Information for Decisions in Environmental Policy

The Congress is developing special information services to deal with environmental issues.

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The National Environmental Policy Act of 1969, signed by President Nixon on 1 January 1970, is the product of 3 years of congressional consideration of new priorities for the use of resources and the environment. It promises to be landmark legislation not only in policy formation but in stimulating ecological research and the broad development of data about the environment. The current intense interest in this subject has generated an enormous demand for information and also a plethora of commentary, opinion, and data. Thus, the task for the Legislative Reference Service is to identify and select high-quality information and then bring it to the attention of the legislators in a timely manner. Some techniques have been developed which are relevant to other issues in science and public policy.

The embrace of environmental problems by the body politic can only be cheered by all concerned. Enthusiasm quickly becomes tempered, however, when specific issues are examined, because basic policy conflicts emerge to confound management decisions. The fact is that the United States (and most developed nations) enjoy a high standard of living only by persistent and skillful scientific exploitation of the natural environment. This same advanced state of knowledge now shows the necessity of discovering and applying ecological principles. A technologically competent society and a rich economy make it possible to do so and, in fact, invite a charge of mismanagement and unbalanced priorities if we do not restore and preserve environmental quality.

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Environmental Issues and Politics

Environmental policy is incomplete if it does not mean both quality and productivity. Legislation in the first 200 years in this country has supported a democratic, free-enterprise system with the goal of sustained maximum economic growth. Rising public concern with better use of resources, including the control of pollution, requires a historic and wrenching turn for both business and political processes.

Henry Ford, in a recent address before the Public Affairs Forum of the Harvard Business School (*1*), stated the industrial issue clearly:

> Modern industrial society is based on the assumption that it is both possible and desirable to go on forever providing more and more goods for more and more people. Today that assumption is being seriously challenged. The industrial nations have come far enough down the road to affluence to recognize that more goods do not necessarily mean more happiness. They are also recognizing that more goods eventually mean more junk, and that junk in the air, in the water, and on the land could make the earth unfit for human habitation before we reach the 21st century. In short, the terms of the contract between industry and society are changing. Industry has succeeded by specializing in serving one narrow segment of society's needs. We have bought labor and material and sold goods, and we have assumed that our obligations were limited to the terms of the bargain. Now we are being asked to serve a wider range of human values and to accept an obligation to members of the public with whom we have no commercial transactions. We are being asked to contribute more to the quality of life than mere quantities of goods.

President Nixon, in his State of the Union address, defined the challenge to conventional goals:

> We can no longer afford to consider air and water common property, free to be abused by anyone without regard to the consequences. Instead we should begin now to treat them as scarce resources which we are no more free to contaminate than we are free to throw garbage into our neighbor's yard. This requires comprehensive new regulations. It also requires that to the extent possible the price of goods should be made to include the costs of producing and disposing of them without damage to the environment.
>
> Now, I realize that the argument is often made that there is a fundamental contradiction between economic growth and the quality of life, so that to have one we must forsake the other.
>
> The answer is not to abandon growth but to redirect it. For example, we should turn toward ending congestion and eliminating smog the same reservoir of inventive genius that created them in the first place.
>
> Continued vigorous economic growth provides us with the means to enrich life itself and to enhance our planet as a place hospitable to man.
>
> Each individual must enlist in this fight if it is to be won.

Congress has a more pragmatic political concern. Unwanted changes in air, water, or landscape are manifested locally in congressional districts and the States. "Problem sheds" do not correspond to arbitrary jurisdictional boundaries, and local cooperation is often difficult when the offenders are not also the offended. The federal government is the only recourse to citizens in these instances. Further, there is increasing evidence that many environmental issues can only be studied and resolved on a national, international, or even worldwide basis.

The "chamber of commerce" approach, boosting the human and natural resources of a region, no longer conveys all of the values important to the people who live there. The legislator is now called upon to represent new local interests and to act on a regional basis in complex issues that do not correspond to classical politics and success in election returns.

At this time, environmental policy is primarily concerned with reestablishing a set of management guidelines that are internally compatible. Existing statutes aid government agencies, businesses, and individuals in manipulating the environment for short-term economic gain and also in avoiding the external costs of environmental degradation. These are being supplemented by regulations and directives to protect, restore, maintain, and enhance the long-term quality of natural resources.

