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Species and Ecosystem Conservation: An Interdisciplinary Approach

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Yale School of Forestry & Environmental Studies

Species and Ecosystem Conservation: An Interdisciplinary Approach

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**Northern Rockies
Conservation Cooperative**

Contents

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Welcome to Readers

This volume introduces and illustrates an interdisciplinary approach to species and ecosystem conservation. We know from our own diverse experience and that of many other professionals that this approach can improve policy and management in many contexts. Improving our problem-solving and leadership skills is one of the most important challenges of our time.

The formal course summarized in this volume and the interdisciplinary approach it uses can be applied with good effect in many situations. The students who have used this approach in Tim Clark's course at the School of Forestry & Environmental Studies over the past 11 years have found it helpful in analyzing and recommending conservation solutions in cases across Africa, South America, Asia, Australia, and North America. We hope you will find the information in this volume pertinent to your work as well.

One of the primary roles of NRCC is to help citizens and governments manage natural resources in the best ways possible, and we feel that this volume will be helpful in that regard. NRCC typically carries out work in half a dozen countries at any one time. The organization also supports students, interns, and others in their efforts to become better problem solvers and leaders.

This publication is a genuinely cooperative product of NRCC and the Yale School of Forestry & Environmental Studies. The editors were all affiliated with both organizations when they prepared this volume (with NRCC as board members, research associates, or interns, and with Yale as graduate students, doctoral candidates, or professors). Copies of this document can be ordered from the Yale School of Forestry & Environmental Studies at www.yale.edu/environment. We would appreciate your feedback.

Sincerely,

Louise Lasley
Executive Director
Northern Rockies Conservation Cooperative

Acknowledgments

Preface

This volume introduces a genuinely interdisciplinary problem-solving approach and applies it to cases ranging from the conservation of single species to ecosystem management, and to policy problems across local, regional, national, and international scales. Many people today are seeking to learn such an interdisciplinary approach and would like to develop the skills to use it successfully in diverse situations. The present volume is offered to help them in the dual task of learning and applying this approach. All papers in this volume emphasize cooperative, effective problem solving.

The method of problem solving that is discussed and demonstrated here has been taught in the School of Forestry & Environmental Studies at Yale University for the last 11 years in a course called "Species and Ecosystem Conservation: An Interdisciplinary Approach." The course teaches problem-solving skills and offers students an opportunity to apply them. Case applications cover the spectrum of contemporary conservation challenges. Each year the course has been diverse in terms of student backgrounds, disciplines represented, skills present, and lifetime experiences and interests. Over a decade's experience shows that this interdisciplinary approach can be learned, talked about explicitly, and applied systematically, as the contents of this Bulletin illustrate.

The Bulletin begins with a brief introduction to the species and ecosystem conservation challenge, the professional task, and the skills needed to address it successfully. The remainder of the volume is divided into three parts. Part I introduces the concept of interdisciplinary problem solving, and provides several lists of general questions to guide application. Within Part I, the first paper describes in detail the course "Species and Ecosystem Conservation: An Interdisciplinary Approach," which is designed to teach and learn this approach to leadership and problem solving. The concluding paper in Part I discusses concepts and methods for successful problem solving, and uses an example of a species conservation challenge to illustrate the fundamental ideas.

In Part II, selected cases from the 1999 class are used to illustrate this interdisciplinary approach and its successful "first time" application by university students. Four cases are featured: shellfish conservation in Chesapeake Bay, United States; introduced species management in the Galapagos Islands of Ecuador; wolf recovery in Minnesota in the United States; and land conflict along the border of the Mbaracayú Reserve in Paraguay. Ten other abstracts describing cases from a broad range of geographic locations, together with a listing of cases examined by the other students in the 1999 course, further illustrate the range of possible applications.

In Part III, five additional cases from previous years are offered which use the interdisciplinary problem-solving approach in a flexible way,

emphasizing the various aspects of problem solving. For example, a paper on biodiversity conservation in Hawaii focuses on "problem definition," whereas an analysis of zoos examines policy direction and organizational flexibility. Part III also includes a list of other selected cases from those examined by the over 200 students who have taken this class over the last 11 years, again showing the broad range of possible applications. The final paper of the volume provides an overview of interdisciplinary problem solving and discusses how this approach might be utilized by a professional to address a specific conservation problem.

The material in this Bulletin is directed toward a diverse audience throughout the world. It is intended for anyone interested in improving their own problem-solving skills, regardless of the situations in which they find themselves. It serves as a reader and casebook for students in future courses at Yale University, but it can also aid people who do not have the opportunity to take a course at Yale to learn about this approach. These papers are also available for downloading at the Yale School of Forestry & Environmental Studies website (www.yale.edu/environment/publications). In addition, it is a guide to further reading, as numerous citations and examples using the problem-solving method are included in the literature referenced in each paper. Our hope is that this volume will encourage both new and more experienced professionals everywhere to learn and apply interdisciplinary problem solving to the challenges of species and ecosystem conservation.

The Editors

Leadership in Species and Ecosystem Conservation

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Leaders who are explicitly skilled in interdisciplinary problem solving will be essential if humanity is to solve the species and ecosystem loss problem. Developing such leaders is one of the most vital and pressing challenges of our time. The broad outline of the biological problem is clear: many species and ecosystems are being destroyed at an accelerating rate because of human practices. These permanent losses threaten to impoverish the planet, and endanger the long-term sustainability of human activities. In this introduction, we briefly examine the problem of species and ecosystem loss and the reasons for its persistence. We also provide a brief overview of a graduate-level course at the Yale School of Forestry & Environmental Studies designed to meet the challenge of developing leaders with strong interdisciplinary problem-solving skills. All of the case studies discussed in the remainder of the Bulletin originated in this course. The course, or variations of it, can be taught elsewhere in workshops, field trips, and in real-world problem-solving situations involving management and policy problems.

Leaders who are explicitly skilled in interdisciplinary problem solving will be essential if humanity is to solve the species and ecosystem loss problem.

THE SPECIES AND ECOSYSTEM PROBLEM AND ITS SOLUTION

The living environment consists of millions of species, which are organized into ecosystems. The interactions of these species and the productivity and resilience of ecosystems sustain the great biotic enterprise of which humans are a part. Among the factors responsible for the modern loss of species and ecosystems, three stand out: exploitative practices, conventional (narrow) problem-solving approaches, and weak leadership. In this section we discuss exploitative practices and narrow problem-solving approaches, and how they can be understood and effectively addressed through the use of interdisciplinary problem-solving methods. In the next section we discuss how to develop strong leaders who possess such problem-solving skills.

EXPLOITATION VS. SUSTAINABILITY

The significance or meaning of the environment to humans is determined by the goals, or values, that people seek at specific times and places, and by their expectations about the utility of particular environmental resources for achieving their values. If people seek short-term gains (or value accumulation) from the environment and use destructive practices to get those gains, we call that "exploitation." If they seek long-term benefits through practices that can be carried on without destroying species and ecosystems, we call it "sustainable." Although many people and most nations seek at least some level of sustainability, exploitation is widespread. Numerous studies document the high rate of degradation and loss of species and ecosystems through unsustainable practices worldwide (see the references at the end of this paper). Collectively, they suggest that, if current trends continue, the future of much of the living environment is in jeopardy. These negative trends, and the conditions under which they are taking place, must be reversed if sustainability is to be achieved.

On the positive side, however, there are also many cases where the living environment is used sustainably. These examples can be understood as "prototypes" that offer lessons for achieving sustainability elsewhere. The lessons can be harvested, diffused widely to other situations, and adapted or refined as appropriate to local circumstances. Learning from prototypes and applying the lessons in other settings is a constructive, practice-based way to overcome diverse problems.

CONVENTIONAL DISCIPLINARY VS. INTERDISCIPLINARY
PROBLEM SOLVING

Problem solving is merely an effort by an individual or group to think of a way out of a difficult situation. Conventional problem solving draws on ordinary, everyday images, notions, and vocabulary about people, problems, and the process of making decisions. The conventional approach to problem solving, as institutionalized in most organizations, usually involves various levels of conflict and cooperation among participants who are thrown together to address a problem and who often use divergent forms of reasoning, subscribe to different ideologies, and seek diverse goals. This approach, and the ensuing conflict, rarely satisfies anyone or solves problems effectively. Conventional problem solving muddles through one crisis after another without truly understanding the nature of the problems, solving them, or gaining insight into why the process is not effective. Increasingly, this approach is seen as inadequate in dealing with the complexity and conflict of conservation cases.

Biology, ecology, sociology, political science, economics, and many other disciplines can all be invoked in making decisions about the use of living resources. Yet the problem of species and ecosystem losses cannot be reduced to a single disciplinary conceptualization or solution. Moreover,

Problem solving is merely an effort by an individual or group to think of a way out of a difficult situation.

fundamental problems in the decision-making process cannot be remedied with the addition of new scientific information from ecological, economic, or other single-discipline models alone. The loss of the living environment is a complex, *interdisciplinary* challenge and thus demands *interdisciplinary* solutions from skilled problem solvers and leaders.

Many people see conservation and sustainability issues in terms of plants, animals, and ecosystems, typically drawing on a conventional scientific perspective. This focus on *substance* under-emphasizes the *processes* of social interaction and decision making which determine substantive outcomes. Another way to look at this is to think of conservation as a process of people making decisions about how they will manage themselves in relation to the environment—daily decisions about how they will make a living, which practices they will use, and what policies and programs will guide their activities. Human decisions—whether in Kenya, Costa Rica, Indonesia, Germany, Australia, or the United States—determine whether species and ecosystems will thrive or vanish. Focusing on improving the human decision-making process is therefore key to achieving sustainability. Presently many decision-making processes are not themselves sustainable: they are not reliable, comprehensive, or realistic, and ultimately they fail to be viable, solve problems, or invigorate people to remain involved. The real key to sustainability is to change these processes so that they become sustainable.

Interdisciplinary problem solving is a much more effective way to address problems. It includes "ways and means for blending wisdom and science, for balancing free association and intellectual discipline, for expanding and refining information, and for building a problem-solving culture that balances 'permanent' with 'transient' membership, thereby remaining open to new participants and to fresh ideas while retaining the capacity for cumulative learning that refines, clarifies, and simplifies" (Burgess and Slonaker 1978: 1). Interdisciplinary problem solving is a kind of disciplined, "higher order" rationality not found in any single discipline or in conventional problem solving. It is a means of organizing knowledge for thought and research and integrating it to solve problems practically.

The first requirement of interdisciplinary problem solving is a framework that can accommodate—conceptually and practically—diverse data, epistemologies, and disciplines. The conceptual categories of such a framework can serve as a "checklist" of variables to address in any conservation problem, thus enabling users to construct a realistic map of the decision process and its context and to use it to define and solve problems. The second requirement is that problem solvers must clarify their own position, or "standpoint," relative to the problem and the decision process. Finally, they must integrate what is known, make a judgment, and take responsibility for it. The interdisciplinary approach to problem solving described and illustrated in this volume satisfies these requirements. As Brewer and

Interdisciplinary problem solving is a much more effective way to address problems. It includes "ways and means for blending wisdom and science, for balancing free association and intellectual discipline, for expanding and refining information, and for building a problem-solving culture that balances 'permanent' with 'transient' membership, thereby remaining open to new participants and to fresh ideas while retaining the capacity for cumulative learning that refines, clarifies, and simplifies" (Burgess and Slonaker 1978: 1).

deLeon (1983: 22) note, "Other approaches may appear to offer simpler or easier solutions, but each usually turns up lacking in important ways—not the least of these being their relative inability to help one think and understand, and hence to become a more humane, creative, and effective problem solver."

DEVELOPING STRONG LEADERS: AN INTERDISCIPLINARY COURSE AND PRACTICAL APPLICATIONS

Without appropriate leadership, conservation and sustainability of the living environment will remain only a dream. Although many of the participants in conservation problems have good intentions and the desire to improve conservation practices, few have the skills to integrate knowledge from multiple disciplines and work cooperatively to solve problems. Good leaders know how to effectively address a problem by clarifying social goals, mapping the trends and causal factors that have led to the current state of affairs, making projections into the future, developing and evaluating alternative strategies, and implementing the best strategy to move toward the desired goals. A semester-long course is an effective way to learn interdisciplinary problem-solving methods and leadership. This basic approach is useful to understanding and solving not only conservation problems, but all kinds of policy problems in other arenas.

Without appropriate leadership, conservation and sustainability of the living environment will remain only a dream.

THE COURSE

The course at the Yale School of Forestry & Environmental Studies, "Species and Ecosystem Conservation: An Interdisciplinary Approach," seeks to give students: (1) an interdisciplinary approach to species and ecosystem conservation; (2) a working ability (skill) in applying this approach; and (3) an opportunity to integrate and synthesize their course of study with their own experience. The interdisciplinary approach is both a theory and a conceptual framework which is designed to help students in this class, or professionals in workshops, to see the whole picture or context in problem solving, and to be selective and targeted in finding a solution. Users of this method are required to address the rationality, politics, and morality in any problem setting, clarify their own standpoint relative to their work and its context, and integrate their knowledge into an overall judgment.

PRACTICAL APPLICATIONS

Students in the course learn several ways to apply this interdisciplinary approach and their leadership skills to actual conservation situations. First, "cooperative problem solving" focuses on designing an adequate decision process as a way of helping other people or communities to seek their common interests. Problem-solving exercises can be organized by participants, coordinators, or decision makers to help groups integrate their

knowledge to solve complex problems. This design seeks to explore the problem at hand, its context, and find to enduring solutions in an integrative manner. Second, students learn about "prototyping," which is a small-scale, experimental change in a social or policy system. The primary goal of experimenting in this way with problems and solutions is to get information on relevant factors and to learn how to solve problems. Thus, these efforts include explicit protocols for learning and integrating lessons across experiences, and later scaling up to pilot studies and full-scale applications. Third, students learn about designing and carrying out "workshops for capacity building." Workshops seek to improve basic problem-solving knowledge and skills. Diverse people can be involved in workshops, even those at odds with one another. Workshops, if properly structured, can help participants avoid conventional approaches that are overly technical, parochial, or promotional (favoring special interests). The challenge is to teach individuals how to orient to complex problems using knowledge and methods from many disciplines and how to integrate that knowledge for practical purposes. Workshops can help build a shared definition of the conservation challenge, improve cooperation among participants, enhance the capacity of participants to be effective through group action and discussion, establish priorities for conservation, and open up opportunities to experiment and learn.

CONCLUSION

Interdisciplinary approaches offer the best means for successfully resolving conservation problems in the common interest. Leaders who are knowledgeable and skilled in interdisciplinary problem solving are therefore vital to solving the species and ecosystem loss problem. The task of educating these leaders is one of the most important jobs of universities, non-governmental organizations, and government agencies. Leaders must be explicitly versed in interdisciplinary problem-solving concepts and be skilled in critical thinking, observation, management, and technical proficiency. Courses, workshops, and hands-on experience are all opportunities to shape the leadership needed for conservation of the living environment. The materials in this *Bulletin* can aid people familiar with this interdisciplinary problem-solving approach to become more skilled in its use, and help other people currently unaware of this approach to learn about it, use it to address conservation problems of interest, and include it in educational programs of their own. In future years, we expect that this collection of papers will be used in the Yale course, and in the United States and internationally in workshops and ongoing cases, with government managers, non-governmental advocates, and citizens.

Interdisciplinary approaches offer the best means for successfully resolving conservation problems in the common interest. Leaders who are knowledgeable and skilled in interdisciplinary problem solving are therefore vital to solving the species and ecosystem loss problem. The task of educating these leaders is one of the most important jobs of universities, non-governmental organizations, and government agencies.

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Part I: Interdisciplinary Problem Solving

Part I of the *Bulletin* describes a course designed to enable students to learn and apply an interdisciplinary problem-solving approach, introduces the interdisciplinary problem-solving approach, and gives an example of its use. The first paper describes the course, "Species and Ecosystem Conservation: An Interdisciplinary Approach," in which this concept of problem-solving is taught and learned. It gives a detailed overview of the course, including background, goals, and main themes. An evaluation of the course is given as well.

The second paper describes more fully the interdisciplinary problem-solving approach, which is directed at making a conservation policy or program rational, practical, and justified. The paper shows how to thoroughly examine a problem that is being addressed by a policy or program, and the problem's context in human social and decision terms. Several analytic tools and questions are offered to guide this task. The approach also asks the professional to clarify his or her standpoint relative to the problem and the process under examination. Finally, it asks the professional to integrate what he or she knows from the above examination into an overall judgment and to take responsibility for it.

Part I serves as the foundation for the rest of the volume. The cases in Parts II and III use this interdisciplinary problem-solving approach in various ways in the search to improve species and ecosystem conservation.

A Course on Species and Ecosystem Conservation: An Interdisciplinary Approach

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ABSTRACT
Many ways exist to learn interdisciplinary problem solving (e.g., field trips, on one's own, workshops, and courses). This paper describes "Species and Ecosystem Conservation: An Interdisciplinary Approach," a course taught at Yale University's School of Forestry & Environmental Studies. It is a graduate, three-hour, one semester course which offers a comprehensive approach to interdisciplinary problem solving, illustrations on how to use it, and an opportunity for students to apply it and present results. The course, which emphasizes problem structuring, applies interdisciplinary problem-solving concepts to species and ecosystem conservation, as well as to contemporary professional practice. In the last 11 years, over 200 students from 30 countries have found the course to be highly relevant for them and applicable to their professional goals. A similar course could be taught elsewhere or abstracted into a several day workshop. This paper is structured in three sections: (1) an overview of the Yale course, (2) an outline of how to apply and present an interdisciplinary approach, and (3) student evaluations of the course. The course's rationale and goals are explained, and its content, organization, and main themes are described. An outline for writing and presenting interdisciplinary case analyses is offered.

LEARNING INTERDISCIPLINARY PROBLEM SOLVING

This course offers students the opportunity to learn a comprehensive approach for interdisciplinary problem solving, apply it for the first time, and present results to the class. There are many ways to learn interdisciplinary problem solving, such as workshops (Clark *et al.* in press), field trips (Clark and Ashton 1999), and on one's own or in study with a trained practitioner (Clark 1997a). However, a three-credit, one semester course that meets once or twice a week for about three hours is an excellent vehicle for introduction to the subject.

COURSE RATIONALE

The present problem of species and ecosystem loss and the limited effectiveness of professionals in addressing this problem successfully rests on a *common problem*. The common problem is that, typically, conventional professionals, and other participants and analysts, simplify a problem and misconstrue or overlook some important part of the context, only to discover their error in retrospect when results come in which are quite different from what they expected! The case material covered in this course clearly shows how participants in problem solving fall victim to their own limited (disciplinary, epistemological, organizational, or ideological) problem-solving conceptions and skills. The professional challenge is to acquire facility in the use of an interdisciplinary conceptual framework that helps you to see more of the relevant context more reliably than would otherwise be achieved by using conventional, positivistic, and narrow disciplinary viewpoints. This framework is made up of *problem orientation*, the *social process model*, and the *decision process model* as

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the basic tools for "mapping" any policy context. The course teaches the framework.

The course is part of a professional and policy movement, which in turn is part of a worldwide effort to address the increasingly complex environmental problems of our time (Brunner and Ascher 1992). The goal of this movement is to improve species and ecosystem conservation, professional practice, and diverse policy decisions through interdisciplinary scientific inquiry. This movement is often *mis*understood as a search for rational, objective, and specific solutions (using positivistic or experimental science) to specific environmental problems that would otherwise be solved "politically." In actual practice, enduring solutions to these kinds of problems cannot be found by reducing them to either single disciplinary perspectives or positivistic approaches.

This class, taught at the university level, fulfills the need to integrate theory and practice in an interdisciplinary professional school. Virtually every discipline in the conventional academic spectrum can contribute to improving professionalism and environmental decisions—today's problems require truly interdisciplinary approaches. However, no environmental policy problem, in particular the loss of species and ecosystems, falls entirely within the boundaries of any one discipline. Unfortunately, when most disciplines encounter environmental policy problems, they usually subordinate the problem to their disciplinary perspective, which proves to be theoretically and methodologically limited, and often inadequate.

The first interdisciplinary-like, policy-oriented programs in United States universities began about 35 years ago, although the movement was initiated over 50 years ago (Brunner 1991). Since that time, the interdisciplinary policy movement has fragmented into many approaches because of disciplinary biases and the fact that the basic goal of these programs is often ambiguous and therefore open to different interpretations.

The interdisciplinary problem-solving approach of the *policy sciences* is the oldest distinctive tradition in this professional and policy movement (Brunner 1997a). The conceptual and theoretical tools to apply this interdisciplinary approach were formulated by Harold Lasswell, a "sociologist/political scientist" at Yale Law School (see, for example, Lasswell 1971). Since then, they have been continuously refined through practice by Ronald Brunner (University of Colorado), Garry Brewer (University of California), William Ascher (Claremont McKenna College), Andrew Willard (Yale University), and many others. Brunner, Brewer, and Ascher were all students of Lasswell's at Yale University in the 1960s and 1970s.

The interdisciplinary policy approach of the policy sciences recommends human dignity (achieved through a commonwealth of democracy) as the overriding standard for improving policy decisions. Positivism, which has traditionally dominated nearly all disciplines, is beginning to be recognized as an insufficient basis for effective problem solving. Many examples of this are evident in the course readings and elsewhere in practice today. The policy

This course is part of a professional and policy movement, which in turn is part of a worldwide effort to address the increasingly complex environmental problems of our time (Brunner and Ascher 1992). The goal of this movement is to improve species and ecosystem conservation, professional practice, and diverse policy decisions through interdisciplinary scientific inquiry.

sciences uses an "anthropologically-based" approach that is problem-oriented, contextual, and multi-method. This professional and policy movement can be used as a standard for other problem-solving approaches.

COURSE GOALS

The overarching goal of the course is to learn how to think more efficiently, effectively, and responsibly about any area of conservation (or any policy area) using the best conceptual and applied interdisciplinary tools available (Brunner 1997b, c). This in turn helps professionals to be effective practically on the job. The course helps the student to:

1. Define a specific policy-relevant species and ecosystem conservation problem and develop alternatives that are rational, practical, and justified responses to the problem (while clarifying personal standpoint on the matter).
2. Critique any literature or program (e.g., management plan, policy prescription, field effort) in conservation decision making and come to understand it in terms of a more comprehensive, functional view of the practical and theoretical context.
3. Understand the professional responsibilities and roles of the interdisciplinary, policy-oriented practitioner in today's complex world.

These three objectives of the course—practical, theoretical, and professional—are interrelated and mutually reinforcing. Progress on any one of them encourages progress towards the other two. It bears noting that this course can improve competence in *basic professional practice.* However, mastery of the interdisciplinary approach to problem solving requires intelligence, integrity, hard work, practice, and persistence over many years.

Making interconnections among the general conceptual tools of interdisciplinary problem solving and the particular conservation problem of interest is the main challenge of the course and students' later professional work. The tools are abstract and general enough to be useful to any conservation problem. But each conservation problem is unique in its concrete details. So an interdisciplinary conservation professional must move back and forth between the general and the particular situation. This is not easy because *it requires professional judgment and interpretation throughout.* That is, the professional must learn how to think systematically and critically. However difficult this task is for a student, the effort pays off practically, as he or she comes to "see" more of the problem-relevant context over time. It also pays off as the student gains confidence in his or her understanding of the case's details. Finally, it pays off as the student learns to recognize patterns (small and large) that have been "invisible" before. All the while, the student is developing skills in the use of these intellectual tools through application to specific problems. While this interdisciplinary approach is key to making improvements in species and

The overarching goal of the course is to learn how to think more efficiently, effectively, and responsibly about any area of conservation (or any policy area) using the best conceptual and applied interdisciplinary tools available (Brunner 1997b, c). This in turn helps professionals to be effective practically on the job.

ecosystem conservation and to responsible professional practice, it is also invaluable to problem solving in other policy arenas.

MAIN THEMES
A list of key themes that a student needs to understand through this course can be found in the Appendix to this paper. They are part of the foundation of the course. This lists contains 20 themes grouped under problem orientation (species and ecosystem loss), professionalism, pre- and post-positivist theory in interdisciplinary problem solving, and contemporary professional practice. These four groups are a guide to questions and considerations a student will need to be aware of during the semester. This list is also a "decision tool" to help a student determine whether or not to take this course. Students are encouraged to be aware that this course is likely to contradict what they have learned or assumed in their education and experience to this point.

THE COURSE AND INTERDISCIPLINARY PROBLEM SOLVING

The course as described in the school catalogue is given below. Also a brief introduction to the principal dimensions of the interdisciplinary approach is given, with questions to ask in any problem-solving setting. This is followed by discussion of the course's organization.

COURSE DESCRIPTION—PROBLEM FOCUS
Conserving species and ecosystems (biodiversity) is an important social goal. The historic trend is that species and ecosystems are being lost at unprecedented and accelerating rates. This major problem has profound significance for the present and all future human generations. Professionals (and citizens) now living are the last generation that can prevent the extinction of large numbers of species and the disruption of critical ecosystem processes. To address this problem, professionals must apply conservation (ecological and social) sciences and, at the same time, know explicitly about integrative, interdisciplinary problem solving and how to apply it skillfully. This course systematically uses a proven interdisciplinary approach derived from the policy sciences to address the species and ecosystem loss problem. The role of the individual professional and his/her effectiveness in problem solving is examined also. The course includes theory, techniques, and case studies. This includes looking at the organizational and policy contexts of biodiversity work.

The course goals are to develop an interdisciplinary approach to species and ecosystem conservation and demonstrate a working ability (skill) in applying this approach. The course also offers an opportunity for the student to integrate and synthesize his or her course of study and experience. Course requirements are to attend class, read assignments and think, participate in class discussions (1/3 of grade), and answer weekly questions (each answer 1 pg. max.)(1/3 of grade). The quality of the class discussion is a function of the quality of student preparation before class. Students must also write issue/case analyses as part of

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a group of three or four people and present them (1+ hr)(1/3 of grade).

The prerequisites are few. Students should have taken one or more classes in conservation biology and related areas (e.g., population, community, or landscape ecology), in social ecology (e.g., human dimensions of wildlife conservation, science and politics of environmental regulation), and in the policy sciences and related areas (e.g., natural resource policy, environmental law and policy). Extensive and diverse work experience (local to international) is highly desirable.

To facilitate lively discussion, enrollment is limited to 25 students. Reading assignments include a reading packet (theory and cases, available on request) and a book—*Averting extinction: Reconstructing endangered species recovery* (Clark 1997b). Readings change each year. The course's evaluation policy includes an evaluation form handed out during the last week of class. Throughout the course, students are encouraged to make constructive comments on how to improve the course, at any time, in writing or in person.

COURSE ORGANIZATION

Interdisciplinary problem solving requires that the problem solver successfully orient to the problem at hand, be contextual (in terms of the social and decision process involved), and use diverse methods. The conceptual framework introduced above and discussed below can guide this work and serve as a checklist and means to integrate results for judgement and action.

The course begins with a brief overview in the first meeting (week 1). Part I: Basic Elements in Interdisciplinary Problem Solving (weeks 2-5) introduces elements in interdisciplinary problem solving. It provides details on the policy problem (species and ecosystem losses and the effects on humans) and its context, the challenges of professional practice, and the policy process as a means of understanding and participating to improve professional and societal responses. Part II: The Decision Process: Species and Ecosystem Conservation in the Common Interest (weeks 5-10) focuses on the conservation decision process and employs the basic interdisciplinary elements. Numerous examples and cases are used. This part identifies some basic weaknesses in decision processes and discusses ways to avoid them. Part III: Student Applications (weeks 11-13) offers students an opportunity to demonstrate their knowledge and skill in interdisciplinary problem solving. Part IV: Course Review and Final Discussion (week 14) ends the course. The organization as presented in the 1999 course, based on two meetings of 80 minutes each per week over a 14-week semester, is available on request.

INTERDISCIPLINARY PROBLEM SOLVING

Species and ecosystem management is actually an ongoing process of humans making decisions, not about plant and animal behavior, but about our own actions (Clark and Brewer 2000). Should we limit what we do or change our practices? Should we conserve species? Or collect and hunt them? Should we

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encourage species to exist in viable populations? Should we leave them alone? How should we set ecosystem management goals? Should we adopt a new policy for managing species and ecosystems? The management process is about people and what we value, how we interact, and especially how we set up and carry out practices to limit our impacts on the environment, including detrimental effects on species. Because the outcome determines what happens to a public resource, the management process is—or should be—open and public.

A focus on the "decision process" is key. Some of the activities that lead up to a decision include gathering, processing, and disseminating information about the issue. Relevant information includes data on people's values and beliefs, the behavior of organizations, institutional practices, and the species and ecosystems. This stage of the decision process also calls for open discussion, debate, and lobbying about the meaning of the data and what should be done with the information. Next, based on all the information and debate, a decision is made resulting in a prescription (plan, law, program, etc.), which should be realistic and detailed enough so that everyone knows what to expect. Finally, the follow-up activities include implementing the decision (administration and enforcement), evaluating the program (done by those formally involved as well as by outsiders), and eventually terminating old ways of doing things and moving on to new ways. Evaluations—formal and informal, public, comparative, and continuous—are particularly important in providing feedback for midcourse "corrections." Appraisals are the basis of learning.

Because managing species and ecosystems involves many different people, agencies, and organizations, each with potentially different information, interests, roles, analytic and political challenges, and perspectives, we need to be careful about how we organize ourselves to carry out this decision-making process. A good process will not happen on its own, nor will it come about by recycling standard operating procedures, bureaucratic arrangements, existing conflict, and old ideas. Rarely do people discuss the difficulties and limitations of struggling to decide significant, complex public issues. Yet these interactions make all the difference in whether the decision process—in this case, how species and ecosystems will be managed—will succeed or fail.

Many people despair that decision making is a messy, politicized, irrational process. But recognized standards for good decision processes do exist, and everyone involved should try to make the overall process meet these standards. The decision-making process should be, first of all, rational, integrated, and comprehensive. At the same time it should be selective, targeted, and focused. The biophysical and social information considered in decision making should be reliable; if not, some measure or description of uncertainty (or risk) is needed. Decision making should be open and accessible to those with something to contribute or something at stake. The process should also be open to scrutiny. It should be inclusive, as "selective omission" often serves personal or special interests and causes unproductive conflict. Timeliness is also essential. The lag between finding a problem and fixing it should be as short as possible,

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and obsolete or unworkable practices and policies should be corrected promptly. Decision processes should also be honest, flexible, and efficient. Overall, decision making should make things better, not worse.

The ideals we should strive for in choosing our problem-solving methods are *rationality, integrativeness*, and *comprehensiveness*. The three-part framework outlined below taken from Clark and Brewer (2000), invented decades ago to address complex problems, is an alternative to the conventional, ordinary problem solving so often applied to natural resource management and policy problems. This simple framework—substantiated by extensive research and practical applications—enables users to manage enormous amounts of ecological complexity and psychosocial conflict. It helps people understand and describe situations, outcomes, events, and processes in their real-life contexts, and it reveals options for action to people with authority or those with the desire and ability to make a difference.

This framework will not provide quick answers. It constitutes a set of operational principles, a means to organize knowledge for thought and research and to integrate it to solve problems (Figure 1). Its categories serve as a "checklist" of variables to address in any conservation project, thus enabling users to construct a realistic map of the social context and decision process and to use it to define and solve problems. It is rational, integrated, and comprehensive.

Before applying the framework, however, it is essential that we examine and clarify our own standpoints concerning the conservation problem and its context under investigation. All people have biases that limit rationality, and these biases should be appreciated to the extent possible and taken into account by the professional when doing his or her work. True professionalism demands that participants in problem solving commit themselves to two standpoints: (1) to be as unbiased and as free as possible from parochial interests, cultural biases, ideologies, disciplinary rigidities, and fixed bureaucratic loyalties; and (2) to seek the common good, which, as mentioned above, is described by the policy sciences as human dignity achieved through a commonwealth of democracy.

