency's strategic planning process by identifying and researching emerging issues that will impact environmental quality at the federal, regional, and state levels.

In order to benefit from futures thinking at the state level and to inform the strategic planning process with our partners' perspectives from outside EPA, EPA's Office of the Chief Financial Officer (OCFO) led an interactive session at the Environmental Council of States (ECOS) Spring Meeting in Washington, DC on April 11, 2005.

Additional introduction was provided by Leah Ann Lamb of Utah and the ECOS Planning Committee. During this brief afternoon session a

limited group of current and former ECOS members, ECOS consultants, and current ECOS staff participated in a structured brainstorming exercise and shared their thoughts on future environmental concerns and the potential impact on EPA's strategic planning.

The session began with a presentation by Michael Brody about many of the forces creating rapid change in our world and on their impacts on the environment. Michael Childress, Executive Director of the Kentucky Long-Term Policy Research Center, followed with a description of his program's successful efforts to incorporate foresight into a wide-range of state-level policy issues.

After the presentations, facilitators guided the participants through a series of discussion questions designed to elicit views on future environmental quality, the forces driving change, and possible strategies that can be used to build on positive, and discourage negative, trends. In addition to sharing ideas and perspectives, several participants said that they appreciated the opportunity for dialogue, and would encourage further such opportunities.

The results, summarized below, represent this small group of ECOS members' informal and preliminary views on emerging environmental challenges rather than official policy

Environmental Change:

An Interactive Discussion about the Future

Session Highlights

- Presentations on future trends in environmental quality and state-level futures work
- Structured Brainstorming session focusing on several aspects of future environmental quality:
 - o Well-known and emerging concerns
 - o Unanticipated changes in environmental quality
 - o Impacts of new technologies
 - o Ramifications of demographic trends
 - o Implications for EPA Strategic Plan revision

positions. They will be considered throughout EPA's strategic plan revision process. Detailed results are presented in the appendix.

What May Lie Ahead

Respondents shared ideas about emerging trends in environmental quality. By discussing well-known concerns, potential surprises, and issues that are not on EPA's radar screen participants provided new perspectives for our strategic planning.

Well-Known Concerns

The well known environmental concerns that participants believed could have the largest impacts between now and 2025 are water (availability as well as quality), air pollution (especially from domestic coal-fired power plants and trans-boundary air pollution), climate change, and a variety of economic changes such as federal budget cuts and a decline in domestic manufacturing.

Potential Surprises

Participants saw energy technology developments as the area where the biggest surprises could occur. Accelerating progress in developing a wide range of alternative energy technologies, including tidal power and fuel cells, could have large environmental benefits. Support for nuclear power could grow as a way to cope with climate change. Climate change could bring many surprises because it affects biological systems all around the world, and it could pass a "tipping point" where much larger impacts occur. Existing chemicals could be found to cause new problems, and impacts related to pharmaceuticals in waste water could become far more important than previously thought. Ocean pollution could have very serious biological impacts. And we may be surprised by limitations on our ability to affect change through policy and technology. Environmental quality could decline

Environmental Trend Categories

Categories correspond to specific brainstorming questions

Well-Known Concern – trend not a problem now, but fairly certain that it will become a big issue

Potential Surprise – not sure how trend will develop, surprises reflect inability to see potential consequences of new driving forces

Not on EPA "Radar Screen" –potential surprises or even well-known concerns that may warrant more attention

New Solutions...

Alternative energy technologies, including tidal power and fuel cells, could have large environmental benefits

New Challenges...

New issues like pharmaceuticals in wastewater could be important

despite good enforcement of current standards and many technological solutions could prove to have unanticipated side effects.

Emerging Issues Not on EPA's "Radar Screen"

Participants believed that energy policy will emerge as a critical national issue. EPA has many roles related to energy production and use that affect energy production and use, and these roles need to be better coordinated to help reduce U.S. reliance on imported oil, address climate change, and decrease other environmental impacts associated with fossil fuels. EPA roles related to water policy also need to be coordinated to set high, attainable standards, address the loss of aquifer resources, and achieve a better integration of land use planning with efforts to protect water quality. Other areas that need more attention include land conservation (especially promoting conservation of private land), the decline in science education, indoor environmental quality, invasive species, and regeneration of ecosystems such as coastal forests. There are also novel homeland security issues that deserve more attention.

New Strategies...

EPA's roles related to energy production and use need to be better coordinated

Forces Driving Change

New technologies and demographic change both impact environmental quality. Although these forces are out of EPA's control, the sooner we are aware of these forces and their potential consequences, the more ably we can respond.

