How to Lose Your Political Virginity while Keeping Your Scientific Credibility

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Many biologists and other scientists shy away from the political process. The reasons for this lack of involvement include unfamiliarity with the legislative and other political processes, concerns that their science will somehow be compromised, and the dissatisfaction that many Americans feel with the political system. Yet there are many reasons—self-interest and the interests of the biota we study—for biologists to become educated about the political system and involved politically. Involvement can take a wide variety of forms, such as writing a letter that provides information about a topic of public debate, giving testimony at a public hearing, signing a letter that requests a particular action, or becoming involved in helping someone get elected to public office.

As Congressman Maurice Hinchey (D-NY) told the League of Conservation Voters—the group created by leaders of the environmental movement to evaluate legislators and to help elect pro-environment candidates —at their Earth Day gathering in 1999, "Without politics, there is no conservation; without politics, there is no wilderness." Wilderness has existed since the earliest days of the planet, when all was wilderness. But until wilderness in the United States was protected by an act of Congress, and until individual wilderness areas were set aside, wilderness was not safe. It is also safe to say that, although legislation alone will not conserve biodiversity, without politics there will be no biodiversity.

For scientists to begin to interact with the political system, it is necessary to understand something about the job of making political decisions in our democracy. Elected officials are a special class of decisionmakers whose profession is to make decisions based on their perceptions of the views of the people who elect them. Their job description includes making decisions, choosing among alternatives, allocating resources that are usually insufficient for the tasks required, balancing or choosing among competing values and interests, and ultimately reaching compromise with individuals who profess and represent differing values. As one member of Congress said to me, "I vote for a living." Not only do legislators vote for a living, but their ability to earn a living as an elected voting representative depends on their ability to convince the voting public to select them for this job. Their accountability comes up for ratification every two or six years, when they request that their employers—the voting public—grant them a job extension.

Even though the culture and values of the political system are very different from the culture of science, where the uncompromising search for truth is paramount, scientists have much to offer to the political process, including

- specialized expert knowledge
- critical thinking
- objectivity
- data and informed interpretations
- credibility
- independence
- wisdom

Each of these is a valuable commodity that can help the decisionmaking process.

In addition to our responsibilities as citizens in a democracy, we have additional responsibilities as scientists claiming the attributes listed above to contribute them to the political

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process. Most scientists are recipients of public funds for our research. As part of the social contract by which society supports science, we are obligated to provide some payback by sharing the fruits of our knowledge with society.

As biologists, our professional responsibility is even deeper. In concluding his term as president of the Society for Conservation Biology, Tom Lovejoy wrote an essay entitled "Obligations of a Biologist" (Lovejoy 1989). He points out that we biologists have a responsibility to use our science, and to speak out as advocates for biodiversity. I keep this essay above my desk.

Our professional responsibility is a public responsibility. It is also a moral responsibility. The ethics of human civilization compel that if we see a person who is injured, we have an obligation to help. Those who have first aid or medical training have a particular obligation to use their specialized knowledge to help the injured. Physicians have codified this ethical professional responsibility as the Hippocratic oath.

Perhaps we biologists should have a similar oath. It is more complicated, because we have research subjects, not patients. Yet if we see a planet or an ecosystem or a biota that is being injured, we have an obligation to help. If our special training allows us to see something and understand something better than the average person, our obligation to use that knowledge is even greater. Those of us who by virtue of our education can see that we live in the proverbial "world of wounds" (Leopold 1953) have both professional and personal obligations to try to heal those wounds. I don't think that any biologist would argue that we should be doing nothing; indeed, anyone within the biological science community who self-identifies as a conservation biologist has made a professional commitment to help heal our embattled planet.

Nobel laureate chemists Mario Molina and Sherwood Rowland presented the first Senator John H. Chafee Memorial Lecture on Science and the Environment at the first National Conference on Science, Policy and the Environment in December 2000 (Rowland and Molina 2001). Molina asked rhetorically, "Is it enough for a scientist simply to publish a paper? Isn't it a responsibility of scientists, if you believe that you have found something that can affect the environment, isn't it your responsibility to actually do something about it, enough so that action actually takes place?" Rowland concluded the lecture by answering a question about his move from the lab into advocacy: "If not us, who? If not now, when?"

