Testimony by Ellis Cowling

University Distinguished Professor At-Large
North Carolina State University

Question 1: How has acid rain affected forest, rivers, and other ecosystems in the Southeast and have those ecosystems shown signs of recovery since the Clean Air Act Amendments of 1990?

Question 2: How important are monitoring networks for understanding acid rain and related air pollution, and is federal support for monitoring adequate?

Acid rain, ground-level ozone, regional haze, particulate matter, eutrophication, and climate change continue to be major matters of public worry and industrial concern in the southeastern United States. Although Los Angeles is famous for its historically high ozone concentrations, the Houston-Galveston area of Texas is now rivaling Los Angeles as the most remarkable place to observe rapid accumulation of ozone in the U.S. today. Although air concentrations of sulfate aerosol are decreasing in most states in the eastern US, this is not true in the southern Appalachians and most notably not true within the Great Smoky Mountains National Park. Although the number of urban areas designated non-attainment for the 1-hour ozone standard has decreased in recent years, the total number of counties included within ozone non-attainment areas of the south will increase markedly as soon as the 8-hour standard for ozone is implemented. Many of these newly designated ozone non-attainment counties will be rural rather than urban in character. Although total emissions of sulfur oxides have decreased in most states east of the Mississippi River, emissions of nitrogen oxides have remained about the same or even increased. This difference is especially noteworthy in the southeastern states where emissions of ammonia from animal agriculture also have increased substantially in recent years. The visual range over scenic vistas has decreased in most Class I areas in the southern Appalachians. Although a trend of decreasing ozone concentrations has occurred in the US as a whole, during the 10-year period from 1990-1999 ozone concentrations increased in the southeastern states – the 2nd highest daily maximum one-hour average ozone concentration increased by 13 percent and the 4th highest daily maximum 8-hour average increased by 17 percent. Eight of nine US National Parks showing increased ozone concentrations during 1990-1999 were located in southeastern states (AR, FL, KY, NC, SC, TX).

All these differences and trends provide substantial justification for continuing investments in research and pollution-management activities aimed at discovering and implementing cost-effective means for decreasing these impacts in the southeast.

Biography

Ellis Cowling is a forest biologist at North Carolina State University who became a world leader in air pollution research. Beginning in 1975, he led a group of 200 scientists in creating the National Atmospheric Deposition Program (NADP). This network measures the amounts of nutrients and injurious substances transferred in rain and snow from the atmosphere to forest and agricultural land and surface waters at 200 research sites throughout the US. In some parts of our country, these substances are having positive effects on the productivity of crops and forests. In other parts, some of these same substances are having negative effects on forests, fish, and surface and ground water quality. Cowling will discuss how scientists and engineers in NADP (and in the Southern Oxidants Study which he now leads) are increasing scientific and public understanding about environmental change and the sustainability of ecosystems. As Chair of the session on Regional Impacts, he will also lead our discussion of how society can adjust the procedures by which air and water quality are maintained. Cowling has two earned Ph.D. degrees-one from the University of Wisconsin and the other from the University of Uppsala in Sweden. He has served as major professor for 66 graduate and postdoctoral

students at Yale and at NC State Universities. He has been a member of the National Academy of Sciences since 1973.

Themes to be Addressed:

1. Celebrating the achievements of NADP's first twenty years
2. Ensuring the long-term stability of the NADP network
3. The growing importance of nutrient nitrogen in determining the pollution climate of North America
4. Prospects for developing area-wide estimates of total (wet plus dry) deposition through collaboration with other organizations in North America and Europe

What Are the Most Notable Achievements of NADP's First Twenty Years?

1. Building and maintaining for 20 years, a uniquely successful partnership among many disparate federal, state, industrial, and university research communities
2. Developing a high quality environmental database that is trusted by both scientific and policy leaders throughout North America and around the world
3. Achieving a remarkable degree of personal and professional satisfaction through collaboration and cooperation among atmospheric, agricultural, forest, aquatic, and terrestrial scientists on a continental scale

Celebrating the Achievements of NADP's First Twenty Years

1. Using the bottom-up traditions of the Regional Project System of the State Agricultural Experiment Stations as an organization paradigm
2. Selecting, developing, and maintaining a single Central Analytical Laboratory at Illinois State Water Survey (ISWS)
3. Winning the confidence of federal agencies (USDA, USGS, USFS, EPA, USF&WS, NPS, BLM), electric utilities, and other organizations to assemble the present 200-station NADP/NTN network under NAPAP
4. Maintaining cooperation and intercomparisons with the Canadian CANSAP and CAPMoN networks
5. Certification of network-wide QA/QC through site visits by EPA and laboratory intercomparison by the World Meteorological Organization
6. Periodic peer reviews of NADP by NAPAP and the Regional Associations of Directors