Technology-Driven Change

Emerging technologies that participants believe can do the most to create new capabilities for doing the job of environmental protection include improved remediation technology, monitoring and database technology, and communication and presentation technology.

Emerging technologies whose widespread use could do the most to reduce environmental impacts include efficient transportation technologies (fuel-electric hybrids and other low-emission vehicles, improved mass transit, telecommuting), new energy technologies (bio-fuels and other forms of renewable energy), and cradle-to-cradle industrial designs that use non-toxic materials, minimize waste, and make recycling and reuse of materials and products easy to do.

Promising Environmental Technologies:

Efficient transportation technologies could do the most to reduce environmental impacts

Cradle-to-cradle design could encourage recycling and reuse

Emerging technologies that could do the most to harm the environment include traditional energy production, chemicals, e-waste, unwise applications of nanotechnology and gene manipulation, EMF/EMR, and fishing technology that

encourages over-fishing. Some “good” technologies could also prove problematic: fuel-efficient cars could induce more sprawl, and unequal access to advanced education technology could worsen economic polarization, with growing poverty leading to disinvestment in environmental protection.

Demographic Trends

Participants agreed that population growth and shifts can have major environmental impacts. This is true on a global scale, with rapid growth in China, India and other areas. It is also true in the U.S., with population shifts to environmentally sensitive areas such as the arid Southwest can have major environmental impacts. An aging population could have mixed impacts. Older people tend to consume less and place more value on a clean environment for outdoor leisure activities, but aging will tend to reduce government revenues. Changing generational consumption patterns could also prove important. “Green purchasing choices” by younger generations (hybrid cars, energy efficient homes, etc.) could significantly reduce environmental impacts.

Helpful Demographic Trends

Green purchasing choices by younger generations could reduce environmental impacts

Harmful Demographic Trends

Population shifts to environmentally sensitive areas can have major environmental impacts

Foresight and Planning for Environmental Agencies

Planning is too frequently a simple projection outward of today’s conditions with no acknowledgement of changing trends and forces. Successful management of an environmental agency, however, requires foresight. Participants in the brainstorming session shared ideas about how foresight can be used to make EPA’s Strategic Plan more responsive to emerging trends and potential surprises.

Revising EPA’s Strategic Plan

Based on all the views they had shared, participants were asked what specific issues most need to be addressed in EPA’s strategic plan revision. Climate change was the issue mentioned most frequently, with many participants urging that the U.S. become a leader on this issue. Focusing more on ecosystem health and maintaining critical “ecosystem services” rather than on distinct media was strongly urged by some participants. Several argued for more investment in basic monitoring and assessment and for more research on cumulative and long term effects of exposures to small quantities of multiple types of pollutants. And

Emerging Concerns in Strategic Planning

- Define position on climate change
- Address preservation of critical “ecosystem services”
- Account for impacts of decreasing water quantity on water quality

several suggested that the strategic plan revision could be used to initiate new change strategies that “bring it closer to home” by helping people understand the implications of environmental problems impacting their local areas.

Participants also suggested several objectives or outcomes for the revision of the Strategic Plan. One was to improve the quality and transparency of environmental information underlying the strategic plan. Another was to increase regional involvement, bringing in regions from the start at the problem identification level and providing more avenues for input. More effort should be made to address holistic impacts across different media. And the Agency needs to find appropriate ways to address water quantity as well as quality since water quality concerns are increasingly affected by water quantity issues, both supply and demand.

Improvements in Environmental Planning

Participants discussed improvements in planning and other organizational activities needed to deal with the issues they have identified. Nearly everyone said that greater efforts need to be devoted to identify and address emerging issues before they turn into major problems. But considerable frustration was expressed about the lack of flexibility to address issues early, how long it takes to generate awareness and action, and lack of resources for improving foresight. Many participants urged a greater focus on the biggest problems, with more dialogue across agencies and levels of government to agree on what they are. Some stressed the need to address all major problems and expressed concern that politically sensitive environmental problems could become much worse because people are unwilling to take them on. Several urged EPA to strengthen the regional focus in its strategic plan by giving more attention to region-specific issues and by arranging an effective exchange of views on budget matters, including ways of joining resources for common goals.

Foresight & the Planning Process

- Identify and address emerging issues before they turn into major problems
- Build flexibility to address issues early, frequently
- Give more attention to region-specific emerging issues
- Organize more opinion-gathering sessions to elicit views of the future

Final Thoughts

Participants urged that more opinion-gathering sessions of this kind be organized, saying that state environmental officials rarely have an opportunity to meet and discuss these issues. The process could be improved by making questions available ahead of time and making the session longer – a half-day in length.