After committing to the appropriate standpoints, we can use the framework to address a problem. The three activities that constitute effective problem solving, and which are often described as being *problem-oriented, contextual, and multi-method* (Clark and Brewer 2000), are as follows:

1. **Explore the problem fully.** The way in which we characterize the conservation management problem will largely determine how we respond to it. Too frequently in environmental issues, people commence "biological solutions" before they define "conservation problems." If we miscast or under-represent what is involved, we virtually guarantee the misallocation of resources and increase chances of failure. To effectively characterize a problem, five procedures must be used:

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Figure 1   Interdisciplinary guidelines for addressing conservation policy and management issues. See text for explanations.

#1 IS IT REASONABLE? Problem Orientation	#2 IS IT POSSIBLE? Social & Decision Process[1]	#3 IS IT JUSTIFIED? Social Process[1]
Value task (goals)	Participants[2]	Participants[2]
Historic task (trends)	Perspectives	Identification
Scientific task (conditions)	Situation	Expectations
Futuring task (projecting)	Base values	Demands
Practical task (alternatives)	Strategies	Participants' Myths[3]
	Outcomes	Doctrine
	Initiation	Formula
	Estimation	Symbol
	Selection	
	Implementation	
	Evaluation	
	Termination	
	Effects	

#4
WHAT IS MY STANDPOINT?
Standpoint Clarification

In terms of personality, epistemological, disciplinary, organizational, and parochial biases. Biases limit rationality.

#5
HOW WILL I INTEGRATE WHAT I KNOW?
Knowledge Integration

Synthesize knowledge from #1-4 to improve understanding and judgement for action.

[1] A social process is people pursuing values (i.e., power, wealth, knowledge, skill, respect, well-being, affection, rectitude) through institutions using resources. Human social process includes participants, their perspectives, situation, base values, strategies, outcomes, and effects.

[2] People are likely to act in self-interested ways to complete acts that are perceived to leave themselves better off than if they had completed them differently (mazimization postulate).

[3] Myth is comprised of doctrine (philosophy, basic beliefs), formula (constitution, laws), and symbols (lore heroes, flags, grizzly bears). Myths are constantly being readjusted through social and decision process.

Goals: What goals or ends, both biological and social, does the community want? Are the values behind the goals clear? These may be refined over the course of the analysis.

Trends: Looking back at the history of the situation, what are the key trends? Have events and processes moved toward or away from the specified goals?

Conditions: What factors, relationships, and conditions created these trends, including the complex interplay of factors that affected prior decisions? What models, qualitative and quantitative, might be useful at this stage to explain trends?

Projections: Based on trends and conditions, what is likely to happen in the future? It is important to project several scenarios and evaluate which is most likely. Is this likely future the one that will achieve our goals?

Alternatives: If trends do not seem to be moving toward the goals, then a problem exists and alternatives must be considered. What other policies, rules, norms, institutional structures, and procedures might help us to achieve our goals? Evaluate each in terms of the goals. Select one or more and implement them.

2. **Ensure an adequate decision process.** Species and ecosystem management is concerned with establishing *who* will make decisions about *how* we use resources. Participants must successfully influence this process if we expect to save species and their habitats. Remember the standards for good decision processes described earlier.

Pre-decision

Initiation: Initial sensing that a problem exists. Who first determines that there might be a problem? Who and how should the problematic situation be examined? Who should undertake the initial work? When, how? Can or should the issue be tentatively put on the agenda for further study? Should investigation begin on the size, importance, and other features of the problem? Who is affected? Who should follow up?

Estimation: What information—biological and social—do we need to make good decisions about the problem, in this case of species and ecosystem management? Do we have it? What is missing? How do we get it? How will it be integrated and used? Does everyone have the information they want? Who is advocating which courses of action and for what reasons? Is there adequate opportunity for debate? Who might be served by which courses of action and who might be harmed?

Species and ecosystem management is concerned with establishing who will make decisions about how we use resources. Participants must successfully influence this process if we expect to save species and their habitats.

Decision

Selection: Will the new policy be adequate to solve the problems we have identified? Will it be efficient, effective, and equitable? What are its goals?

Post-decision

Implementation: How will we "invoke," implement, or enforce the new rules? Who will do it, where, when, and how? Is it authoritative? Are adequate assets available to carry it out? Is it clear under what circumstances we will invoke the new rules, i.e., do people know what to expect? How will the new rules be administered? By whom? What sanctions will apply if people violate the new rules?

Evaluation: By what standards will we evaluate whether the new policies have succeeded? Who will do the evaluations? Who will get and act on the evaluations? How will their actions be appraised?

Termination: How will we know when to end this policy and move on to something more fitting? Who will decide? How can we start the process over again smoothly?

3. **Understand the context.** The human social context is too easily overlooked, ignored, or viewed as a constraint to the central biological task of species and ecosystem management and policy, when, in fact, it is central to understanding the problem and finding a permanent solution. "Map" the social process as realistically as possible.

The human social context is too easily overlooked, ignored, or viewed as a constraint to the central biological task of species and ecosystem management and policy, when, in fact, it is central to understanding the problem and finding a permanent solution. "Map" the social process as realistically as possible.

Participants: Which individuals and organizations are participating? Who wants to participate or should participate?

Perspectives: What demands are participants making? What expectations do they have? On whose behalf are demands made, i.e., what groups or beliefs do people identify themselves with?

Situations: What is the "ecology" of the situation—geographic features, for instance? Are there any crises? Which institutions are or should be involved? Is the situation organized or not, and is it well organized?

Values: What "assets" do participants have in terms of power, wealth, skill, knowledge (enlightenment), affection, well-being, respect, and rectitude?

Strategies: How are these assets being used? Are people's strategies educational, diplomatic, economic, or militant? Are these used persuasively or coercively?

Outcomes: What are the results of each decision activity? Who benefits and who is harmed in terms of which values or assets?

Effects: What institutions and practices are promoted and which are set back?

Attending to these three aspects of problem solving maximizes the likelihood that, as we tackle the problem of species and ecosystem conservation, the process will be procedurally and substantively rational, politically practical, and morally justified. Finally, the professional must integrate all the information derived from the above activities into an overall picture of the whole and render a judgment. This judgment is the basis for solving the problem at hand.

APPLYING AND PRESENTING THE APPROACH

Once a student has been introduced to this interdisciplinary approach, he or she is ready to apply it for the first time to a case of his or her choosing and make an oral presentation using visual aids. Analysis of case material is challenging. Moving between the concepts of interdisciplinary problem solving and the case repeatedly brings out the utility of the theory and links case analysis. Presenting the case in a clear, understandable fashion to an audience is also demanding. Students, depending on group size, generally take from 15 to 40 minutes per case presentation.

OUTLINE FOR WRITING

Clearly writing the analysis requires drafting, editing, and redrafting. Students are asked to follow an outline and limit their writing effort to 15 pages (Table 1). The outline is comprised of an introduction, description of the problem, analysis of the problem, recommendations to solve the problem, and conclusions. Clark and Willard (2000) explain this outline, detailing why it is constructed in the way that it is. Clark *et al.* (2000) give ten cases using this outline in diverse situations. Student-authors in Part II of this volume used this outline as well. The paper length was chosen so as not to overwhelm a student with a large writing and analytic task. Also, a relatively short manuscript is something that might be presented to an elected official, program manager, or agency official. Shorter "policy briefs" of a page or two are even better for this audience. Thus, these papers are also an exercise in professional communication.

TEMPLATE FOR ORAL PRESENTATIONS

 The oral presentation follows the written account. To facilitate presentations, students are asked to follow a similar "template" to that of the paper (Table 1). As each case is different, and creativity in presentation is necessary, students vary the template as needed. Cases are presented using overhead transparencies and other visual aids (e.g., slides, maps). Overheads are generally prepared using PowerPoint (examples in Part II). Each overhead contains text and/or pictures, and students generally use from five to 10 overheads each. A typical

Once a student has been introduced to this interdisciplinary approach, he or she is ready to apply it for the first time to a case of his or her choosing and make an oral presentation using visual aids. Analysis of case material is challenging.

Table 1   Recommended outline to follow in making written and oral presentations.

SPECIES AND ECOSYSTEM CONSERVATION: AN INTERDISCIPLINARY APPROACH
(There are many possible variations)

ABSTRACT (1 short paragraph. Less than 150 words)

INTRODUCTION (1 pg.)
    A.   1st paragraph (be problem oriented = goals, problems, alternative(s)).
            "The policy problem is..."
    B.   2nd paragraph (very short purposes of paper (3 purposes)).
    C.   3rd paragraph (clarify your standpoint in reference to the problem).
    D.   4th paragraph (describe the method you used).

I.   PROBLEM (Description of the problem, 3-4 pgs.)—The what?
    A.   Specify contextually (=social process) and in some detail the species/ecosystem problem that is the subject of your study.
    B.   Specify problem in terms of decision process.
    C.   Clarify goals in reference to the problem of concern.

II.   ANALYSIS OF THE PROBLEM (Trends, conditions, projections, 3-4 pgs.)—The why and what's likely to happen?
    A.   Description of trends in the decision process that have had an impact on the problem of concern, including identification of particular impacts and their relation to the achievement of goals.
    B.   Identification and examination of the factors that have shaped the trends and impacts described in II. A.
    C.   Projection of future trends in decision and accompanying impacts, with an emphasis on exploring the relationship between projected impacts and the achievement of goals.

III.   RECOMMENDATIONS (Alternative promoted, 3-4 pgs.)—What to do? Justify your recommendation.
    A.   Alternative(s) for resolving the problem given projections described in II. B. and C. above.
    B.   Evaluation of the alternative strategies proposed for their potential contribution towards reaching the goals.
    C.   Selection and justification of particular strategy to resolve the problem.

CONCLUSIONS (1 pg.)
    A.   Very brief re-statement of goals, problem.
    B.   Recommendation and justification to solve problem as defined.

ACKNOWLEDGMENTS

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presentation might be introduced by a slide showing title and theme. A second slide would contain a brief statement of the policy problem, purpose of analysis, analyst's standpoint, and methods. Next, a table or figure showing the social process might be presented. A map of decision process follows this. Goals, based on the analysis to this point, are given. Next, an overhead showing trends, conditions, and projections in the problem is shown. A statement of recommendations to solve the problem and justification for the recommendation follows. The last transparency is the conclusion, restating the goal, problem, recommended alternative, and justification.

EVALUATING PRESENTATIONS

Students are asked to evaluate each other's presentation recording their appraisal on a standardized form (Table 2). This form follows the recommended outline for paper presentation, which in turn contains all elements of

Table 2   Evaluation form for student presentations.

SPECIES AND ECOSYSTEM CONSERVATION:
AN INTERDISCIPLINARY APPROACH
Appraisal of Presentations
This exercise is to help ppresenters improve (be constructive)
(1=excellent, 2=good, 3=needs work)

I.	**INTRODUCTION**				
	1.	Was the policy problem stated clearly and simply?	1	2	3
	2.	Were the purposes of the presentation stated clearly and simply?	1	2	3
	3.	Was the presenter's standpoint clarified?	1	2	3
	4.	Were the presenters methods clear?	1	2	3
II.	**PROBLEM**				
	1.	Was the problem's context (=social process) adequately detailed?	1	2	3
	2.	Was the problem's status relative to the decision process clear?	1	2	3
	3.	Were goals sought in reference to the problem clarified?	1	2	3
III.	**ANALYSIS**				
	1.	Were relevant trends (history) adequately described?	1	2	3
	2.	Were conditions (=factors) that shaped trends adequately described?	1	2	3
	3.	Were future trends (=projections) adequately described?	1	2	3
IV.	**RECOMMENDATIONS**				
	1.	Were alternatives to resolve the problem adequately described?	1	2	3
	2.	Were alternatives adequately evaluated?	1	2	3
	3.	Was the selected alternative (=strategy) or complex of strategies appropriate to achieve goals and solve the problem?	1	2	3
V.	**OTHER CRITERIA**				
	1.	How would you rate the overall quality of the presentation?	1	2	3
	2.	How would you rate the use of overheads and other visuals?	1	2	3
	3.	What is your recommendation to improve presentation and analytic style? Use reverse side to detail your recommendations.			

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interdisciplinary problem solving. Following each presentation, the presenter is given the evaluations as a basis for revising and submitting his or her paper for a course grade.

EVALUATING THE COURSE
Students are requested to evaluate the course formally on the final day. The Yale School of Forestry & Environmental Studies provides a standard form that students use in all courses to appraise their semester's experiences. Additionally as a specific course assignment, students are asked to list and describe in a paragraph the three "take-home" lessons of the course from their perspective. Results of the 38 student evaluations in the 1999 class are summarized above.

1999 STUDENT EVALUATIONS
When asked to rate the relevance/value of the assignments and projects to the course subject, 96% said they were highly relevant and 4% said they were

pertinent. The course workload was considered heavy by 78% and manageable by 22%. In 1999, the course was taught in two sessions, one with 22 students and the other with 16. Taken together, 50% felt the class size was just right, 40% a bit too large, and 10% too large. When asked if the goals and objectives of this course were made clear at the beginning of the course, 98% said yes. One hundred percent said these goals were met by the course. Finally, when asked if the course fit into their overall course of study, 79% said there was an excellent fit, 15% said it was a very good fit, and 5% felt it was a satisfactory fit.

Students' general comments were solicited about the course. They included the following. "Fewer readings. More discussion. The course probably taught me more than any other at Yale did. I had an excellent experience. I only wished I had taken it last year. I learned a very valuable tool I will use a lot. This was by far the most useful and thought provoking class that I have taken to date at Yale. The presentations and guest speakers were a great learning experience. This class helped me to lucidly understand the issues that are my *(sic)* master's thesis. I recommend it to everyone, even those not involved in conservation of endangered species and ecosystems per se. It applies to any problem-solving context. A great course that I would not hesitate to take again and again."

1999 TAKE-HOME LESSONS

The final assignment asked students to describe the three take-home lessons from the course. A sampling of take-home lessons follows. "An explicit, methodological analysis of a policy situation grants the individual, group, or organization increased power to understand and influence that situation. The majority of policy is based in politics, not science. Development of new educational approaches and new professionals is critical to the future success of environmental policymaking. Conservation involves decisions by different people. It is important to understand the social process or context involved. The policy sciences approach to problem solving is an enormously useful tool in both defining problems and concomitantly finding solutions, not only to species and ecosystem problems, but to any complex issue involving human beings and their social, political, economic, and cultural systems. How one defines a problem inevitably dictates the solutions chosen to remedy the problem as defined. How complex species and ecosystem conservation really is (*sic*). Define a problem using problem orientation, understand the social process by mapping participant values and their interactions, and work in a group to clarify ideas and refine concepts for presentation and publication. The most important thing is the idea of a person's standpoint. The basic interdisciplinary nature of conservation issues and using it to approach problem solving (*sic*). It became obvious to me that mapping and understanding a problem and the social context, as well as the decision process is fundamental to finding a solution to the problem. The class has improved my self-confidence."

The policy sciences approach to problem solving is an enormously useful tool in both defining problems and concomitantly finding solutions, not only to species and ecosystem problems, but to any complex issue involving human beings and their social, political, economic, and cultural systems. How one defines a problem inevitably dictates the solutions chosen to remedy the problem as defined.

EVALUATIONS FROM PREVIOUS YEARS

The 1999 evaluations and take-home lessons are similar to all previous years. The following comment by one student in 1997 is typical. "I studied anthropology as an undergraduate in the UK. My career developed in my native country [not the U.S.] as the coordinator of an environmental management program, which eventually led me to the international level. I was unexpectedly influenced by the policy sciences [interdisciplinary problem solving] at Yale. It was stimulating stuff. It gave me an incredible scope and opportunity to work as a policy-oriented professional [building on my past experience and contacts]. I came to Yale, without recognizing it, as an infant policy scientist [interdisciplinary problem solver]. I leave it as a maturer *(sic)* one, one who recognizes my skills and strengths, and through that recognition, will be able to develop and apply them in a more systematic and, ultimately, productive manner toward the realization of my own professional goals. I feel, at last, happy in the knowledge that my interdisciplinarity is my strength. The course was a seminal experience for me!"

CONCLUSIONS

Learning interdisciplinary problem-solving concepts and skills and applying them to species and ecosystem conservation problems is a task that can be productively accomplished in a three and a half month graduate course, of which the Yale University School of Forestry & Environmental Studies course is but one example. The course is structured to introduce interdisciplinarity, key concepts, an analytic framework, and sample applications. These ideas are best learned and taught with the support of diverse readings, exercises, and open discussion. Students generally evaluated the course to be of great significance to their professional education, intellectual maturation, and development of critical thinking and applied skills.

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APPENDIX

MAIN THEMES OF THE COURSE "SPECIES AND ECOSYSTEM CONSERVATION: AN INTERDISCIPLINARY APPROACH"[1]

Problem Orientation (Species and Ecosystem Loss)

1. Species and ecosystems are being pushed to extinction at unprecedented rates worldwide. Species and ecosystems are the "basic" small- and large-scale "units" of nature, respectively.
2. Causes for species and ecosystem losses include a complex mix of direct and indirect human activities. This is therefore a human problem. This problem has intermixed biological, social, economic, and political dimensions.
3. Extinction rates are variously estimated at 100+ species extinctions per day and increasing. Destruction rates of native ecosystems are considered high, but are not quantified precisely.
4. Life support systems for all living forms depend on the health of species and ecosystems (i.e., nature). Thus the loss of species and ecosystems is expected to have harmful, uncertain, and long lasting effects on all humans and societies.
5. To avoid or ameliorate the harmful affects of species and ecosystem losses, nature should be maintained so that species exist in viable populations and ecosystems retain their structure, processes, and resiliency. Maintaining these species and ecosystems would permit the human enterprise to perpetuate itself sustainably.

Professionalism

6. Conservationists and natural resource professionals are part of a tradition comprised of many parts that differ in origin, outlook, and practical impact, but share the common (although sometimes ambiguous) aspiration to contribute to improved conservation management and policy.
7. There is a growing worldwide movement, in response to the increasingly complex problems of the contemporary world, including species and ecosystem losses, to which professionals from many disciplinary backgrounds are moving. Conservation and natural resource professionals are typical. However, this cohort of professionals is currently a minority in the overall social and decision processes in society.
8. The interdisciplinary approach to improving management and policy holds that most preventable errors of professional practice stem from the professional's own perspective: Typically, some important part of a problem's context is misconstrued too narrowly or overlooked altogether. As a result, the concept of the "problem" thus constructed and acted upon is inadequate.
9. The philosophy of knowledge known as positivism (experimental science), which dominates most scientific and problem-solving endeavors today, predisposes such errors because of its non-contextual view that postulates universal laws of behavior, its over-reliance on quantitative and formal methods, and its avoidance, in principle, of normative issues. These are problems in professional perspective and they can be corrected.
10. In contrast, the interdisciplinary problem-solving approach is based on the postulate that behavior is selective from the actor's own subjective viewpoint (perception matters). Multiple methods are required to understand problems. It recommends that the overriding aim of policy and inquiry should be human dignity (a commonwealth of democracy), wherein science is conceived in the broad sense to bring about human freedom. This requires a focus on normative (value) issues.

11. Progress of the interdisciplinary problem-solving movement to improve professional and policy responses to society's problems depends upon distinguishing the main elements of the overall movement and appraising their performance relative to one another and to the common goal of improving professionalism and policy decisions. Importantly, do not assume (in positivistic terms), that it means "to improve policy decisions through scientific inquiry" (wherein science is conceived in the narrow positivistic sense).

Pre- and Post-Positivist Theory in Interdisciplinary Problem Solving

12. Pre- and post-positivist theory, as used in interdisciplinary problem solving, abstracts similarities from many different contexts of human experience over history. It does not and cannot detail any specific context unambiguously, completely, or permanently.

13. Normative (values) and empirical (verified) theory are both grounded in diverse human experiences. Normative theory abstracts value preferences while empirical theory abstracts patterns of behavior without expressing value preferences. These two theoretical approaches are integrated in the interdisciplinary problem-solving approach.

14. The function of theory, from a post-positivist standpoint, is to direct attention to the relevant aspects of any particular "problem's" context. The function is not to prescribe what should be found there, nor to predict what will be found there, but to aid in assessing and in understanding what is found there.

15. Most recent claims of theoretical progress in problem solving in many disciplines and "multidisciplinary" efforts are actually refinements or innovations in the vocabulary of the policy sciences interdisciplinary problem-solving approach (they are partial re-inventions or convergences). Because authors of this vocabulary are usually unaware of the policy sciences, they think their new terms are true, first-time innovations.

Contemporary Professional Practice

16. Human behavior is not determined in the sense of Newtonian mechanics (mechanistic cause and effect). A person's pattern of behavior can be understood to be the coordination of individual acts, each based on a person's own subjective construction of the self-in-specific-context. Human behavior is about "making meaning" in life (e.g., a sense of self in social context).

17. Human value preferences are too often taken as given or fixed in contemporary professional problem solving, misused as rationalizations for hidden interests in promotional politics, and reduced to wealth and power considerations in the overall society. This is an oversimplification with significant harmful consequences.

18. For conservation problems fraught with uncertainty and ambiguity (as most interesting problems are), rationality is more procedural than substantive. In such circumstances, decision processes should focus on appraisal, and stopping errors in management and policy.

19. Political symbols (spoken, visual, and exemplars) are significant elements and tools shaping social process in groups and society and in meaning making, but they are under-estimated and under-studied relative to the substantial (e.g., biological) factors by participants in problem solving.

20. The politics of our time (trends) are distinguished by the rise of modernizing intellectuals, including scientists. Their power base is skill, their technique is symbol manipulation, and their net impact on human dignity is still in doubt! Whether they can significantly address the species and ecosystem loss problem and improve decision making is questionable.

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[1] This list was partially derived from Ronald Brunner, Center for Public Policy Research, University of Colorado, Boulder, with his permission and modified for this course.

Interdisciplinary Problem Solving in Species and Ecosystem Conservation

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ABSTRACT

Many species and ecosystems are threatened worldwide. Improved problem solving and leadership are needed to address this growing problem. Interdisciplinary problem solving is an innovation that permits leaders to address complex problems more rationally, practically, and morally than use of traditional disciplinary methods. This proven interdisciplinary approach can guide problem solvers in their search for improved conservation policy and programs for species and ecosystem sustainability. The approach focuses inquiry on "defining" the problem at hand and understanding its context in terms of the human social and decision process at play. Basic problem-solving tools include problem orientation, mapping the social and decision process, and analyzing basic beliefs. Because a professional can assume many roles in the search for conservation improvements, he or she must also clarify his or her standpoint. Finally, all the above must be integrated into an overall judgment, and responsibility taken for this judgment. Interdisciplinary problem solving is a skill that can be taught, learned, and applied. It can aid leaders and professionals in their search for improved conservation. This paper poses and answers questions about the policy or management process and the content of interdisciplinary problem solving. The Yellowstone grizzly bear conservation case is used to illustrate the interdisciplinary approach. The analytic framework detailed in this paper can guide a professional in his or her work.

Species and ecosystem conservation requires problem-solving strategies. The traditional strategy used until recently is disciplinism, emphasizing a single discipline, or a few disciplines in a multidisciplinary approach, to address problems. However, demands are being placed on professionals to become more interdisciplinary, policy relevant, and effective on many fronts (e.g., Pool 1990). If we think of a policy process (or management process) as the development and implementation of strategic aims, then skilled professionals have much to offer society to improve conservation. For example, human impacts on Yellowstone National Park and the surrounding national forests and wildlife refuges are receiving increasing attention and eliciting demands for improved management and policy (Clark and Minta 1994). Grizzly bear (*Ursus arctos*) management in the Greater Yellowstone Ecosystem (GYE) is one particularly high profile case. Threats to grizzly bears may be defined in terms of habitat and population fragmentation and the biological measures needed to maintain or restore populations (e.g., Knight *et al.* 1999). However, they may also be understood as an interdisciplinary management problem, realizing that the conservation of grizzly bears and their ecosystem are only partly a technical problem and largely an outcome of complex human social dynamics—a policy process. Understanding this policy process and making it more effective is the key to achieving effective grizzly bear and ecosystem conservation.

Species and ecosystem conservation requires problem-solving strategies. The traditional strategy used until recently is disciplinism, emphasizing a single discipline, or a few disciplines in a multi-disciplinary approach, to address problems.

This paper first offers a brief overview of the policy process. Second, it examines three basic interdisciplinary problem-solving elements or perspectives that can be applied to species and ecosystem conservation. These can be

stated as questions about a given policy or management effort (is it rational? is it politically practical? is it morally justified?), which can be answered using a set of logically comprehensive, conceptual tools. This toolkit for problem solving includes rational problem orientation, social and decision process mapping, and basic belief analysis. Third, the paper discusses the roles or standpoints professionals play in the social and decision processes they are part of, and finally focuses on integrating knowledge about rationality, politics, morality, and standpoint into an overall judgment. Even a little knowledge of these basic concepts and how to use them practically can dramatically enhance professional effectiveness. Grizzly bear conservation in GYE will be used here to illustrate this principle (see Primm 1996).

BACKGROUND AND OVERVIEW

Environmental professionals are deeply concerned about the loss of species and degradation or loss of ecosystems and the consequences thereof. These professionals possess discipline-based knowledge that is important to conservation and management issues; however, another kind of knowledge is also needed if we are to be successful. This second kind of knowledge is skill at interdisciplinary problem solving within the entire policy process. But what is interdisciplinary problem solving? What is policy process? How can knowledge and skill be obtained? What role can and should professionals play? How can professionals be most effective? The more a professional knows about both kinds of knowledge—disciplinary and interdisciplinary—and how they are interrelated, the more successful he or she is likely to be. Just as theory exists in the disciplines about natural resources management, so too there is theory and experience about interdisciplinary problem solving. This latter kind of knowledge is seldom taught in biological curricula of universities, and an interdisciplinary approach has not yet been applied to grizzly bear conservation.

This century in the GYE, the policy process led to many bears being killed, and eventually to the species being listed in 1975 as threatened under the 1973 Endangered Species Act. Remember that people and organizations (and nations) seek to maximize power, wealth, or some other human value, and in this case bears got in the way. Bears were exploited well beyond sustainable levels and policy ignored their value and needs altogether until recently. Over the last few decades, however, efforts have begun to restore the GYE bear population. Today, some people see the GYE bear population as recovered, whereas other people feel that it is in need of further, more intense conservation. This difference of perspectives is important, because the motivation for a rational grizzly bear policy is the perception that a problem exists which begs a solution (see Weiss 1989). A problem is a discrepancy between what you prefer to have happen and what is most likely to happen, or a difference between your goals (values) and historic trends, current conditions, and future prospects. A policy is a commitment to a program providing an alternative to the practices causing a problem, that intends to reach the aim or preferred outcome. The current

Environmental professionals are deeply concerned about the loss of species and degradation or loss of ecosystems and the consequences thereof. These professionals possess discipline-based knowledge that is important to conservation and management issues; however, another kind of knowledge is also needed if we are to be successful. This second kind of knowledge is skill at interdisciplinary problem solving within the entire policy process.

grizzly bear conservation effort is a complex policy process and it appears to be hopelessly mired in conflict.

WHAT IS MEANT BY MANAGING THE POLICY PROCESS?

Regardless of how grizzly bear conservation is understood, it can best be resolved if its entire context is fully appreciated. For example, attacking only biological causes will probably do little to resolve the underlying human causes of the problem (Brewer and Clark 1994). It is only by understanding this human process of management (the policy process), and learning how to analyze it practically that policy can be improved (Clark *et al.* 2000). This is true not only for professionals working in offices on policy formulation, but also for those working in the field on policy implementation.

In general terms, the policy process is a human social dynamic that determines how the "good and bad things" in life are partitioned out, and who gets what, how, and why. Unfortunately many people misunderstand the policy process because it is "often treated as an abstraction, associated with the dry prose and dusty volumes of government documents" (Culhane 1981: 30). Such a view is highly misleading. Policy is not the same as legislation or government action. Instead, policy is what government and private bodies do for or to citizens and the environment. What professionals and other people in the field do matters far more in the long run than what is said in formal government documents. Real policy is made in the field through the collective actions of many people. The grizzly bear policy process has spanned decades and is ongoing. To compound matters, different people have different conceptions of just what the bear process actually is, whether it is working well or not, and what to do about it, if anything.

A more complete and realistic definition of the policy process is needed. Policy-making is a sequence of many actions by many actors, each with potentially different perspectives, values, and strategies (Ascher and Healy 1990). No one can guarantee that any policy process will be optimal. Each phase of the policy process is populated with somewhat different people and organizations, as well as interest groups. Typically, most texts which describe policy leave out the analytic and political challenges facing the people involved, as well as the difficulty of coordination and communication. Yet, all these interactions are the "policy process," and how these processes actually unfold spells the difference between success and failure. Some processes work better than others, and abundant evidence shows that the grizzly bear process is not working very well, as will be shown.

WHAT IS INTERDISCIPLINARY PROBLEM SOLVING?

One obstacle to effective resolution of species and ecosystem problems is that much of the knowledge about problems and the policy (management) process is highly fragmented and dispersed. Some parts are even "invisible" to key participants. Knowledge tends to be partitioned according to discipline, orga-

A more complete and realistic definition of the policy process is needed. Policy-making is a sequence of many actions by many actors, each with potentially different perspectives, values, and strategies (Ascher and Healy 1990). No one can guarantee that any policy process will be optimal. Each phase of the policy process is populated with somewhat different people and organizations, as well as interest groups.

nization, and other special interests. Consequently, a wildlife biologist may interpret the grizzly bear conservation problem quite differently than a sociologist, and a federal official may view bear management from a much different perspective than a state administrator. Traditionally, the policy problem is subordinated to the perspective of one scientific discipline or managing organization. This limits the way a problem is defined and the options for solution.

The conceptual framework for interdisciplinary problem solving described below was designed to minimize distortions and help professionals see the whole picture—the entire problem and its context (Figure 1). Skill in interdisciplinary problem solving is essential for integrating diverse knowledge, and the framework is a tool that can help in this task. In Lasswell's (1971: 181) words, these tools enable their users to "study the process of deciding or choosing and evaluate the relevance of available knowledge for the solution of particular problems." These tools are directly applicable to the grizzly bear case but have not been used to date.

Skill in interdisciplinary problem solving is essential for integrating diverse knowledge and the framework is a tool that can help in this task.