Celebrating the Achievements of NADP's First 20 Years

1. Undertaking special studies of atmospheric transport and deposition of pesticides and heavy metals and creation of NADP's Mercury Deposition Network (MDN) and Atmospheric Integration Research Monitoring, Network (AIRMoN)
2. Publishing isopleth maps showing spatial gradients in deposition of major nutrient cations and anions
3. Learning to use the Internet as a means of data dissemination and information transfer to major users of NADP data and information
4. Consolidation of the NADP Coordination Office in Colorado with the Central Analytical Laboratory in Illinois
5. Demonstration that Title IV of the Clean Air Act Amendments of 1990 is working
6. Learning to survive periodic budget crises – a continuing challenge of organization self-education, future planning, and proactive marketing

Ensuring the Long-Term Stability of the NADP Network

The financial stability and longevity of the NADP program depends critically on the number, geographical distribution, and organizational or political clout of satisfied "customers" that include:

- Many data users who care about the data, use the data often, and willing to speak out publicly about the important values they

derive from analysis and interpretation of the data.

Hence the following recommendations to:

- NADP Marketing, Executive, and Technical Committees
- NADP Coordinator and his colleagues at the ISWS
- NADP Administrative Advisors within CSREES
- Regional Associations of Directors within the SAES

Recommendation I

Use the NADP Web Site and other outreach venues (see list below) to build an enduring support base of "satisfied and vocal customers:

- "Inside Rain: A Look at the National Atmospheric Deposition Program,"
- "NADP/NTN Wet Deposition in the United States 1995,"
- "NADP/NTN Wet Deposition in the United States 1996,"
- "NADP/NTN Wet Deposition in the United States 1997,"
- "Uses of National Atmospheric Deposition Program National Trends Network Data for Science and Education and Environmental Problem Solving,"
- "Trends in Precipitation Chemistry in the United States, 1983-94: An Analysis of the Effects in 1995 of Phase I of the Clean Air Act Amendments of 1990, Title IV."

Recommendation II

Cultivate and education the NADP Administrative Advisors in CSEERS and the SAES Directors within the four Regional Associations of Directors – Northeast, Southern, North Central, and Western.

This education is essential to maintain the confidence of current leaders within the Regional Research System of Land Grant Universities, the State Agricultural Experiment Stations (SAEA), and the Cooperative State Research, Education, and Extension Service (CSREES).

Recommendation III

Develop and maintain a standing group of current and former NADP leaders who are prepared on short notice to mount an educational campaign for reaffirmation of support whenever one of the major NADP support organizations is threatening to withdraw or decrease its support.

Current members of the NADP Executive Committee and a carefully selected, well connected, and articulate spokespersons including:

- Current and former Chairmen of NADP – Stan Coloff, Mike Kelley, Steve Lindberg, Bill McFee, Jim Lynch, Ellis Cowling, etc.
- Current and former CSREES Administrative Advisors to NADP
- Current and former Directors of NAPAP – Mike Uhart, Dereck Wnstanley, Patricia Irving, James Mahoney, and Chris Bernabo
- Current and former scientific leaders in NADP and closely related organizations including Jim Galloway, Jim Gibson, Eville Gorham, Dick Simonin, Rick Linthurst, Walter Heck, David Shriner, Jim Lodge, Rona Birnbaum, Gene Likens, Jerry Millilo, Bruce Hicks, Dan Albritton, Christina Bierbaum, Milton Russell, Senator Patrick Moynihan, Congressman David Prices, etc.

Recommendation IV

Identify within every state within NADP, a member of the NADP Technical Committee who is willing, to serve as the NADSP Designated State or University Representative for his or her particular state.

The responsibility of these State or University Representatives should be to actively, state by state, cultivate, communicate with, and maintain a roster and current mailing list of "NADP customers" (data users) within his or her own particular state. In this way customers can be informed of NADP activities and enlisted as supporters.