Discussion Format

The discussion took place in two small groups. Discussion was focused around the questions below. The bullets following each question are statements taken directly from the discussion and were selected to illustrate the full range of views expressed on each question. Where responses are numbered, views that were most widely expressed are listed first. Where responses are listed without numbering, they received roughly equal emphasis.

Discussion Topics

- 1)
 - a) *When you think about environmental issues in your own state and surrounding region, what do you see as the two biggest well-known concerns that could unfold between now and 2025?*
 - b) *When you think about environmental issues in your own state and surrounding region, what do you see as the two biggest surprises that could unfold between now and 2025?*
- 2)
 - a) *Which emerging technologies could create new capabilities for doing the job of environmental protection?*
 - b) *Which emerging technologies could do the most to reduce environmental impacts?*
 - c) *Which emerging technologies could do the most to harm the environment?*
 - d) *Which emerging technologies could do the most to reduce environmental impacts?*
- 3) *Demographic changes can have major environmental impacts. What specific demographic trends and related consumption or behavior changes do you see in your State that could cause, or worsen, or relieve environmental problems between now and 2025?*
- 4) *As you look back on your answers to the previous questions think about implications for EPA's Strategic Plan revision. What specific issues or underlying causes need to be addressed in the Strategic Plan revision?*
- 5) *Do you have suggested objectives or outcomes for the revision of the Strategic Plan to address specific issues and underlying causes?*
- 6) *Are there some trends or emerging developments in your State that are not on EPA's "radar screen" that you foresee could surprise us by sharply increasing – or reducing – environmental impacts between now and 2025?*

- 7) *What changes in planning and other processes could your organization and EPA make in order to get the emerging issues you identified “on the radar screen” faster and acted on faster so they don’t turn into major problems?*
- 8) *Is there anything else you would like to add about foresight for EPA or future environmental concerns?*

Discussion Responses – Organized by Theme

Questions 1a & 1b - Most Important Regional Concerns & Surprises Anticipated By Respondents

1) Energy Technology Developments

- Alternative energy improvements/ alternative fuels will significantly decrease environmental impacts of traditional fossil fuel energy
- Alternative fuels will NOT work
- Increased support for nuclear power
- Use of marine currents, wave energy
- Major fuel cell improvements
- Source of energy that was once inconceivable will be tapped
 - Ex. lunar [tidal] power, negative energy

2) Air Pollution

- Coal-fired power plants and air quality impacts
- Transboundary air pollution
- Impact of developing country transition to market economy – more cars...greater impact of international pollution (e.g. from China)
- Decreased restriction on movement of Mexican trucks into U.S.

3) Climate Change

- More certainty about climate change
- Louisiana: no elevation; any sea level change may cause devastating changes
- Epidemiological changes; rainfall patterns
- We will hit a tipping point leading to collapse of the ocean conveyor belt and subsequent mini-ice age
- Climate change will turn out to be “not a big deal” --same respondent mentioned--More land turned back to forests due to less farm land will offset climate effects

4) Water Availability

- Population increase and pressure on water availability
- Hydroelectric plants will be affected as water supplies decrease
- We assume water will always be available
 - However, water quantity is likely to be an environmental issue in the future (in Louisiana)

5) Water Quality

- Maintaining water quality as quantity decreases

- Water quality could degenerate to pre-EPA/1970 levels due to funding lapse
- Ocean health [declines sharply]...dead zones
- Continued ocean deterioration, species loss, changes in currents
- Pharmaceuticals in water

7) Economic Changes That Could Impact Environmental Protection

- Poverty...limits interest in conservation/environment at individual level
- Manufacturing industry will decline relative to services and other sectors
- U.S. will import agricultural products and natural resources instead of exporting

Other topics mentioned include:

- Spread of disease vectors
- Obtaining federal funding
- Suburban Sprawl
- Even with a perfect job on environmental enforcement and compliance to today's standards, we will see a decline of environmental quality
- Environmental terrorism
- Biodiversity loss
- Genetically modified food

Questions 2a, 2b, 2c, & 2d – Technology Driven Change

Improved Air Quality

- Low-emission vehicles (may encourage sprawl though)
- Efficient design; light weight, strong vehicles
- Improved mass transit
- Telecommuting
- Improvements in inner city educational technology may reduce sprawl from urban to suburban areas