The conflict can be mitigated if it can be shown that a highly productive environment is also a high quality environment. With careful management, multiple uses of land, air, and water

can be broadened; but ecological "magic" cannot avoid the many hard choices to be made.

Three Approaches to Environmental Issues

A challenge to the development of a coherent environmental policy is the perspective from which an issue is approached. Parties to a discussion of a specific environmental problem may be unable to reach agreement because of fundamental differences in viewpoint, precepts, measurement, and even language. Three approaches to environmental quality and productivity are currently identifiable and important.

The traditional approach is marketplace economics. The ability to determine costs of all aspects of a policy problem is a great advantage. A substantial effort is being made to place the economic burden of pollution abatement upon those responsible for the pollution as a means of forcing abatement and restoring equity to complex uses of a stream or air mass. To the extent that this can be done, the well-developed mechanisms of the market are ready to bring about the proper action. A major difficulty is the quantification of long-term interests when economic theory discounts the future value of money. Economics also concentrates on perpetual expansion, thus excluding the eventual equilibrium that ecologists know is inevitable.

A second well-established viewpoint is that of human health. The powerful appeal of protecting individual health and maximizing the human life span is useful in motivating social actions that are otherwise uneconomic. Public health policy is well developed to optimize the environment for mankind when disease, accidents, and direct cause-and-effect relations are involved. On the other hand, important environmental health hazards can be extremely subtle and complex, noticeable only after long periods (perhaps even generations); for example, exposure to very low concentrations of sulfur dioxide in the atmosphere. Environmental epidemiology and genetics are so difficult to use as a basis for administering law that the health approach alone cannot be relied upon as a guide to policy.

Recently the definition of human health has been expanded broadly to include social welfare, mental well-being, personal fulfillment, and protection against stress. If accepted by all parties in an issue, this enlarged scope is valuable—but this is seldom the case.

The third approach is that of ecology. Almost by definition, ecological considerations are so complex and tend to involve such a large system that the data required for drawing accurate conclusions are not available. Ecological values are not easily quantifiable—particularly in economic terms. The human being is seen as only one species out of many—and is sometimes demeaned by naturalists in a way which is irritating to Judeo-Christian traditions. In the broader view, man is seen as an "ecologic dominant" capable of upsetting the physical features of the earth, energy flow, and natural food chains. The ecological approach to environmental management calls for drastic control measures for optimum continued productivity which are not easily rationalized in terms of present economic commitments.

Despite these obvious shortcomings, the ecological viewpoint is apparent to the political community as a concept of great potential. In just a few years ecology has moved from relative obscurity to an absolute necessity in any major speech or congressional hearing statement. In view of the limited applicability of systems analysis in complex affairs, the growing power of modern science, the worldwide growth and concentration of population, and the appreciation of a rich society for the things money cannot buy, ecology is looked to as management's last great hope.

In summary, environmental issues

Table 1. Principal congressional committees concerned with environmental quality and productivity. In addition, the appropriations committees in both houses are critical.