Yet our scientific skills and understanding may not be sufficient for us to apply our knowledge in a decisionmaking context. Our scientific training often does not include interaction with political and social institutions and those who populate them. Moreover, many scientists become quite wary and inappropriately characterize any interaction with the legislative decisionmaking process as "advocacy." And many scientists regard advocacy as anathema.

Yet the skills necessary to present scientific information to decisionmakers, who are lay people, are really only extensions of the skills we use to present scientific information to our colleagues and to our students. The concern about advocacy is often no more than a red herring pulled out of the basket by those who have little experience with the decisionmaking environment.

I argue that there is a continuum from data to advocacy (Figure 1). All scientific reporting, whether among scientists or to a nonscientific audience, involves interpretation and contextualization. Collecting and interpretating data in a scientific setting are, of course, what all scientists do. Interpreting data for lay people is what all educators do.

Data → Interpretation → Advice → Counsel → Advocacy

Figure 1. The data-to-advocacy continuum.

Yet many of us are uncomfortable extending this approach to questions of policy and management. Admittedly, it is much messier. Science is never straightforward and applications of science to policy are even less so. The answer to the policy question is never "found in Table 1."

There is always a need for interpretation, as well as data. The application of science to any problem, whether it is a scientific problem, a resource-management problem, or a policy decision, involves judgment. Yet who is better qualified to provide this judgment than scientists? Many scientists believe that at some point on this data-to-advocacy continuum, there is a line that we should not cross. If it exists, the line is certainly gray, and scientists disagree on where to place that line. Many will say that it is a slippery slope. Each scientist should find a place where he or she personally feels comfortable and should not be critical of other scientists whose personal values may put them at different points along the continuum.

Advocacy has a bad reputation among some scientists. The dictionary definition of an advocate is "one that pleads the cause of another." What is wrong with pleading the cause of another, particularly if the other—biodiversity, in this case—can't plead its own case? If biologists are not advocates for biodiversity, who will be? Are we not to be blamed if we walk away from the scene of an accident or crime and do not help in any way?

A legitimate concern among scientists is that if we become advocates, we somehow tarnish our credibility. *Credible* is defined as "capable of being believed." Like virginity, credibility can be lost only once.

There is a perception among scientists that, if we "go beyond our data" and interpret, recommend, counsel, or advocate that a particular action be taken, somehow our credibility is tarnished. We need to examine this perception and to ask who is judging our credibility. The peer review process does not discriminate as to whether the author has been an advocate or has visited his congressional representative or has been on the board of an environmental group. However, a tenure and promotion committee might.

Politicians, on the other hand, expect scientists to have an agenda or a purpose. They are suspicious of those who say they don't have one. However, they generally have high expectations that science will provide answers that they can trust. De-

Table 1. Seventeen cardinal rules for working with Congress.

1.	Convey that you understand something about Congress.
2.	Demonstrate your grasp of the fundamentals of the congressional decisionmaking system.
3.	Don't seek support of science as an entitlement.
4.	Don't convey negative attitudes about politics and politicians.
5.	Perform good intelligence gathering in advance.
6.	Always use a systematic checklist.
7.	Do your homework on the issue or problem.
8.	Timing is vital.
9.	Understand congressional limitations.
10.	Make it easy for those in Congress to help you.
11.	Keep the "bottom line" in mind.
12.	Use time—yours and theirs—effectively.
13.	Remember that members and staff are mostly generalists.
14.	Don't patronize either members or staff.
15.	Don't underestimate the role of staff in Congress.
16.	Consider and offer appropriate follow-up.
17.	Remember that the great majority of members and staff are intelligent, hardworking, and dedicated to public service.

Source: From Wells 1993 (© 1993 by American Association for the Advancement of Science).

spite the pedestal that we scientists have placed ourselves upon, nobody expects scientists to be infallible.

Here are a few guidelines on how to maintain scientific credibility while going beyond presentation of data.