Cradle to Cradle Design

- Better cradle-to-cradle design for profit and sustainability
- Using waste products; more reuse technology... water reuse
- Alternative or substitute materials
- Changes in packaging technology to reduce waste production

Improved Water Quality & Availability

- Desalinization – use of Pacific Ocean for drinking water
- More opportunities for water reuse

New/Alternative Energy Technologies

- Tidal power
- Cost effective renewable energy – eliminate fossil fuels and associated impacts such as climate change and ecosystem health
- Biofuels

Improved Remediation Technology

- Microbes for bioremediation of heavy metals, treatment plants (POTWs), protection & clean-up of sensitive environments, source reduction & treatment technologies
- Bioremediation technology revolutionized by nanotechnology
- Lead reduction technology for soil
- Better waste treatment of pharmaceuticals in water supplies
- Technological limitations may exist in treating pharmaceuticals in water supplies

Improved Monitoring and Database Technology

- Real time monitoring
- Aerial surveying/LANDSAT [More use of]
- More... spatial data to support environmental decision-making
- Adapt technology uses developed by private business to develop new generation of data systems such as PDAs for sanitary surveys

Improved Communication & Presentation Technology

- More capabilities to present information [GIS] may influence decisions about land use
- Electronic transmission, GIS, Internet to communicate all available data on environment more efficiently and to a wider audience
- Video conferencing and communication technology to save money and time in environmental agencies

Uncertain & Unforeseen Environmental Impacts of New Technologies

- **Nanotechnology** – great potential, but also problems
- **E-waste** – miniaturization could reduce volume of e-waste over long term, however, benefits could be offset by rapid replacement of IT devices
- **EMF/EMR** – radiation effects from wireless technologies
- **Energy** – continued traditional energy production
- **Chemicals** – including new pharmaceuticals, existing chemicals, & new chemicals in drinking water
- **Gene Manipulation** – of plants and animals for agriculture
- **Fishing Technology** – overfishing driven by technology improvements
- **Fuel-Efficient Cars** – can be harmful if they create more sprawl
- **Education Technology** – continued downward trajectory for technology distribution could polarize population (haves vs. have nots) as funding for educational technology dissemination declines in some areas; more have nots will lead to disinvestment in environmental protection

- **New environmental & safety technologies** - Unforeseen side effects of technological solutions to various problems (environmental technologies, flame retardant chemicals, etc.)

Question 3 - Demographic Trends

Population Size and Distribution (domestic & international)

- Population loss in New England with decline of manufacturing base
- People shifting spatially to environmentally sensitive areas
- Rapid global growth in some areas, i.e. India and China
- What will continued immigration to U.S. mean in terms of support for the environment? Will increased Hispanic population take on the role of environmental stewards? Will new immigrants lack a sense of place and conservation ethic?
- Changes in legislation relating to land use planning will encourage sprawl

Aging

- Older population has less environmental impact due to less consumption... they place more value on a clean environment due to outdoor leisure activities associated with retirement
- Less consumption... generates less sales tax revenues for government agencies, aggravating disinvestment
- Will older people move in or move out of certain regions? ...In Georgia older people are moving back to urban cores while suburbs are mostly new immigrants

Consumption Patterns

- Changes in “generational consumer choice” – green purchasing choices by younger generations may reduce consumption of natural resources
- New architectural trends will change people’s perspectives on alternative energy usage...green design concepts
- U.S. is 4% of global population but [high consumption] generates 25% of environmental impacts

Other Topics Mentioned Include:

- Growing Deficits – less \$ for environmental protection
- Less emphasis on environmental science & education; lack of natural connection to environment in the youngest generation

Questions 4 – 8 – Potential Implications for EPA Strategic Plan

Emerging Concerns not currently on EPA’s “Radar Screen”

Energy Policy

- Climate change, sea level rise

- Help shape national policy on energy to limit U.S. reliance on foreign oil (especially in unstable parts of the world); decrease environmental impacts associated with fossil fuels
- Hydroelectric plant impacts on water quality, endangered species

Water Quantity & Quality

- Loss of aquifer resources
- Water quality standards – Are they attainable? Should EPA allow stricter standards to be enacted?