Committee	Chairman	Ranking minority member
	Senate	
Agriculture and Forestry	Allen J. Ellender (D-La.)	George D. Aiken (R-Vt.)
Commerce	Warren G. Magnuson (D-Wash.)	Norris Cotton (R-N.H.)
Subcommittee on Energy, Natural Resources, and the Environment	Philip A. Hart (D-Mich.)	Clifford P. Hansen (R-Wyo.)
Government Operations	John L. McClellan (D-Ark.)	Karl E. Mundt (R-S.D.)
Subcommittee on Intergovernmental Relations	Edmund S. Muskie (D-Me.)	Karl E. Mundt (R-S.D.)
Interior and Insular Affairs	Henry M. Jackson (D-Wash.)	Gordon Allot (R-Colo.)
Labor and Public Welfare	Ralph Yarborough (D-Tex.)	Jacob K. Javits (R-N.Y.)
Subcommittee on Health	Ralph Yarborough (D-Tex.)	Peter H. Dominick (R-Colo.)
Public Works	Jennings Randolph (D-W.Va.)	John S. Cooper (R-Ky.)
Subcommittee on Air and Water Pollution	Edmund S. Muskie (D-Me.)	James C. Boggs (R-Del.)
	Joint	
Atomic Energy*	John O. Pastore (D-R.I.)	George D. Aiken (R-Vt.)
	Chet Holifield (D-Calif.)	Craig Hosmer (R-Calif.)
	House of Representatives	
Agriculture	W. R. Poage (D-Tex.)	Page Belcher (R-Okla.)
Government Operations	William L. Dawson (D-Ill.)	Florence P. Dwyer (R-N.J.)
Subcommittee on Conservation and Natural Resources	Henry S. Reuss (D-Wis.)	Guy Vander Jagt (R-Mich.)
Interior and Insular Affairs	Wayne N. Aspinall (D-Colo.)	John P. Saylor (R-Pa.)
Interstate and Foreign Commerce	Harley O. Staggers (D-W.Va.)	William L. Springer (R-Ill.)
Merchant Marine and Fisheries	Edward A. Garmatz (D-Md.)	William S. Mailliard (R-Calif.)
Subcommittee on Fisheries and Wildlife Conservation	John D. Dingell (D-Mich.)	Thomas M. Pelly (R-Wash.)
Subcommittee on Oceanography	Alton Lennon (D-N.C.)	Charles A. Mosher (R-Ohio)
Public Works	George N. Fallon (D-Md.)	William C. Cramer (R-Fla.)
Subcommittee on Flood Control	Robert E. Jones (D-Ala.)	Don H. Clausen (R-Calif.)
Subcommittee on Rivers and Harbors	John A. Blatnik (D-Minn.)	William H. Harsha (R-Ohio)
Science and Astronautics	George P. Miller (D-Calif.)	James G. Fulton (R-Pa.)
Subcommittee on Science, Research, and Development	Emilio Q. Daddario (D-Conn.)	Alphonzo Bell (R-Calif.)

* The chairmanship of this joint committee alternates between the House and the Senate.

are important to the Congress, basic conflicts are present in existing laws, and perspectives in seeking solutions may vary so as to bar progress. Making decisions under such conditions makes information service more important than is usual in other legislative affairs. Reliable, timely, and complete data are required, and they must be analyzed and interpreted to match questions within the larger political context. Despite the importance of environmental problems, few of these issues are settled in a narrow framework. On the contrary, the complexities of social science and human behavior exacerbate difficult ecological problems.

The Work of Congress

The legislative branch of our government integrates a great variety of social needs when a vote is finally taken. The 435 representatives and 100 senators work out a national response to proposals from the executive branch on the issues of our time.

The means for dealing with the issues that require the production of over 25,000 bills in each Congress is the specialized committee (Table 1). Most legislators are lawyers and businessmen with no formal training in the specialized professions which carry out the activities of our highly technical civilization. Therefore, the information on which to base decisions in environmental matters must be transferred to lawmakers.

Most congressmen serve during their entire careers on one or two committees and become highly perceptive in the subject matter under their jurisdictions. Unfortunately, environmental problems are not the province of a single committee and are fragmented when they pass through the legislative process. For example, water pollution control may be considered by the Interior and Insular Affairs Committee or the Public Works Committee in the Senate and the Merchant Marine and Fisheries Committee, the Public Works Committee, or the Science and Astronautics Committee in the House of Representatives.

A particular emphasis or viewpoint is imparted to an environmental policy issue, depending on which committee takes jurisdiction.

Precedent dictates that certain matters are always assigned to certain committees. For example, pesticides have been the subject of critical hearings in Government Operations, Merchant Marine and Fisheries, and Commerce Subcommittees. The legislation regulating pesticides is the responsibility of the Agriculture Committees in both houses which usually give greater weight to crop protection than to side effects. As a result, despite considerable congressional investigation, the Federal Insecticide, Fungicide, and Rodenticide Act has not been amended since 1964.

Channels for Information

Information for the Congress flows from all levels and institutions of society via diverse mechanisms, ranging from personal advisory groups established by individual legislators to joint House-Senate meetings.

The public committee hearing is the traditional information-gathering procedure. It is often adversarial in nature, with the committee taking one position and witnesses seeking to support another. In some cases, the committee may not have a well-defined stand and, accordingly, testimony from varying viewpoints is arranged. Most hearings are limited to one of the three legislative functions—authorization, appropriation, or overview. Witnesses are admitted at the pleasure of the committee chairman. Time is always short. Thus a hearing may not cover all pertinent and authoritative sources of information.

Executive agencies appear before the Congress to advocate and defend administration programs. The extent and expertness of their testimony may be satisfactory, but their objectivity is always subject to question because of the constitutional separation of powers.