1. Follow the facts and tell the truth.
2. Obey the "rules" of science.
   - —Base interpretation upon data and conclusions that are peer reviewed.
   - —Explain how conclusions are reached.
   - —Present margins of error.
3. Present caveats.
4. Identify uncertainty.
5. Help to distinguish between uncertainty and guesswork.
6. Avoid hyperbole.

As Lovejoy (1989) pointed out, "If we explain what we are doing, we in no way compromise our scientific credibility." Molina emphasized that "we need to make clear when we are speaking as scientists and when we are expressing our values" (Rowland and Molina 2001).

Now that I've answered the second part of the question on my title, let's go to the first part, losing your political virginity. Without being too graphic, there are three main methods:

1. Do it yourself.
2. Do it with a group.
3. Pay someone else to do it for you.

Doing it yourself

A recent editorial in *Science* (van der Vink 1997) framed the question as the scientifically illiterate politician versus the politically clueless scientist. That may be only a slight exaggeration. All Americans, other than those living in Washington, DC, have two elected senators and a member of the House of Representatives. These people work for the public. Their ability to keep their jobs depends on keeping the public happy (or at least the majority of the people who actually vote). There are also a host of local and state elected officials who also work for the public, who are generally even more accessible, whose areas of responsibility have an even greater effect on a day-to-day basis (such as local land use planning), and who hear from scientists even less frequently. Although I very much agree with the adage "think globally, act locally," my focus here is on conversations with congressional representatives and senators. However, the lessons I present apply broadly to communication with elected officials anywhere in the United States and probably in other countries too.

The first thing to know is that elected officials are very busy and have lots of demands on them. However, they also have staff who work for them whose job it is to supply the best possible information on issues to their bosses. Staff are generally young (just out of college) and don't have much scientific background—freshman biology class may have been their last formal education in science. Each congressional office has one (or, rarely, more) legislative assistant who handles environmental issues. Staff members like to talk to scientists because scientists give them information. Information is the currency of Washington (money is, too). Information is power. Scientists have it. However, Washington has an oral culture. Staff are not interested and don't have time to read your thesis or a pile of reprints. As painful as it may be to scientists, a one-page summary is the most that they will read.

Harold Hansen, former staff director of the House science committee, stated that the first two commandments are "Know thy congressmember (personally)" and "Know about thy congressmember." The best place to get to know your congressmember is in the home district where you both live. Invite the representative or senator to your university, your laboratory, or your field site. Show him or her what you are doing with taxpayer money and explain why it is important and beneficial to society. You will be more effective if you do not come with a political agenda. Instead, build up a relationship so that you can be relied upon as a trusted source on scientific and environmental issues.

There are many resources for scientists who want to speak with congressional people. William Wells (1993), who has made a career of helping scientists work with politicians, has come up with 17 cardinal rules for scientists working with Congress (Table 1). A whole industry has developed to provide information about Congress. The best publications are those by the National Journal company, including the annual *Almanac of American Politics* (Barone and Cohen 2001). The League of Conservation Voters provides environmental profiles of members of Congress and compiles an annual scorecard of their voting record at *www.lcv.org*. The Library of Congress Thomas system *(www.thomas.loc.gov)* provides access to all official congressional Web sites, including congressional directories, hearing schedules, legislation, and the *Congressional Record*. Exclusive access to over 1,000 Congressional Research Service reports on policy issues relating to the environment and natural resources, and a plethora of other online resources, are available at the National Library for the Environment *www.cnie.org/NLE*, maintained by the National Council for Science and the Environment.

How to Influence Federal Decisionmaking—Without Writing a Single Letter!

Is your in-box stuffed with pleas from AIBS and other professional organizations and interest groups asking you to write to Congress? Would you like a more direct opportunity to influence federal decisionmaking? Consider serving on a federal advisory committee (FAC). You won't be alone: Over 52,000 individuals served on 956 federal advisory committees last year.

The federal government recognizes the value of expert advice, ideas, and diverse opinions offered by various advisory groups to federal agencies. But to avert undue influence by special interest groups and closed-door decisionmaking, input from outside groups is regulated by the Federal Advisory Committee Act, which established a regulatory scheme for the establishment, membership, and operation of such entities. Requirements for appointments of members, public meetings, and public reporting of minutes and recommendations were intended to ensure that the decisions of advisory committees would be open and impartial. Federal advisory committees can be created by federal agencies, by Congress, or by the president.