Effects on water of use of land; lack of integrated land and water use planning

Land Conservation Incentives

- Opportunities for conservation of “working” lands (land managed by the Forest Service, DOI)
- Loss of tax breaks for conservation
- Promoting conservation on private land (big opportunity)

Science Education

- Decreased funding for science education
- 90% of middle school students are taught science by non-scientists
- Lack of education leads to disinterest leads to lack of political will
- Lack of education paired with immigration and cultural issues

Other Topics Mentioned Include:

- Trade Opportunities for US to meet food demand in China
- Invasive Species
- Regeneration of Coastal Forests
- Indoor Environmental Quality
- Novel Homeland Security Issues
- Environmental Implications of Aging Population

Issues to Address in EPA’s Strategic Plan

Climate Change

- U.S. needs to be a leader on climate change
- CO₂ should be regulated as a pollutant
- We should be dealing strategically with CO₂

Ecosystem Health

- Focus more on multimedia ecosystem health & ecosystem services rather than distinct media
- Strategic Plan does not look at holistic impacts or depict trends in enforcement
- EPA not even asking the right questions about ecosystem health or minimum combination of essential ecosystem services needed for sustainability/ survival

Regional Environmental Information

- Strategic Plan could have regional components that the regions could comment on
- EPA should strike a balance between national and regional level information in the Plan
 - Region-specific environmental issues may not be adequately addressed

Cumulative and Long Term Effects

- Cumulative impacts of multiple types of environmental impacts and stressors are not directly addressed in the Strategic Plan
- Effects of long-term exposure to small quantities of pollutants

Water Quantity & Quality

- Strategic Plan does not address issue of water quality vs. quantity
- Eastern states will begin to face water quantity & quality issues similar to those currently experienced in the West
- Strategic Plan does not address reservoirs
- No flexibility in setting water standards in the Strategic Plan; reality of the difficulties associated with implementing more and more stringent water standards for states and regions is not reflected

Sprawl

- Sprawl is not reflected in the current strategic plan
 - EPA is restricted by its mission but should identify issues, gather data on impacts
- No one is willing to take on politically sensitive environmental issues [so] the Strategic Plan can't realistically reflect what will happen

Information Gaps

- Strategic Plan needs to improve investment in basic monitoring and assessment
- Strategic Plan did not reflect best environmental information

Change Strategies

- EPA should plan to engage people by "bringing it closer to home" so everyone understands the implications of environmental problems impacting their area
- Find ways to overcome cultural resistance to change within bureaucracies that protect the environment

Recommendations

Address Emerging Issues

- What's the plan for the future of environmental futures in EPA planning?
- Increase flexibility to address emerging issues – state's input on this subject not heard by EPA
- Process takes too long to address emerging issues

- Find ways to address currently unresolved environmental problems, particularly new ones
- Better communication needed between states, regions, and EPA HQ on emerging chemicals

Consult State Stakeholders

- Make questions available ahead of time and allow more time—especially for final question need senior management leadership
- People want to talk about environmental futures. ECOS members were not aware of the nature of this session. ECOS members are rarely given a chance to discuss these issues.
- Prepare questions ahead of time and make the session a half-day
- Have Steve Brown or Steve Thompson send the information out to signal that high level officials are paying attention to environmental futures. States will be more interested in participating if the message is delivered from high level EPA officials
- Outside experts would be helpful for sparking discussion and fueling effort
- State Commissioners should discuss environmental futures with state and regional government staff
- Need vital link with budget and partnerships – need conversation about joining resources for common goals across agencies

Strengthen Regional Focus

- How is EPA engaging with regional offices on environmental futures issues? Are there more opportunities for interaction at that level?
- Strategic Plan should link state and Federal levels – need effective exchange of views on budget matters (communication instead of mutually exclusive processes)
- Involve regions in strategic planning starting at problem identification level
 - Approach national priorities from the bottom up
- Hold Regional Forums – past process doesn't foster input from regional areas
- Improve communication between HQ and regional offices (impacts communication with states)

Focus on the Biggest Problems

Climate Change

- We need to take advantage of the opportunity to do more on climate change...
- Regionally-based work and reports model cooperation but no outcome. Impatient with talking but not gaining traction (including interactions between media/national security, etc.)

Hydrogen Energy

- Increased interest in hydrogen economy and energy issues. Need hydrogen work group (CA, FL, MA)

Other topics included:

- State Implementation Plans (SIP) Approved, Maximum Achievable Control Technology (MACT) Established
- Better Crisis Management
- Budget crunches, personal preferences affect ability to “think big” ...
 - All environmental organizations are fighting for survival and new incarnation
 - Organizations, state and federal, are set in their ways although problems have changed
 - How can we reorganize to solve today’s problems?
 - Can’t do it by going back to larger funding levels so we need to find new ways to work