Lobbies are a legitimate and forthright source of information and opinion. They serve to sort out special interests in complex matters and anticipate the results of legislative action. In environmental affairs, the lobbies for economic values are alert, well funded, capable, and active, whereas the ecological interests have often been represented in a haphazard manner. Of course, the conservation lobbies are practiced at advocating their positions. The recent anxiety over tax exemptions for such groups was based on the recognition that equal lobbying strength was desirable but difficult to maintain.

Committee staffs have been strengthened by the addition of professional positions that are somewhat removed from considerations of patronage. The staff specializes, as do the members, in legislation under the committee jurisdiction. Information flow from the corresponding agencies is usually adequate as far as program facts and budgets are concerned. When a critical evaluation is underway, the cooperation is naturally subject to strain.

Legislators are continually in touch with industries, civic groups, and individuals of their home states or districts. Information and advice may be self-serving but nevertheless extremely valuable as a guide to the results of laws passed in an atmosphere of national policy.

Professional technical societies can be a valuable source of information for Congress. In contrast to other sources, the broad membership allows professional, rather than employment-related views, to come to the surface. Their tax-exempt status need not be jeopardized, nor are they required to register as lobbyists. The simple conditions are that the congressional liaison not be a major portion of their activities and that the Congress has invited their testimony. These criteria are easily met by organizations such as the Ecological Society of America because education and science are its main pursuits, and a standing invitation to communicate with Congress has been issued by many members of both houses.

Learned societies are not expected to present a consensus view on issues—which might engender internal strife. Rather, they should provide a forum for discussion of issues that affect science policy just as they have historically for the presentation of results of research. The discussions of policy, with the participation of private individuals, would provide interpretations and viewpoints useful to the Congress. Such a forum would be relatively balanced as to vested interests from the primary employment of participants. Without reaching a consensus, or putting the matter to a vote, a science policy forum would reveal the pros and cons of an issue in a unique way. This is a new responsibility for professional societies. It is well worth adding to the traditional functions of publication, holding national meetings, and supporting education.

Innovations in advisory mechanisms continue to appear. Several committees, and even informal groups of congressmen, have formed ad hoc advisory panels. Information is transferred from specialists by means of commissioned

papers, meetings, informal hearings or discussion sessions, and by circulation of commentary.

For example, the Environmental Clearing House, Incorporated, was chartered in 1968 to form a nexus between legislators from both houses and over 100 voluntary advisers outside of government. This mechanism furnished witnesses on the Environmental Quality Council bill before the House Merchant Marine and Fisheries Committee. Other activities include circulation of submitted papers and an occasional newsletter to the groups of advisers and legislators.

Last October, a meeting was arranged in the Senate Office Building by the Fund for New Priorities. The subject was the public sensitivity on pollution and other aspects of the "environmental crisis" and the political feasibility of taking stands on these issues. Over 100 legislators cosponsored the meeting, but only a few actually attended.

Coordination within the Congress

To bridge the many committees interested in the environment without a formal joint committee, a House-Senate Colloquium on a National Policy for the Environment was held in July 1968. Discussion with cabinet members and other persons was sponsored by the Senate Committee on Interior and Insular Affairs and the House Science and Astronautics Committee. Proceedings were published (*2*). This report defined elements of policy as follows:

> It is the policy of the United States that:
> Environmental quality and productivity shall be considered in a worldwide context, extending in time from the present to the long-term future.
> Purposeful, intelligent management to recognize and accommodate the conflicting uses of the environment shall be a national responsibility.
> Information required for systematic management shall be provided in a complete and timely manner.
> Education shall develop a basis of individual citizen understanding and appreciation of environmental relationships and participation in decisionmaking on these issues.
> Science and technology shall provide management with increased options and capabilities for enhanced productivity and constructive use of the environment.

These elements formed the basis for the policy statement finally incorporated in The National Environmental Policy Act of 1969. Considerable elaboration by congressional and administration staff produced a set of principles of management which show the intent of the Congress in this area (and may prove as significant a national policy statement as the Full Employment Act of 1946).

