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NON-POINT POLLUTION RESEARCH AND INFORMATION NEEDS

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BACKGROUND

The Department of Energy and Natural Resources (DENR) maintains a high level of interest and a very broad perspective in the area of non-point pollution research and information. This interest is established by DENR's mandate, which reads in part: "It shall be the duty of the Department to investigate practical problems, implement studies, conduct research and provide assistance, information and data relating to the technology and administration of environmental protection; energy; the natural history, entomology, zoology and botany of this State; the geology and natural resources of this State; the water and atmospheric resources of this State; and the archeological and cultural history of this State."

DENR carries out this mandate through the Springfield office, the State Museum, and the three scientific surveys in Champaign. The department also funds outside research related to our mandated interests.

Research and information are the key ingredients of the process of environmental problem solving. The process begins with problem identification followed by research, information exchange, and finally solution. Conferences such as the Annual Non-point Pollution Conference are an important link in that process since they provide an opportunity for problem identification and also the platform for information exchange.

Collectively, farmers, regulators, planners, and scientists have come a long way in the understanding and control of non-point source (NPS) pollution since the first studies were begun. Some of the original goals such as "fishable - swimmable by 1983" may have been overly optimistic, but they have served their purpose. Many of our rivers and streams have seen water quality improvements and further degradation of others has been stopped. Now with increased knowledge, and working relationships between the various interest groups, it is possible to move forward with reasonable solutions to remaining problems.

Innovative funding programs and means for distributing payment for improvements among all of the beneficiaries will prove to be as important as the technical solutions to problems.

AVAILABLE INFORMATION AND PROGRAMS

Many research products and action programs are in place now. The Water Quality Management Plan brings together many of the efforts of state and federal agencies into a comprehensive plan. The State Water Plan Task Force insures that programs of the various state agencies are consistent

and without duplication. The Water Plan itself offers a means for funding needed water-related programs within the state.

The Urban 208 studies followed by the National Urban Runoff Program (NURP) offered insights into the problems of urban NPS pollution. These demonstrated in Illinois that street sweeping was not likely to improve water quality but that storm water detention was a promising best management practice (BMP). The Water Survey participated in both the 208 and the NURP programs through IEPA, and has become the data repository for all non-USGS NURP studies.

The SCS Urban Erosion Control Handbook is another example of a product that can benefit NPS efforts.

The Water Survey has an active project on stream bank erosion on Court Creek. This work is complemented by an extensive study of drainage and erosion problems and solutions on the Cache River. Other studies relating to long-term sediment problems are well under way at Quincy Bay, Peoria Lake, and Lake Springfield. These studies are all aimed at finding solutions to problems.

A statewide climate and water network at the Water Survey includes monitoring of ground-water levels and suspended sediment in streams. The collection of these important baseline data is constantly threatened by cuts in funding.

The Lands Unsuitable for Mining program at DENR has resulted in the development of an extensive natural resources data base that is built around a computerized geographical information system (GIS). This system has great potential for integrating huge data bases and producing meaningful and useful mapped products.

The Rural Clean Water Program (RCWP) is a nationwide experimental program initiated by Congress through USDA and USEPA in 1979. The Highland Silver Lake project in Illinois is one of five projects selected to monitor and evaluate the impacts of best management practices (BMPs). This study illustrates the need to monitor the impacts of various BMPs on water quality. It demonstrates that large percentages of affected land must be treated if measurable water quality improvements are to be obtained.

Ground-water protection is of great concern and much is yet to be learned; however, nitrate data are now available from public water supply testing, and testing for organics is under way at IEPA. The water use inventory of the Water Survey identifies well locations, pumpage, and the aquifer being used.

The newly formed Hazardous Waste Research and Information Center (HWRIC) is concentrating on point sources of Hazardous Waste generation and disposal. The information being produced will be of great benefit in protecting both ground water and surface water supplies.

Contributions of NPS pollution from the atmosphere are still poorly understood, but we can estimate annual atmospheric NPS loads by source, and

initial data on dry deposition are now becoming available from the National Atmospheric Deposition Program.

Perhaps one of the most promising developments in NPS control is the proposed conservation reserve program, a component of the Federal Farm Bill. This program has the potential for removing 2 million acres of marginal Illinois farmland from production. This will greatly reduce erosion and resultant sedimentation in the affected areas.

With these and many other accomplishments behind us, there is reason to be hopeful and proud of the progress that has been made. As always, however, there is still much to be learned and much to be done.

RESEARCH AND INFORMATION NEEDS

Surface Water

1. A long-term suspended sediment monitoring program for Illinois streams and rivers is needed. Suspended sediment can be the primary environmental indicator of progress in control of NPS pollution. An adequate statewide network will indicate the degree to which erosion and sedimentation have been reduced by conservation tillage and other more costly conservation measures.

2. Additional information on the transport and fate of herbicides, pesticides, and nutrients from agricultural watersheds through overland flow and stream flow is required before countermeasures can be designed.