Some critics say that FACA's procedural requirements, together with amendments intended to prevent FAC mission creep and senility, have a "chilling" effect on public participation in environmental decisionmaking (Long and Beierle 1999). The Clinton administration imposed policies that limit the number of advisory committees that agencies are allowed to establish. The number of advisory committees fell from 1,305 in fiscal year 1993 to 956 committees in fiscal year 2000.

Whatever their limitations, federal advisory committees offer scientists myriad opportunities to contribute directly to the federal decisionmaking process. Probably the most high-profile science FAC is the Presidents' Committee of Advisors on Science and Technology. The National Science Foundation's discipline-oriented advisory committees, advisory panels, and special emphasis panels are all federal advisory committees. They serve the directorates, addressing such issues as priority investment areas in research disciplines; ways in which the directorate's mission, programs, and goals can best serve the scientific community; institutional administration and policy; and promotion of high-quality graduate and undergraduate education in various disciplines.

Especially within the Department of the Interior, the US Department of Agriculture, and the Environmental Protection Agency, scientists are invited to join various science or resource management advisory committees. Some focus on specific issues. The US Department of Agriculture's 1999 forest management planning regulations were based in large part on the recommendations of the Committee of Scientists. These 13 experts represented such disciplines as forest management, forest ecology, landscape ecology, forest hydrology, range ecology and management, animal ecology, natural resource law, sociology and organizational theory, and public participation and dispute resolution. The Invasive Species Task Force Advisory Committee, an interdepartmental entity, has a number of nongovernment scientists helping to devise appropriate policies and programs to address this thorny issue. At the Environmental Protection Agency, the sole function of the Endocrine Disruptor Screening and Testing Advisory Committee was to recommend to EPA methods and procedures to detect and characterize endocrine activity of pesticides, commercial chemicals, and environmental contaminants. At the Department of the Interior, one FAC focuses on the Going-to-the-Sun Road.

Other FACs are more general. The EPA's Science Advisory Board (SAB) is a technical review panel that provides scientific advice on many subjects. SAB is unusual in that it was established by Congress, rather than by the agency itself, to provide independent scientific and engineering advice to the EPA administrator on the technical basis for EPA regulations. It is now formal practice that many major scientific points associated with environmental problems are reviewed by SAB. Generally, SAB deals with risk assessment issues associated with various control options under consideration by the EPA. Its 10 sub-

Doing it collectively

One of the best vehicles for scientists to provide information to policymakers is through scientific professional societies. These societies have differing philosophies regarding public policy. Most of the big societies recognize that it is necessary to be involved in policy issues. Most societies are engaged in advocacy on behalf of the direct interests of their members, particularly when it comes to funding and regulatory issues (such as research permits). More challenging is to what extent and how societies should be involved in social issues, such as the teaching of evolution, animal welfare, and conservation.

Biomedical societies and others hire lobbyists to represent them in the constant chase for the federal dollar and to help present the perspectives of their members on national issues of concern. The American Institute of Biological Sciences (AIBS) has a long tenure in Washington, DC, and has recently reactivated its public policy program after several years' hiatus (see sidebar). This office is staffed by Adrienne Froelich and Ellen Paul. The Ecological Society of America (ESA) has a very active public policy program that prepares white papers, provides briefings for politicians and staff, communicates with the press, and works closely with agencies. ESA, like many scientific societies, rarely takes positions on specific legislation. The Society for Conservation Biology (SCB) has recently opened an executive office in Washington, DC, and hired Alan Thornhill as its first executive director. One of the purposes of this office is to allow SCB to provide information relevant to the national decisionmaking process on natural resource issues. The 10 ornithological societies in North America and the Caribbean joined together in 1993 to form the Ornithological Council, which has a mission to provide scientific information about birds to decisionmakers and others needing this information.