Title I of the Act is a declaration of national policy which includes new information requirements. Section 102 (C) states:

> The Congress authorizes and directs that, to the fullest extent possible . . . all agencies of the Federal government shall . . . include in every recommendation or report on proposals for legislation and other major Federal actions significantly affecting the quality of the human environment, a detailed statement by the responsible official on—
> (i) the environmental impact of the proposed action,
> (ii) any adverse environmental effects which cannot be avoided should the proposal be implemented,
> (iii) alternatives to the proposed action,
> (iv) the relationship between local short-term uses of man's environment and the maintenance and enhancement of long-term productivity, and
> (v) any irreversible and irretrievable commitments of resources which would be involved in the proposed action should it be implemented.

Section 102 (G) instructs each agency to "initiate and utilize ecological information in the planning and development of resource oriented projects."

Title II of the Act establishes a Council on Environmental Quality with the task of transmitting to the Congress an annual report on status and trends in environmental affairs. Section 204 (5) states:

> It shall be the duty and function of the Council . . . to conduct investigations, studies, surveys, research, and analyses relating to ecological systems and environmental quality.

The reports of federal agencies and the new independent Council to the appropriate operating committees of the Congress will constitute a great increase in environmental information. The analysis of these reports and response to their recommendations will generate additional information requirements by the legislators and their staffs.

Current Environmental Concerns

In the past few months, major issues which have come before the Congress may be grouped under the following headings.

1) *Policy analysis.* This general category includes: identification and analysis of elements of environmental policy in laws, reports, and statements; comparison of policies for conflict or correlation; implications of policy for day-to-day living; trends in national goals and objectives, that is, quality versus productivity; and strategies for action, funding policy, and development of timetables. Policy related to population, natural resources, and environment has previously followed independent lines which are now converging.

2) *Environmental programs.* This category includes: organization and administration of government and other institutions; budgets, economics, and evaluation as to efficiency of action programs; coordination and planning for government-wide programs. Literally everything we do affects the environment, and there is less thought of centralizing administration of programs than there is of focusing all of government on the future of environmental values.

3) *Pollution—air, water, and solid wastes.* Pollution is contamination of the environment such as to inhibit some desired use. Some part of any processed material becomes waste; and these gases, liquids, and solids are passed back to the landscape by the cheapest means available. Although some parts of a pristine environment are not necessarily desirable for civilization (including swamps, volcanic emissions, burned forests, eroded soils, and desert dusts), the use of air masses, streams, and landfills as receptacles for the offal of industrial society is a fraud. Changing the habits (use and discard) of 150 years to a system of perpetual recycling as required by long-term ecological management is a disruptive process for individuals, municipalities, and corporations.

4) *Agriculture.* A variety of rural programs and foreign trade, as well as topics such as food and nutrition, agricultural chemicals, and agricultural wastes are involved. Agriculture may be the most radical ecological disruption perpetrated by man. Its future is now linked in the Malthusian equation to world population.

5) *Urban conservation.* The planning of land use, parks and recreation, scenic easements, and zoning are included, as is the control of noise. Major decisions in human ecology are to be made in the city where social psychological perturbations exacerbate the complex problems of plant and animal communities.

6) *International implications.* Arbitrary boundaries of local governments

and the states necessitate national legislation for resolution of issues, and even larger continent-wide limits may be inadequate. The United Nations conference on the human environment in Sweden in 1972 presents an opportunity for agreements and initiatives in controlling pesticides and air pollutants, and in the application of Western technology in less-developed countries.

7) *Minerals, fuels, forests, and range.* Soil conservation and flood control are not novel, but early conservation measures often dictated the rules by which a continent was systematically harvested. Now we are replacing this legislation with consideration for the very long-term future. Resources are to be recovered perpetually. Fuels must be extracted, transported, and consumed without damage to environmental quality. The resources of food and fiber, air and water, must be utilized at a rate which does not irreversibly destroy their restorability by natural processes. The astounding statistic that the Western nations plus Japan and Russia account for 27 percent of the world's people but consume about 90 percent of its natural resources is evidence that the developed nations are the greatest threat to the environment.

8) *Wildlife and fisheries, recreation, parks, and esthetic values.* The affluence of Americans has led directly to an appreciation of things money cannot buy. The protection of endangered species has a constituency extending far beyond those who have ever seen a whooping crane. The most immediate problem in our national parks is their preservation from their ardent and careless admirers. Politicians are now joining protest movements against intrusions of highways and industry into recreational areas—a remarkable reversal of the "chamber of commerce" viewpoint prevalent only a few years ago.