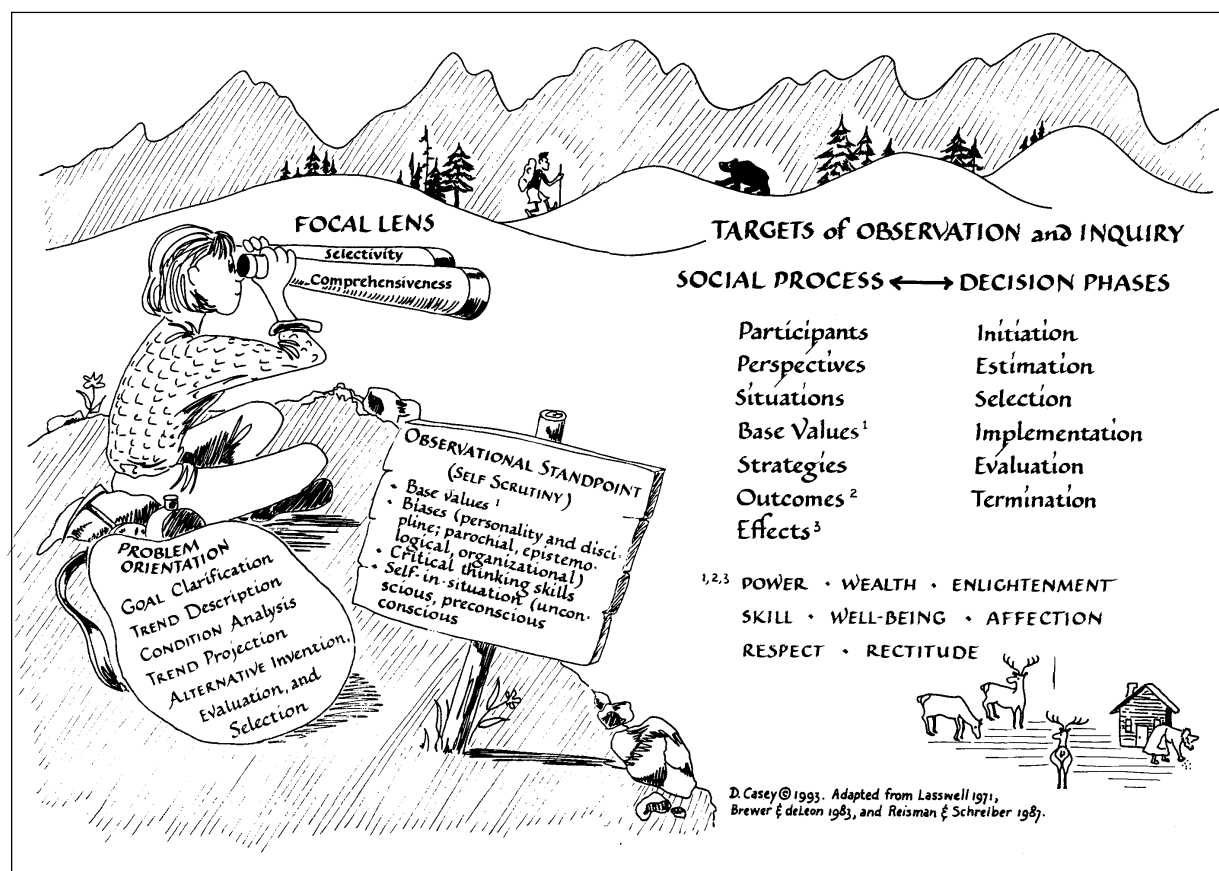Figure 1   An illustration of the interdisciplinary approach to understanding and participating in the policy process. Participants should carry out a thorough problem orientation. They should observe and understand the social and decision process of which they are a part. And they should be clear on their observational standpoint. All participants in social and decision process reflect the eight base values.

OVERVIEW

Suppose that you join the ongoing grizzly bear conservation effort. You must get oriented to the people, organizations, local culture, legal mandates, history of events, technical issues, and many other aspects of the issue in a hurry. You will need to look at all existing information, determine if holes exist in what is known, decide what is included as well as missing from the reports and accounts you read and hear, determine the real picture from rational, political, and moral perspectives, and come up with your own interpretation that is realistic and that can help the process function more efficiently and effectively. How should you start?

BASIC INTERDISCIPLINARY PROBLEM-SOLVING CONCEPTS

There are three key perspectives—rational, political, and moral—to any policy problem (Figure 1). The first perspective (rational) can be examined using a "problem orientation," which asks "Is the policy process reasonable?" The second perspective (political) can be examined using "social and decision process mapping." It focuses on conflicts among the participants and asks "What values are being used and promoted in the process?" The third perspective (moral) focuses attention on the underlying assumptions or beliefs used by participants to justify their positions and asks "Is the process moral or justified?"

THE PROBLEM ORIENTATION (E.G., IS GRIZZLY BEAR POLICY RATIONAL?)

Problem orientation is a strategy for constructing a more rational policy (Lasswell 1971; Simon 1985). In the rush to solve problems, conservation activists, politicians, and the general public have traditionally been more "solution-oriented" rather than "problem-oriented" (Dery 1984: 9). Being solution-oriented, also called "problem-blind," is often a major problem in and of itself! Lasting, comprehensive solutions to problems cannot be constructed unless the problems themselves are first fully understood and analyzed. Thorough problem orientation requires that five interrelated tasks be undertaken (Lasswell 1971). These tasks are carried out by anyone addressing a problem, whether they are aware of it or not. They are:

1. Clarify goals, which are things, events, or processes you want to achieve as the preferred outcomes.
2. Describe trends, which are historic and recent events and include changes relevant to the goals.
3. Analyze conditions, which are factors that shape trends, including causes, motives, and policies.
4. Make projections, which are the likely future developments under various circumstances.
5. Invent, evaluate, and select alternatives, which are possible courses of action open to you that will likely help realize your goals.

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If these five tasks are fully carried out, rational choices can more easily be established. The rational thing to do is to "choose the alternative that you expect, on the basis of trends, conditions, and projections, to be the best means of realizing your goals" (Brunner 1995: 3). Best, in this case, means the most effective, efficient, and equitable alternative.

Let's continue with our grizzly bear example to illustrate these problem orientation concepts (see Table 1). Like most professionals, assume for a moment that, given your civic responsibilities, you desire to improve GYE grizzly bear conservation. You hope to accomplish this, in part, by minimizing the frequency of lethal incidents to bears (this is your goal). Suppose you read a report on lethal incidents from poaching, scientific research, car collisions, lightning, and so on over the past decade, and how much those mortalities have threatened future grizzly bear survival (these are trends). You conclude that the frequency and severity of incidents is much higher than you prefer (i.e., you become aware that a problem exists).

Table 1   Problem-oriented tasks of problem analysis (Brunner 1995; Clark 1996; Wallace and Clark 1999).

1. **Goals:** What outcomes do we want?
2. **Problems:** (Problems are discrepancies between goals and real or likely states of affairs): What are the problems given our goal?
3. **Alternatives:** What alternatives are open to participants to solve problems?
4. **Evaluate alternatives:** Would each alternative help solve the problem?
A. **Trends:** Did it work or not work when used in the past similar occasions?
B. **Conditions:** Why, or under what conditions, did it work or not work?
C. **Projections:** Would it work satisfactorily under existing conditions?
5. **Repeat:** Repeat on ongoing basis within limits of time and resources.

To do something about the problem, you need to understand why the frequency and severity of incidents is so high. So you take a closer look at the report and discover, perhaps, that hunter behavior, unsanitary camping conditions, and high vehicle speeds were involved in most bear deaths. Based on your experience as a professional, you conclude that poaching, improper solid waste management, or poorly-educated backcountry users are the main causes of bear deaths (analyze conditions). If nothing is done or too little is done too late, the frequency and severity of incidents will remain higher than you prefer (make projections). On the other hand, if poaching can be reduced, if solid waste management can be made bear-proof, and if backcountry users can be educated, some progress seems possible (generate alternatives).

To improve prospects for grizzly bear survival you decide to promote a policy that reduces poaching, improves waste management, and educates backpackers. In your estimation, it is the cheapest and most effective means of achieving your goal of minimizing lethal incidents (evaluate and select a policy), a goal which may be shared by others. Is this a rational policy? The

answer depends upon whether or not the number of grizzly bear deaths decreases because of the actions you propose. Your analysis provides some confidence that the policy might be rational, keeping in mind that your level of confidence could change given additional interest or time for further analysis. For example, you might try to find out what happened in other areas where one or more of these causes of bear deaths were either low or absent.

In the real world, however, this evaluation is far from the end of the story. Upon more reflection, you realize that you have neglected to consider something that might be key to promoting the policy successfully, if not actually improving it. Cleaning up the solid waste management problem or regulating backcountry users may, in fact, reduce the frequency of lethal incidents, but it would also likely impact the goals of other people and perhaps other goals of your own. For example, better waste management increases costs by 20% and backcountry regulations may totally preclude human use of certain areas at certain times (like the site you wanted to camp in next July). Given that people universally prefer to reduce their costs and increase their opportunities, it seems unlikely that your policy would receive broad public support.

It becomes clear that, although your policy is undoubtedly important to you, it is far from comprehensive. It failed to consider other peoples' goals and other possible alternatives. This lack of comprehensiveness has two significant implications—political and analytical. First, your preferred policy will likely conflict with other policies supported by various interests. For example, environmentalists might oppose it because in their estimation it does not adequately protect bears. Conflicts like these are reconciled through *decision process.* Mapping the grizzly bear decision process is essential and is described in the next section.

Second, the implication of this analysis is that a perfectly rational policy is an ideal worth striving for, but in reality there is always other relevant information to be considered. No matter how hard or long you work to solve a given problem, perfect rationality is never achieved. It requires mental capabilities well beyond human powers or resources. In addition, unanticipated events can and do undermine your rational consideration of a policy. For example, almost no one in the public predicted the potentially beneficial effects of the 1988 GYE fires that burned over a million acres in the park. As it turned out, however, the extensive fires may aid grizzly bear survival by creating more ungulate habitat (Mattson and Craighead 1994). The point is that problem solving, in actual practice, is a series of approximations. It is a process used to construct more rational policies, rather than an unwavering commitment to one initial policy. Thus, rationality is procedural. In other words, to be rational, a person must carry out certain procedures, namely, the five interrelated steps in problem orientation in the sequence listed above.

These five steps should be repeated over and over again as time permits (Dewey 1910; Lasswell 1971). Upon their completion, greater insight is gained about the nature of the problem at hand and the potential solutions that exist.

This lack of comprehensiveness has two significant implications—political and analytical. First, your preferred policy will likely conflict with other policies supported by various interests…second, the implication of this analysis is that a perfectly rational policy is an ideal worth striving for, but in reality there is always other relevant information to be considered.

Each subsequent evaluation must reconsider previous findings in light of new information and changing circumstances.

The sequence of these five steps is important. It is necessary to begin by clarifying goals. Without goals, you have no rational basis for deciding on the important trends, conditions, and projections to examine. You must be selective in your analysis because you cannot possibly consider everything. Goals should be tentative. As you consider trends, conditions, and projections, and learn more about the problem at hand, you will likely want to revisit your goals. Perhaps they need to be changed. This iterative process promotes individual and policy learning and is extremely important in real problem solving. Policy failure commonly occurs when goal clarification and trend description are downplayed in the rush to get on with the high profile tasks that follow (e.g., generation of alternatives).

Problem orientation is essential not only in constructing your own policy, but also in appraising an argument that someone else has made on behalf of their favored policy. In fact, evaluating other people's policy positions is necessary to adequately construct your own policy stance. You must specifically look for and find the goals, trends, conditions, projections, and alternatives on which other people's policy arguments are based. If any of the five elements are not explicitly stated, then you can and should raise important questions about them.

When one or more of the five tasks is omitted or poorly treated, a gap exists in the policy argument. Sometimes a gap is a sign of propaganda or censorship designed to manipulate viewpoints on controversial issues. For example, a promoter of an endangered species recovery program might censor all but one alternative in order to focus attention on that tactic. This, in effect, "captures" expressed or accepted goals by associating them with his/her alternative. While good analysis thrives on alternative choices, politics often depends on restricting consideration of alternatives in order to control policy outcomes.

THE SOCIAL AND DECISION PROCESS (I.E., THE POLITICS OF GRIZZLY BEAR POLICY)

The second perspective concerns the social and decision processes, which are the means of reconciling conflicts and achieving agreement on policy (Lasswell 1971; Figure 1). Politics are inevitable in policy because people have special interests and tend to promote these to the exclusion of other alternatives. None of the interests has a complete or completely objective picture of the issue (Brewer and Clark 1994). Yet overall, people must reconcile their differences to find their common interest.

Politics develop as participants, with their particular perspectives, interact in complex ways and changing situations (Tables 2 and 3). Each participant brings certain base values (e.g., power, wealth, and enlightenment) to the situation and uses them to promote his/her own interests. Each

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Table 2   Interdisciplinary questions in social and decision process mapping (Lasswell 1971; Willard and Norchi 1993; Clark and Brunner 1996; Clark and Wallace 1998).

SOCIAL PROCESS

1. **Participants.**
   Who is participating (identify both individuals and groups)?
   Who would you like to see participate?
   Who is demanding to participate?

2. **Perspectives** Perspectives include:
   A. **Demands** or what participants or potential participants want, in terms of values and organization;
   B. **Expectations** or the matter-of-fact assumptions of participants about past and future; and
   C. **Identifications** or on whose behalf are demands made.
   What are the perspectives of those who are participating, those you would like to see participate, and those making demands to participate?
   What would you like their perspectives to be?

3. **Situations**
   In what situation do participants interact?
   In what situations would you like to see them interact?

4. **Base Values** All values (see Table 3), including authority, can be used as bases of power.
   What assets or resources do participants use in their efforts to achieve their goals?
   What assets or resources would you like to see participants use to achieve their goals?

5. **Strategies** Strategies can be considered in terms of diplomatic, ideological, economic, and military instruments.
   What strategies do participants employ in their efforts to achieve their goals?
   What strategies would you like to see used by participants in pursuit of their goals?

6. **Outcomes** Outcomes occur during the phases of decision process. Outcomes also refer to the ways in which values are shaped, shared, or redistributed. The particular ways in which values are shaped and shared are called practices or institutions.
   What outcomes are achieved in the ongoing, continuous flow of interaction among participants overall and by phase?
   Who is indulged in terms of which values?
   Who is deprived in terms of which values? How are practices changing?
   - How would you like to see practices change?
   - What is your preferred distribution of values?

DECISION PROCESS

A. *Initiation:* a problem is perceived, identified, and placed on the public agenda. Outcomes: putting information about the problem on the public agenda, including possible initial problem definitions and proposals. Standards: reliable, comprehensive but selective, creative, and open.
   - How did the issue originate?
   - Who first framed it for other participants to address?
   - Was the issue identified in a timely way?
   - Whose interests are favored by the initial problem definition?
   - How would you like to see initiation proceed?

B. *Estimation:* the problem is defined in more detail using expert analysis, open debate, and technical considerations. Outcomes: gathering, processing, and disseminating information for decision making, including alternative policies. Standards: rational, integrated, comprehensive, and effective.
   - Is information being collected on all relevant components of the problem and its context from all affected people?
   - To whom is information being communicated?
   - How is information used?
   - Which groups (official or unofficial) urge which courses of action?
   - What values are promoted or dismissed by each alternative and what groups are served by each?
   - How would you like to see the estimation phase carried out?

C. *Selection:* a policy response to the problem is formulated, debated, prescribed, and authorized by a legitimate source. Outcomes: formal or informal policies that stabilize expectations surrounding the rules to be enforced under various circumstances, including but not limited to enactment of legislation. Standards: comprehensive, rational, and open.
   - Will the new prescriptions harmonize or conflict with rules by which participants and institutions already operate?
   - What rules does the group set for itself and others?
   - What parts of the prescription are binding and which are not?
   - How would you like to see the selection phase carried out?

Table 2   *Continued*

D. *Implementation:* a program is developed and applied to the problem. Outcomes: final characterization of a specific prescription, including policing and other means. Standards: timely, open, dependable, rational, uniform, effective, and constructive.
- Is implementation consistent with prescription?
- Who should be held accountable for following the rules?
- Who will enforce the rules?
- How would you like to see enforcement carried out?
- How will disputes be resolved?
- How do participants interact and affect one another to resolve disputes?
- How would you like to see implementation carried out?

E. *Evaluation:* appraisal of the implementation effort and original policy formulation. Outcomes: appraisal of the flow of decisions relative to the prescriptions (goals), and identification of those parties formally and informally responsible for successes and failures. Standards: dependable, realistic, ongoing, independent of special interests, and fully contextual.
- Who is and is not served by the program?
- Is the program evaluated fully and regularly?
- Who is responsible and accountable for success or failure?
- Who appraises one's own activities?
- How would you like to see evaluation carried out?

F. *Termination:* discontinuation, revision or success of policy. Outcomes: ending a prescription and focusing on claims of people who acted in good faith when the prescription was in effect. Standards: prompt, respectful, comprehensive, balanced, and ameliorative.
- Who should stop or change the rules?
- Who is served or harmed by ending a program?
- How would you like to see termination carried out?

7. **Effects**
   What are the long term effects on the social and decision process involved?
   What new practices have been put into place?
   Where there any innovations? How were innovations diffused or restricted?

Table 3   Values or "bases of power" participants use to influence decision outcomes (Lasswell 1971).

VALUE DEFINITION	QUESTIONS TO ASK
Power: to give and receive support in making decisions in specific contexts.	How is power given and received in interpersonal and decision process and what are the outcomes?
Enlightenment: to give and receive information.	How is information given and received? What are the outcomes?
Wealth: to give or receive the opportunity to control resources, such as money, natural resources, and other people.	How is wealth affected (given and received) by the process? What are the outcomes?
Well-being: to give or receive the opportunity for personal safety, health, and comfort.	How is well-being, both physical and mental, affected by the decision process?
Skill: to give or receive the opportunity to develop talents into operations of all kinds including professional, vocational, and artistic skills.	What kind of skills are used (or not) in problem orientation and in decision process, how, and with what outcomes?
Affection: to give and receive friendship, loyalty, love, and intimacy in interpersonal situations.	How are professional, friendship, and loyalty values used in decision process and with what outcomes?
Respect: to give and receive recognition in a profession or community.	How is respect or deference used (or not) in decision process and what are the outcomes?
Rectitude: to give and receive appraisal about responsible or ethical conduct.	What are the ethics at play in interpersonal relations and embodied in decision process outcomes?

player operates in ways that he or she believes will leave him or herself better off than before. The decision process produces outcomes that have positive or negative benefits to participants.

Let's return to our grizzly bear example. Suppose that in your concern about grizzly bear population survival, you still advocate stronger law enforcement against poaching, better waste management, and backcountry user education. Yet other environmentalists might advocate excluding people from bear habitat altogether. Government agencies might advocate the status quo. Hunters or energy producers might want something else entirely. It is not possible to meet all these demands at the same time. Nor is it reasonable to have several separate reserves set aside so that each special interest can do its "own thing" with it. In brief, they all have a common interest in sharing use of the GYE and in finding some consensus on grizzly bear conservation. A policy that reflects this common interest must be found, selected, and implemented. A selected policy is a public consensus on the rules expected to hold people accountable for behaviors that conflict with the policy. In the case of grizzly bear conservation, such rules may include regulations which exclude people from bear habitat under certain circumstances or which impose jail sentences for people found guilty of harming bears. A logically inclusive and explicit set of rules specifies each of the following: (1) goals (or purposes) to be achieved through the policy; (2) rules of conduct intended to achieve those goals; (3) contingencies (or circumstances) in which the rules apply; (4) sanctions to enforce compliance with the rules in the applicable circumstances; and (5) assets to cover enforcement and other administrative expenses. (Brunner 1995: 13).

A consensus in conservation does not mean that the special interests have gone away, nor does it mean that all parties agree with the rules of conduct. What it does mean is that everyone more or less expects the rules to be enforced, regardless of whether or not they agree with them or with the purpose of the rules. In effect, a poacher can rightly expect to be prosecuted to the full extent of the law if caught. "More or less" is an important qualification here. After all, consensus is never perfect and rules are seldom perfectly clear.

Grizzly bear conservation is a primary purpose (or goal) of the wildlife management agencies involved, and legal arrangements (or rules of conduct) have been made to support this goal. For the grizzly, however, these rules are contingent upon where you are located. People in the Yellowstone region tend to comply with the rules, in part, because of a basic respect for the law and a concern for personal safety (positive sanctions). People also comply with the rules because they do not want to be arrested for littering or hiking in closed areas (negative sanctions). However, if enforcement by state and federal wildlife officials and other such agents becomes lax or non-existent, people will gradually change their expectations and do what they like. Because enforcement and compliance are not perfect, the effective rules (as opposed to the formal rules) are more lenient.

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A good policy prescription can be undone if the agency charged with carrying out the policy reduces its staff and operating funds. A well-enforced prescription can be undercut if the courts do not vigorously enforce the law. The goals used as criteria to define success can be retroactively redefined, or the data can be manipulated to show success. Or, if failure is inescapable, responsibility can be deflected to scapegoats. Finally, ending a policy and moving to a new one is often difficult or impossible because special interests who benefit from the selected policy are unwilling to relinquish it, regardless of whether or not the policy is effective.

To this point, we have examined only part of the decision process and some of the political possibilities that affect outcomes. How the other decision phases unfold depends primarily on who controls planning. If an office in the federal government, such as the U.S. Fish and Wildlife Service, has a planning monopoly and is also allied closely with traditional natural resource extractors, it is unlikely to comply with demands from conservationists for a viable population of grizzly bears based on the best standards of modern conservation biology. If these planning, debating, and rulemaking phases are not inclusive, open, reliable, and comprehensive, then it is likely that implementation will be weak, lawsuits will proliferate, and the effort will go on with little consensus or resolution.

Knowledge of the different policy and decision phases has enabled policy researchers to distinguish patterns among both successful and failed programs.

Knowledge of the different policy and decision phases has enabled policy researchers to distinguish patterns among both successful and failed programs. Some policies have undesirable, unplanned, and often unanticipated impacts (Ascher and Healy 1990). Some weaknesses or pitfalls are characteristic of each policy or decision phase (outcome) and recur time after time, regardless of the technical details of the conservation issue (Table 4). Knowing about these common pitfalls and being able to anticipate them can help you avoid them in your professional practice.

BASIC BELIEFS (I.E., IS GRIZZLY BEAR CONSERVATION POLICY MORALLY JUSTIFIED?)

The third question, regarding the morality of a policy, can be understood by examining basic beliefs (Figure 1; Table 2). Basic beliefs are fundamental assumptions about the way society should function (i.e., how people should treat one another and the living world around them). Cultures and sub-cultures are distinguished by different belief patterns. Policy and political conflicts usually stem from differences in basic beliefs. Among other things, basic beliefs serve as guidelines as to how power is used in society. The grizzly bear policy process presently shows high conflict. This is a reflection of differences in participants' basic beliefs and their notion of how power should or should not be used.

Greater understanding of the grizzly bear policy process can be achieved by examining how opposing policy positions are being justified and what basic beliefs are being appealed to and by whom in these justifications. To date, there

Table 4   Common weaknesses or pitfalls in each of the policy phases (after Ascher and Healy 1990; Clark 1997).

1. **Initiation phase:** Delayed sensitivity in which perception of a problem comes only after the problem has developed and harmful effects are widely felt. Biased initial problem definition. One interest sets out a problem definition that favors its own interests and view of the problem. This definition fails to capture the full and true nature of the emerging problem.

2. **Estimation phase:** Inadequate analysis of the problem. Needed data and analysis of trends, conditions, and projections are lacking or only partially carried out. Study the problem to buy time. This form of delaying is a common tactic of people who oppose the emerging policy picture and problem definition. These people do not accept the problem definition nor want to take action on it.

3. **Selection phase:** Poor coordination in government decision making. Often, complex problems are addressed by several groups simultaneously who may not be aware of each other or communicate well in developing a common understanding of the problem and what needs to be done to solve it. Over-control. Groups may respond to problems by automatically imposing greater controls on everyone involved. This leads to bureaucratization and sometimes paralysis; or gridlock.

4. **Implementation phase:** Benefit leakage. Certain socioeconomic interest groups may seek to capture and benefit more from the policy than other intended recipients. Limitations of state enterprises as natural resource managers. The size, slowness, political interests, conservative, and bureaucratic features of governmental organizations can all be limitations. Poor coordination of implementation. Often bureaucratic over-control, rivalry, and exclusion of key parties can lead to muddled policies and programs.

5. **Evaluation phase:** Insensitivity to criticism. Critics may try to improve a policy honestly, but government often simply ignores their input, regardless of its merits. Failing to learn from experience. Organizations can fail to learn and repeatedly respond to new conservation challenges using the same programs, approaches, and techniques.

6. **Termination phase:** Pressure to continue unsuccessful policies. Even unsuccessful or poorly performing policies and programs that have outlived their usefulness may benefit someone who then clamors for the policy to continue. Failure to prepare for termination. Groups may fail to appreciate and prepare for the difficulties of terminating even a bad policy, early in the overall policy process.

has been virtually no explicit, systematic analysis of these issues in GYE grizzly bear management. While participants in grizzly bear policy might agree that the bear is an important part of America's natural and cultural heritage, that consensus does not flow directly into specific management decisions. Disagreement about political issues such as whether to kill problem bears and to curtail development in and adjacent to bear habitat essentially stems from opposing basic beliefs.

Social scientists recognize that basic beliefs or premises form the foundation of political myths. "Myth" in this usage refers to the underlying philosophy of communities or individuals rather than a fictitious story, and should be considered synonymous with more neutral terms such as "paradigm," "worldview," "outlook," or "frame of reference."

Myths are made up of a hierarchy of three elements (Lasswell 1971). The first is doctrine, which is that part of the myth that sets out basic beliefs—aims and expectations of the community. For example, statements of doctrine can be found in preambles to constitutions. The second element is formula, which prescribes the fundamental rules for conduct according to the community's aims and expectations. Principal laws or constitutions are examples of the formula. The third element is symbol, which glorifies and legitimizes the political myth (e.g., heroes, flags, and anthems). Grizzly bears symbolize different things to different people depending on the myths that these people believe in (e.g., conservation needs vs. development), and this can cause conflict.

Because they are so deeply ingrained in our psyches, myths or basic beliefs are accepted as a matter of faith and often go unquestioned by the vast majority

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of people. Basic beliefs are usually reaffirmed and redefined through their use in social interaction over time. Each generation will adapt basic beliefs unique to their time and circumstances. Societies can and do change their doctrines, formulae, and symbols as they confront new circumstances and changes in their own identities, expectations, and demands. However, there is considerable variety in how well individuals and societies understand these social dynamics or adapt successfully to new situations.

The grizzly bear remains a powerful symbol that connects strongly and directly with certain basic beliefs, namely securing a national identity and sustaining a healthy environment. For example, invocations of key symbols like "grizzly bear" and "Yellowstone National Park" are often used successfully to mobilize public support for important conservation policy actions. They have been successful in reducing conflicts when they incorporate shared basic beliefs.

We use myths to reconcile differences and to grasp some understanding of our situation, because no one has a comprehensive and totally objective view of the world. For example, science, law, and politics are made up of sub-communities each with a separate sub-myth. Many such sub-communities and sub-myths exist within the broader human community. For instance, many members of the grizzly bear research community believe that more and better research is the key to securing effective conservation. This myth about the power of science and knowledge is pursued without sufficient acknowledgment that, irrespective of the nature and validity of research findings, political circumstances will often be the determining factor in decision making. Scientists, managers, and other natural resources professionals and community groups would benefit greatly from becoming fully aware of their own myths and sub-myths (see Brunner and Ascher 1992; Brunner 1993a, b). Greater appreciation of the doctrines, formulae, and symbols that one follows can liberate individuals previously unaware of their own myth.

We have now examined three perspectives on the policy process—rationality, politics, and morality. In doing so, we have looked at the concepts of problem orientation, social and decision process, and basic beliefs or myths, which are the interdisciplinary conceptual tools for critical thinking and practical problem solving. Simply knowing about these elements does not guarantee that consensus will be reached. Use of these concepts, however, can result in considerable insight into, and understanding of, the policy process. A successful policy integrates what is rational, politically practical, and justifiable according to basic beliefs, into one set of practical actions. These three interdisciplinary concepts can help a person appraise different policies. However, mastering these concepts and using them practically with skill requires time and experience. With this as background, we turn to the issue of your own standpoint as a professional in whatever policy process you currently play a part or show interest in.

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STANDPOINT OF PROFESSIONALS (WHAT ARE YOUR CHOICES?)

A professional can take diverse standpoints in any policy (Clark *et al.* 1992). In policy process, the term participant/observer is used because professionals both participate in policy process and observe it at the same time from their particular vantage points. This dual role is critical to developing a greater understanding of policy process. It is important to remember that *all* participants/observers have biases, based on experience, culture, education, values, etc. (Lasswell and Kaplan 1950; Lasswell and McDougal 1992). Yet many professionals proceed under the assumption that they are objective, neutral, and acting in the public interest. For a person to reach their full potential, they must be able to examine and understand themselves and other people in the process (Lasswell 1971).

CONVENTIONAL STANDPOINTS

A conventional professional tends to see situations, events, values, and decisions in customary, even habitual, ways (Table 5). Alternative ways of understanding the world, even those that are empirically grounded, are devalued, and in many cases ignored or silenced.

Much of the conflict surrounding grizzly bear conservation arises from various conventional professionals and other participants drawing on different standards, basic beliefs, and other variables to form their perspectives. Because bias prevents each person from seeing the total picture, it can be likened to the story of the three blind men examining different parts of an elephant. Each person has only a partial understanding of the whole elephant.

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Table 5   A comparison of traditional and interdisciplinary professional standpoints (Clark and Wallace 1999).

TRADITIONAL PROFESSIONAL	INTERDISCIPLINARY PROFESSIONAL
Participants know what they want and follow a pre-specified plan or project design; people tend to be rigid.	Participants do not know where projects will lead so work is an open learning process; people tend to be flexible.
Assumption of single, tangible reality, which is generally known to participants; "correctness" is clear and "right and wrong" actions known.	Assumption of multiple realities; reality is partially socially constructed and must be discovered by participants; "correctness" and "right and wrong" to be decided by participants.
Method of participation tends to be singular, disciplinary, reductionistic, positivistic, and narrowly ideological (cause and effect, prediction), often with a special interest focus; thought and actions "bounded".	Method of participation tends to be holistic and interdisciplinary, broadly ideological, with a common interest focus (empirical, systematic); thought and actions "unrestricted".
Policy and information are extracted from situations that should be controlled; authority, control, and dominance are at issue.	Policy understanding and appropriate focus of attention emerge from interaction with context; authority and control are important issues, but focus is on solving common problems fairly.
Problem solving is blueprint-like; a "formula" is known and it should be used to address problems.	Problem solving is process-like; guidelines are known to address problems as well as general standards (e.g., reliability) to aid problem solving.

Conventional frames of reference encourage "partial blindness" about the policy process. For example, biologists believe that better information will automatically improve the decision-making process. In conventional frameworks, attention is often restricted to the "rules" and deflected away from the "policy process." Typically, values of key participants are overlooked, a hazy understanding exists of the decision process, and participants are left with, at best, an anecdotal understanding of the overall policy process and, at worst, confusion and misdirection. This leads to unproductive conflict and power struggles.

CIVIC PROFESSIONALISM AND A POLICY ORIENTATION

Interdisciplinary professionals seek to move beyond a conventional standpoint to understand the overall structure and functioning of a policy process. they seek a clear view of themselves, including an appreciation of their biases (and myths). They explicitly and systematically employ the conceptual tools introduced above in carrying out their work. In this way, they take on an anthropological role of sorts by living in a society while simultaneously describing and analyzing that society and any decision-making exercises of interest to them.

Ultimately, the goal of grizzly bear policy is to achieve viable, self-sustaining populations of grizzly bears in the GYE in ways that benefit from long-term public support. Exercises such as producing publications, holding meetings, performing research, or improving the political status of an organization can be advantageous, but should not be primary policy goals. There are many specialists and interest groups involved who try to justify their activities on the basis of alleged contributions to a common goal (e.g., saving the bear). Their activities are most likely to serve grizzly bear conservation if they and other participant/observers take a functional standpoint and become knowledgeable and skillful in addressing the four elements of policy addressed to this point—rationality, politics, basic beliefs, and standpoint—than if they ignore or under-attend to these dimensions.

To be successful, professionals should provide knowledge that is useful in policy processes, and at the same time have knowledge of those same processes and how well they are working (Clark 1999). Unfortunately, some professionals remain discipline-bound and conventionally oriented with a strictly technical focus, and fail to be policy-oriented. To become policy oriented is not to give up traditional professionalism, but to add to it (in a "value added" way) the benefits of commanding the conceptual tools introduced above.

Several authors offer advice and perspective for improving professional performance in conservation processes (e.g., Lasswell 1971; Clark and Wallace 1999). First, it is necessary to recognize that human social systems and ecological systems have co-evolved and that dealing with problems in one system affects the other system (Norgaard and Dixon 1986). Too many past efforts at policy improvements have had poor outcomes because they failed to recognize this relationship. Norgaard and Dixon (1986) offered guidelines for policy and management improvements. They suggest policy success will come if a group:

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sustains system productivity and diversity as the most important goal; starts small and experiments with policy interventions; learns from experience as quickly and thoroughly as possible; maintains flexibility in new policies and programs; reduces the vulnerability of policies and its consequences on both systems; and avoids big temporal and spatial scale plans by staying small and manageable.

