

Putting Research in the Right Place

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The Clean Water Act has been, and will continue to be the driver behind research for the water environment in the foreseeable future. Whether or not this is appropriate is debatable. If the scientific and policy leaders treat our future as an extension of our past, we will likely miss our mark. While we have made significant achievements in controlling point source pollution, there are many important issues to resolve. The reauthorization of the Clean Water Act will provide direction, but sound scientific research must lead the eminent regulatory charge.

Society historically enjoys a 28% rate of return on its investment in research. Environmental research has had its share of success. Achievements over the past 20 years are part of our everyday lives, and manifest themselves in the public's eye as do the vibrant Potomac River, Cuyahoga River in Ohio, and our vast shorelines. Water quality professionals reflect on our achievements in terms of physical-chemical and biological treatment processes, control of air toxics and odors, and the proliferation of biosolids management practices to include burning, burying, composting, pelletizing, spreading and other beneficial reuse practices. It is impressive how far we have come.

In the past, regulations resulting from previous Clean Water legislation challenged the boundaries of "the state-of-the-art", and provided funding for research and development primarily through EPA's grants program. A partnership evolved in which federal programs established

a network of government laboratories, grants provided universities with the freedom to innovate and revolutionize our perspective on problems, while managers and vendors became problem solvers developing processes and equipment we now consider conventional. It was a partnership that worked.

The federal government allocated nearly \$5 billion in fiscal year 1992 for environmental research to mission oriented agencies of the federal establishment. According to a study by the Committee on Environmental Research, Commission on Life Sciences of the National Research Council "there is no comprehensive national environmental research plan to coordinate the efforts of the more than 20 agencies involved in environmental programs. Moreover, no agency has the mission to develop such a plan, nor is any existing agency able to coordinate and oversee a national environmental research plan if one were developed."

Focusing this situation on the water environment, we find that the U.S. Environmental Protection Agency ranked seventh in total environmental research funding during 1992 behind Agriculture, Interior, National Science Foundation, Defense, NASA, and Energy Departments (Figure 1). In fact, only 7% of environmental research dollars appropriated by Congress finds its way to the U.S. Environmental Protection Agency. While there is a surprisingly large sum allocated to environmental research, EPA's share is relatively small and defused. During fiscal year 1992