9) *Electric power.* The regulation of the production of electricity has been based on low cost to the consumer by building a large uniform load for the power plant. The resulting "energy society" now is caught between recurring blackouts (or brownouts) and the environmental consequences of more generators, including the disfiguration of the landscape by high-voltage transmission lines, thermal pollution of surface waters for cooling, air pollution by sulfur oxides and particulate matter, uncertainties of radiation from nuclear power alternatives, and the fundamental question of power plant site location.

10) *Population.* Population is the basis of all issues in environmental quality and productivity—what Hardin (*3*) has termed the tragedy of the commons. Too many persons are making demands on a finite environment. While the global crisis point looms and fades with temporary agricultural or engineering feats, the more tractable problem of population location and density in this country emerges for consideration. The major corridors of the Northeast, Great Lakes, West Coast, and Gulf Coast are contrasted with the sparsely populated plains and mountains. Incentives and disincentives, even regulations, for the relocation of American citizens is a novel proposition. Planning for land use on a national scale is beginning to gain acceptance. Fate of the coastal zones and consideration of the optimum use of the 700 million acres still owned by the federal government are important current issues.

The Legislative Reference Service

The Reorganization Act of 1946 strengthened and modernized the Legislative Reference Service, an agency of the Congress which had operated in the Library of Congress since 1915. The service has grown in size and changed in nature so that the Reorganization Act now under discussion proposes a name change to the Congressional Research Service and the assignment of additional tasks.

At present the service comprises about 325 persons housed in the Library of Congress. Total inquiries are approximately 155,000 per year or 1200 a day for the better part of the congressional session. Routine reference inquiries account for 65 percent of the total. Averages mean little, however, when it is recognized that questions may be answered while the asker waits—or may require many man-months of research. The relation of policy research to reference work is illustrated by the fact that only 1 percent of the inquiries account for 45 percent of all professional time spent in the Service.

Research and analysis is carried out through subject matter divisions staffed with professionals from every field of knowledge. These researchers are "specialists" in certain disciplines only in comparison with one another. They would be judged generalists by their peers in the particular field of learning.

Environmental Policy Division

The scope of this division has been arbitrarily limited since its establishment in 1969 in order to mesh with the capabilities of other units in the organization. Flexibility is retained to match professional competence to legislative issues. For example, the analysis of energy policy and its effects on environmental quality cuts across several divisions of the Service. The staff includes persons trained in ecology, biology, chemistry, economics, geography, and forestry.

To a large extent research is kept separate from reference work and data retrieval, but specialists are available to assist in any inquiry.

Staff members are full-time employees of the Library of Congress. They are protected from partisan political influence by a merit system identical to that of the Civil Service. Congressional overview is maintained by the Joint Committee on the Library and the Legislative Subcommittees of the Senate and House Appropriation Committees.

Requests are honored from any member of Congress or any committee. No work is done for the Executive or Judiciary branches or directly for the public. The annual budget for the service has risen to about $4 million in the current fiscal year, and most of the funds are spent in-house.

Techniques of Congressional Assistance

Experience suggests a few guidelines to success and hazards to be avoided. The service has a record of being able to hurdle the most obvious obstacle—that of assisting the political process without being destroyed by it.

The service is a two-way communication channel to the best information, wherever it may be located. It is not a primary source of knowledge. The legislative branch deserves the highest quality of specialized information and opinion—no permanent stable of experts could meet that criterion in all fields. It is unlikely that experts would be willing to leave their work to serve directly and full-time in a congressional assistance organization. Furthermore, since public policy issues come and go somewhat unexpectedly and rapidly, the right sort of experts would seldom be on hand. Finally, the size of an organization which carried a specialized

staff in every field of knowledge would be enormous.

In fact, the expertise of the service lies in coupling the needs of Congress to the entire world of information and advice.

The legislator in a democratic system earns the right to make final decisions in the public interest by being subjected to periodic reelection. He must maintain the support of a majority of his constituents. He is well informed as to national goals and the allocation of resources to meet these needs.

Technological facts are always integrated and interpreted within this larger political framework. For example, the medical data on the physiological consequences of cigarette smoking will be regarded differently in Kentucky and Wisconsin.