Second, keep in mind that seeking ways to improve policy and management often involves pushing beyond the conventional capabilities of analytic, decision, and management means (Brewer 1986). In seeking improvements, remember the following: science is essential in nearly all efforts to improve policy; there is never enough science available at the time of decision; time and space are important considerations that are often overlooked; synergisms and thresholds characterize most environmental problems and need careful attention; and the way the environment is affected and managed is directly related to the kinds of human institutions that are in place. Failure to attend to these issues can account for the lack of past successes.

Third, Viederman *et al.* (1997: 572) note that policy success rests on "how well we succeed in achieving a vision of a world that serves the needs of humans and preserves nature." They offer three operating principles: be humble; think deeply and move slowly; and do not take irreversible actions. Lastly, they (p. 480) emphasize the need to understand the policy process as a basis for success as follows:

> There is a tendency among scientists to argue the centrality of scientific information in the policy process. Knowledge is clearly better than ignorance, but good science does not necessarily make good policy. Science may be necessary, but cannot be sufficient, because policymaking is the process of reflecting what we value in society, which is at heart a matter of ethics and values.

INTEGRATION

With this information on standpoint, and the information derived from the preceding problem-solving operations, the professional must make a decision for himself or herself about what it all means. On this basis, he or she can offer recommendations to improve decision process to best clarify and secure the common interest.

CONCLUSIONS

Interdisciplinary problem-solving tools as described in this paper could be used to better understand the grizzly bear management policy process, and the roles of professionals, advocates, and other interests involved in it, including government, business, and nongovernmental participants, or any other species and ecosystem conservation problem. The perspectives inherent in problem

orientation, social and decision process mapping, and analysis of basic beliefs can help evaluate and recognize good and bad policies, and construct better policies regardless of one's role in the process.

There is much to consider in the grizzly bear policy process to achieve practical conservation in the common interest (Figure 1; Tables 1-5). The first requirement of interdisciplinary problem solving is possession of a framework that can accommodate, conceptually and practically, diverse data, paradigms, and disciplines. The interdisciplinary guidelines introduced in this paper can do just that.

Learning further about this framework is possible by examining the literature (see citations) and working with people already knowledgeable and skilled in its use. Newcomers to the interdisciplinary system of inquiry introduced here might be dissuaded by its seeming complexity. Use of this interdisciplinary approach does require substantial effort, because it requires many of us to change habitual ways of thinking and understanding. However, it is worth noting again that the realities of the grizzly bear policy problem used as an example here are dynamic and complex, and they do not lend themselves to understanding or resolution using conventional, rigid or incomplete analytic frameworks. A new approach is necessary if grizzly bear conservation is to improve.

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ACKNOWLEDGMENTS

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Part II: Interdisciplinary Problem Solving in Practice – Student Cases From 1999

Part II of the Bulletin offers a selection of work by Master's students from the autumn 1999 "Species and Ecosystem Conservation: An Interdisciplinary Approach" course. These cases represent the first application of the interdisciplinary approach by these students. Papers were written to be readable by a wide audience. Throughout the semester, students worked in small teams of two to six individuals and assisted each other in learning concepts and analyzing cases. The end product was a set of relatively short papers (about 15 pages each). Authors could not go into great detail because of the length restriction, but were quite knowledgeable about their cases. The papers were regarded as an opportunity to develop skill in authoring a "policy brief" that could be presented to a decision maker, scientist, manager, or the public. Students were able to demonstrate their analytic and writing skills in this exercise.

The 1999 class formed itself into ten teams. The work of four of the teams is featured in this Part of the Bulletin, although the names of all of the students in the class and the titles of their case applications are also listed (Table 1) and mapped (Figure 1). Space precluded printing all cases. Each team had a unifying theme, such as "species conservation," and each team member crafted his or her analysis to be consistent with the theme. To illustrate how interdisciplinary problem solving is applied, a single paper from each of the four selected teams is presented in this Part along with abstracts from the papers of other team members. Also, the overhead illustrations used in the oral presentation of each featured paper are included. Overheads give readers a better sense of how case analyses were presented to the audience. Each team had about an hour to present their work to classmates and this was followed by half an hour of discussion.

Topics investigated by the 1999 class ranged from rare species conservation to large ecosystem management challenges. Cases looked at planning, public participation, decision making, and other topics at various scales—local, regional, national, and international. A number of analyses focused on the United States, including the Florida Everglades ecosystem, wolves in Washington State and Minnesota, water projects in California, biodiversity in America's grasslands, and marine conservation in Chesapeake Bay. International cases come from the Federal Islamic Republic of the Comoros, Colombia, Costa Rica, Cambodia, Democratic Republic of Congo, Kenya, Indonesia, China, Ecuador, Paraguay, Bhutan, Nepal, Thailand, Namibia, and Uganda. The diversity of individual analytic and presentation styles and the range of topics and geographic settings provided a broad variety of cases to learn interdisciplinary concepts.

Table 1   Authors and titles of student papers from the 1999 "Species and Ecosystem Conservation: An Interdisciplinary Approach" course (see Figure 1 for map showing locations).

1. **Baillie, Alexandra.** 1999. IUCN/Species Survival Commission action plans: An interdisciplinary approach.
2. **Brown, Mark.** 1999. Conservation of biodiversity and sustainable development in the Federal Islamic Republic of the Comoros.
3. **Byrd, Daniel.** 1999. The Everglades: Holistic ecosystem approach to restoration and management.
4. **Cabrera, Heather.** 1999. Bring back the beast: A policy analysis of the proposed reintroduction of gray wolves to the Olympic Peninsula of Washington.
5. **Casas, Adriana.** 1999. The oil industry and the U'wa: Conflicting views, Colombia.
6. **Cesareo, Kerry.** 1999. From upper to lower river: A decision process analysis of the Housatonic River Restoration in New England.
7. **Chen, Linus.** 1999. Biodiversity conservation in Costa Rica.
8. **Dillon, Tom.** 1999. Biodiversity and civil society in Cambodia: Improving conservation.
9. **Elias, Roberta.** 1999. An application of the policy sciences to restoring the degraded Quinnipiac marsh ecosystem, New Haven, Connecticut.
10. **Frey, Gregory.** 1999. The upper Yuba River studies program: Ecosystem and species restoration in California.
11. **Gorman, George.** 1999. New Haven's Quinnipiac Marsh: A diamond in a dump, New Haven, Connecticut.
12. **Hollamby, Matthew.** 1999. Biodiversity conservation in Ecuador: The role of international organizations.
13. **Ilambu, Omari.** 1999. The impact of human conflict on eastern lowland gorilla conservation in Kahuzi-Biega National Park, Democratic Republic of Congo.
14. **Jones, Greg.** 1999. The Canadian north Atlantic cod fishery: A case study of management and conservation policy.
15. **Kelly, Tierney.** 1999. Colorado lynx reintroduction: Why a simple idea is so controversial.
16. **Kuebler, Caroline.** 1999. Black tailed prairie dogs: A new era of management?
17. **Kugler, Lisbet.** 1999. The Bering Sea: Management of an ecosystem and the World Wildlife Fund.
18. **Lanfer, Ashley.** 1999. Recommendations for a smooth ecological and social transition into the future for agro-pastoralists of the Baringo lowlands, northern Kenya.
19. **Mardiah, Siti Nissa.** 1999. Ecotourism: An alternative sustainable utilization of Indonesian biodiversity and its conservation.
20. **McGray, Heather** and **Aurelia Micko.** 1999. A student analysis of the School of Forestry and Environmental Studies' curriculum decision process.
21. **Meisler, Jonathan.** 1999. Environmental policy creation and implementation in southwest China.
22. **Morton, Jeff.** 1999. The Quinnipiac River Tidal Marsh: A policy process review in New England.
23. **Muchnick, Barry.** 1999. (W)helping the wolves: A perspective on delisting endangered species in Minnesota.
24. **Nyce, Chris.** 1999. Conflict resolution between local communities and park management in Lake Mburo National Park, Uganda: The African Wildlife Foundation's role.
25. **Osborn, Anne.** 1999. Arid prairie ecosystem restoration in the United States.
26. **Padwe, Jon.** 1999. Resolving land conflict along the border of the Mbaracayú Reserve, Paraguay.
27. **Schaub, Erika.** 1999. An examination of the participants in the prairie dog conflict, United States.
28. **Scheffler, Tracy.** 1999. Bridge over troubled waters: Faith-based stewardship in Chesapeake Bay.
29. **Sherrow, Hogan.** 1999. The cheetah *(Acinonyx jubatus)* in Namibia: An application of the policy sciences to endangered species conservation.
30. **Stein, Julie.** 1999. The Yellowstone grizzly bear policy process.
31. **Stevenson, Michael.** 1999. Galapagos Islands: Managing introduced species in an endangered ecosystem.
32. **Taylor, Francis.** 1999. Philosophical pragmatism and the policy sciences.
33. **Teelen, Simone.** 1999. The cougar *(Felis concolor)* controversy in the west.
34. **Williams, Scott.** 1999. The first Quaabbin Massachusetts deer hunt: A review.
35. **Yonten, Deki.** 1999. The impact of tourism in Jigme Dorji National Park, Bhutan.
36. **Young, Christie.** 1999. The illegal extraction of *mai hom*, a non-timber forest product, in Khao Yai National Park, northeast Thailand.
37. **Ziegelmayer, Kim.** 1999. Tourism and development: Implications for snow leopard conservation in the Annapurna Conservation Area, Nepal.

Figure 1   Location of study site or region of students' case analyses (see Table 1 for key to paper titles and authors).

INTERDISCIPLINARY PROBLEM SOLVING
AT LOCAL, REGIONAL, AND GLOBAL SCALES

The scale at which a conservation problem is analyzed guides the problem-solving effort and its outcome. Analysis at the wrong scale can lead to conclusions that are incomplete or insufficient to solve the problem at hand. Each conservation issue in this section takes place at one of three geographic scales: local, regional, or global. These papers show that, regardless of scale, "positivistic" approaches that emphasize narrow, technical solutions often fail when used to address complicated, multi-faceted conservation issues. At all scales, the interdisciplinary tools of problem orientation and examination of the social context and decision-making process are critical if practical solutions are to be found.

The first of the three papers in this section is presented in its entirety, along with an appendix showing the visual aids used in the oral presentation of the paper to the class. The remaining two papers are presented in one-page abstract format.

Bridge over Troubled Waters: Faith-Based Stewardship in Chesapeake Bay

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ABSTRACT

This paper addresses the policy problem of illegal blue crab *(Callinectes sapidus)* harvesting in Chesapeake Bay by watermen on Tangier Island, Virginia. Illegal harvest occurred in the mid-1990's after strict regulations were put on the fishery due to concern that the stock may be fully exploited. Residents were fearful of the effect that regulations would have on their economic life. This fear resulted in tension between Tangier residents and several scientific/regulatory groups. Resolution of the issue began to occur in 1997-1998, when some residents adopted a faith-based stewardship program and began to accept the idea that conservation was a necessary part of their lives. The program served as a mechanism to promote conservation of the Bay's resources and to address the economic issues that threatened Tangier's unique heritage. The values and social context of participants in this issue are addressed, revealing how the problem developed and how it may be resolved through faith-based stewardship. In addition, an analysis of how lessons learned from this problem can be used to help resolve related conservation problems is given.

Conservation problem solving is a multi-faceted and often difficult task. Conflicts over natural resource exploitation are particularly challenging due to the extent and variety of interests and participants typically involved in the situation. In a perfect world, successful conservation problem solving should leave all participants better off than they were at the outset, but rarely does this happen. Occasionally, however, integrated solutions are found that increase the well-being of everyone involved. Examining such issues can shed light on important aspects of the conservation problem-solving process. The following analysis looks at the problem surrounding the blue crab *(Callinectes sapidus)* fishery in Chesapeake Bay that is being resolved with an integrated solution.

During the early 1990's, scientists and conservationists in the Chesapeake Bay watershed began advocating increased regulation of the blue crab fishery because monitoring data showed that harvesting pressure on the stock was ecologically unsustainable (Orner, personal communication). Residents of Tangier Island, Virginia, a small fishing community in the Bay, felt that the economic impact of such regulation posed a serious threat to both their immediate livelihood and their long-term future as watermen. Tension between Tangier residents and those who were advocating for increased blue crab fishery regulations mounted quickly. When strict regulations were put into place in 1994, hostilities were such that Tangier residents at times blatantly disregarded the new regulations.

The illegal harvest of blue crabs by Tangier residents is the policy problem that will be addressed in this paper. An analysis of the blue crab fishery conflict on Tangier, especially its broad social context, is presented. Background on Tangier and its heritage is given, as well as descriptions of several academic and conservation organizations that were involved. Participants' values are discussed, as they are particularly pertinent to the outcome. Related to this, the relevance of faith-based stewardship for Tangier residents is highlighted. An

Conservation problem solving is a multi-faceted and often difficult task. Conflicts over natural resource exploitation are particularly challenging due to the extent and variety of interests and participants typically involved in the situation.

analysis of how and why the problem moved towards resolution is also given. Finally, the utility of this case as a prototype for conservation problem solving elsewhere is discussed.

PERSONAL STANDPOINT AND RESEARCH METHODS

My interest in this issue stems from my strong belief that wildlife conservation is a worthwhile societal goal. Having spent several years after college working in the Chesapeake Bay watershed, I am particularly interested in resource issues related to the Bay. As for the importance of religion in resolving this conflict, I did not address this issue as a means of promoting religious solutions to conservation problems. Instead, I chose this issue because I see faith-based stewardship as a value-relevant social means by which a positive conservation outcome has been achieved. It has therefore made me think critically about the importance of understanding and incorporating participants' values into any problem-solving process.

Information for this paper was gained through personal communication (via telephone and email) with individuals involved in the situation. I also used the internet for information about various environmental, scientific, and regulatory organizations involved.

To understand the situation on Tangier, I used an interdisciplinary framework to analyze the conflict from its inception through a critical turning point that occurred in 1997, when Susan Drake Emmerich, a doctoral student at the University of Wisconsin, introduced faith-based stewardship to Tangier. Drake Emmerich's conservation program was able to bridge the gap between the environmentalists' goal of preventing over-fishing and the goal of Tangier residents to continue their traditional lifestyle as watermen.

One important note is that although I have focused on the faith-based program as a mechanism for resolution, some Tangier residents do not agree with the faith-based stewardship program and/or still feel hostile towards scientists and environmentalists. However, even these residents stand to benefit directly and indirectly from the program and therefore have the potential to be better off than they were originally.

CHESAPEAKE BAY AND THE BLUE CRAB FISHERY: HISTORY AND TRENDS IN CONSERVATION

The Chesapeake Bay is the largest and most productive of the nation's estuaries (Virginia Institute of Marine Science 2000). Approximately 199 miles long, three to 30 miles wide, and an average of 27 feet deep, the Bay supports over 2700 species of plants and animals. Historically, the Bay has been highly valued by visitors and residents. Native Americans called it "great shellfish bay." Spanish explorers described it as "the best and largest port in the world," and other authors have termed it "the noblest bay in the universe" (Chesapeake Bay Program 2000).

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When Captain John Smith sailed the Bay in 1607, the Chesapeake was a vibrant estuary teeming with fish and shellfish (Chesapeake Bay Program 2000). Over the years, human impact on the Bay and the watershed has taken its toll. A multitude of forces, including point and non-point source pollution and over-harvesting of the Bay's living resources, has contributed to the Bay's decline (Chesapeake Bay Program 2000). In response to the Bay's declining health, a restoration initiative called the Chesapeake Bay Agreement was adopted in 1983. The Agreement was signed into action by three of the states in the Bay watershed (Maryland, Pennsylvania, Virginia), the District of Columbia, and the United States Environmental Protection Agency (Chesapeake Bay Program 2000). Although restoration work had begun in previous decades, adoption of the Chesapeake Bay Agreement led to dramatically increased effort in the Bay and its watershed.

During the 1990's, advocacy, regulatory, and scientific institutions involved in the Bay's restoration were driven by the goal of returning the Bay to its earlier state of vigor and abundance. As a result, monitoring and management of the Bay's living resources became a top priority (Chesapeake Bay Program 2000). Even with the growing attention, several commercially important fishery populations, including shad, oyster, and striped bass, crashed during the last few decades due to disease, habitat degradation, and over-harvesting. These crashes resulted in closed or highly restricted fisheries (Chesapeake Bay Foundation 2000).

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The Chesapeake is currently the largest producer of blue crabs in the world: the hard crab fishery, which constitutes the majority of the harvest, averages 46 million pounds annually in Maryland and 40 million pounds in Virginia (Chesapeake Bay Program 2000). Concern for the health of the Bay's blue crab population began to rise in the 1990's, as some scientists predicted that this population might be next in line to crash. Scientists in the watershed began debating whether or not the fishery was "fully exploited," meaning that any increase in fishing pressure had the potential to cause a significant decline in the crab population (Chesapeake Bay Program 2000). Consensus that the stock was most likely fully exploited was eventually reached, and stricter regulations were put on the fishery in 1994 and 1996 to halt increased fishing pressure on the blue crab stock (Travelstead, personal communication).

Two aspects of this context are especially important to the issue on Tangier. First, conservative management of the Bay's fish stocks is seen as highly socially desirable for two reasons: (1) the Chesapeake Bay is esteemed worldwide for its commercial fishery, and (2) managers did not want to see another commercial population in the Bay crash. Second, due to the multi-million dollar effort and strong citizen support to restore the Bay, Tangier is situated in a political setting in which scientists and environmental advocates are highly respected by the majority of the Bay community (although previously not by Tangier residents) and therefore hold considerable power.

PARTICIPANTS IN BLUE CRAB CONSERVATION: PERSPECTIVES AND VALUES

Many organizations are involved in blue crab conservation in the Chesapeake Bay watershed. Three key Virginia organizations directly involved with the situation on Tangier are the Chesapeake Bay Foundation, the Virginia Marine Resources Commission, and the Virginia Institute of Marine Science.

CHESAPEAKE BAY FOUNDATION (CBF)

CBF, whose slogan is "Save the Bay," is the largest non-profit environmental organization involved in Bay restoration. CBF has offices in Pennsylvania, Maryland, and Virginia, and boasts more than 80,000 members nationwide (Chesapeake Bay Foundation 2000). CBF claims, via their website, to "speak for the fish at legislative hearings, in regulatory forums, and directly to fishermen" (Chesapeake Bay Foundation 2000). One of the Foundation's methods of fostering conservation is education programs for school children and other groups. Through CBF's Island Education Program, students throughout the watershed learn principles of conservation and gain hands-on exposure to living resources such as crabs, submerged aquatic vegetation, and oysters (Harrison, personal communication).

VIRGINIA MARINE RESOURCES COMMISSION (VMRC)

VMRC is the regulatory body responsible for making Virginia's fishery regulations. The commission "emphasizes a decision-making process that is science-based, balanced, and open to wide public participation" (Virginia Marine Resources Commission 1999). VMRC was responsible for the regulations put on the blue crab fishery in 1994 and subsequently in 1996 (Travelstead, personal communication).

VIRGINIA INSTITUTE OF MARINE SCIENCE (VIMS)

VIMS, located in Gloucester Point, Virginia, is the marine sciences department of the College of William and Mary. VIMS's Bay research includes trawl surveys in the Bay, including blue crabs (Virginia Institute of Marine Science 2000). Research from VIMS is used to support and provide impetus for VMRC regulatory measures (Travelstead, personal communication).

Although these organizations occupy different sectors of the environmental field (non-profit, governmental, and private/academic), they have several values in common. For example, they all value knowledge, or enlightenment, of the condition of the Bay's resources greatly. All three, to different degrees, are positivistic in that they rely heavily on traditional science as the basis for supporting and/or implementing conservation measures. Other values represented in these organizations are power (e.g., VMRC, as it is a primary regulatory agency in Virginia), and skill (e.g., VIMS, as its reputation is contingent upon the rigor and merit of its scientific findings). Each organiza-

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tion also desires respect from the Bay community in their restoration efforts. These values are embedded in the common goal of wanting to wisely manage the Bay's living resources. Also, each of the three organizations strives for long-term conservation and management of the Chesapeake's blue crab stock, through maximizing their value outlook.

TANGIER ISLAND: HISTORICAL BACKGROUND AND VALUES RELEVANT TO CONSERVATION

Tangier Island, Virginia, located in Chesapeake Bay several miles below the Maryland-Virginia border, is home to approximately two hundred Bay watermen and their families. Today, most of the island's eight hundred residents are descendents of the John Crockett family, the original 1686 settlers of Tangier Island (Walczyk 1998). In 1812, Christianity was formally introduced to Tangier by a Methodist named Joshua Thomas (Walczyk 1997).

Historically, farming and cattle raising were the primary livelihoods for early inhabitants of Tangier. In the mid-1800s, with the expansion of the seafood market and the arrival of the railroad to nearby mainland Maryland and Virginia towns, oystering and crabbing became important sources of income. Soon, with the ability to reach distant markets by rail, it was more profitable for the islanders to fish than to farm, and fishing became the predominant livelihood of Tangier men (Walczyk 1998).

Today, pride in working the water runs deep in Tangier, as some men on the island are third and fourth generation watermen (Shores, personal communication). Christianity also remains a very strong component of Tangier community life (Au Sable Institute of Environmental Studies 1999). According to a survey given to residents of the island, 87% of the community consider themselves Christian (Drake Emmerich, personal communication). Tangier, due to its ancestry, religious bearing, and tradition of working the water, is a relatively homogenous community.

Historically, conservation and environmentalism for nature's sake were not formally elements of Tangier's lifestyle. This may be because of the predicament that conservation presented for watermen: their long-term livelihood as watermen could be ensured by a decrease in fishing pressure to allow the declining fishery population to recover; however, by taking less catch, the short-term ability to make a living would be hindered. As 90% of Tangier's income in the 1990's was based on the blue crab fishery, the immediacy of this dilemma made regulations on the fishery a highly emotional issue (Shores, personal communication). Tangier, being a small island, offered few alternative sources of income to turn to when fishery regulations impacted residents' incomes (Shores, personal communication).

Because of this dilemma, watermen resented scientists, and residents felt that they had a superior knowledge of the Bay and its relative health (from working on it daily) than did the scientists from VIMS who studied it "here and there" (Shores, personal communication). As watermen, Tangier residents

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have always taken a great deal of pride in their work. Their resentment therefore also stemmed from anger that their livelihood was not being adequately considered in the regulatory process. Although a Tangier resident was on the Board of VMRC, he was not considered to adequately represent the views of the Tangier community (Drake Emmerich, personal communication).

The approach to conservation, and specifically fishery regulation, taken by the residents of Tangier is clearly a function of their perspectives. Tangier residents achieve both personal and community stability through the ability of watermen to provide for their families. They see the Bay's living resources as a means to this end. For Tangier residents during the 1990's, these values culminated in a strong desire to maintain their way of life, which they saw as impossible given the new fishery regulations.

This social context of Tangier is an important element to the problem for several reasons. First, as the island of Tangier is steeped in heritage and tradition, changes in attitude and lifestyle are difficult and unlikely. Second, as the island is predominantly composed of watermen and their families, opportunities for non-fishery related income are not prevalent (Tangier Island Cruises 1999). Third, religion is a prominent component of community and personal life on Tangier and has the potential to both unify and fragment the population. These elements will be further discussed as they played important roles in various aspects of the problem-solving process, including the ability of the faith-based stewardship program to contribute to a successful conservation outcome.

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THE POLICY PROBLEM ON TANGIER

During the early 1990's, tension began to grow between residents of Tangier and CBF, VIMS, and VMRC, as scientists advocated new regulations to protect the Bay's crab fishery. Tangier residents felt that the fishery regulations under consideration were being imposed on them without consideration of the effect on their economic security. They also felt that they were bearing the burden of the blue crab's decline even though other factors, such as habitat degradation from agricultural non-point source run-off, were culprits in the decline as well (Shores, personal communication). The ensuing tension was particularly noticeable between Tangier residents and the Chesapeake Bay Foundation, which, although not directly responsible for fishery regulations, was "the closest thing to throw stones at" due to CBF's nearby Pt. Isobel Island Education office (Shores, personal communication). Banners insulting the Chesapeake Bay Foundation were hung from residents' boathouses, and signs were hung at tourist locations on the island telling patrons that Tangier's heritage was in danger of being lost due to the Foundation (Robotham 1999). This tension, although noticeable, was apparently not significant enough to spur any of the organizations to action to resolve the issue. Criticism by Tangier watermen apparently did not represent a powerful threat to the conservation initiative and its regulatory guidelines.

The problem became more acute in 1994 and 1996, when Tangier residents' fears were realized through the adoption of regulations further limiting the fishery by reducing the season length and number of crab pots (Travelstead, personal communication). Residents responded to the new regulations harshly. Some watermen chose to harvest crabs illegally out of anger and fear. Although an estimate of the number of illegally caught crabs did not exist, it was clear at this point that a policy problem had emerged.

For almost a decade prior to this situation, the Chesapeake Bay Foundation had attempted to instill an "environmental ethic" on Tangier. But when tension between the Foundation and Tangier arose in the mid-1990's, the Foundation did not actively address the blue crab fishery issue since it was not responsible for having made the regulations (Harrison, personal communication). And, since adequate communication was not occurring with VMRC or VIMS, it is not clear to what extent these organizations were aware of the illegal harvesting (Shores, personal communication). Due to lack of clear ownership of the problem, action was not taken to resolve the problem for several years.

DEVELOPING A SOLUTION

It was not until Susan Drake Emmerich's arrival on Tangier in 1997 that the problem moved significantly towards resolution. Drake Emmerich, a doctoral candidate from the University of Wisconsin, was conducting her dissertation on the application of faith-based stewardship to conservation issues. She chose to work in Tangier due to the strength of religion in their community life (Drake Emmerich, personal communication). A Christian herself, Drake Emmerich was accepted into the Tangier community through her active participation in the religious life on the island, which included teaching Sunday school classes in one of the island's two churches (Robotham 1999). Drake Emmerich originally intended only to observe Tangier to determine the underlying causes of the fisheries conflict and potential forces for change in the community. She soon became directly involved in Tangier's situation however, as watermen began asking for her help to better understand what they could do to address fisheries declines and ensure a future for the community (Drake Emmerich, personal communication).

In response to such requests, Drake Emmerich formally introduced biblically-based stewardship (Christians' responsibility to care for the earth and its creatures as God's creation) at a joint service of the island's two churches in February 1998 (Robotham 1999). According to Drake Emmerich, the faith-based stewardship initiative convinced many of Tangier's residents that caring for the Chesapeake's living resources was mandated by scripture. Faith-based stewardship therefore became a question of obedience to God.

The stewardship message included two important components: understanding stewardship in a scriptural framework, and being reminded of Jesus' command to love thy neighbor. These elements helped accomplish several things. First, Tangier residents realized the need to be proactive in the fishery

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regulation process in order to preserve their cultural heritage. Second, Tangier's concept of who their neighbors were broadened to include environmentalists and scientists as well as people living on the Eastern Shore of the Chesapeake, where trash thrown overboard from Tangier watermen's boats frequently washed up. Third, residents began to view civil laws as an extension of God's laws. They also realized that disobeying civil laws was causing them to be viewed by outsiders as lawbreakers, requiring further laws and therefore compounding the situation (Drake Emmerich, personal communication).

These attitude changes led to action on the part of Tangier residents. Fifty-eight watermen signed the "Watermen's Stewardship Covenant" (Drake Emmerich 1998a), a pledge to "be good stewards of God's creation by setting a high standard of obedience to civil laws (fishery, boat and pollution laws)…and commit to brotherly accountability." The men who signed the covenant formalized their new commitment to conservation by flying a red ribbon, symbolic of Christ's blood, on their boats (Robotham 1999).

Not all of Tangier's residents agreed with the Covenant or the stewardship program. As of the winter of 1999, several men were still posting anti-CBF signs on their boathouses and were open about their disapproval of faith-based stewardship. They claimed that they were willing to obey fishery and pollution laws, and did not need religion forced upon them to do so (Robotham 1999). Shores commented in "Tangier Island: Faith-based Stewardship for the Chesapeake" (Tangier Island Cruises 1999) that the ribbons were not meant as a divider of those who had and had not signed the Covenant, but instead as a way for those who had to remind themselves that they work for God, not Man.

Even with this dissension, it could be said that during 1997 and 1998, with Drake Emmerich's arrival to Tangier and the subsequent introduction of faith-based stewardship, the problem began moving towards resolution. In the spring of 1998, several volunteer committees of Tangier residents were formed to address specific, practical ways to implement faith-based stewardship with regard to fishery management, pollution clean-up on the island, and diversification of income generation (Drake Emmerich, personal communication). FAIITH, "Families Actively Involved in Improving Tangier's Heritage," was formed to: "[P]rotect our ecological and community well-being…to represent Tangier's watermen families and all other watermen families of Virginia, and [to] be actively engaged in the political, economic, environmental and social issues that affect the watermen's way of life. Furthermore, we will collaborate with the government and all advocacy groups to find solutions that will maintain the watermen's heritage of Virginia." (FAIITH 1998). Dialogue between outside organizations and Tangier residents was conducted through FAIITH (Drake Emmerich, personal communication).

Specific goals of FAIITH included: (1) collection of scientific and regulatory information about Chesapeake Bay fisheries, ensuring watermen representation at important VMRC meetings, (2) educating Tangier's children about the importance of Tangier's heritage, and (3) integrating use of scientific data with

watermen's knowledge as the basis of fisheries regulations (FAIITH 1998).

The "Tangier Island Watermen Community Stewardship 2020 Vision" (TaSC 1998) was also created at this time. The Vision was a long-range plan to address several aspects of the community's future, including: (1) developing an organized and politically, socially, and environmentally active community, (2) maintenance of healthy shellfish and finfish populations, (3) promotion of flexible licensing to protect watermen's livelihoods, and (4) diversification and expansion of (non-fishery) income-generating opportunities (TaSC 1998).

These activities and committees were collectively organized into a non-profit organization, Tangier Watermen's Stewardship for the Chesapeake (TaSC), by Drake Emmerich and five Tangier stewardship leaders. The organization's overall goal was to ensure "an environmentally sustainable fishery, island, and culture" for the Tangier community (Drake Emmerich 1998b). A steering committee and Board of Directors was formally put in charge of organizing and charting the progress of the initiative and related activities at quarterly meetings (Shores, personal communication).

Not only was there strong volunteer support for these activities, but the Tangier Town Council also endorsed TaSC. This was important because it gave those who were not interested in faith-based stewardship an avenue for community-based participation in the conservation movement.

The faith-based stewardship program has been underway for almost two years. While there is still residual tension and difficult issues continue to arise, significant progress has been made through the program.

THE FUTURE OF CONSERVATION ON TANGIER

The faith-based stewardship program has been underway for almost two years. While there is still residual tension and difficult issues continue to arise, significant progress has been made through the program. The program fostered a change in Tangier's outlook on conservation while strengthening an already present value (rectitude via religion) within their community. The actions that Tangier residents took by selecting and implementing the previously mentioned activities not only fit within the power structure of the Bay community (conservation through science and policy), but also fit within their own community value system. According to Shores (personal communication), momentum is still strong, despite Drake Emmerich's departure from Tangier in the fall of 1999. All of the committees have been making progress toward their goals, but few, if any of the goals have been fully met. Examples of progress include the following.

First, under the Watermen's Stewardship Covenant, members agreed to "brotherly accountability," meaning that they would remind members of their pledge if a member was seen acting out of accordance with a fishery or pollution law. This form of positive peer pressure has apparently provided an active support network for those involved (Shores, personal communication).