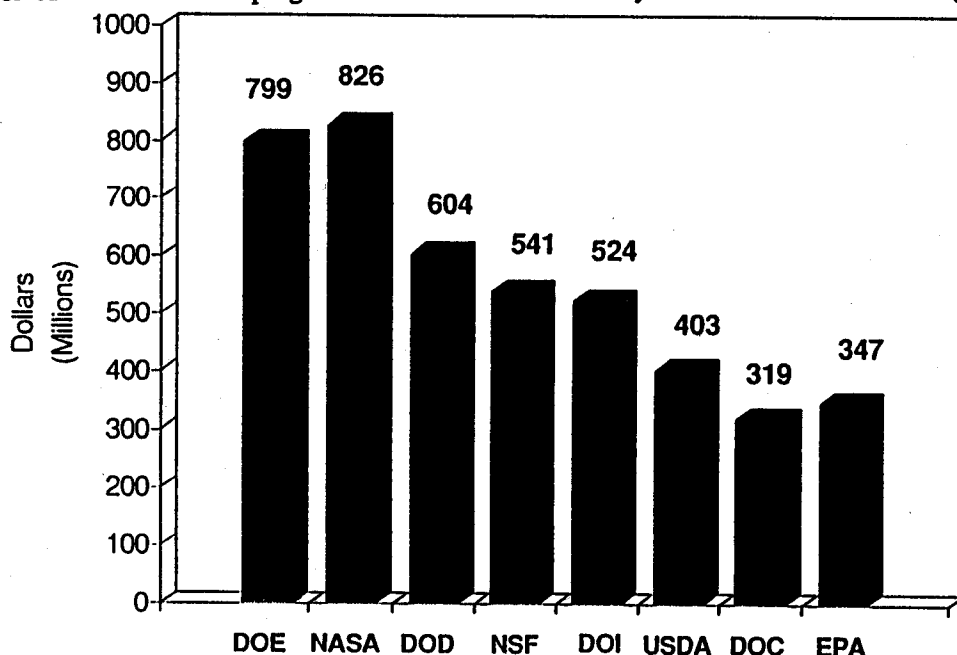


Figure 1. 1992 federal funding for environmental research by agency

approximately 22% of EPA's \$438 million research budget was allocated to "engineering and technology." A close look at these expenditures revealed that the small percentage allocated for water issues had a regulatory focus relative to the Great Lakes, wetlands, and toxic compounds. Virtually no funding was provided for wastewater process or treatment technology. The stated priorities for the \$97.7 million allocated for engineering and technology research were air, hazardous waste, solid waste, drinking water, and pollution prevention.

One could conclude that our policy leaders believe our work in wastewater treatment is done, yet the evidence clearly indicates otherwise. Our future holds the promise of a growing population, and demographic/geographic shifts. Our growing population will cause increasing environmental stress resulting in more stringent legislative and regulatory requirements. The future holds the promise of more issues, and more complex issues. Researchers are just beginning to address ecosystem or watershed management, while policy leaders are drafting legislative initiatives and regulatory frameworks for watershed management in the absence of any clear scientific understanding of the issues.

The widening impact of people also must drive our scientific agenda. Consider that in the year 1800 there were 1 billion people on the earth, and now there are close to 6 billion. During its early stages, wastewater treatment technology evolved through significant scientific investments to protect the public health. As the world population growth passed the 4 billion mark, and the implication of an industrial and technologically advanced society become evident, policy leaders moved the target to include swimmable/fishable waters and zero discharge. We continue to move forward towards this elusive goal. The United Nations estimates a population of 6.3 billion by the year 2000, and almost double that by 2050. The implication of this growth becomes increasingly daunting when one considers the expectations for an increasing quality of life and its impact on the environment.

Many of us will experience a doubling of the population in our own communities in our lifetime. During the 1980's 26 states experienced growth of 5% or more. A total of 46 states experienced some growth, while only four declined in population. A growth rate of 3% results in a doubling of population in 23 years, and at a 5% rate, the population doubles in just 14 years. In the past we assumed that population growth could support water quality programs. This will probably not be true if we continue with business as usual. The consequences of population changes will require a higher degree of treatment as more and more discharges flow into an already stressed environment. We likely will need to treat for toxic compounds and for nutrients. Space available for treatment facilities will be a premium. Conservation will become a larger part of our lives, and unless we achieve greater efficiencies, we will

break municipal and federal banks.

In the short term, the Clean Water Act will dictate how research dollars are allocated, and it prioritizes environmentally related capital expenditures. Capital costs will be staggering as the short term priorities of biosolids management, air emissions, nutrients, cso/stormwater, toxics, and pollution prevention are addressed. Estimates range from tens of billions to a couple hundred billion dollars. To ensure that these funds are spent wisely, and with confidence that environmental goals will be achieved, 5% to 10% of the total capital expenditures should be appropriated for research.

As we look ahead to long term issues, we need to strive to achieve higher levels of treatment and greater efficiency, protect the public health, understand ecosystem management, and determine the consequences of society's behavior towards the environment. Good science must guide our decisions, and even greater investments in research will be needed.

Putting research in the right place, where it guides decision makers and ensures wise allocations of resources appeals to the logic of all who care about our environment. As a practical matter, we have demonstrated that investing in research creates a high rate of return to society. Unfortunately the research establishment is poorly structured to deal with complex, interdisciplinary research on long term, large scale environmental issues.

The burden to comply with increasingly stringent regulations is falling on local government. Meanwhile, technology with a scientific basis developed some 20 years ago is utilized at staggering cost, with little confidence that environmental goals will be met. Organizations such as the Water Environment Research Foundation are beginning to fill the gap left by the federal establishment and are helping municipalities meet their research needs in a cost effective manner. The time for a major change in the way we think about funding research, and the role research must play before costly environmental decisions are made is now.

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