Recommendation IVa

NADP data users for each state should include leaders and/or outreach persons in the following organizations:

- NADP Site Operators

Leaders in various university organizations:

- Botany
- College of Agriculture
- College of Forest Resources
- Crop Science or Agronomy
- Earth and Atmospheric Sciences
- Fisheries and Wildlife Management
- Forestry
- Horticultural Science
- Marine Biology
- Multidisciplinary Studies
- Outdoor Recreation
- Park, Recreation, and Tourism Management
- Political Science and Public Administration
- Public Health and Environment
- Soil Science
- State Agricultural Experiment Station
- Water Resources Research Institute
- Zoology

State Divisions of:

- Agriculture
- Air Quality
- Environmental Conservation
- Environmental Statistics
- Fish and Game
- Parks and Recreation
- Public Health
- Water Quality

Environmental officials of major industries and trade associations:

- Animal waste research groups
- Cattlemen's association
- Electric utilities
- Fish producers
- Forest products companies
- Municipal waste managers association, etc.
- Pork producers
- Poultry producers

State and/or Regional District Offices:

- Fish and Wildlife Service
- Forest Service
- Soil Conservation Districts
- U.S. Geological Survey

Regional and local chapters of environmental groups

- Conservation Foundation
- Ducks Unlimited
- Environmental Defense Fund
- Natural Resources Defense Council
- Nature Conservancy
- Sierra Club

Regional research groups

- Albemarle and Pamlico Sounds Res. Prog.
- Chesapeake Bay Research Program
- Regional Associations of air quality managers such as NESCAUM, MAEAMA, SESARM, etc.
- Tampa Bay Research Program

County and municipal public health and parks and recreation departments
Members of the National Teachers Association

Recommendation IVb

At least once each year (and occasionally in between), the NADP Designated State or University Representative should use the mailing list of data users within each state for at least three general purposes:

1. Call attention to the time, place, and major presentations during at least the public-information portion of the NADP Annual Meeting
2. Ask if there are additional interests that could be satisfied by available NADP data

and the information products or through additional studies or products needed within each state
3. Ask these persons to continue to speak out vocally (and in appropriate institutional publications) about the values they derive from use of the NADP data and information

Recommendation IVc

Every five or so years, the NADP Designated State or University Representative should organize state-wide meetings with organizational leaders from the state to:

1. Communicate NADP appreciation for continuing multi-organizational support and participation in the program
2. Determine if NADP operations are continuing to be adequately representative of current nutrient-, air quality-, water resource-, natural resource-, and fisheries-management and other environmental concerns within the state
3. Identify improvements that may be needed in the location and/or operation of NADP Collection Sites in the state
4. Identify additional uses that might be made of existing NADP data an information products or other data and information needed within the state
5. Discuss contemporary financial and other aspects of the NADP program during past years and the need for continuing use of the data and participation in the program during future years

Recommendation V

The NADP Executive Committee, Regional and CSEERS Administrative Advisors, and all NADP support organizations should explore the possibility of building a contingency ("rainy day") fund to provide temporary support for high quality NADP sites that are in jeopardy of losing their support.

One means of doing this is to add a "contingency surcharge of 2-5% to the analytical service fees of CAL" which would be administered by the NADP Coordinator with the approval of the Executive Committee to provide time-limited (12-24 months) support for sites that lose support by sponsoring organizations.

Recommendation VI

Circulate a Resolution of Mutual Commitment {A "Gentleman's Agreement"} among NADP leaders

As responsible leaders within various universities, federal and state agencies, and industrial organizations in the United States, we are pleased to pledge our continuing participation and financial support of the National Atmospheric Deposition Program (NADP).

We believe that continuing multi-organizational support of NADP, collect5ively totaling less than $4.0 million dollars per year, is by far the most cost effective means by which our country can continue to provide high-quality, scientifically-valid information on contemporary changes in the chemical climate of the United States.

If, at some future time, our organization finds it necessary to decrease our support for this valuable program, we promise to do our best to provide a minimum of 2-years' advance notice of the necessity to decrease our participation. We make this promise out of respect for other organizations which will have to make up for our decreased participation.

Rational For a "Resolution of Mutual Commitment"

The amount of precipitation (rain, snow) occurring in urban, suburban, rural, and remote regions in the United States is currently measured on a daily basis at about 4,000 locations. The longevity of these valuable records of precipitation amount varies across the United States from about 150 to 250 years (since about 1750 in many pars of the eastern US and since the early 1800s in other parts of the nation). The total cost of these measurements and routine reporting of results is currently more than $25 million dollars per year.

For only the past 20 years, the nature and amount of beneficial nutrient substances, toxic substances, acidic and acidifying substances, and

growth-altering substances dissolved or suspended in precipitation has been measured by NADP on a weekly basis at about 200 locations in the United States. The cost of these measurements and their public reporting is currently borne by a voluntary association of nearly 100 organizations affiliated with about 20 state and private universities, 7 federal and 6 state regulatory and natural resource management agencies, and 5 commercial firms which have voluntarily joined together to support NADP for the past 20 years.