Second, in keeping with the goals of FAIITH, Tangier watermen and/or members of their families have begun to participate in open meetings of VMRC pertaining to fisheries regulations. The committee members of FAIITH have actively sought scientific information about Chesapeake fisheries and regula-

tions, and have put together a newsletter to distribute the information. Members of FAIITH involved in the island's Combined School (the only school on the island, elementary through twelfth grade) have developed environmental programs for students that emphasize conservation and Tangier's heritage (Shores, personal communication).

Third, per progress under the 2020 Vision Plan, Tangier watermen are more adequately represented on the VMRC Board, and two Tangier watermen are involved with VIMS scientists on an oyster restoration project. Some of the watermen have decided to change fisheries altogether, and are now fishing for king crab and conch in the Atlantic.[1] Women in the community are actively pursuing income diversification, including plans to learn basketry and other crafts that can be sold at tourist locations on the island. They are also exploring the possibility of building a crab packing factory on the island so that they can turn a higher profit from the crabs that are brought in, as packed crab meat can fetch a higher price at times than whole crabs (Shores, personal communication).

The Board of Directors of TaSC meets quarterly to evaluate the program as a whole. This appraisal is the only formal method of evaluation currently in place. Although Drake Emmerich has turned over the directorship of TaSC to a Tangier resident, she sees her involvement as a life-long commitment to the faith-based program on Tangier. She has no plans for the program to end (Drake Emmerich, personal communication). A formal end to the program is hard to imagine, as long as resource conservation of the Bay's fisheries remains a societal goal, scarcity of living resources remains a possibility, and the Tangier community remains intact.

IMPROVING CONSERVATION ON TANGIER

Due to the success of the program in halting illegal harvest of blue crabs and promoting environmentalism in general, it is difficult to suggest alternative courses of action to improve matters. While the non-religious residents of Tangier are not in favor of the program, the goals under FAIITH, the 2020 Vision Plan, and TaSC, are not (all) religious in nature and stand to improve the lifestyle of everyone on the island, regardless of creed. The TaSC focuses on heritage and maintaining the lifestyle of Tangier watermen via long-term conservation, which does not have to be a religious undertaking for those who do not share religious values. Information gained pertaining to research findings or new regulatory measures on the fishery benefit the entire community of watermen on Tangier, whether or not a red ribbon flies from a waterman's boat. The important negative consequence of the strained relationship between those who have signed the Covenant and those who have not, which may or may not remain as time passes, must be seriously acknowledged.

One suggestion for the program is to take advantage of the Chesapeake Bay Foundation's connections to scientific and political institutions in the watershed, now that CBF is seen as an ally and not an enemy. For instance, Shores (personal communication) mentioned that while communication with Bay

[1] This option has not met with approval from some of the watermen's families, as it means that the watermen are away from home for extended amounts of time and are in a potentially more dangerous area. It has also meant that the watermen have had to acquire expensive new boats and fishing gear, as these fisheries require completely different gear than that of the blue crab fishery.

scientists has increased, it is still not as easy or fruitful as watermen would like. According to Drake Emmerich (personal communication), two reasons for this may be differences in language (folk vs. scientific) and type of knowledge (experiential vs. academic). The Chesapeake Bay Foundation could provide a strong link, as a translator, between the residents and scientists.

As a second suggestion, the residents of Tangier should strengthen communication between watermen groups in the watershed. While residents of Tangier actively encourage other communities to engage in conservation, it is not clear how much actual communication is occurring (TaSC 1998). A united watermen community could present a powerful social force for negotiating details of future regulatory measures.

ASSESSING THE RESOLUTION: WHAT WORKED AND WHY

As illegal blue crab harvesting by Tangier residents no longer occurs, the policy problem as previously defined no longer exists. It is therefore important to assess what worked and why in resolving the problem. This analysis will be used to draw general conclusions about conservation problem solving.

Resolution of this issue occurred because the worldview of the Tangier community was used to work towards the Chesapeake's societal goal of living resource conservation. This was not occurring at initial stages of the problem, when scientific/regulatory organizations were using scientific language and positivistic thinking to address the conservation issue. Data from VIMS and other academic institutions were being used by the conservation community, including CBF, to get regulations implemented through VMRC. Essentially, these groups were focusing on values that Tangier residents did not recognize or value highly. Tangier, meanwhile, was concentrating on the stability of their community in terms of economic and cultural security. CBF, for all its effort, had not been able to promote conservation for conservation's sake on Tangier in years past because they were appealing to a value which residents did not share with the Foundation. Through an assessment of the stakeholders' standpoints, it became clear that the base values of participants (and how those values influenced participants' perspectives) were (and still are) quite different. Ultimately the goal of conservation could be seen to benefit all stakeholders, especially Tangier residents, but it could not have been achieved by forcing drastic value shifts in the community.

Resolution of the problem also occurred because the problem was properly defined by Drake Emmerich and the Tangier residents. At the outset, dissension by residents did not represent a strong enough force in Virginia to block the passage of regulations. Furthermore, the number of crabs that residents were catching illegally was not quantified, and it was therefore unknown as to whether or not disobeying the regulations was a

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serious conservation threat to the blue crab population. Because of this, it could be argued that a problem might not have existed. Yet clearly the residents of Tangier were not acting in accordance with the goal of the majority of the stakeholders in the watershed. Had the situation been interpreted differently, faith-based stewardship may not have been an appropriate tool. For instance, if the problem was defined at the outset as one in which stakeholders needed to reach consensus on the blue crab fishery regulations, the problem might remain grid locked today. Instead, it was recognized that in light of the goal of conserving the Bay's living resources, the problem was the illegal harvesting and general disregard for conservation measures.

The problem, as defined, made it necessary for Tangier residents to accept conservation into their lifestyle. Faith-based stewardship combined the institution of religion with conservation. It allowed for the selection and implementation of resolution-related activities on a local, volunteer basis, which was important considering the strength of Tangier's community life.

The homogeneity of the Tangier community was therefore an important aspect of resolution. Because the vast majority of residents describe themselves as Christian, the faith-based stewardship program was pertinent to this portion of the population. In a more diverse setting, the program would not have been able to engage such a significant portion of the community. The fact that the island is small probably also contributes to the success of the program, simply because frequent contact and communication occurs between residents as they go about their daily lives.

The relevance of the resolution mechanism to the majority of Tangier residents was therefore key to success. As religion is an integral part of life on Tangier for its many residents, and since conservation has now been transferred from a naturalistic to a theistic basis, it is not likely that the residents' interest in conservation will diminish. From that standpoint, faith-based stewardship in this setting is a powerful conservation tool.

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LESSONS LEARNED

It will not always be possible to look to old conflicts for keys to the resolution of new conflicts. Case study approaches should not be used at the expense of continuing to search for creative new solutions to problems. But, just as learning from mistakes can be useful, analyzing successful situations and learning from them has the potential to provide insight into resource conflicts.

In reference to the issue on Tangier, the question could be asked: Are certain conservation problems predisposed to successful resolution? In other words, can only problems with certain elements, such as homogenous community structure or narrow problem definition, be successfully resolved? While this could be argued, as some situations are certainly less complex than others and lend themselves to "easier" resolution, it could also be argued that the problem was resolved because action appropriate to participants' worldviews was taken.

If the latter is considered, analysis of the resolution can be used as a "prototyping tool" for problem solving in other conservation conflicts.

Prototyping is "the original or model on which something is based or formed" (Random House Webster's College Dictionary 1999). Prototyping has the potential to be useful in this way due to the similarity of resource conflicts in conservation. While context will differ from one situation to the next, many resource conflicts are based on a lack of agreement among participants on the role of conservation in their community. In such situations, key components may be present that permit the "lessons learned" from one situation to be applied to a different situation with similar issues. The situation with Tangier offers the following lessons.

First, participants do not need to move towards a common goal along the same trajectory. For some people, conservation may be an extension of enlightenment. For others it may be connected to rectitude. It is unrealistic to think that everyone will value a resource for the same reason or to the same extent. It is therefore important at the outset to have participants clarify their values to the extent possible in relation to the conservation issue. The key to success of the Tangier initiative was working within the theistic worldview of the Tangier community. The conflict on Tangier clearly shows the inability of science to be the causative agent of behavioral change in local people in cases where a scientific worldview is not predominant. The situation on Tangier demonstrates that incorporating participants' values in the conservation process can be an important element in problem resolution.

Second, solutions that incorporate participants' values can be useful tools for promoting conservation in a situation where one stakeholder dissents from the majority's viewpoint concerning a conservation issue. A value-relevant resolution mechanism that promotes volunteer compliance has the potential to promote human dignity by replacing coercive measures or strict legal enforcement of the policy in question. An important aspect of using a program that incorporates values is that it has the potential to promote long-term conservation buy-in, which creates a strong conservation trend for the future.

Third, as seen in Tangier, sometimes a third party is needed to work out a compromise or integrated solution. Third parties have the potential to provide perspective, leadership, and skill to guide problem resolution. Although the Chesapeake Bay Foundation never tried to promote faith-based stewardship on Tangier, it is unlikely that residents of Tangier would have listened to them if they had, due to the tension that had grown between the two groups. In this case, a third party was a form of mediation, which can be helpful in some emotionally-charged cases or those where leadership is lacking.

Finally, identifying a strong value that may lend itself to conservation and is shared within a community can be a useful avenue for promoting conservation goals.

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CONCLUSION

Conservation problems often have many dimensions that make resolving them a difficult undertaking. One such dimension is that conservation resolutions should aim to increase the well-being of everyone involved, while at the same time achieving the desired, substantive conservation aim. This is obviously not always possible. In the Tangier situation, all participants can benefit, either directly or indirectly, from the faith-based stewardship program. Benefits include: (1) organizations involved in blue crab conservation now have the cooperation of Tangier watermen, (2) residents of Tangier who have accepted the faith-based stewardship program have a new-found connection to their surroundings, (3) residents will have an active role in the future of the regulation process, and (4) residents have benefited from being actively engaged in maintaining Tangier's unique heritage and ensuring its future as a watermen's community. The situation on Tangier creates hope that if an interdisciplinary approach to conservation is taken that embraces the technical and social aspects of a problem, resolution is likely to enhance human dignity and well-being for all participants.

ACKNOWLEDGEMENTS

I would like to acknowledge the following people for their guidance during this project: Tim Clark, Susan Drake Emmerich, and Michael Stevenson. Thank you for your time, comments, and general oversight of my work. I am also grateful for the willingness of Susan Harrison, Carlene Shores, and Jack Travelstead to share their personal experiences with me regarding the fishery issue on Tangier. Susan Drake Emmerich will be publishing her dissertation during 2000. For more information on Tangier and the faith-based stewardship initiative, Drake Emmerich can be contacted directly: 7943 Dada Drive; Gurnee, IL 60031, Tel: 847-223-7646, Fax: 847-231-4035, Email: sdemmerich@yahoo.com

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APPENDIX

VISUAL AIDS USED IN THE ORAL PRESENTATION

Slide 1   A photograph of Tangier Island, Virginia.
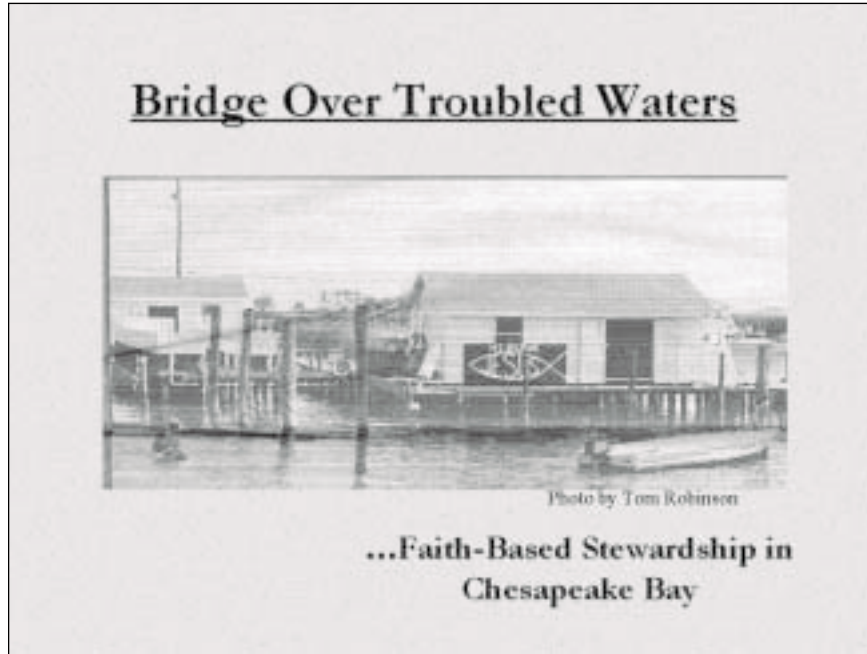
Slide 2   This slide gives a brief definition of the policy problem on Tangier and several reasons for analysis.

Slide 3   This slide lists the major participants and their base values as related to the policy problem.

Participants and Associated Values

Residents of Tangier Island, Virginia:
　　—well-being, respect, rectitude, skill

Chesapeake Bay Foundation (CBF): "Save the Bay"
　　—enlightenment, respect

Virginia Marine Resources Commission (VMRC):
　　—enlightenment, power, respect

Virginia Institute of Marine Science (VIMS):
　　—enlightenment, skill, respect

Susan Drake
　　—well-being, respect, rectitude

Slide 4   Major trends relevant to the policy problem are overviewed.

Trends (1990's)

- Chesapeake Bay restoration effort was driven by the myth of Captain John Smith.

- Crab populations were fluctuating, but showing a general decline from the 1970's and 80's. "Fully exploited".

- New regulations were put on the blue crab fishery in 1994 and 1996.

- Residents of Tangier feared the economic impact of fishery regulations; 90% of Tangier economy is based on blue crab fishery.

Result:

Tension began to grow between the Tangier community and the scientific/regulatory community. Tangier residents felt that their livelihood and heritage was in danger of being lost due the economic impact of stricter blue crab fishery regulations

Slides 5 and 6   The decision process of the policy problem is laid out.

Decision Processes

Initiation
Tangier watermen objected to blue crab fishery regulations

Estimation
Faith-based Stewardship ⇒ duty to "care for creation"

Selection
Watermen's Stewardship Covenant
Women's Stewardship Covenant
Families Actively Involved in Tangier's Heritage (FAIITH)
Tangier Island Community Watermen Stewardship 2020 Vision
Tangier Watermen's Stewardship for the Chesapeake (TaSC)

...Decision Processes

Implementation
Volunteer, community effort

Evalutation
TaSC Board of Directors meetings
Brotherly Accountability

Termination
Formation of non-profit organization TaSC = lifelong commitment
(Termination may not occur)

Slide 7   Alternatives and recommendations are suggested.

Alternatives and Recommendations

Alternatives: Unnecessary at this point due to success of program.

Recommendations:

- Increase information flow between wider Bay watermen community to promote conservation.

- Foster communication between scientists and Tangier watermen by promoting a partnership between Tangier and CBF.

Photo courtesy of Chesapeake Bay Program

Slide 8   Elements of the problem that had a significant role in the resolution are emphasized.

Key Elements in Problem Resolution

1) Participants values were radically different. Resolution needed to bridge participants' value systems rather than force value changes. Faith-based stewardship was a value-relevant resolution mechanism.

2) The problem was narrowly defined. This allowed action at appropriate scales to be taken, including estimation and selection of activities at the community level.

3) Interference by Drake acted as a mediation tool between residents of Tangier and the scientific/regulatory agencies.

Slide 9   General recommendations are given that suggest ways to use lessons learned from this case in
           a broader context.

ABSTRACT

The Canadian North Atlantic Cod Fishery:
A Case Study of Management and Conservation Policy

Gregory C. Jones
Yale School of Forestry & Environmental Studies

The Northern Atlantic Cod (Gadus morhua) has represented a valuable economic resource to Canadian fishers for hundreds of years. In the late 1980's, however, a collapse of cod stocks occurred. In 1992, drastic declines in cod populations forced the government of Canada to declare a moratorium on the cod fishery and allocate billions of dollars for fishery relief. Today, the moratorium is still in place, and the cod populations have not recovered. Several factors led to the collapse and continued moratorium: government fishery policy, industry overexploitation, an inability of science to accurately measure cod populations, and other more subtle factors that influenced the policy process. My paper's goal is to explore reasons for this set of failures in order to determine what policies must be changed to foster success in the current cod recovery and future fishery management. The approach of Canada's Department of Fisheries and Oceans (DFO) in setting fishery policy, and the economic, social, and political processes that influence the DFO, have come under close scrutiny in the past decade. Some institutional changes have occurred, but challenges remain. One option for the future is greater emphasis on the study and management of the aquatic ecosystem, in order to understand cod population trends. Although this change is a stated objective of the DFO, it is not yet being practiced. A second option is to open up the policy decision process to the Canadian public, allowing free exchange of fishery data between the DFO, the Fisheries Resource Conservation Council, and fishery stakeholders; in the past, information flow has been restricted to meet political ends. A third alternative is to address the potential impact of small regional food fisheries and cod bycatch mortality with adaptive management; although these are important cultural and economic activities, they may be slowing the cod recovery process. A fourth alternative is to further reduce and re-direct subsidies that support the maintenance of a fishery over-capacity in Eastern Canada. A fifth possibility is to address the means of moratorium termination now, in order to establish specific requirements for the re-initiation of the fishery, and avoid the possibility of premature re-initiation as a result of political and social pressure. These alternatives are relatively diverse, yet each is designed to remedy a different part of the same policy process. My recommendation is that all five of these changes be made to facilitate the recovery and future management of the cod population. The value of the resource justifies this effort.

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ABSTRACT

IUCN/Species Survival Commission Action Plans: An Interdisciplinary Approach

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The Species Survival Commission, one of the biologically focused divisions of the World Conservation Union (IUCN), has been producing species Action Plans in conjunction with its volunteer network of species specialists since 1987. Action Plans consist of taxonomic or regional accounts of a group of species, as well as each species' conservation status, threats to its long-term viability, and recommendations for its conservation. Action Plans are compiled with the purpose of promoting species conservation action in two ways: (1) motivating Specialist Group members to collate biological data and conservation-related information, and (2) providing scientifically-based, prioritized recommendations for those who can promote, support, and implement species conservation. The first of these goals is being achieved. The second goal, however, is not being met because Action Plans are not effectively reaching decision makers or implementers. This paper identifies the source of this problem and assesses ways in which the action planning process can be ameliorated. The action planning process is analyzed by considering the nature and goals of the organizations involved, the technicalities of creating an Action Plan, and the difference between goals and actual outcomes. It is determined that Action Plans do not fit into the social context of decision-making bodies and that much of this is due to the biological bias, format, and lack of evaluative research of the Action Plans. Alternative solutions to the problems associated with ineffective Action Plans include maintaining the status quo, creating strictly biological plans, and utilizing the resources of the IUCN's other commissions to create interdisciplinary plans with more comprehensive, contextually realistic recommendations. The interdisciplinary approach to the action planning process is the alternative that most practically solves the policy problems related to action planning. Its potential stems from its ability to transfer the biological focus of Action Plans to one that incorporates human needs and values, simultaneously. Action Plans with a greater social focus are appealing to decision makers because the power of these individuals and their organizations is often determined by the support of the communities they live in. This alternative also encourages communication among IUCN programs and incorporates constant evaluation and "double loop" learning into action planning. A more comprehensive, interdisciplinary approach to action planning will result in the production of plans that effectively achieve their goal of assisting decision makers responsible for allocating resources and authorizing action, as well as implementers of species conservation.

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PROTECTED AREAS MANAGEMENT: INTEGRATING COMMUNITIES, CONSERVATION, AND DEVELOPMENT

Integration of communities, conservation, and development represents a promising approach toward successful protected area management. The goal of integration has received considerable attention in recent years, yet the number of protected areas where it is being achieved are few. In this section, management of protected areas in Ecuador, the Congo, Uganda, and Nepal is examined, and recommendations are made to improve the management process in each location. The case studies provide a spectrum of approaches to meet the twin goals of conservation and development. Each location shows unique problems based on the local context, and varying degrees of success at integration. The analyses make it clear that communities must be meaningfully involved in the management process. However, community involvement alone does not necessarily lead to success simultaneously on both the conservation and development fronts.

The first of the four papers in this section is presented in its entirety, along with an appendix showing the visual aids used in the oral presentation of the paper to the class. The remaining three papers are presented in one-page abstract format.

Galapagos Islands: Managing Introduced Species in an Endangered Ecosystem

Michael J. Stevenson
Yale School of Forestry & Environmental Studies

ABSTRACT

Species introduced through development for fishing and tourism are destroying the native ecosystem on the Galapagos Islands, Ecuador. To address this problem, introductions must stop, and species already introduced should be removed or reduced. This paper analyzes the "species introduction" problem and makes recommendations to improve conservation efforts. The problems with management to date include lack of integration of social realities into an effective decision process focused on reducing damage caused by introduced species. Recommendations include a mix of strategies to improve the decision process by making it more comprehensive, inclusive, and realistic. Specifically, (1) organize a more effective decision setting, (2) involve all concerned interests, (3) improve social and ecological research to identify key problems and their contexts, (4) restructure conservation funding to reflect an integrated research and decision approach, (5) enforce current legislation, (6) continue species eradication efforts, and (7) provide economic alternatives for fishermen and other island residents who will be displaced by the conservation effort. Through these strategies, the unique ecology of the islands may be supported, and human dignity and respect may be achieved.

Ensuring conservation of native biodiversity and ecosystems is increasingly recognized as critical to sustainability in the 21st century. The Galapagos Islands, an archipelago approximately 1,000 kilometers off the coast of Ecuador in the Pacific Ocean, are currently suffering severe destruction of the native ecosystem and extinction of endemic species as a result of the introduction of exotic species (Mauchamp *et al.* 1998). The islands are of particular ecological and historic significance, figuring prominently in our current understanding of evolution and ecology. They provided a natural laboratory for Charles Darwin, who formulated his theory of evolution while visiting in 1835 when he gathered material that underpinned *On the Origin of Species.* Termed the "enchanted islands," the archipelago is characterized by remarkable beauty and high levels of endemism.

Feral goats, pigs, dogs, cats, rats, and many other species have altered ecosystem characteristics and driven endemic species, such as several species of the Galapagos tortoise, to extinction (Schofield 1989; Mauchamp 1997). While the Ecuadorian government agrees with island biologists and the international community that these exotic species are a problem, a highly politicized environment on the islands has complicated control and/or elimination of this harmful biota. Continued reintroductions by local residents, fishermen, and visiting tourists remains problematic. Yet to sustain this fragile and endangered ecosystem, prevention of current and future introductions is necessary.

This paper examines the problem these introduced species pose and the effort to solve this problem from an interdisciplinary standpoint. To date, the majority of analysis of this problem has been limited to biological assessments and, to a lesser degree, recommendations based on these biological findings (Schofield 1989; Mauchamp 1997; Peck *et al.* 1998; e.g., Desender *et al.* 1999; and many others). In contrast, the intention of my present analysis is multifaceted. This analysis seeks to present a more complete depiction of the

Ensuring conservation of native biodiversity and ecosystems is increasingly recognized as critical to sustainability in the 21st century.

problem, highlighting social, political, and economic factors underlying the invasive species issue. Further, this paper will provide practical alternatives to resolve the problem, in terms of improvements to both management strategies and the decision-making process itself.

My personal standpoint as an analyst is driven by a desire for a responsible and ethical outcome, in which all concerned individuals are involved in the decision-making process, treated with respect, and empowered to assist in developing solutions. It is hoped that, as an academic and an outsider to the situation, I will be able to offer a helpful evaluation, different from those of individuals directly involved with the Galapagos Islands.

Research for this paper was undertaken during the 1999-2000 academic year. A review of the current literature was performed, which included articles from academic journals, reports from news services, and information from online resources. In most cases, information from news services, electronic or otherwise, are not cited as the information is widely available. Other references are cited throughout the paper. I conducted a telephone interview with Tony DeNicola, who is providing consulting services for a goat eradication effort on the islands. I also exchanged email correspondence with Peter Grant, an eminent biologist who has made a career of studying bullfinch populations on the Galapagos Islands. Analysis was performed using the policy sciences' interdisciplinary problem-solving framework (Clark 1992; Lasswell and McDougal 1992). An earlier iteration of this paper was presented to classmates in the course, Species and Ecosystem Conservation: An Interdisciplinary Approach. Visual material used in this presentation, which further illustrate the analysis, are included in the Appendix.

ECOLOGICAL AND SOCIAL CONTEXT

Numerous authors have identified significant impacts from introductions of exotic plants, animals, and other biota, including the loss of native flora and fauna, and fundamental changes in ecosystem structure and function (Mauchamp 1997; Desender *et al.* 1999). As an example, estimates place the number of exotic plant species on the islands at over 500, although only a portion of these are considered invasive (Brockie *et al.* 1988; Schofield 1989). At least eight native plant species are considered endangered, and one plant species extinct (Mauchamp *et al.* 1998). Furthermore, 19 animal species have gone extinct, and an additional 74 are in danger (Gonzalez 1997). Many other extinctions may have occurred over time, but due to information gaps in the historic record, details will never be known. This extinction process has occurred incrementally, but the situation has developed to a crisis stage over the past two decades, as was evidenced by the 1995 threat of the United Nations Educational, Scientific, and Cultural Organization (UNESCO) to list the Galapagos as an "endangered world heritage site." The environmental problems related to exotic species in the Galapagos have been well documented. As a result, these problems have been subject to little debate.

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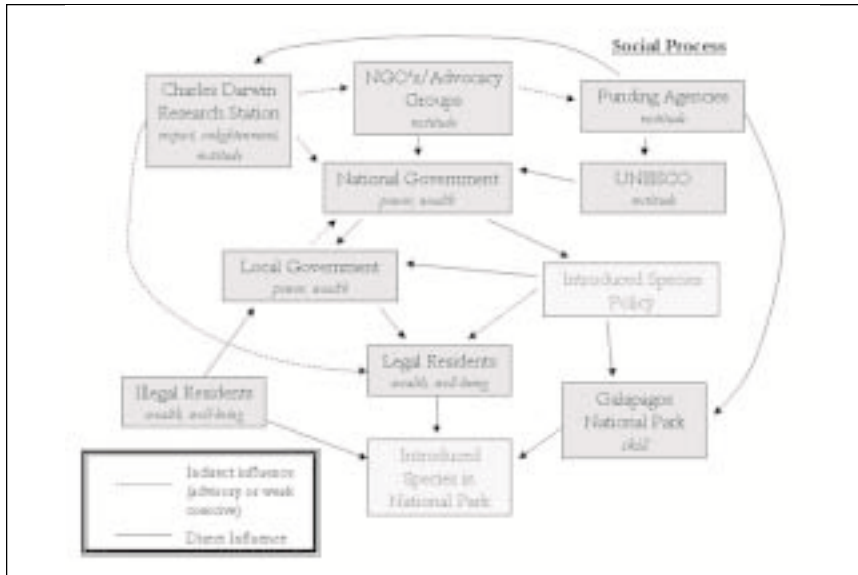
Figure 1   A social process map of the invasive species issue in the Galapagos Islands, showing relationships among participants. Words in italics represent the base values (power, wealth, knowledge, skill, respect, well-being, affection, and rectitude) that each participant seeks to maximize.

The social context of this situation is complex. Numerous participants with power to influence the problem, ranging from local to international in scope, are currently involved. The arena in which they interact has been and continues to be informal, and it appears that a lack of communication and coordination has characterized the situation to date. Participants include: UNESCO and other international funding agencies and non-governmental organizations; local and national government; the Charles Darwin Foundation, sponsoring the Charles Darwin Research Station (CDRS) that coordinates and performs biological and ecological research on the archipelago; tourists; and local residents, both legal and illegal. While a comprehensive treatment of the relationships among these participants would be desirable, it is beyond the scope of the present effort. Instead, examples are given below that focus on the relationships between several key participants, addressing the underlying values at play, as well as their demands, expectations, and strategies (Figure 1).

Differences among groups are striking. For instance, the Charles Darwin Foundation has referred to the aggressive actions of the locals as "a lack of respect for authority," threatening the well-being of both the foundation members and the ecology of the archipelago (Aplet *et al.* 1995). Foundation employees' demands and expectations include enforcement of existing regulations and the maintenance of order by the government. On the other hand, economics and lack of power to control their own destinies drive illegal fishermen onto the islands. They engage in violent acts and harvest the endangered sea cucumber, and in the process, introduce species to the islands.

The social context of this situation is complex. Numerous participants with power to influence the problem, ranging from local to international in scope, are currently involved. The arena in which they interact has been and continues to be informal, and it appears that a lack of communication and coordination has characterized the situation to date.

They demand autonomy and the opportunity to improve their living conditions, and expect little government intervention, as that has been the status quo in the past. Strategies on the part of the Charles Darwin Research Station include persuasive activities, such as advisory letters to Ecuador's president, and educational outreach in the local populace. The fishermen, on the other hand, resort to illegal activity, and in some cases, use of coercion and violence.

In another example, the national Ecuadorian government has utilized diplomatic tools, such as legislation to limit introduced species. It seeks to maximize its power, and expects respect, and compliance with its laws. However, its desire to maximize its wealth has limited efforts to enforce regulations. For instance, the majority of income generated by the national park is used by the national government for other programs, rather than those sustaining the park (DeNicola, personal communication). UNESCO, in contrast, engages in similar strategies, but seeks to maximize rectitude, or an ethical outcome, and its demands are on behalf of the global community. The local government, similar to the national government, seeks to maximize its power, wealth, and respect for its authority. However, it is attempting to achieve this by demanding autonomy, pursuing coercion as a strategy. As can be seen, these different perspectives, strategies, and lack of integration have led to little consensus regarding goals, problems, or what to do in response.

UNDERSTANDING THE DECISION-MAKING PROCESS

The problem of introduced species was first identified and placed on the policy agenda during the early years after the establishment of the CDRS in 1964, at which time study of the islands was institutionalized. The problem, however, had existed for at least 140 years (Schofield 1989). It is clear that delayed sensitivity has played a major role in the magnitude of the current problem, owing to two causes. The first is that the problems related to introduced species have increased exponentially during this period, starting slowly and accelerating only recently, and finally attracting the attention of authorities and the global community (Mauchamp 1997). Second, a lack of systematic study prior to 1964 had led to an absence of information regarding the impact of introduced species. The problem as defined, once it was identified, was simply that introduced species are undesirable. This definition favored the interest of scientists, the national park, and by inference, the global community. The local community, particularly the fishermen who depended upon several of these introduced species for survival, were not represented by this definition of the problem.

Despite this, detailed estimation of the problem based on this initial definition then took place. The scientific study of the ecological effects of exotic species, as mentioned earlier, has been reasonably comprehensive and conclusive. The causes of introduction have been identified as well, identifying a link between the problem and its anthropogenic sources. This information was shared primarily among CDRS, the national park, the Ecuadorian government,

The local government, similar to the national government, seeks to maximize its power, wealth, and respect for its authority. However, it is attempting to achieve this by demanding autonomy, pursuing coercion as a strategy. As can be seen, these different perspectives, strategies, and lack of integration have led to little consensus regarding goals, problems, or what to do in response.

and to some extent, the international community. It appears that little or no effort was made to share this information with local residents intimately involved with the issue and responsible for the majority of introductions. This clearly limits the ability of these residents to adjust their behavior related to the problems to which they are contributing.

Once an analysis of the problem was complete, only one alternative, consisting of several components, was seriously considered. The first component involved removal of introduced species, identifying feral goats as a primary target to focus eradication efforts. The potential of removing goats entirely from the islands is questionable, and hence this goal perhaps suffers from misplaced optimism. The second component was the enactment of legislation to prevent further introductions. This alternative failed to resolve the underlying social and economic issues surrounding these introductions. Instead, it addressed the problem's symptoms.