The American Association for the Advancement of Science (AAAS) has a substantial public policy program. AAAS rarely takes stands on issues. Through its public policy program, AAAS provides valuable resources to educate scientists about the political process and to educate politicians about science. For more than 25 years, AAAS has coordinated a Congressional Science Fellow Program. This program provides scientists with an incomparable year-long experience working as a scientific expert on a congressional staff. The program is a career-changing and life-changing experience for most Fellows, including myself. Many former Fellows occupy important positions in national science policy, in the government and outside the government. Fellows are sponsored by indi-

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committees provide expertise on diverse subjects, including radiation, air pollution, and environmental economics. Under the US Department of Agriculture's new forest management planning regulations, biennial, independent peer review of the monitoring program is mandated. Outside scientists will also form regional science advisory boards and a national board will provide guidance on issues of national significance. The Department of Defense seeks advice from its Science Board, Ocean Research Board, Strategic Environmental Research and Development Program Scientific Advisory Board, and American Heritage Rivers Initiative Advisory Committee. In 1998, the Bureau of Land Management created a Science Advisory Board.

Still other FACs focus on local issues. The Bureau of Land Management's 23 Resource Advisory Councils, all in the western states, provide advice on the management of public lands and resources. The councils are citizen-based groups that advise the Bureau on standards of rangeland health and guidelines for grazing management. Each council consists of 12 to 15 members from diverse interests in local communities, including ranchers, environmental groups, tribes, state and local government officials, academia, and other public land users. Other local councils cover various rivers, national parks, and recreation areas.

Opportunities for direct participation exist even in international affairs. The US Department of State's advisory committees counsel the US National Section of the Inter-American Tropical Tuna Commission and the US Section of the North Pacific Anadromous Fish Commission. Advisors sometimes accompany US delegations to meetings of the United Nations Food and Agriculture Organization and a host of other conferences focused on, for example, genetically modified organisms; and US representatives to the Subsidiary Body on Science, Technical, and Technological Advice of the Convention on Biodiversity, or to the Scientific Assessment Panel of the Montreal Protocol, regularly consult with outside experts.

All FACs, and contact information for them, are listed on the General Services Administration Web site, *www.policyworks.gov/org/main/mc/index-r.htm.* When new agency FACs are created or vacancies occur on existing FACs, notices are published in the *Federal Register*. AIBS sends these notices to its member societies and organizations via the biweekly policy update. Agencies generally identify potential members of highly specialized committees, but they are required by law to consider for membership any interested parties with professional or personal qualifications or experience that might contribute the functions and tasks to be performed. Scientists can and should seek appointment. Endorsement from scientific societies is helpful and should be submitted for agencies' consideration. Committee members typically attend two to four meetings each year. Travel expenses, and occasionally compensation, are paid by the agency.

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vidual societies. AIBS has cosponsored fellows from time to time (see below).

Doing it anonymously (Paying someone else to do it)

It is important to understand that many scientists simply do not feel comfortable speaking with congressional staff, writing letters, testifying, serving on public policy committees, or participating in the policy process by other personal means (I hope that they do, at least, vote). These people can still contribute to improving the connection between science and decisionmaking. They can follow the time-honored method of helping to fund those who are more skilled in speaking out for their interests. Financial contributions are generally anonymous and thus cannot be said to harm anyone's scientific credibility.

Some scientific societies, such as The Wildlife Society, have a surcharge to their society dues to operate their public policy programs. My congressional fellowship in 1987–1988 was cosponsored by AIBS and the American Society of Zoologists (now the Society for Integrative and Comparative Biology), which financed their part of my fellowship through voluntary contributions from individuals. The Ornithological Council is financed by membership fees from its member societies and by voluntary contributions from individual ornithologists.

Most conservation biologists belong to one or more environmental groups. Many of these groups have a strong scientific basis. Although they are generally very effective politically, there is also a broad range of the political spectrum that reacts negatively to many environmental groups.

Finally, scientists, like any other citizen, can add their drops to "the mother's milk of politics." Campaign contributions can be given individually to the candidate of one's choice, or they can be bundled with other contributions through political action committees, principally the League of Conservation Voters or the Sierra Club, both of which take an active part in election campaigns.

However one approaches it, biologists have a responsibility to take advantage of the opportunities offered in our democratic system and use them for the conservation of biodiversity.

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