3. Factors affecting the affinity of herbicides, pesticides, and nutrients for sediments need further study. This could lead to new or modified chemicals that would be less likely to travel with the sediment.

4. More information on the areal distribution and availability of agicultural chemicals in Illinois would assist in the important task of targeting areas for expenditure of limited funds.

5. The effects of cropping practices on the delivery of agricultural chemicals to the rivers, lakes, and ground-water supplies of Illinois need to be determined.

6. The extent and potential for toxic pollutant accumulation in the sediments of urban lakes and streams requires further study, as well as methods for the safe removal and disposal of such sediments.

7. The source, fate, and transport mechanisms of priority pollutants borne by urban runoff are not well known. NURP showed that risks to human health could result when domestic water supply intakes were in close proximity to urban stormwater discharges.

8. Runoff from industrial areas and central business districts has higher contaminant levels than that from other urban areas. More data are required to quantify these pollutants, and new techniques are needed to control loadings from these areas.

9. Physical impacts of urban runoff on receiving streams have received little attention. These impacts can be more limiting to beneficial uses than chemical impacts on some streams. Stream bank erosion is one significant problem.

10. The use of wetlands, either natural or man-made, for the reduction of pollutants shows promise and needs further investigation. The Des Plaines Wetlands project is designed to be a natural laboratory that will allow investigation of many natural processes, but significant additional funding is required.

11. The use of grass swales has also shown potential for pollutant removal. However, their performance is dependent on design features about which very little information is available.

12. Methods for minimizing the impact of sediment on habitat need study and development.

13. Management of NPS data, selection of target areas, and documentation of progress can be done statewide on DENR's GIS. This application needs investigation by a multi-agency group.

Ground Water

1. Funding of a statewide ground-water monitoring network to assess the long-term effects of land use practices and changes is of critical importance. Limited sampling has shown that organic contamination exists in a surprisingly large number of wells.

2. Investigations of the sources, movement, and treatment of organic compounds and other toxic chemicals, including agricultural chemicals, are needed on a statewide basis.

3. Methods need to be developed for in-situ treatment of highly permeable septic fields, and tighter controls need to be implemented.

4. Investigation of the effects and treatment of oilfield brines that leach to ground water or flow overland to streams and rivers has begun at DENR, but needs several years of work.

5. The extent to which highway deicing chemicals have entered shallow aquifers has been studied in some areas, but the extent to which controls are required is not clear at this time.

Atmospheric Sources

1. Investigations into the fundamental physical and chemical processes of both wet and dry deposition are required before we can hope to deal with the pollutional aspects of these processes.

2. Better identification of atmospheric NPS as well as chemical makeup and particle size distribution by source is also required.

3. High metals content is of concern in urban runoff. The relationship between rainfall pH and appearance of heavy metals in stormwater runoff needs further study.

DENR'S MANAGEMENT PLAN

DENR's most recent solicitation for research proposals contained the following statements to identify highest priority research:

A. Agricultural Ecosystems. With its abundance of fertile soil, Illinois has become a major agricultural state whose importance as a food supplier to the United States and the world earns it nearly $8 billion a year in crop and livestock receipts. Yet agriculture also takes its toll on the environment of the state. The use of pesticides, herbicides, and other chemicals for greater productivity leads to significant environmental problems in air and water. Soil erosion not only carries harmful chemicals into Illinois waterways, it also leads to sedimentation of lakes and streams, affects the viability of aquatic life, and jeopardizes the long-term productivity of our farmland. Another major issue for agriculture is land-use planning and the competition for land among farming, subdivisions, commercial and industrial uses, and natural areas. Because of agriculture's economic importance to the state and because of its serious environmental effects, the Department is interested in supporting research in this area.

B. Air Quality. Air pollutants can act individually and synergistically with other pollutants to produce adverse effects on humans, plant and animal life, and materials. Local emission sources of various metals, gases, and biological agents can create health and environmental problems in our communities. In addition, the transport of air pollutants involves a complex interplay of meteorological factors which may create air quality problems far from the source of the pollutant. Toxic air pollutants are increasingly being considered as a serious problem. Although air quality has generally continued to improve in Illinois since enactment of national and state ambient air quality standards, a continuing need exists for better understanding of the sources, effects, and control of air contaminants.

C. Water Quality. A major water quality issue facing Illinois is the contamination and depletion of ground-water supplies. The problem becomes compounded because of the difficulty and expense involved in cleaning up contaminated aquifers and the number and diversity of the pollutant sources. These sources include a variety of elements and compounds which can reduce the quality of ground water until it is unsuitable to meet present needs or future demands. Very little scientific data is available on ground water quality or quantity, which impedes progress in the research and development of new techniques in the fields of detection, isolation, and removal of ground-water contamination.

The funding of research projects in these areas is a good indication of DENR's continued commitment to solving problems in air, land, and water pollution.

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