While specific legislation and its relevance to introduced species is discussed later, several generalities can be made about the shortcomings of the selected strategy. To begin with, it obviously conflicted with the lifestyles of the fishermen on the islands. Further, it assumed that the legislation would work simply by fiat, and minimal provisions or funds for enforcement, administration, and implementation were provided.

It should come as no surprise then, that implementation of these two components was incomplete and inadequate to solve the problem as defined. Goat eradication efforts, despite removing several hundred thousand goats over the past three decades, have not ultimately been successful. Remnant populations of goats have regenerated to bring population numbers back up, and reintroductions occur (Mauchamp 1997; DeNicola, personal communication). Law enforcement has been left in the hands of local government whose interests are not represented or furthered by the law. No forum has been created for revising the problem definition or for dispute resolution to resolve these fundamental differences in interests. This particular point was well demonstrated by the violent takeovers of CDRS in 1995 by illegal fishermen in response to restrictions on sea cucumber harvesting. In general, implementation did not follow the law. The basic problem remains.

Ongoing research pointing to continued loss of species and ecosystem damage caused by introduced species has underscored these weaknesses in the decision process, and general opinion has mirrored this evaluation. In 1995, UNESCO, in response to its perception of these programmatic failures, threatened the Ecuadorian government that unless the situation was remedied, it would list the Galapagos as an "endangered world heritage site." This would impose stringent controls on the islands, and restrict tourist income to the Ecuadorian government. The government eventually responded by enacting the "Special Law for the Conservation of the Galapagos Islands" in 1998.

Ongoing research pointing to continued loss of species and ecosystem damage caused by introduced species has underscored these weaknesses in the decision process, and general opinion has mirrored this evaluation.

In sum, efforts have failed to satisfy any of the participants. Practices and institutions have not developed to ensure that conservation goals are met, and the ecology of the islands is not protected. Further, the underlying values of the various participants have not been enhanced in such a way that the situation has improved from their personal standpoints.

GOALS OF CONSERVATION

The conservation goals and the introduced species problem, from my standpoint, consist of three parts. First, no new species should be introduced to the Galapagos Islands, particularly those that are known or suspected to have a deleterious impact on the native ecosystem. Second, introduced, harmful species already present should be eliminated to the extent practicable. Third, the two aforementioned goals should be met in a manner that engages all participants in an explicit decision-making process as much as possible. By restructuring goals such that they address both the process and outcome dimensions of the invasive species problem, the potential for success will increase.

HISTORY AND CURRENT CONDITIONS

As alluded to earlier, the Galapagos Islands have enjoyed a colorful history (Table 1). Humans first began regularly inhabiting the islands in the early 19th century, and records show the presence of non-native goats, pigs, cattle, and donkeys during this period (Schofield 1989). Ecuador annexed the archipelago

Table 1   Timeline of major events in the Galapagos Islands related to introduced species.

DATE	EVENT
1535	Europeans discover the Galapagos archipelago
1835	Darwin visits; first permanent settlements; goats, pigs, cattle and donkeys arrive
1932	Galapagos annexed by Ecuador
1959	Declared a National Park; 97% of land area protected
1960's	Tourism begins
1964	Charles Darwin Research Station (CDRS) established
1970's	First goat eradication programs
1979	UNESCO declares the islands a World Heritage Site
1988	Sea cucumber "discovered," fishing begins
1992	Sea cucumber fishing banned by Ecuadorian government
1994	Quarantine and inspection law passed
1995	Cucumber regulations enforced; CDRS taken hostage
1996	UNESCO threatens "endangered world heritage site" status
1997	Galapagos park warden shot by poachers
1998	Law for Conservation of Galapagos passed
1999	Grant from United Nations Foundation

in 1932, and in 1959 created the national park, protecting over 95% of the area of the islands. UNESCO declared the archipelago a world heritage site in 1979.

An endemic species of sea cucumbers, considered a delicacy in the Asiatic market, was "discovered" in 1988. This lucrative catch led to huge increases in fishing activity, and legal and illegal fishing encampments have led to the further release of many non-native species. Due to severe over fishing, restrictions were put in place in 1992. An early end to the harvest season in December of 1994 imposed by the government led to an explosion of violence on the islands. The CDRS was occupied by local residents, park rangers were held hostage, and threats of further violence were made. This trend of increasing violence continued over the next year, culminating with the governor of the islands sending a statement to the Ecuadorian government in support of fishermen and demanding greater independence for the islands.

In response to increased problems with exotic species, quarantine and inspection laws were passed in 1994. Quarantine guidelines, to date, have remained largely unenforced. In 1998, under pressure from UNESCO, the Ecuadorian legislature enacted the "Special Law for the Conservation of the Galapagos." This statute stipulated that immigration to the islands would halt, and all residents who had lived on the islands for less than five years were subject to deportation. It also further restricted the areas allowable for fishing. This law, although only recently enacted, could also be criticized as largely unsuccessful due to lack of enforcement.

Tourism on the islands has continued to grow at the rate of 14% per year, with over 60,000 tourists visiting the islands in recent years (Kenchington 1989; Lemonick 1995; Benchley 1999). The human population is growing at approximately 8% per year, and recent estimates place the total at approximately 14,000 people (Lemonick 1995; Mauchamp 1997; Benchley 1999). These trends can be attributed to political and social unrest on mainland Ecuador, as well as the fact that, by some reports, salaries on the islands are approximately 75% higher than on the mainland (Benchley 1999). This has been coupled with an increase in the frequency and magnitude of introductions.

Greater numbers of non-native species are being introduced or augmented on the archipelago as a result of increased human populations, fishing, and indirectly through tourism. The social climate on the islands, while currently sedate, has been relatively volatile in the recent past, reducing the ability of the government and other parties to take effective action to control the problem.

The extent to which these trends have impacted the aforementioned goals, while not quantifiable, is clear. Greater numbers of non-native species are being introduced or augmented on the archipelago as a result of increased human populations, fishing, and indirectly through tourism. The social climate on the islands, while currently sedate, has been relatively volatile in the recent past, reducing the ability of the government and other parties to take effective action to control the problem.

In addition, the funding and programmatic responses have mainly centered around the eradication of feral goats. While these animals admittedly have a huge impact on the islands, they are only one of a large number of introduced species, including plants, fungi, insects, and other mammals. Further, this approach addresses a symptom, but does nothing to address the underlying problem. Laws restricting activity on the islands and new immigra-

tion get closer to the root of the problem, but lack of effective enforcement renders these laws ineffectual.

A variety of conditions have conspired to limit the success of past strategies to address this problem. To begin with, the goals of the funding agencies have been less than comprehensive by self-limiting to biological issues. The government, as well, has tended to have little desire to invest funds for enforcement and other actions to preserve the Galapagos, despite the park's status as a major source of revenue to the government through tourism fees.

Recently, a new initiative to eliminate introduced species has begun. The United Nations Foundation has awarded almost $4 million to UNESCO to specifically address invasive species in the Galapagos. The project aims to prevent new invasions through community education initiatives, establish a quarantine inspection system, and develop rapid response capacity to unwanted introductions. Also included are plans to eradicate or control selected populations of invasives, primarily feral goats, and assure the sustainability of these efforts over time.

This plan, while having merit, has not fully transcended the limits of previous efforts. It will not meaningfully involve the community, other than through educational outreach, which is unlikely to reach those that are responsible for introductions. The majority of the local population is currently in favor of removing exotic species (DeNicola, personal communication), but the plan does not attempt to capitalize upon this favorable support. The underlying issues surrounding introductions remain unaddressed.

THE FUTURE?

If current policies and programs are continued, introduced species will remain a problem on the islands. Fishing, tourism, and population growth on the islands are likely to continue, particularly in light of the current political instability on the mainland. Feral goats, as a target species, could be removed or controlled, but this is only one aspect of the issue. Many other exotics will remain, such as rats that predate the eggs of the threatened turtle populations. Further, the social climate is likely to remain troubling. The presence of illegal fishermen and their continued activities on the islands, alongside continued population growth, will undoubtedly lead to continued introductions and reintroductions. Without expanding the scope of effort, and addressing the underlying issues surrounding invasive species, the large discrepancy between the goals stated earlier and conditions on the islands will continue, and the ecological value of the Galapagos will be seriously degraded. This will also have the effect of long-term damage to the fishing and tourist industries.

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RECOMMENDATIONS

Many alternatives exist to address the problem of introduced species and achieve the goal of conservation of the unique ecology of the Galapagos Islands. One option is no control of introduced species. Another is the status quo. As discussed earlier, neither of these is likely to lead to a satisfactory resolution given the conservation goals. The remaining alternatives fall into two general categories: first, change the social and decision process surrounding introduced species; and second, use new policy and management strategies (Table 2). These two alternatives are described below.

Table 2   Recommended strategies to address the invasive species problem in the Galapagos Islands, Ecuador.

PROCESS-ORIENTED	BENEFITS
• Organized, explicit process	Transparency, improved analytic capacity
• Inclusive process	Consensus on goals

OUTCOME-ORIENTED	BENEFITS
• Perform socioecological research	Improved understanding of situation Identification and prioritization of key problems
• Restructure funding	Improved ability to focus on problems
• Enforce existing legislation (including that related to immigration, quarantine, fishing, and introduced species)	No new legislation necessary Introductions will be reduced
• Continue eradication efforts	Direct, measurable impact on island ecology
• Provide alternatives/incentives for fishermen	Goals will not be undermined Immigration and impacts will be reduced

USE NEW PROCESS-ORIENTED STRATEGIES

As mentioned earlier, the decision process to date has been underorganized, has failed to be inclusive of all concerned parties, and has suffered from lack of transparency. The decision process through which conservation is to be achieved can be improved in two ways: (1) use an explicit approach toward decision making (i.e., develop an organized decision process) and (2) include participants representing all major interests relative to the invasive species issues on the islands.

The first means that the decision process must become better "managed." The policy sciences offer a model upon which to structure such a process (Clark 1992). Giving an agency or individual the mission of managing the process would help to ensure that it proceeds in an appropriate fashion. As the preservation of the Galapagos is technically the mission of the national park, it is my recommendation that this be performed by the Galapagos National Park Service. Using this agency would have the additional benefit of providing facilitation that represents a "middle ground" among the various participants.

As mentioned earlier, the decision process to date has been underorganized, has failed to be inclusive of all concerned parties, and has suffered from lack of transparency. The decision process through which conservation is to be achieved can be improved in two ways: (1) use an explicit approach toward decision making (i.e., develop an organized decision process) and (2) include participants representing all major interests relative to the invasive species issues on the islands.

It also would ensure that all future strategies are coordinated with each other, provide a basis for concerned parties to become involved, and give power to justify decisions. Retrospective evaluation, implementation, and other outcomes would become possible in this scenario, and accountability would be defined clearly.

Second, the decision process could be made inclusive of all concerned parties. Representatives from the national government, the local government, the national park, CDRS, UNESCO, local interests in the fishing community, the support economy for tourism, and non-governmental funding agencies could all take part in the decision process. By creating such a group, the potential to reach a consensus on goals and strategies may be increased. Also, by including various groups and individuals in the process, further understanding of the roadblocks to effective conservation would be facilitated. The likelihood of future actions that undermine these conservation efforts (e.g., reintroductions, malicious, or otherwise) would be minimized.

Involvement of local representatives is particularly important. Many are in support of eradication efforts, but the only method employed to enlighten and empower these individuals in the past has been "educational outreach." This does not allow them to take an active role in the decision process, particularly the implementation phase, nor do outreach activities effectively reach those most responsible for introductions. The facilitating agency must therefore actively recruit stakeholders into the decision process. Key individuals with interest in the process from the various communities must be recognized and engaged. In some cases, incentives for involvement will need to be identified and exercised, particularly for marginal groups.

OUTCOME-ORIENTED STRATEGIES

Policy and management for conservation of the Galapagos Islands may also be further improved in several ways. Recommended management strategies are: (1) improved socioecological research, (2) restructured funding systems to improve conservation on the islands and reflect this integrated approach, (3) implementation of current regulations, (4) additional eradication efforts, and (5) provision of social and economic alternatives for local residents and fishermen.

Additional research is warranted. Scientific study of introduced species and their impacts, building upon previous efforts, should be undertaken, particularly to conclusively identify and prioritize introduced and endemic species of greatest concern. This would expand understanding of the ways in which these species are changing the ecology of the islands and suggest avenues for management. More importantly, however, interdisciplinary analysis such as the present effort that integrates social, political, and economic factors is critical. This would offer a comprehensive understanding of the roots of the problem from a larger perspective. An explicit analysis of the most pressing problems facing the islands could be made, and action ranked on that basis. It may be that, given

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costs and benefits, current feral goat eradication efforts represent a misuse of scarce resources.

Second, funding systems should be restructured to allow the various parties to more effectively address the problem. The Ecuadorian government, which currently gives only about 5% of $60 million it earns in tourist fees back to the national park (Lemonick 1995; DeNicola, personal communication), should increase this proportion to allow for more intensive management by park officials. Other funding agencies could coordinate funding efforts such that an integrated program could be undertaken. This would necessitate that these agencies reorient their institutional goals regarding use of funds. Previously, these requirements have limited management efforts to strategies that address symptoms (e.g., goat eradication) rather than underlying causes (e.g., changing the social environment to limit introduction of goats by locals). This could also shift management from one-time efforts to ongoing strategies that ensure success over the long term, a goal which has already been acknowledged as desirable by the latest UNESCO effort.

Third, current regulations should be enforced. Regulations already exist that provide for quarantine, immigration, harvest of sea cucumbers and other marine resources, and introductions. However, without enforcement, these laws are meaningless. Because conservation of the Galapagos is technically a national issue, and the sovereignty of the Ecuadorian government should be upheld, enforcement should be carried out by the national government, either through the military or the Galapagos National Park Service.

Fifth, alternatives for individuals displaced by these policies, such as fishermen and other residents of the islands, must be provided. This could include federal aid, relocation allowances, and retraining to build skills in different sectors of the Ecuadorian economy.

If enforcement by the national government proves to be infeasible, perhaps due to upheaval on the mainland, some other institution with a vested interest and mission toward preservation of the islands could step in. UNESCO, in particular, could declare the islands an "endangered world heritage site" and take actions accordingly. This option is not preferable, however, because such dependence on the part of the Ecuadorian government on outside agencies should not be encouraged.

Fourth, further eradication efforts should be undertaken. Further socioecological analysis, as described above, may identify certain introduced species that can be removed using relatively simple and non-resource intensive solutions. In addition, feral goat eradication, if coupled with enforcement surrounding reintroductions and ongoing management, may actually be feasible. Such a program could also extend to other large mammals such as cattle and donkeys. The key is identifying emerging issues and addressing them before they become intractable.

Fifth, alternatives for individuals displaced by these policies, such as fishermen and other residents of the islands, must be provided. This could include federal aid, relocation allowances, and retraining to build skills in different sectors of the Ecuadorian economy. As long as an economic incentive exists for people from the mainland to immigrate and engage in illegal fishing activities, enforcement will continue to be difficult. Providing incentives for these people

is crucial. Further analysis of this option would be highly desirable but is beyond the scope of the present effort.

The development of a unified policy and management strategy, backed by authority and control, is critical. Policies, regulations, and management to date have been piecemeal, and this has contributed to the lack of effectiveness. By approaching the issue from a more comprehensive standpoint, effective solutions may be reached.

CONCLUSION

As can be seen, the invasive species issue on the Galapagos, because of the socioeconomic underpinnings of the human community, is far more complex than a purely biological view or analysis would suggest. Development on these islands for fishing and tourism has created a situation in which continuing introductions and reintroductions persist, at the expense of the native ecosystem. As a result, the conventional approaches attempted to date have shown and continue to show limited success.

To best achieve goals to eliminate or reduce invasive species, human social interactions and their impact on the biology of the islands must be factored into both analysis and management. Only through acknowledgment of this, and involvement of the various interests, will the basic issues be addressed. Failure to do so will result in continuance along the current trajectory, addressing the symptoms of the problem rather than the causes, to the detriment of the island ecology.

An approach that addresses the underlying sources of the problem, such as that presented in this paper, offers greater potential for successfully preserving this unique ecosystem. By creating an inclusive, explicit decision process and engaging in rational management decisions, the promise of satisfying the values of the various interests may be increased, human respect and dignity will be maximized, and the Galapagos Islands may be preserved for the benefit of all.

To best achieve goals to eliminate or reduce invasive species, human social interactions and their impact on the biology of the islands must be factored into both analysis and management. Only through acknowledgment of this, and involvement of the various interests, will the basic issues be addressed.

ACKNOWLEDGEMENTS

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APPENDIX

VISUAL AIDS USED IN THE ORAL PRESENTATION

Slide 1   A cover slide, showing the landscape and some of the key species on the Galapagos Islands.
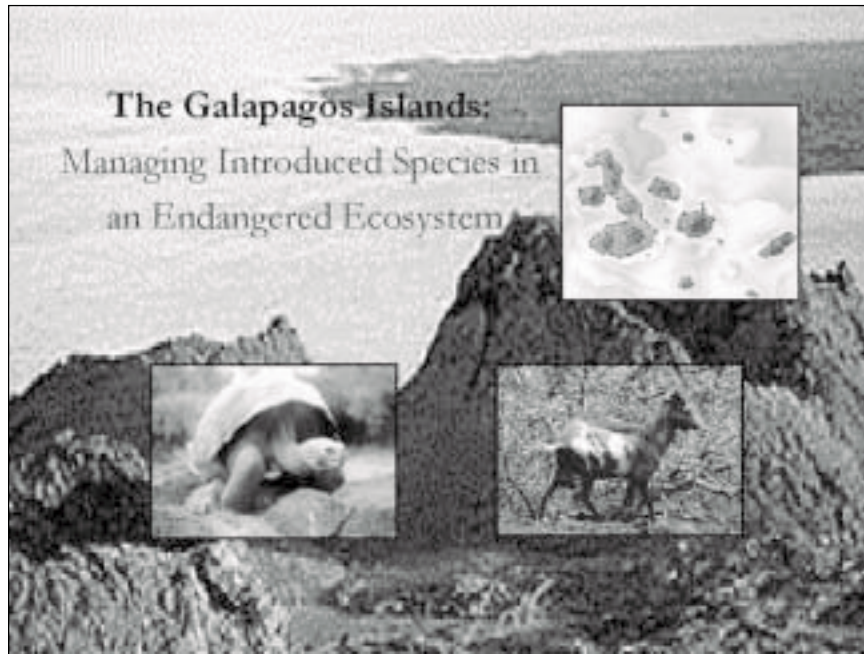
Slide 2   This slide outlines the policy problem that is being addressed, the purpose of the present analysis, my standpoint relative to the problem, and the methods used for research and analysis.
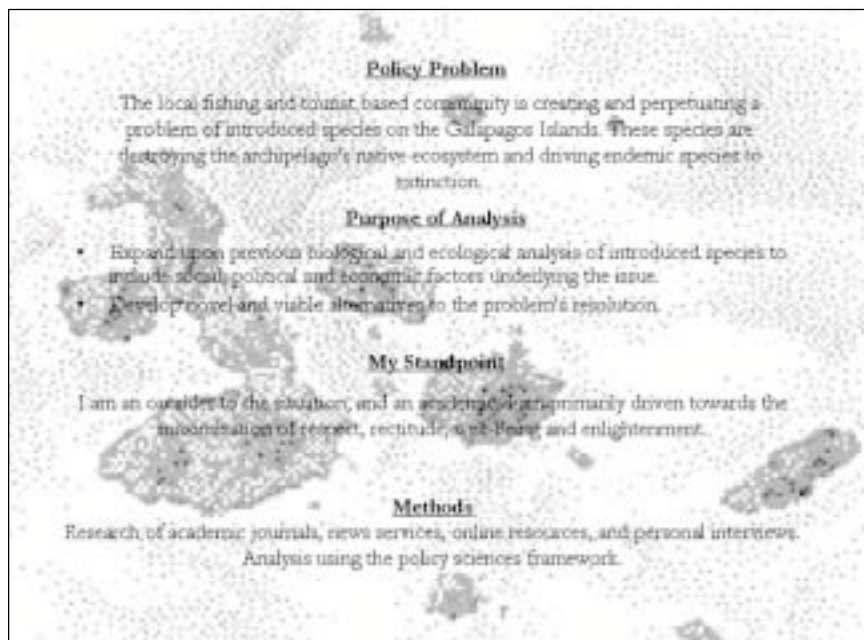
Slide 3   Illustrates various participants, their perspectives, and their interactions.
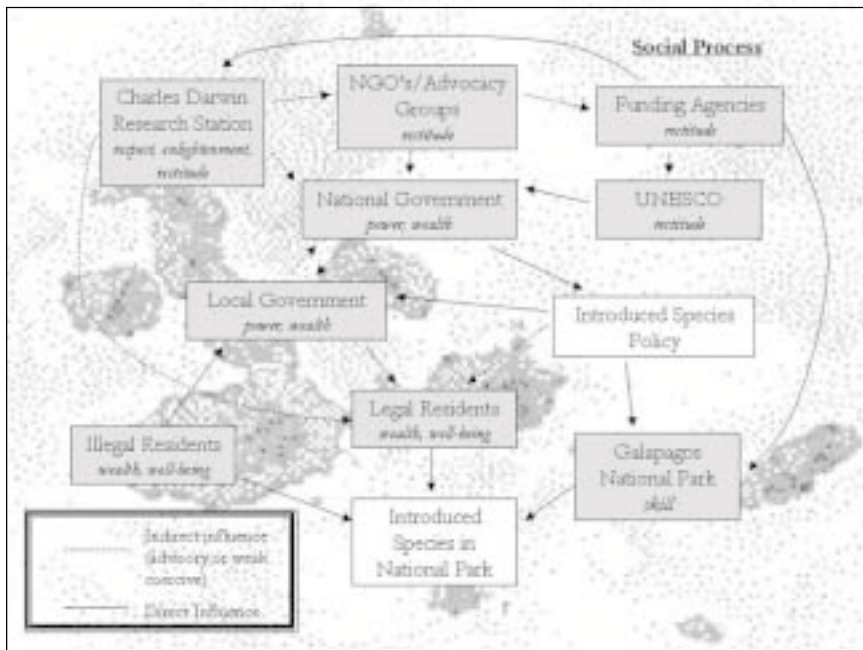
Slide 4   An outline of the six stages of the introduced species decision process on the Galapagos
           Islands, highlighting the problems in each stage confounding the solution of the problem.

Slide 5   This slide characterizes my standpoint and goals.

Slide 6   This timeline is a history of the Galapagos Islands, showing major events related to introduced species in the archipelago.

Slide 7   Key historical trends and projections based on these trends.

Slide 8   A mix of recommended strategies is called for. These address both process and outcomes along with the benefits expected from each recommendation.
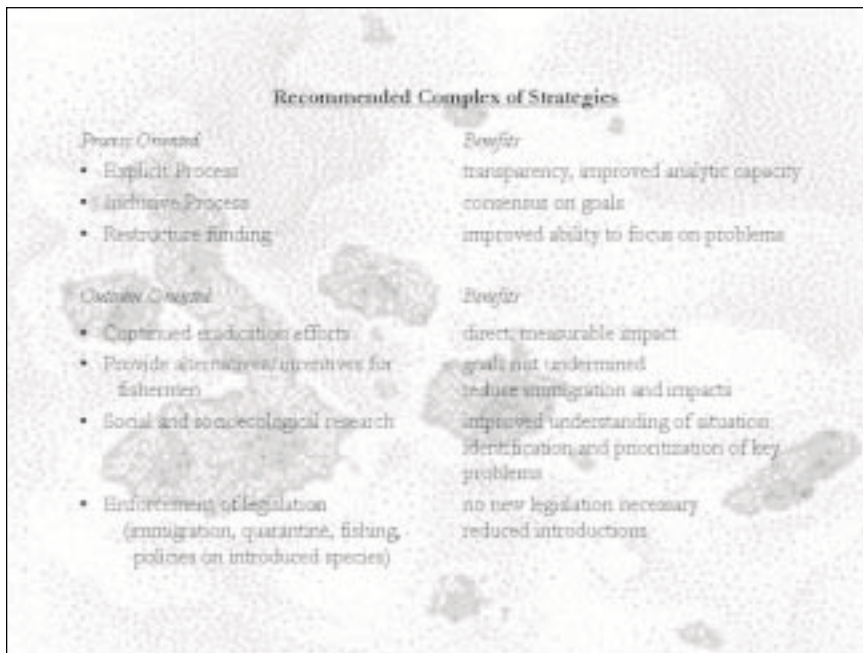
Slide 9   This concluding slide summarizes key points of the presentation.
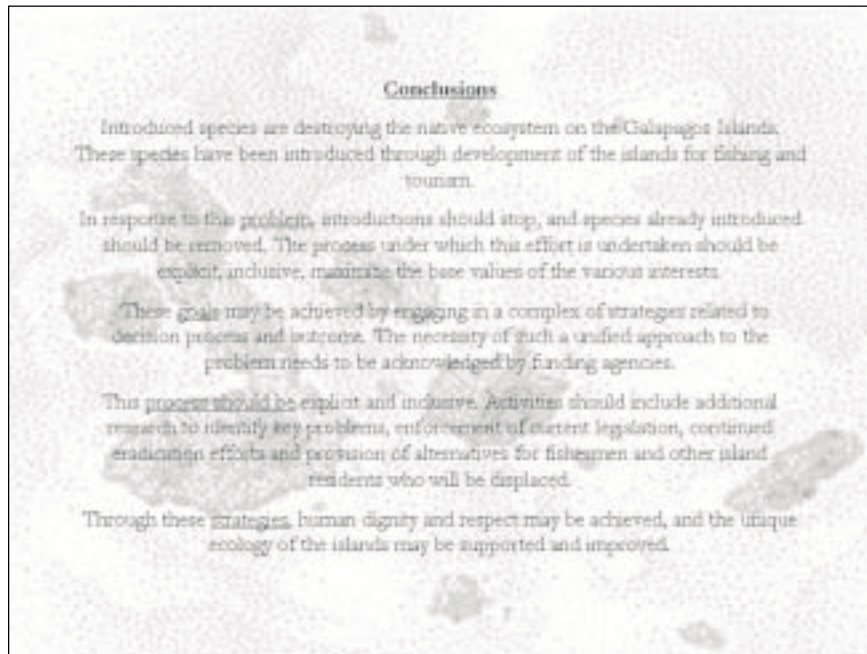
ABSTRACT

The Impact of Human Conflict on Eastern Lowland Gorilla Conservation in Kahuzi-Biega Nation Park, Democratic Republic of Congo

Omari O. Ilambu
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Kahuzi-Biega National Park was established in 1970 to assure long-term conservation of the Eastern Lowland Gorilla (*Gorilla gorilla graueri*). This endemic species is "endangered" according to the Primates Specialist Group, a Species Survival Commission group of the International Union for Conservation of Nature and Natural Resources. The park is also listed as a World Heritage Site and is managed for preservation of its flora and fauna. Growing human populations around Kahuzi-Biega National Park and conflicts over land within the corridor linking the two main parts of the park have led to stress on the small gorilla population. Attempts to address this problem have not been entirely successful to date. International assistance to improve long-term gorilla conservation within the park by reducing human pressure through micro-enterprise and community development has been helpful. This paper describes and analyzes conflict between local community development concerns and park management in the corridor between the two sectors of the park. Several options are examined to address problems, ranging from doing nothing, removing all illegal human settlement in the park, significantly involving local communities in park management, coercive enforcement of existing laws by park officials, to defining rights of access to natural resources. Three recommendations follow. First, a truly cooperative system of direct collaboration, negotiation, and mediation between park managers and the local community should be developed. This will allow local communities to feel ownership of the park and will improve the strained relations. Second, local communities should be able to develop small tourist activities related to the park, which can offset benefits of extracting natural resources and crop losses caused by animals leaving the park. Locals can also be employed in law enforcement activities related to the park, thus providing them a stable source of income and well-being. Third, establish sustainability in project assistance programs. Projects can be funded on the basis of collaborative planning between park management and the local community.

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ABSTRACT

Conflict Resolution between Local Communities and Park Management in Lake Mburo National Park, Uganda: The African Wildlife Foundation's Role

Chris M. Nyce, Yale School of Forestry & Environmental Studies

The protected area system of Uganda, East Africa, is steadily improving its management approaches to wildlife conservation. One example is the Community Conservation for Uganda Wildlife Authority project, which has supported Lake Mburo National Park to address conflicts with local communities over natural resource management. Since 1991 the African Wildlife Foundation, with support from both the Swedish Agency for International Development and the United States Agency for International Development, has implemented projects to aid this work. The goal of the community conservation approach is to involve local communities in park management decisions about access to and control over natural resources in the region. The trends that led up to the African Wildlife Foundation's efforts are reviewed, and the conditions behind these events are described. Historical events that led to conflict include: illegal hunting and the consequent handling/arresting of poachers, problem animals destroying crops in the communities without compensation, pastoralists being arrested inside the park with their cows for trespassing, corruption, violent exchanges between rangers and locals, the seasonal fluctuation of grazing areas and water and its influences on animal movement—all of which results in seemingly intractable conflicts. The African Wildlife Foundation's project to ameliorate these conflicts initiated from outside, without the communities ownership of the endeavor. This is typical of a large-scale development project where the targets, communities in this case, are recipients of the project activities and are unable to participate in the decision-making process owing to a lack of an open, inclusive learning system on the part of the project implementers. Despite the initial participation of some local communities in the project-planning process, the implementation phase is relatively closed because it does not have an adequate feedback process for successfully integrating community ideas into the implementation of its activities. Unfortunately, there is no easy way to resolve conflicts between local communities and park management. It is recommended that community conservation, as an innovation in protected area management, be further refined through experience, and the recently established Local Council III (Sub-county) Environment Committees be supported in their work to solve natural resource management questions for their constituencies with park management. This emphasis on local government promises to resolve conflicts between local communities and park managers.

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ABSTRACT

Tourism and Development: Implications for Snow Leopard Conservation in the Annapurna Conservation Area, Nepal

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The Annapurna Conservation Area was established in 1986 to manage environmental degradation. Its designation as a "conservation area," as opposed to a "park," was based on the World Wildlife Fund's Integrated Conservation and Development approach. The goal was to maintain positive relations with indigenous people while protecting and conserving the area's rich natural resources. The indigenous population was allowed to live in the designated area, and was also encouraged to take a partnership role in its management and sustainable development, in conjunction with the Annapurna Conservation Area Project management team. Though the Annapurna Conservation Area Project has achieved notable success in terms of both community development and protected area management, the focus on tourism (the area is Nepal's most popular trekking destination) as the means to achieve the project's development goals has led to a neglect of other stated goals, particularly wildlife conservation. The program lacks explicit linkages between wildlife conservation (e.g., the endangered snow leopard (*Unica unica*)) and community development, for example. This paper describes and analyzes how the project has handled snow leopard conservation. Alternative approaches for snow leopard conservation include coercive enforcement by the Department of National Parks and Wildlife Conservation, persuasive environmental education and outreach, agricultural extension assistance, from monetary compensation for livestock killed to monetary rewards for information on snow leopard poaching. I recommend several alternatives to improve snow leopard conservation. First, establish stronger and more formal links between the Annapurna Conservation Area Project and the Department of National Parks and Wildlife Conservation. The department has the legal authority to enforce the endangered species policy that protects snow leopards, but no physical presence within the conservation area. Second, agricultural outreach could provide the subsistence pastoralists with direct economic gains while reducing snow leopard depredation of livestock. This alternative fits well with the development philosophy of the Annapurna Conservation Area Project. Third, increase entrance fees, setting aside a portion for snow leopard conservation. This allows tourists, who value the snow leopard positively, to share in the cost of its conservation. Taken together, these alternatives will improve snow leopard conservation while maintaining the spirit and philosophy of the Annapurna Conservation Area Project.