So, the first technique in assisting the Congress is to keep objective, technological questions separated from the political context. The task is to determine what information will be useful to those making decisions on a given issue. These questions are translated for submission to the appropriate sources of data. Pertinent answers are culled from the literature, individuals, and institutions. The information is recast for clarity, evaluated for validity, analyzed for gaps and conflicts, and submitted without advocacy to the legislator.

The Legislative Reference Service has perfected the "pro and con" technique as a means of organizing information. Even though a request may be for only one side of an argument the researcher seeks all relevant facts and opinions. In fact, it is impossible to develop any position thoroughly unless the case for the opposition is made simultaneously. Thus, the assignment of the policy researcher is removed at the outset from the possible polarized viewpoint of the requester.

From a more practical standpoint, the "pro and con" technique also readies the service for the member who may take the opposite position from the initial requester.

The criteria by which policy research and analysis are judged are scholarship (completeness within the time available) and objectivity. The goal is to uncover all relevant information, to document the source, to describe the authenticity, validity, and acceptability of the data by the peers in the particular field, and to evaluate the results as to their utility in a debate.

Mere information is not wanted—the legislator has many diverse channels already operating on and for him. Neither is advice on how to vote the product of policy research. This cannot be delegated to the service. Moreover, the skills for reaching a proper conclusion are akin to those in achieving elective office. Decision-making is risk-taking; only a political body responsible to the electorate can be entrusted with this role.

The evaluative function of the service is as to the quality of the information. Rather than an increase in the quantity of facts and opinion, good analysis will replace lower quality or fragmented information. Since decisions are always made on the basis of incomplete knowledge, the lawmaker is helped most by gaining confidence that a particular source is reliable. This is the standard sought by researchers of the service.

Assurance of quality is obtained by a technique of review and documentation. The large work load and the nature of policy research make team efforts inefficient—it is usually the case that one senior scholar synthesizes and produces an analysis. To guard against personal biases creeping into the report, other senior staff members familiar with the field review the project from time to time. Thorough documentation is required so that any interpretations or views of the researcher are exposed as such. If the confidentiality of the request permits, outside review is sought by authorities in the subject.

Another way of describing the role of policy research is that it strengthens the adversarial process. Committee hearings and floor debates can occur on many levels of understanding as to the technological facts. The resulting decisions may be simply yes or no in any event. But the responsiveness of the Congress to the will of the people is enhanced if the adversarial process is undergirded by timely and scholarly staff assistance. Witnesses can be chosen and scheduled to afford an opportunity to confront conflicting experts with one another. The legislator may be furnished an analysis which lists the so-called "hard questions" and warns against diversionary replies and unresolved controversies in the field. The candor and public education which are hallmarks of a proper congressional hearing make this an ideal mechanism for introducing assessments of technology into the legislative process.

Finally, the personnel of the service remain anonymous. Their assistance must be unobtrusive. The glare of publicity on congressional affairs is to illuminate the performance of senators and representatives so they may be judged by their constituents. Their use of information and advice is what counts, not the assistance itself.

An equally important reason for performing such research quietly behind the scenes is the added protection of objectivity and the avoidance of distracting unsolicited input from special interest groups. The service encourages normal professional contacts and activities for its personnel but maintains considerable discretion as to its role in any particular legislative program.

Development of Ecological Information Sources

Ecology as a profession is just beginning to be effective in the political process. The perception and willingness of a few leaders has alerted the Congress to the valuable insights which this science can give to public issues. Some of the problems and opportunities for service may be suggested by the experience to date.

Ecology is unusual among sciences in the absence of an industrial basis of support. Of course agriculture, forestry, and fishing have used the talents of ecologists, but usually in a narrow sense. The great importance of environmental consequences from industrial actions means that big business needs ecological competence. This need will be satisfied by direct hiring of ecologists, use of consultants, support of university programs (teaching, research, and facilities), and a retreading of other personnel to acquire an ecological viewpoint. Thus, the expected rapid expansion of ecology as a profession need not depend solely on federal funds. The interest of private corporations should ensure a broad, healthy growth in numbers of trained ecologists and in amount of ecological research. Ecologists should guide this development and set priorities, goals, and timetables which are realistic.

Not all the work in bringing ecology to bear on the problems of society need be done by ecologists. In fact, the principles of ecology must become a basis for the activities of a great variety of scientists and engineers. City planning, pest control, location and design of

power plants, transportation engineering, and petroleum processing are just a few examples. The injection of ecology into education will be extremely important to the profession. The apparently insurmountable task of injecting the precepts of ecology into management on a broad scale with relatively few thoroughly trained ecologists can be met only in this manner.

Proposals for a National Institute of Ecology and National Environmental Laboratories are being developed. A number of functions may be imagined for such institutions. Most important will be the assembly and maintenance of a base of knowledge. Ecological information today is often anecdotal or extrapolated. In their zeal to arouse a public that is ill-equipped to couple obscure causes and effects, the ecological alarmists shrug off scientific discipline and create environmental dramas. For the time being this may be justified.

Soon the fundamental conflicts between use and preservation of natural resources will become widely recognized, and society will settle down to the hard choices. Then the facts must be available. What is not known must be admitted. Verifiable, reproducible, reliable statements will be demanded. The eventual environmental management decisions will be balances of costs and benefits in the broadest sense. Doctrinaire, polarized positions will not be helpful. A common centralized data-gathering and information dissemination center to serve all parties in debate will be a primary responsibility of the profession.

Ecologists have an enormous opportunity to serve society. In the current questioning of the relevance of science and research they have a clear-cut case for support. Only a stubborn retreat to the woods and the lakes will prevent ecology from making a massive and determining contribution to the problems of modern civilization. The political community now recognizes the need for ecological information and advice. A growing number of professional ecologists accept participation in public affairs. Therefore, the new role of ecology in achieving natural goals seems assured.

References

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NEWS AND COMMENT

Environmental Law: Courts Demand DDT Action, Block Pipeline Road

In recent weeks federal courts have handed down major decisions in the developing field of environmental law.

● On 28 May, the U.S. Court of Appeals for the District of Columbia, by its decisions in two separate DDT cases, brought jubilation to organizations seeking a total ban on use of this pesticide. The court demanded, in effect, that the two federal agencies with regulatory authority over DDT either impose such a ban promptly or explain why they have not done so.

● In April, the U.S. District Court for the District of Columbia issued a ruling in the trans-Alaska pipeline case which indicated that environmentalists may have a potent legal tool in the new National Environmental Policy Act (NEPA). The government was ordered not to issue a construction permit for a haul road that is essential to the $1-billion pipeline project pending the court's decision on whether the pipeline itself should be built. The court had found, among other things, that the government had not yet met all of NEPA's requirements for studies of the environmental impact of the pipeline project.

The Environmental Defense Fund (EDF), a pioneering organization in the field of environmental law, was a plaintiff in the pipeline case and in both DDT suits. Last week, after the DDT rulings, Charles F. Wurster, a biologist at the State University of New York at Stony Brook and chairman of EDF's scientists advisory committee, told *Science*: "We have really won the ball game. These decisions have implications for [efforts to eliminate from the environment] lead and dieldrin and chemical contaminants of every kind."

The fight by EDF and other groups against DDT has not yet actually been won, but the decisions in the DDT cases show that the courts can be used to make government administrators account for their actions—and their inaction. "From a plaintiff's point of view these are the best opinions ever written in an environmental law case," comments Joseph Sax, a University of Michigan law professor and a leading authority on conservation law. In one ruling the court ordered the Secretary of Agriculture to decide, within 30 days, whether or not to suspend (and ultimately cancel) the registration of DDT as an "economic poison" approved for shipment in interstate commerce. EDF and several other groups, including the Sierra Club and the National Audubon Society, had petitioned for such a suspension 7 months ago. "If he [the secretary] persists," the court said, "in denying suspension in the face of the impressive evidence presented by petitioners, then the basis for that decision should appear clearly on the record, not in conclusory terms but in sufficient detail to permit prompt and effective review." The court interpreted its role to be one of ensuring that the secretary exercises his discretion within a reasonable time and seeing that his decision is "supported by the record."

Zero Tolerance

In the other DDT case, the court ordered the Secretary of Health, Education, and Welfare to initiate an administrative proceeding to decide the merits of the plaintiffs' petition of last October to have a "zero tolerance" established for DDT residues in or on raw agricultural commodities. The Food, Drug and Cosmetic Act (FDCA) authorizes HEW to establish tolerances for pesticide residues in farm products "to the extent necessary to protect public health." (The so-called "Delaney Amendment" of 1958 to the FDCA requires an immediate ban of any "food