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SPECIES CONSERVATION IN THE UNITED STATES

Conservation of species has been a central focus of the modern environmental movement. Yet species conservation has enjoyed mixed success, as is evidenced by the embattled Endangered Species Act and other similar national and international prescriptions. Papers in this section illuminate common problems faced by species, including the inability of conservation organizations to take into account diverse human perspectives toward threatened and endangered species, and the lack of adequate decision-making processes. A new conceptualization of species conservation is required that moves beyond the strictly technical and biological approaches used in many past projects.

The first of the three papers in this section is presented in its entirety, along with an appendix showing the visual aids used in the oral presentation of the paper to the class. The remaining two papers are presented in one-page abstract format.

(W)helping the Wolves: A Perspective on De-listing Endangered Species in Minnesota

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ABSTRACT
Endangered species recovery and conservation is a highly complex, multifaceted task requiring effective, interdisciplinary problem-solving strategies to be most successful. In order for a recovery program to be successful, science and values must be integrated in such a way as to generate a comprehensive, overall policy that can simultaneously and explicitly address the socioeconomic, organizational, political, as well as biological dimensions of the task. This paper uses the policy sciences to describe the management and delisting of wolves in Minnesota, analyze the recovery program as a policy process, and recommend ways to improve the integrity, quality, and appropriateness of endangered species policy in this case. It is argued that the current, dominant organizational and problem-solving approach—conceptually and administratively—is outdated and interferes with a clear understanding of contemporary conservation challenges. Ideas like adaptive management, prototyping, and organizational "self-awareness" are discussed in reference to establishing a practical conceptual framework for recovery. Suggestions for refining administrative arrangements and actions include organizing personnel and citizenry with a broad range of expertise into multiple, integrated teams of conservation professionals, and exercises in "reflection-in-action" such as systematic prototyping.

It is essential for the long-term conservation of large carnivores that the policies and programs in place are responsive, adaptable, and that they accurately reflect advancements in knowledge of cultural, sociopolitical, and biological information. Our ability to support and encourage sustainable conservation relies on the health of our governance processes, as well as a constituent endorsement of creativity and flexibility in natural resource management. Poised on the cusp of removing the wolf from the endangered species list, wolf management practices in Minnesota are under international scrutiny, and it is imperative that an effective policy mechanism develops to achieve ecological security for the wolf while ensuring that the recovery process itself is conscious of changing conditions and capable of informed, proactive adjustments.

The policy problem for Minnesotans and society-at-large exists at multiple levels. The unwillingness or inability of administrations to conceptually and explicitly consider delisting as a policy issue precludes awareness and resolution of a host of practical, tangible problems. For example, the bureaucratization of wildlife issues frustrates a clear and comprehensive strategy for securing a workable balance between national and local interests. In addition to heightened tension between state and federal authorities, complications like reliance on a narrow problem definition based almost exclusively on technical rationality arise from organizational dysfunction and the over-centralization of wolf management.

The purpose of this paper is to contextually describe management of wolves in Minnesota and provide background for examining the policy problem, analyze current policy and program shortcomings, and recommend measures to improve the recovery process by initiating a shift in organizational perspectives and practices.

Our ability to support and encourage sustainable conservation relies on the health of our governance processes, as well as a constituent endorsement of creativity and flexibility in natural resource management.

To clarify my standpoint with regard to wolf management in Minnesota, I am predisposed to believe that both wolves and humans can and should coexist. My motivation and interest in the problem at hand is based on a sense of values that include a desire for personal and ecological well-being and a motivation to enhance the diversity of life. I have acted as both an observer and educator while working at the International Wolf Center in Ely, Minnesota as a naturalist intern. My conclusions are drawn from my experiences as a student of ecology and policy, and from my work as a biological science technician in large carnivore conservation.

Methods used in this case study include a survey of policy sciences' literature and a review of conservation legislation such as the 1973 Endangered Species Act and the 1992 Eastern Timber Wolf Recovery Plan. Books and journal articles on ecosystem management were consulted, as well as Stephen Kellert's attitude surveys of Minnesotans in 1985 and 1999. While living in Minnesota during the fall of 1998, I conducted eleven informal open-ended interviews with natural resource managers and administrators, wolf biologists, and local residents.

THE SOCIOPOLITICAL CONTEXT OF WOLF RECOVERY

While protection under the Endangered Species Act is a process that represents a noble human concern for other species, "it is vulnerable to less noble human traits such as aggressiveness and dogmatism as well as domination by special interests" (Clark and Gillesberg 2001: 135). The working environments of our natural resource management bureaucracies are extremely challenging, and can be obscured by the intricate network of participants, conflicting policies, and the complex issues at stake. In order to adequately describe the extent and scope of the policy problem, the sociopolitical context of wolf recovery will be described, followed by a description of the policy problem in terms of the decision-making process. This paper's goals in reference to the problem at hand will then be clarified. This will lay the groundwork for the development of a set of recommendations for improving the integrity and efficacy of wolf management.

WOLVES AND HUMANS

The social dimension of wolf recovery is very dynamic, complicated, and largely dependent on professional participants' awareness of themselves, both on the level of individual professionals and in their associations as organizations and agencies. Focusing on the interactions between the major participant groups—the United States Fish and Wildlife Service (USFWS) and the Minnesota Department of Natural Resources (DNR)—I detail the policy problem by examining the actual or desired participants, their perspectives on the issue, the situations they interact in, what values or resources they use in their efforts to achieve their goals, what actions or strategies they use to achieve their goals, what outcomes they might achieve, and the real and potential effects of their actions.

The social dimension of wolf recovery is very dynamic, complicated, and largely dependent on professional participants' awareness of themselves, both on the level of individual professionals and in their associations as organizations and agencies.

The major participants in the process of wolf management in Minnesota can be divided into two groups. The first group is the policy formulators, which consists of Congress, USFWS senior agency personnel, and interest group lobbyists who collectively influence, write, or authorize legislation (e.g., the Endangered Species Act) that outlines policy aims (e.g., to prevent the extinction of species). The second group, the policy implementers, is comprised of Minnesota DNR agency program managers, administrators, bureaucrats, front-line biologists, and biological science technicians, who carry out the work of meeting policy goals (Clark 1993). These two organizational entities are in turn influenced—persuasively, coercively, or forcefully—by special interest groups representing a wide spectrum of views, from the Minnesota Cattleman's Association to The Wildlife Society.

Both the state and federal government desire to delist the wolf, albeit for very different reasons. U.S. Department of Interior Secretary Bruce Babbitt announced in a recent press release that the "USFWS would propose delisting, which would reflect well upon the embattled Endangered Species Act. Furthermore, wolf recovery programs in other states could lose political support if it is perceived that Minnesota's large wolf population cannot be easily removed from the endangered species list" (Route 1999: 9). Allen Rutberg, a senior scientist with the Humane Society of the United States, feels that the situation characterizes the serious pressure on USFWS to demonstrate that the Endangered Species Act works (International Wolf Center 2000). The state, on the other hand, is heavily influenced by the livestock industry, and desires to have the wolf delisted so that more aggressive measures can be taken to minimize economic loss to farmers due to wolf depredation. Ideally, government agencies should transcend ideological differences and serve as neutral administrators who carry out the will of the people. Because the conservation of endangered large carnivores and their habitats touches a broad range of activities and lifestyles (e.g., trapping, timber harvest, oil and gas exploration, recreational activities, hunting), there is a diverse range of possible participants, especially if the conservation process is intended to be open and democratic.

According to DNR Commissioner Al Garber (Don Carlos 1999: 1), the state addressed concerns of those affected by wolf management by initiating "a process of building consensus on recommendations for wolf management [that] was inclusive and thorough." To operationalize this, DNR convened a wolf management roundtable which included representatives of all areas and all interests concerned with the future of wolves in Minnesota, including private land owners, agricultural interests, Native Americans, animal protection advocates, and other Minnesota citizens (see Table 1 for complete list of participants).

The roundtable addressed the most difficult issues regarding wolf management through a purported consensus-building process, and reached agreement on recommendations to the DNR and the Legislature for a wolf management plan. However, rather than being open to all interested parties,

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Table 1   Wolf Management Roundtable participants

Minnesota Department of Agriculture	Freelance writer
Minnesota Department of Natural Resources	Professor (affiliation and expertise unknown)
Minnesota Farmers Union	Minnesota Lamb and Wool Producers Association
Police Commander	Minnesota Deer Hunters Association
Lake County Commissioner	Minnesota Farm Bureau
Minnesota Turkey Growers Association	Minnesota Cattleman's Association
Fond du lac Reservation	Minnesota Trappers Association
Mille Lacs Band of Ojibwe	Minnesota Chapter, Safari Club
White Earth Reservation	The Wildlife Society
Red Lake Band of Chippewa Indians	Izaak Walton League
Minnesota Conservation Federation	Friends of Animals and Their Environment
Leech Lake Reservation	Audubon Society
Grand Portage Band of Ojibwe Indians	HOWL
Outdoor writer	Animal Rights Coalition

Speaking to the tension between local and national interests, Boyd Littrell (1980: 270) notes that our public institutions are becoming increasingly bureaucratic, and that this fact poses a significant dilemma in a democracy because "there is less extensive participation than some might hope and that bureaucracy serves as a tool for maintaining power in relatively few hands."

participants in the roundtable were selected and assembled by state authorities and mediated by Roger Williams, the state representative from the Bureau of Mediation Services. This suggested that the government was unwilling to be inclusive or truly diversify the consensus process. Speaking to the tension between local and national interests, Boyd Littrell (1980: 270) notes that our public institutions are becoming increasingly bureaucratic, and that this fact poses a significant dilemma in a democracy because "there is less extensive participation than some might hope and that bureaucracy serves as a tool for maintaining power in relatively few hands."

Whereas the outcomes of the roundtable discussions produced recommendations for improving wolf management, the issue at stake is the degree to which long-term stakeholders are reasonably incorporated into the decision-making process. Steven Kellert, an expert on the human dimensions of wildlife management, identifies "significant shortcomings in traditional approaches to wildlife management and administration" with regard to endangered species protection, and found specific "institutional problems [such] as inappropriate reward structures, conflicting administrative goals, limited competencies, inconsistent agendas, rigid leadership patterns, fragmented decision making, poor communication skills, and inadequate accountability" (Kellert 1996: 203). In addition to resistance toward effective and genuine inclusion of diverse citizen input, these organizational characteristics are symptomatic of a core policy problem, namely the lack of explicit recognition of delisting as a political problem, rather than a strictly technical quantifiable set of issues. Reliance on technical rationality as in this case is evident throughout the design and

implementation of much of wildlife policy, and confounds a clear, comprehensive understanding of the complexities of carnivore conservation (Clark 1997).

WOLVES AND DECISIONS

The interactions of individuals and organizations concerned with wolf recovery in Minnesota are predicated upon and occur in a cultural environment that is dominated by a dependence on quantification and scientific rationality. Frequently, scientific or technical issues are invoked to legitimize or justify—rather than inform—bureaucratic decisions (Majone 1989). As such, a review of weaknesses in the decision process for delisting the wolf from its endangered status can provide insight into how the inherent "blind spots" of a policy or program can obstruct a truly common interest conservation effort.

During the early stages of determining wolf management policy, reliance on strictly biological, empirical data, and centralization of power with the federal government exacerbated the already tenuous relations between state and federal authorities. Each state is responsible for managing wildlife within its borders unless a species is listed as federally threatened or endangered under ESA. The question of wolf conservation in Minnesota therefore originated as a national rather than local issue with the 1973 passage of the ESA. Like most natural resource programs, wolf management was initially defined and shaped within bureaucratic agencies. As a result, a limited range of structural and operational options were explored—those that maintained or enhanced agency power.

The recovery criteria established in the 1992 revision of the Recovery Plan for the Eastern Timber Wolf were prepared by a panel of scientists and administrators assembled by the dominant participant, the USFWS. Significant negative consequences resulted from how participants interrelated, how decisions were made, and how work was performed (see Clark 1997). Drastically oversimplifying the problem of wolf conservation into purely numerical terms, information was only collected about wolf biology, and the complex matrix of social, economic, organizational, and political issues in which the wolf issue is embedded was ignored. Kellert (1985) notes that nearly all endangered species recovery programs are directed by wildlife biologists, and their understanding of the parameters of the problem reflects the emphasis in their training on biological assessments and solutions. As a result, the subtle nuances of the cultural environment, which may be one fundamental cause of species endangerment in the first place, are often easily overlooked. The lack of diverse expertise and perspective creates a bias which countermands the ultimate goals of carnivore conservation.

Consequently, the prescribed government program did not harmonize with the norms of many Minnesotans. The reclassification of the wolf from endangered status to threatened status in 1978 could be interpreted as evidence of government agency submission to the special interests of the private sector (predominately the livestock industry). It was also an action that set the stage

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for inconsistent and irregular enforcement. Because the state and federal governments have different priorities, and no clear protocol could be found for resolving these differences, coordination of efforts in wolf management could be described as inadequate and perpetuated a narrow problem definition, an imbalanced reliance on biological data, and an unhelpful tension between local and national interests. This is one example of how the organizational design unintentionally creates obstacles to effective cooperation in both planning and implementing public policy. The structure of the government's operating system is predicated on a bureaucratic power-centered view which is inimical to change. Perrow (1979: 6-7) notes that government agencies tend to "stifle the spontaneity, freedom, and self realization of their employees," and that the biggest danger in bureaucracy is "how it inevitably concentrates those forces [social resources] in the hands of a few who are prone to use them for ends we do not approve of, for ends we are generally not aware of, and more frightening still, for ends we are led to accept because we are not in a position to conceive alternative ones."

Any effort to move towards resolution of the wolf conservation problem requires a recognition of the inherent organizational deficiencies that limit effectiveness of endangered species recovery as a process. Because recovery is a multifaceted task with both technical and social dimensions, the major constraint in delisting the wolf is lack of effective processes to integrate science and values and to address—simultaneously and explicitly—the socioeconomic, political, and organizational dimensions of the task. If participants do not acknowledge the process at work and hone realistic knowledge of it, then efforts to remove the wolf from the endangered species list will remain less than effective.

ANALYSIS OF WOLF CONSERVATION

To analyze the wolf policy problem more closely, I will now focus on what has happened in the program, under what conditions (why), and what is likely to happen in the future. A discussion of cultural, historical, and ecological trends concerning the wolf in Minnesota is integrated with an examination of the factors that have shaped the unfolding decision process in contemporary wolf management.

Antagonistic attitudes toward large carnivores are based on and continue to be drawn from historical and cultural fears, and concerns for human safety. These beliefs are about real or perceived competition with humans for livestock, game, and habitat as well as concerns over the loss of property rights—from the perspective of states and as individuals—under conservation legislation like the ESA (Primm 1996). Douglas H. Pimlott, one of North America's wolf experts, points to the similar behavior patterns shared by man and wolf, both hunting cooperatively and living in socially complex bands, as a potential explanation for why the tension between the two species runs so deep (Walker 1994: 242).

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Since enactment of Minnesota's first bounty system for killing wolves in 1849, the animals have been efficiently, ruthlessly, and irrationally destroyed; their numbers were reduced from over 2 million in the continental United States to about 350 to 750 animals in northern Minnesota by the end of the 1950's (Matthiessen 1959). The impacts of the government predator control programs in the first half of the twentieth century objectified and vilified the wolf, and reinforced negative associations connecting the wolf to death and doom (Lopez 1978). These officially sanctioned actions served to affect relations between man and wolf, and would later complicate efforts to protect the previously publicly maligned wolf from the very human populations that were once encouraged, rewarded even, for pursuing the wolves' total and complete annihilation (see Table 2 for a timeline of significant wolf management events).

Table 2   Timeline of significant events in Minnesota wolf management.

DATE	EVENT
1849	First bounty system in Minnesota ($3 per wolf)
1914	U.S. Government provides poison and personnel to extirpate wolves
1956	Minnesota ends a wolf control program that involved aerial shooting
1963	Estimated 300-750 wolves remain in Lower 48 states
1965	Minnesota bounty repealed ($35 per wolf)
1969-74	Minnesota conducts directed predator control programs providing incentives to trappers
1973	Endangered Species Act signed into law
1974	Public harvest of wolves ends
1978	Minnesota wolves reclassified from endangered to threatened
1980	Minnesota Department of Natural Resources (DNR) prepares wolf management plan and makes bid to restore state management of wolves; refused by federal government
1992	Eastern timber wolf recovery plan revised
1997	DNR conducts extensive survey of wolf distribution and abundance in state
1998	Minnesota convenes a wolf management roundtable to use a consensus building process to generate recommendations for the legislature for the wolf management plan
1999	Legislature adjourns without approving Plan

The original government stance regarding the wolf in Minnesota—providing poison and personnel to extirpate wolves in 1914, carrying on a predator control program through the mid-fifties that mandated aerial shooting, and providing inducements and incentives to trappers up until 1973—created a tremendous amount of negative wolf sentiment.

The original government stance regarding the wolf in Minnesota—providing poison and personnel to extirpate wolves in 1914, carrying on a predator control program through the mid-fifties that mandated aerial shooting, and providing inducements and incentives to trappers up until 1973—created a tremendous amount of negative wolf sentiment. One Minnesota resident described passage of the Endangered Species Act as sudden and unwelcome, and its impacts reverberated through northern Minnesota on a local level in the form of refusal to obey regulations against killing wolves, and interference with the government attempts to monitor the endangered populations. This changed behavior on the part of the government had the consequence of undermining

trust and cooperation between government officials and citizens, as well as between state and federal authorities (see Brunner 1994). Steven Bissell (1994: 324) describes the strain which evolved from this federalist dissent:

> Under the Tenth Amendment to the U.S. Constitution, the states have traditionally assumed most of the authority to manage wildlife resources. However, court decisions since the turn of the century have gradually given more and more power to the federal government. With . . . the ESA the federal government has exerted increasing presence in on-the-ground management. There is widespread concern among the states that the emerging issues of biodiversity, ecosystem management, and landscape planning are being used by the federal government to further erode state control of wildlife policy. The history of intergovernmental coop-eration in wildlife policy has not been smooth, and there are indications that there will be more problems in the future.

The shift in priorities of the DNR reflects the preferences of the historic or extant political conditions. Historically, DNR emphasized production and protection of tangible products for the public and commodities such as lumber, oil and gas exploration, minerals, huntable or watchable wildlife, and recre-ational activities. The conflicting mandates and objectives of the DNR and the USFWS regarding wolves exemplify how the conflict over carnivore conserva-tion is often "a surrogate for broader cultural conflicts: preservation versus use of resources, recreation-based economies versus extraction-based economies, urban versus rural values, and states' rights versus federalism" (Primm and Clark 1996: 1037).

Two additional trends are worth emphasizing in the context of the recent wolf management consensus roundtable: first, the notion of science as being pitted against policy, and second, the change in attitudes, knowledge, and behaviors towards wolves in the past fifteen years. Conservation issues are frequently framed as "science versus politics." Often, the political arena weighs beliefs, values, and cultural preferences against one another, resulting in decisions that are virtually always based on these considerations. Even when representative data are available, "we often cannot answer key management questions because our models are unable to address the complex mix of variables believed to affect carnivore populations" (Mattson and Craighead 1994: 120). The initiation of a conservation process which attempts—even if only symbolically—to recognize the importance of integrating science with respect to values is promising for the prospects of improving the endangered species recovery process.

The initiation of the wolf management roundtable indicates a response to the growing interest in the outcomes of conservation as well as to improved knowledge about wolves, heightened civic interest in having an active voice in

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wildlife policy, and shifts in public attitudes. Kellert's (1999) attitude survey of Minnesotans revealed a substantial expansion of positive perception of wolves during the past fifteen years, increased support for the idea of maintaining a healthy wolf population in the state and the surrounding region, while support for government involvement in wolf management decreased, perhaps a manifestation of the longstanding resentment toward government.

Notwithstanding the apparent cooperative effort among government agencies, citizen interest groups, and private citizens, the delisting process is still rife with conflict. To date, Minnesota officials have not provided a publicly scrutinized plan, the state legislature recently adjourned without passing legislation to address wolf management under state law, and the livestock industry has threatened to sue the USFWS to delist the wolf, while several wolf advocacy groups have threatened litigation to prevent the wolf from being delisted (Route 1999).

Projecting these current strained circumstances into the likelihood of future outcomes, it is possible to anticipate that the discord and dissent now marking the delisting process will negatively affect the conservation of wolves in Minnesota. However, Wallace and Clark (1999) point out that such projections can also indicate where interventions or other alternatives are needed to address the problem and provide acceptable or better future outcomes.

RECOMMENDATIONS FOR IMPROVING THE DELISTING PROCESS

We know that problem solving progresses in a dialectical fashion: evidence facing counterevidence, the identification and integration of new facts and experiences, and the testing of long held belief systems (Lovejoy 1989). In order for the wolf delisting process to be effective and offer viable solutions to root causes of the policy problem as defined here, participants must become aware of themselves as part of an ongoing and educable process of problem identification and definition, debate, decision, and program implementation and evaluation. There are many examples where scientists have tried to treat endangered species recovery as a narrow scientific problem and other examples where administrators and politicians have tried to treat it as a political problem where little systematic awareness of process existed (Clark *et al.* 1995).

The current organization of wolf management in Minnesota has a distinct and pervasive tendency to focus on the technical, biological aspects of wolf recovery instead of reviewing the process's own successes and failures. Lowry and Carpenter (1984: 4) determined "a wealth of anecdotal evidence that suggested that efforts around the world to ensure the sustainable exploitation of natural systems are suffering from governmental disorganization and mismanagement." This appears true in the wolf case as well.

Three ways to improve management of wolves in Minnesota are: (1) inclusion of a broad range of people with something to contribute or something at stake in the program, (2) using interdisciplinary, high-performance work

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teams comprised of government and non-government experts across a variety of disciplines, and (3) exercises in organizational "reflection in action," such as adaptive management and prototyping.

First, activities such as the inclusion of citizens and personnel with a broader range of knowledge and experience into the process would bring diverse people together, foster creative problem solving, and provide a structure and means to support individuals and the conservation task. Simply exhorting scientists and politicians to communicate better and to understand the policy process in a more reflective, constructive way is insufficient for affecting and improving decision-making processes. Thus the ability of the wolf recovery process to learn from itself is severely diminished and the mechanism for improving the delisting process hobbled.

Second, establishing high-performance teams consisting of professionals with long formal training and experience in relevant fields could help. Such teams would ideally be composed of mature, well socialized individuals with dedication, high ethical and performance standards, and the ability to work unfettered by extensive rules and regulations. Although demanding, professionals find it easier to exercise creative problem solving within such management arrangements and utilize skill in leadership, planning, organizing, decision making, and the handling and use of information (Clark 1997).

This type of interactive teamwork would give rise to more comprehensive problem definition, reduce single agency domination, and perhaps offer endangered species conservation an incentive, or template, for future reorganization. The establishment of team(s) of participants would simultaneously create opportunities for cooperation, generate a heightened sense of involvement and empowerment, and increase both individual and organizational self-awareness while diversifying perspectives. This approach to improving management of wolves in Minnesota demands a commitment to devolution of power on the part of the bureaucracy. However, this initiative is not a recommendation to turn endangered species recovery over to local groups. "The participation of federal, state, and local governments and input from the scientific, conservation, and community groups is the only way to provide for the necessary shared responsibility, representation, and solid deliberation of all issues, perspectives, and strategies" (Clark 1997: 204).

Third, adaptive management techniques such as reflection-in-action and prototyping could be employed to improve the recovery process. Reflection-in-action is a way of continuously analyzing, evaluating, and restructuring processes to respond to new situations and changing conditions. Clark (1996: 16) defines this kind of reflexive, organizational growth as "the process by which organizations detect and correct errors, that is, mismatches between expectations and outcomes. Organizational improvements come from learning about past performance, analyzing the causes, and then seeking appropriate change."

The bureaucratic structures of the USFWS and the Minnesota DNR are

This type of interactive teamwork would give rise to more comprehensive problem definition, reduce single agency domination, and perhaps offer endangered species conservation an incentive, or template, for future reorganization.

tractable problems, although their rigidity and regimented administration complicates both conservation efforts and attempts to restructure the organizations themselves. Government agencies can be reorganized and debureaucratized in several ways. Most agencies suffer from the "institutionalization of solutions, which carries with it the institutionalization of problem definition" (Dery 1984: 84). Gill (1988: 10) states that "organizations dedicated to excellence will have to be characterized by flexibility, adaptation, sensitivity, public value ethics, and leadership…the organizational leadership must declare publicly, perhaps as a preamble to the agency's strategic plan, the set of organizational ethics to which it will be bound."

Prototyping is a strategy of self-observation, insight-building, and enhancement of understanding. It can increase self-awareness of individuals and agencies involved in recovery, promote responsive and flexible management, and reduce the likelihood of a single problem definition dominating the process (Clark *et al.* 1995). Beginning with a set of guiding principles, prototyping acknowledges that management decisions can be treated as testable hypotheses (Brewer and deLeon 1983).

Unfortunately, various obstacles complicate the implementation of these recommendations. Putt and Springer (1987) suggest several specific sources of resistance, including: fear of loss of status, prestige and power, threatened job security, threatened work philosophy and practice, fear of the unknown, and an innate dislike for forced change.

The goal of improving the recovery process by which endangered species can be effectively and efficiently removed from the endangered species list can only be achieved through awareness and action by individuals. At the individual, and the organizational, level, capable leadership, pride in results, a clear and strong sense of mission, diverse talent and representation, and exacting performance standards are all needed. It is essential to "recast the challenge of threatened species recovery in terms of learning at individual, organizational, and policy levels as a basis for accelerating improvements" (Clark 1996: 13).

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CONCLUSION

The biggest challenge in wolf management in Minnesota is overcoming the deeply ingrained professional norms and the innumerable fixed rules and roles of bureaucratic management. The current policy problem results from a weak organizational approach to the delisting process, primarily stemming from exclusivity, state and federal tension, and narrow problem definition. The existing program jeopardizes the integrity, quality, and appropriateness of wolf management in the Great Lakes Region. In order to improve the endangered species recovery process, delisting of the wolf in Minnesota must be viewed as a policy process and an opportunity to transform bureaucratic organizations into generative, adaptive learning

systems. Adaptive management includes diverse participants, interdisciplinary expert teams, and learning.

ACKNOWLEDGEMENTS

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APPENDIX

VISUAL AIDS USED IN THE ORAL PRESENTATION

Slide 1   The titled cover slide depicts mythological representations of the relationship between wolves and humans, and humans and earth as embodied in the "mother nature" concept.

Slide 2   This slide articulates the overarching policy problem and identifies its specific manifestations.

Slide 3   The schematic diagram depicts the social process by illustrating the participants, their perspectives, and their interactions. The process is highly dynamic: each participant can, at any given moment, embody the perspectives, motives, and intentions of another, as represented by the mobility of the egg-shaped categories within the context of the wolf issues (dark circle).
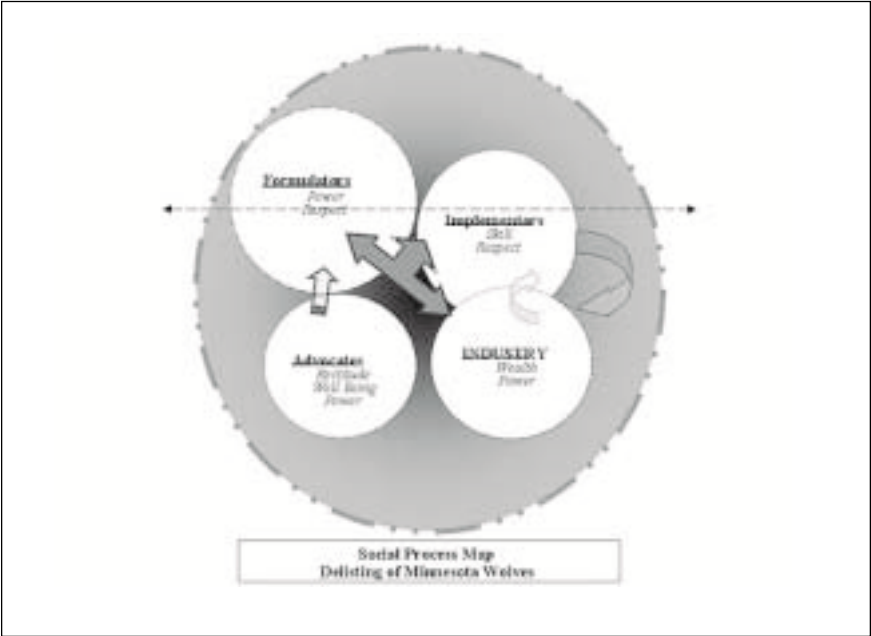
Slide 4   With the background hinting at the complexity of the decision process, this slide speaks to the individual stages of decision making, and underscores potential problems in each phase.

Slide 5   The timeline presented on this slide summarizes major events related to wolf management in Minnesota.
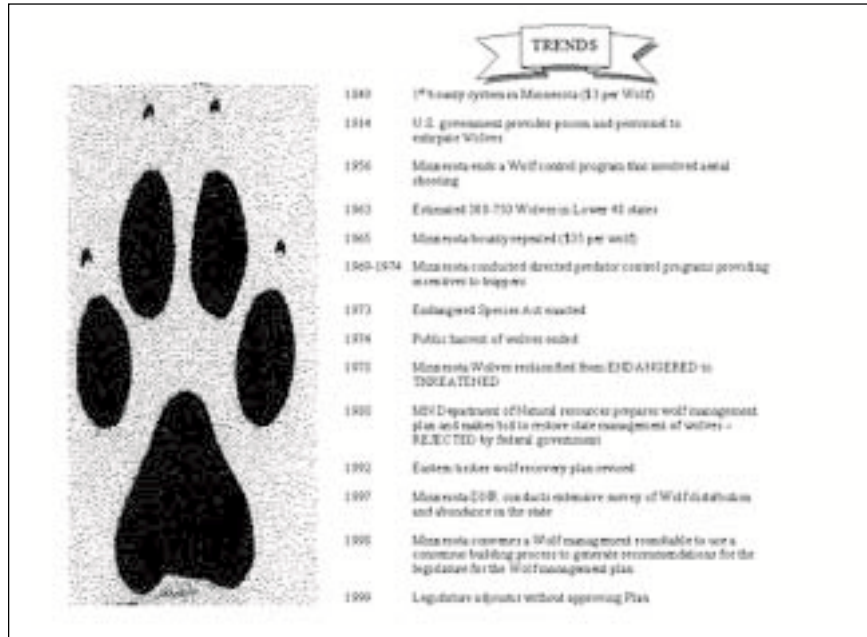
Slide 6   This slide highlights significant changing conditions with regard to perceptions of wolves in Minnesota in recent history.
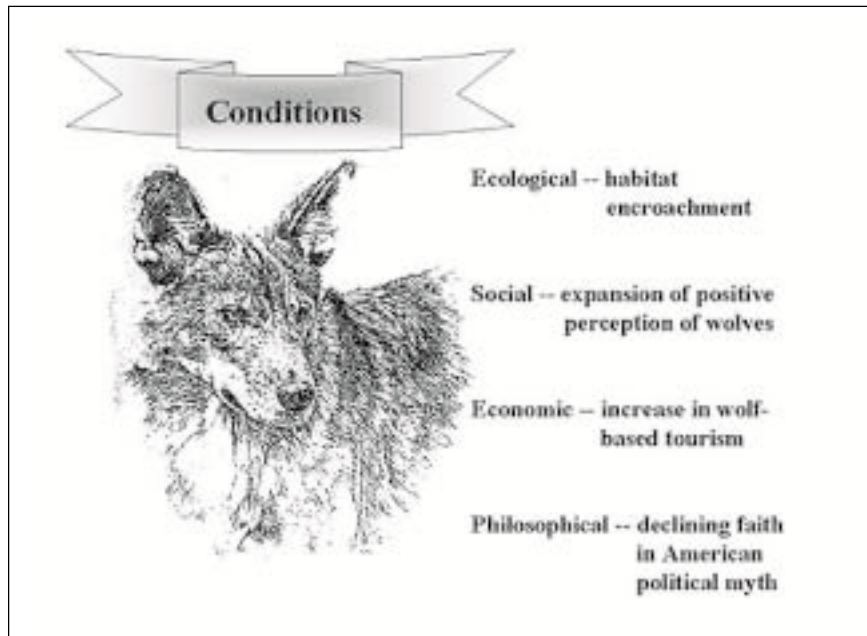
Slide 7   In bulleted, readable form, this concluding slide identifies recommended strategies for
           improving the management of wolves in Minnesota.

ABSTRACT

Black-Tailed Prairie Dogs: A New Era of Management?

Caroline Kuebler
Yale School of Forestry & Environmental Studies

For more than a hundred years, prairie dogs have been considered pests, leading to widespread eradication programs carried out at federal, state, and local levels. These programs along with other factors such as habitat destruction, recreational hunting, and sylvatic plague have led to a 98% decrease in prairie dog populations in the United States. As awareness of prairie dogs and their importance to the prairie ecosystem has increased, a new management objective has come into the forefront—one of prairie dog conservation. This objective encompasses the protection of current prairie dog populations and their associated habitats, and ultimately an increase in their numbers to a sustainable level. The current problem is how to institute this new objective in a way that garners public support. Not only must existing management plans be changed, but the public beliefs that prairie dogs are pests must be altered. This paper analyzes the problem, specifically focusing on past management policies related to the black-tailed prairie dog, as well as the alternative conservation plans currently under consideration. The federal government has been petitioned by various environmental groups to list the black-tailed prairie dog as a threatened species. One alternative would be for this listing to occur. As a second alternative, the eleven states within the historic black-tailed prairie dog range have written a cooperative interstate management plan, in lieu of federal listing of the black-tailed prairie dogs. A third alternative would be to use a "practice-based" approach, finding programs that have already been successfully implemented and using those as models in other locations. The practice-based alternative is recommended because it recognizes that one management plan will not suit every situation. New programs can be tailored to their specific sites. Programs that have worked in specific areas can be used as a template for new programs in similar areas. New programs can be evaluated and modified as needed.

CAROLINE G. KUEBLER graduated from Yale University's School of Forestry & Environmental Studies, where she received her Master's degree in Forest Science in May of 2000. She completed her BA in plant biology from Washington University in 1998. Caroline has worked in both genetics and plant anatomy laboratories, as well as with endangered plants. She spent the summer of 1999 working in Panama on a project examining anatomical and ecological aspects of the tropical shrub genus *Psychotria*.

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ABSTRACT

The Yellowstone Grizzly Bear Policy Process

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The grizzly bear was given federal protection under the Endangered Species Act in 1975 in the coterminous United States. As a result a Grizzly Bear Recovery Plan was released in 1982, and revised in 1993. The goal of the revised Recovery Plan "is to identify actions necessary for the conservation and recovery of the grizzly bear." The plan also states that these outlined actions will ultimately result in the removal of the species from "threatened" status. The grizzly bear policy problem, however, pre-dates these events. In 1968 a controversial management decision by the U.S. Park Service phased out the Yellowstone National Park garbage dumps. Grizzlies used the garbage dumps as a predictable food source, effectively keeping bears away from people, safely within the confines of the Park. Today bears are distributed widely. Presently there is a push by federal authorities to "delist" the grizzly bear in Yellowstone, causing conflict between scientists, environmental groups, and resource users who disagree over the status of the population and the adequacy of bear management. This paper analyzes the grizzly bear policy process of the last 30 years in a relatively comprehensive way. By mapping the full range of participants, examining the values at play, and looking at past, current, and future trends, patterns become evident. In addition, mapping participants' values reveals gaps in the existing incentives structure. This analysis opens up possibilities for improving the grizzly bear policy process. A strategy is suggested to improve the existing policy process for the conservation organizations and agencies involved in the process. Conservation organizations may be able to make better use of partnerships, values that they share with influential groups in the process, advocacy coalitions, and site-specific grizzly conservation prototype management experiments. For the agencies, more inclusive funding mechanisms for bear management may increase access for non-agency expertise to the process, and enhanced agency commitment to the principles of the Endangered Species Act are recommended. Creating appropriate incentives will allow a more cautious approach to delisting by the U.S. Fish and Wildlife Service, insuring that the population is truly recovered before they lose federal protection under the Endangered Species Act. Concrete steps taken towards implementing these strategies will move towards an improved grizzly policy process, with greater local and national support for the long-term survival of one of our nation's most magnificent native predators.

JULIE T. STEIN received her Master's degree in Environmental Science from the Yale School of Forestry & Environmental Studies in 2000. She is interested in human behavior, animal behavior, and the policy processes that unite the two. The first half of her professional career was spent working in the art world. She now hopes to integrate her arts background seamlessly with a future in science and policy.

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EVALUATING CONSERVATION INITIATIVES

Conservation initiatives, in general, suffer from a lack of systematic evaluation. As a result, the opportunity to learn from and integrate the lessons from these efforts is squandered. To demonstrate how this problem can be addressed, the papers in this chapter assess several conservation initiatives, finding varying degrees of success at achieving initial goals. The papers show that failure to perform contextual integration of social factors in conservation initiatives often leads to problems. Conversely, those initiatives that successfully integrate social and political realities often enjoy relative success. Consideration of the social context and decision-making process in the present analyses, in particular, allows for comprehensive treatment of the various programs evaluated.

This section features the work of four individuals, demonstrating the importance of evaluation as a key activity in the policy process. The first of the four papers is presented in its entirety, along with an appendix showing the visual aids used in the oral presentation of the paper to the class. The remaining three papers are presented in one-page abstract format.

Resolving Land Conflict Along the Border of the Mbaracayú Reserve, Paraguay

Jonathan Padwe
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ABSTRACT

A conflict over land use arose along the border of the Mbaracayú Nature Reserve in Paraguay, among the Aché indigenous community of Arroyo Bandera, the colonists of the María Auxiliadora settlement, and the Fundación Moisés Bertoni (the reserve managers). The Aché, who have legally-established rights to hunt within the Reserve, sought access to the Reserve by crossing over newly settled lands at María Auxiliadora. Concerned about illegal poaching and deforestation carried out by colonists, the Fundación Moisés Bertoni intervened to help purchase lands from the colonists and transfer title to the Aché, assisting the colonists to relocate to settlements more adapted to colonist needs. This paper describes the land conflict problem at Mbaracayú, analyzes the problem, addresses the adequacy of the social and decision processes and participants' goals, and makes recommendations for future problem-solving efforts. The selected policy, implemented in 1997-1998, was effective in satisfying many of the participants' interests in this case. However, several possible negative impacts of the policy are examined, including the possible creation of Aché dependency on the Fundación Moisés Bertoni, and the undermining of Aché claims of original rights to all of their former territory.

The Mbaracayú Nature Reserve is a 60,000 hectare protected area in eastern Paraguay managed by the Fundación Moisés Bertoni (FMB), a Paraguayan non-governmental organization. The Reserve is the second largest area protecting the Atlantic Forest of the Interior (or Alto Parana) forest type (Hill *et al.* 1997). About 90% of the species considered rare and endangered in Paraguay are found in the Reserve (FMB 1993), and the Reserve is especially important for the conservation of over 400 bird species, many of them endemic to the forest type (Padwe 1994; Madroño and Esquivel 1995). There are no human inhabitants in the Reserve. However, several human habitations surround the Reserve and pose a concern for the conservation of biodiversity within the protected area boundaries. Human communities include settlements of indigenous Guarani agriculturalists (Ava Guarani, Mbyá and Pái-Tavyterá), settlements of the indigenous Aché hunter-gatherer group, and *campesinos* (smallholder farmers) living in colonies established in the process of land distribution by the Paraguayan Land Institute (FMB 1993). This case study describes the conflict over land use which arose between the Aché community of Arroyo Bandera, the *campesinos* of the María Auxiliadora colony, and the FMB managers of the Reserve. At Mbaracayú, the common interest of the three parties was peaceful co-existence.

This paper examines the policy problem which faced the participants. First I describe the policy problem in terms of its context, decision process, and the goals of the participants. Next, I present an analysis of the problem, paying specific attention to the historical trends and conditions which affected the outcome of the process. Finally, the alternatives for resolving the problem are considered, the selected alternative is analyzed, and the paper offers further recommendations for future improvements in decision making.

I was a participant in this case. From 1993 to 1997 I lived in the Aché community of Arroyo Bandera, where I worked as a community development

This case study describes the conflict over land use which arose between the Aché community of Arroyo Bandera, the campesinos *of the María Auxiliadora colony, and the FMB managers of the Reserve. At Mbaracayú, the common interest of the three parties was peaceful co-existence.*

extensionist in cooperation with the FMB. In my work, I spoke Aché, Spanish, and some Guaraní (commonly spoken by *campesinos*), and conducted meetings with Aché community members, managers within the FMB, and representatives of the María Auxiliadora community. Living and working at Mbaracayú, I came to understand that conservation problems there are problems among humans, and that resolving them must necessarily involve human values. Furthermore, my own values motivated my actions in attempting to resolve the problem.

As a participant, I came to understand the issues of land conflict at Mbaracayú. My analysis of the policy process at Mbaracayú uses a framework which is problem oriented as opposed to solution oriented. Problem orientation seeks to break problems down into their component parts so that they can be analyzed. A problem-oriented approach asserts that a focus on the nature of *problems* is a sound entry point for understanding how policy is formed in response to the problem, and for identifying solutions and understanding why they work (Clark *et al.* 2000). A solution-oriented approach would, on the other hand, tend to ignore or oversimplify the nature of a problem in the effort to produce "results." The short-term actions produced when problems are not fully analyzed may ignore underlying forces which give rise to the problem in the first place. If those causes are not addressed, results-oriented approaches, with their focus on visible outcomes, may not solve a problem in the short or long term.

At Mbaracayú, there existed a common interest in peaceful co-existence among each of the participants in the land-use conflict. However, where participants' individual goals were irreconcilable with this shared interest, a problem arose.

THE LAND CONFLICT PROBLEM

Problems exist where there are differences between demands and reality, or expectations about reality (Dery 1984; Wallace and Clark 1999). At Mbaracayú, there existed a common interest in peaceful co-existence among each of the participants in the land-use conflict. However, where participants' individual goals were irreconcilable with this shared interest, a problem arose. Briefly, the goal of the FMB was to manage the Mbaracayú Reserve for the conservation of biodiversity, the *campesino*s of María Auxiliadora sought to improve their economic well-being through extractive activities and agriculture, and the Aché of Arroyo Bandera sought to maintain access to the Mbaracayú Reserve along customary routes through *campesino* territory, in order to exercise their legal right to hunt and gather in the Reserve using traditional methods. *Campesino* poaching within the Reserve, Aché destruction of *campesino* property, and resentment of both local communities towards Reserve management activities indicated the existence of a policy problem. The policy problem the participants were faced with was how to reconcile the divergent goals and practices of the three groups of participants.

Several alternatives existed to resolve this problem. One possible alternative was to ignore the problem and live with the consequences. A second was to seek an agreement over rights of travel across *campesino* land, coupled with stricter enforcement of Reserve rules regarding poaching by *campesino*s. A third

alternative, which was adopted, was proposed by the FMB: purchase the colonists' land, transfer title to the Aché, and relocate the colonists to better properties closer to roads and hospitals (Padwe and Weary 1997). The selected alternative satisfied most of the goals of the participants, and adequately resolved the problem.

The problem which faced the three participants in the conflict over land at Mbaracayú can in part be understood through the examination of social context, the decision process, and the goals of the participants.

KEY PARTICIPANTS AT MBARACAYÚ: SOCIAL CONTEXT

Social process mapping is a tool used to understand the contextual nature of problems, focusing on individual participants and their interactions (Clark 2000). Clark and Wallace (1998) discuss a framework for mapping human social process, which relies on identifying participants, their perspectives and their base values, assessing strategies, and determining outcomes and effects of participant actions. Social process categories useful for contextualizing partici-pant interaction at Mbaracayú have been applied to the three key participants in this case study (Table 1). The following discussion highlights elements most relevant to solving the problem.

The Aché

The Aché are an indigenous group of formerly nomadic hunter-gatherers, of uncertain ethnic affiliation but speaking a Tupi-Guarani derived language (Susnik and Chase-Sardi 1995). The Aché made contact with Paraguayan society over the past 50 years as the Paraguayan state expanded the national economy, in the form of roads and settlements, eastward through what was formerly a vast forested area. The Aché traditionally inhabited roughly 18,500 km^2 of the Paraguayan interior (Hill and Hurtado 1996). As their territory eroded they were forced to make contact and incorporate themselves into Paraguayan society, although they still maintain hunting and gathering as an important means of survival. The Aché of Arroyo Bandera became involved in a series of increasingly violent encounters with the Paraguayan settlers of the María Auxiliadora colony after the establishment of that settlement by the Paraguayan Land Institute (Instituto de Bienestar Rural—IBR) in 1990. A new settlement of over 100 lots was made available for claims by landless rural people in what had once been publicly owned forest. The settlement was contiguous to the Mbaracayú Nature Reserve where the Aché maintain the legal right to hunt and gather using traditional bow and arrow methods. This right is outlined in Paraguayan Law 112/91, ratified by the Paraguayan legisla-ture in 1991 (FMB 1993).

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Social Process Category	Aché	Colonists	FMB
Participant	Traditional culture No tradition of private property Traditional enemies of colonists Awarded exclusive rights to hunt in Reserve (i.e. Reserve animals are Aché domain)	"Landless" peasants settled in colony by IBR (land institute) Well organized social group They are participants in a "land-rush" Deforesting in area, for agriculture	NGO responsible for management of the Reserve A point of first reference for disputants (a closer source of authority than government, court, etc.)
Perspectives: expectations	Expect free access to the Reserve Expect to rely on Reserve for hunting, gathering activities	Profit from speculation on their land allotments Practice agriculture Expect better social services from IBR	To continue to manage the Reserve without violent threats
Perspectives: myths	Tupi-Guarani derived world view Tension between self-image as poor and weak vs. image of hunter who can provide food Idealization of pre-contact period when Aché were all strong and lived well History of conquest	Frontier myth: the colonist as "civilizer" who must make the land productive Poverty justifies resource use Tradition of hunting "la marisca"	Conservation and sustainable development myth Mandate (from international donors) to bring progress to region but also to conserve biodiversity Myth embodied in mission statement
Base values	Well-being: the resources of the Reserve are important for the Aché to be able to nourish themselves Respect: the conflict with colonists over land-use is an iteration of Aché identity and a form of positioning vis a vis their neighbors	Not motivated as much by well-being in their poaching in the Reserve; rather, it is an expression of their dissatisfaction with their position relative to Aché in terms of Reserve use Respect: seek a strong position within social relations of the area	Rectitude: FMB agents suffer ills of countryside to do altruistic job Power: by intervening in conflict FMB legitimates its own power in the region—useful in future political issues
Strategies	Claim "original right" as lands are part of traditional homeland Invoke legal right to hunt vs. colonist poaching Threaten to "pull out" of cooperative role with FMB	Settle the area quickly by deforesting, planting and other "improvements" to the colony Complain to IBR regarding lack of social services Harass Aché who threaten security	Remove source of conflict by relocating colonists Secure funds by resorting to international donors Assert Aché desire for biodiversity Conservation as justification for titling land to Aché

Table I   The social context in the Mbaracayú Reserve.

The Aché saw the new settlement as an infringement on the forest where they had traditional rights to hunt and fish. Most important for them was the strip of land containing thirty new lots which separated the Arroyo Bandera reservation area and the Mbaracayú Reserve (see map, Figure 1). This strip was the site of Aché trails that led to the Reserve. After the creation of María Auxiliadora, the Aché continued to use these trails, passing over what was now colonist territory.

The Aché sought to maintain legally granted rights to hunt and fish in the Mbaracayú Reserve, and customary rights to pass over the colonists' property. Their traditional culture, associated with Tupi-Guarani cosmology and described in detail by Clastres (1986), can largely be understood as the myth, in the sense of "guiding belief" (Lasswell and Holmberg 1992), governing their interaction with other stakeholders. It is important to note that the concept of

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Figure 1   A map of Paraguay showing the Mbaracayú Reserve.

land rights embedded in private property regimes is new to the Aché and contested by them. This tension explains in part their complaint against the colonists. For the Aché, the most important value involved was their well-being, both in terms of food resources and cultural survival. Also important was maintaining a powerful position as a community with respect to other actors in the area.

María Auxiliadora colonists

The colonists in the María Auxiliadora community had been settled there by the IBR, and thus felt that they had a legitimate claim to the land based on government authority. The predominant myth guiding their practices was that of the expanding frontier. Colonists on the frontier have strong beliefs in the importance of their role in bringing civilization and development to the region. To fulfill this role, they must make the lands "productive" by removing timber and converting the land to agriculture. A second myth operating on the colonists was a claim to entitlement justified by poverty. Poverty and deprivation is at the root of colonists' requests to the government for assistance (their remoteness from social services such as schools and hospitals spurred their desire to leave the María Auxiliadora settlement), and also justified their appropriation of Reserve resources. Poaching thus had a symbolic importance for the colonists. Poaching was, in part, an attempt to improve economic well-being. It was also, however, an expression of their resistance to FMB's central-ized authority over the resources of the Reserve, and a claim of power relative to other participants.

In their conflict with the Aché who sought to cross their territory, the colonists sought respect for their private property rights. They also sought respect in distinguishing the superiority of their settlement over the Aché, whom they considered savages (as they recounted to me on various occasions). The colonists took exception to the Achés' use of the old paths out of fear of an infringement on their own newly awarded property rights. They were also upset with Aché conduct on their land. The Aché using the trail system cut down palm trees for their fruits and for fibers for weaving baskets. For colonists, however, palm trees are the only trees left standing when land is cleared for farming and later for cattle, so this particular infringement, born again of an Aché refusal to accept (or perhaps to understand) private property claims, was particularly irksome.

The colonists in the María Auxiliadora community had been settled there by the IBR, and thus felt that they had a legitimate claim to the land based on government authority. The predominant myth guiding their practices was that of the expanding frontier.

The Fundación Moisés Bertoni

The Fundación Moisés Bertoni, the third principal actor in this conflict, is the non-governmental organization responsible for managing the Mbaracayú Nature Reserve. The FMB's myth and goal are evidenced in its mission statement: "to conserve biodiversity in harmony with the sustainable develop-ment of Paraguay's people" (FMB 1996:3). To accomplish this, it was the stated

strategy of Reserve managers to work outside the boundaries of the Reserve, involving local people in the conservation of resources. FMB involved itself in the dispute because of its concern over the deforestation caused by the colonists, their illegal poaching within the Reserve, and the growing climate of unrest among stakeholders whom the FMB sought to involve in conservation.

The importance to FMB of maintaining good relations with neighboring communities may be understood partially by questioning how FMB raises money for its operations. International donors from whom FMB seeks donations are increasingly interested in how FMB works in the field. Site visits by prospective donors are a principal tool for FMB fundraising. If FMB programs are unsuccessful in local communities, and if relations with those communities sour, it is unlikely that FMB will be able to attract future donors to its cause.

To some extent, the FMB's altruistic intentions are evident in their efforts at "helping" in the Paraguayan countryside. As well, respect and power were invoked via FMB involvement: by negotiating a settlement, FMB legitimized the nature of its authority in the region, gaining respect which could be used in other disputes with neighbors which impinged on Reserve management.

Social process mapping in the Mbaracayú case helps to explain how the problem that developed around land use was constructed by each group. For instance, the colonist adherence to Western conceptions of private property directly conflicts not only with the traditional Aché understanding of human/land interactions (and the absence of a concept of property), but also with Aché extensive resource use practices. Where *campesino*s leave only palm trees standing in cleared fields (to provide palm fruit and leaves for livestock), those same palm trees are the first species which Aché fell when moving across territory (in order to harvest fruit, fibers, pulp, and insect larvae). The importance of the palm tree for members of each group was different, but where those uses conflicted, problems developed. Attempts to resolve the problem without taking into consideration the cultural and social processes from which the problem arises are likely to prove unsuccessful.

TOWARDS A SOLUTION: DECISION PROCESS

The social context, as characterized above, is reflected in the behavior of the actors in the process. How these participants interact in the formation of a problem, and in efforts to resolve it, determines the outcome of the policy process. Brewer (1983) identifies six phases of decision process through which problems pass, from their origins to resolutions. At Mbaracayú, these phases are discernable as described below.

Initiation

The formation of the Mbaracayú Reserve, the institutionalization of Aché use-rights within the Reserve, and the allotment of the María Auxiliadora colony occurred between 1989 and 1991, setting the stage for the problem to arise. It was at this point that colonists began to establish themselves in the area between

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the Aché reservation and the Reserve, and this was also the point during which the FMB began to enforce regulations governing poaching and legal hunting. The policy problem was identified variously by the different participants, and formally voiced during the participatory meeting held in 1992 to draft the 1993-1996 management plan for the Reserve (FMB 1993).

Estimation

Estimation includes the range of activities used to understand the extent and implications of a problem. At Mbaracayú, participatory meetings and long-term studies of Aché social organization and hunting, in conjunction with a study begun in 1993 to assess the impact of hunting on the Reserve, identified trends in exploitation of the Reserve's natural resources (Hill *et al.* 1997). In addition, aerial photographs available in 1992 demonstrated the extent of new deforestation along the María Auxiliadora road. Finally, the importance of the land issue (interpreted by the colonists as Aché trespass, and by the Aché as unfair appropriation of traditional Aché territory by colonists) was made evident at participatory rural appraisal meetings held by FMB staff in both María Auxiliadora and Arroyo Bandera during 1995. In 1996 I began discussing options for resolving the problem with Aché and *campesino* leaders. The idea that FMB might raise funds to buy *campesino* lands and transfer title to the Aché was broached during these meetings.

In 1996, I began discussing options for resolving the problem with Aché and campesino *leaders. The idea that FMB might raise funds to buy* campesino *lands and transfer title to them to the Aché was broached during these meetings.*

Selection

In part because *campesino*s were eager to sell their land (and in fact approached the Aché individually urging this course of action), in 1996 I developed a proposal to purchase 30 lots in María Auxiliadora and transfer title to the Aché of Arroyo Bandera. This policy option was not immediately embraced by FMB. The eventual adoption of the policy by FMB came about in part because Aché leaders repeatedly requested that FMB help them gain title to colonist lands, and at one point made this request to a donor who was visiting Arroyo Bandera on a tour with FMB representatives. I also enlisted the members of María Auxiliadora colony to petition the Paraguayan Land Institute (IBR) to allow the settlers to relocate. The petition gave FMB some assurance that the proposed policy was reasonable and could be successful.

Implementation

FMB found a donor willing to invest in the proposed policy, and received a grant to implement the proposal. From 1997 to 1998 FMB staff purchased colonist properties at María Auxiliadora and assisted the colonists in relocating to other IBR settlement areas. Prices were set for the properties based on a standardized and agreed upon protocol which was used to evaluate each property's value. The protocol was based on extent of deforestation, the number and productivity of fruit trees and other perennial plants, condition

and extent of fencing on the property, and other factors. The FMB also assisted the Aché in completing the necessary paperwork to assume title of the properties.

Evaluation

The process was subject to a continual series of dialogues between FMB staff and the parties involved, forming a kind of continual feedback loop throughout the process. FMB internal documents and progress reports to donors also served as evaluation.

Termination

The "problem" ended when the last colonist had been relocated to new property. At this point the local situation was completely changed: one of the principal actors in the problem no longer existed as a presence in the region. The resulting political landscape was completely different from what it had been when the problem arose.

TRENDS, CONDITIONS, AND PROJECTIONS

Problem orientation, the effort to fully identify the component parts of problems, requires an understanding of trends and conditions which influence the policy process and the likely outcome. Five specific trends are of importance to the problem at Mbaracayú, and each has been shaped by conditioning factors dependent on local history, custom, and the participants' involvement based on their myth, values and perspectives. The first, and most pressing trend in this conflict, was that of violence. Between 1991 and 1997, tensions mounted between the newly arrived settlers and the Aché. In conversations at Arroyo Bandera, the Aché spoke of killing colonists they found poaching in the forest. Likewise, *campesino* representatives complained to FMB workers that if the Aché continued to cut down palm trees on their property, "someone would get hurt." In 1997, a group of Aché returning from a foraging trip in the forest reported that poachers had fired shots over their encampment at night.

The trend towards violence between the two groups is bounded by the condition of historical violence between the Aché and colonists in Eastern Paraguay. Hill and Hurtado (1996) describe the Aché "contact period," in which the Aché group emerged from relative isolation into increased contact with Paraguayan society, as a period of warfare between colonists and the indigenous group. As settlements expanded into Aché territory, up through the 1970's, the Aché engaged in raids on small farms, carrying away metal tools, manioc, and other items. In retaliation, colonists sent raiding parties to attack the nomadic bands in the forest, often killing members of the Aché groups. These experiences remain fresh in the minds of *campesino*s and Aché alike, and the increasingly tense interaction between *campesino*s and Aché in the land conflict problem at Mbaracayú seemed to follow directly from those earlier

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times. Projecting this trend out into the future, it was apparent that if the problem was not addressed, there would be a violent encounter between members of the two groups.

The shots fired over the Aché camp were indicative of a second trend at Mbaracayú, namely, that of illegal poaching in the Reserve. Anecdotal evidence—local gossip, the sounds of shotguns and dogs in the Reserve, and the appearance of game meat at local markets—pointed to an increase in poaching following the creation of the María Auxiliadora settlement. Whereas the Aché are granted the right to hunt and gather in the Reserve, the colonists, as relative newcomers to the area, do not have this right. Colonists hunt illegally with shotguns, and are much more effective at taking large-packet game such as tapirs (*Tapirus terrestris*) and peccaries (*Tayassu pecari*) than are the Aché with bows and arrows. A 1997 study (Hill *et al.* 1997) showed the impact of colonist hunting to be of much greater concern for the long-term viability of these species. Poaching, therefore, is a source of conflict and disagreement between the Ache and the colonists, who are competing for game, and also between FMB and the colonists, as FMB is charged with protecting those species. Conflict between Reserve management and poachers has, in recent years, resulted in exchanges of gunfire between park guards and poachers, and several poachers have been arrested.

The trend of colonist poaching in the Reserve is conditioned on the legal status of the two groups in the law which establishes the Reserve and gives hunting rights only to the Aché (FMB 1993: 78-85). The trend is further bounded by the geographical distribution of colonists and Aché in specific sites along the border of the Reserve, the result of settlement policy instituted by the Land Institute (IBR). The projection of the poaching trend into the future, and the elimination or severe reduction of game species in the Reserve which would result, alarmed both Reserve managers and the Aché.

A third element of concern for the parties involved was the deforestation caused by the activities of the colonists along the María Auxiliadora road. The *campesino*s were gradually clearing their property of all trees as they extended the planting of manioc and other crops from the road back to the rear limits of their properties. Furthermore, the timber on these properties (which were fully forested in 1990) was the principal value which rewarded the colonists' land speculation in its early phase.

Deforestation on colonist land is largely conditioned on the timber economy which drives rural Paraguay. There is a large black market (untaxed and unregulated) export of timber to Brazil, and local timber travels from the Mbaracayú area to the Brazilian border 25 km away. Timber provides needed cash to smallholder farmers who face low market prices for cash crops, due to high transportation costs.[1] The deforestation taking place, and the projection of that trend into a future in which the properties would be completely deforested, was of concern to FMB. The organization is charged with the "sustainable development" of the area surrounding the Reserve. To comply

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[1] Interestingly, the colonists complained that the lack of a viable trucking road made the removal of timber less profitable than they wanted, and slowed the removal of timber.

with this mandate, FMB has traditionally employed extension practices to teach agro-forestry and other economic alternatives that will leave forest standing on private property surrounding the Reserve. Like FMB, the Aché, who, it should be noted, also sell timber from their own property, were also concerned with deforestation by the colonists. The Aché predicted that it would inhibit the migration of game from the Reserve into their own reservation, which is already largely over-hunted.

A fourth trend which influenced and was evidenced in the problem was the lack of infrastructure, social services and extension in the María Auxiliadora colony. Land Institute (IBR) settlements are largely given out by the government as concessions to demands voiced by organized rural groups. Often they are thereafter ignored by the government, or given inadequate support. This was the case at María Auxiliadora.

The trend is in part a function of the low population density of the area, a condition that arises because of the colony's proximity to the large, uninhabited Reserve, and to the relatively sparsely settled indigenous reservations (which are generally low priorities for the government anyway). The lack of population density, and the geographic limits to road building, meant that government investments in social services and infrastructure were not justifiable. Projecting this trend forward, it was highly unlikely that the disputed, isolated section of the María Auxiliadora colony would accommodate a viable community; the residents would likely be poorer and have a lower quality of living than settlers elsewhere.

The final trend bearing on the problem was the gradual calcification of property regimes in the area over the course of the last ten years. The boundaries drawn up by the government during this period, the result of expropriations and land sales, divided the region into smaller discrete units with enforceable property rights, where before there had been only a few larger, unsettled units of land. The trend is rooted in the historical condition of the settling of the Paraguayan frontier. The series of events which formed the modern incarnation of the settlement pattern included the establishment of the María Auxiliadora colony in 1990, including the thirty lots in question in this land conflict, the legal titling of the Arroyo Bandera reservation (settled in 1980, but legally owned by German missionaries until recently), and the establishment of the Mbaracayú Reserve in 1991. This trend led to the gradual erosion of the Aché claim of a right to access the Reserve on trails which crossed *campesino* land. As the mapped boundaries became more entrenched, they defined differing land use, creating a mosaic of forested and deforested, settled and abandoned areas visible from the air and using satellite imagery.

ALTERNATIVES AND RECOMMENDATIONS TO SOLVE THE PROBLEM

At Mbaracayú, the common interest of the three parties was peaceful co-existence. Tensions which threatened this interest resulted where individual

At Mbaracayú, the common interest of the three parties was peaceful co-existence. Tensions which threatened this interest resulted where individual goals of participants came into conflict with those of other participants. Aché at Arroyo Bandera sought to maintain traditional resource use rights. Colonists at María Auxiliadora sought to earn their livelihoods from the process of colonization (a process traditionally involving selling timber, engaging in agriculture, and hunting) and to protect their newly claimed properties.

goals of participants came into conflict with those of other participants. Aché at Arroyo Bandera sought to maintain traditional resource use rights. Colonists at María Auxiliadora sought to earn their livelihoods from the process of colonization (a process traditionally involving selling timber, engaging in agriculture, and hunting) and to protect their newly claimed properties. The Fundación Bertoni sought to protect biodiversity in the Reserve and to assist in the development of surrounding communities. Viewed in terms of these goals, the policy problem, in its simplest form, existed where the goals and practices of individual participants were at odds with each other. As a result, the common interest was unattainable under those conditions.

Seeking a solution to the problem, all three participants hoped for an outcome that would allow them to stay as true to their original goals as possible. There were several alternatives available. In understanding how a policy solution emerges, it is important to realize that policy is not simply conceived of by a "policy maker" (i.e., a government body invested with authority) and then implemented. According to Lindblom (1980), implementation invariably shapes or changes policy to some extent. Nevertheless, proposed alternatives often originate from powerful players within the policy process, such as a government regulating body charged with this duty by law. The policy maker in this case study could be considered to be the Fundación Moisés Bertoni, since the FMB had access to money, and had a government-backed mandate to administer the Reserve and to involve itself in sustainable development in areas surrounding the Reserve. The FMB, then, was well positioned to select and promote certain policy alternatives over others to resolve the problem.

One alternative available to FMB was to ignore the problem, or to delay addressing the problem. Where policies result in pronounced winners and losers, policy makers often prefer to ignore problems rather than to face losing the support of those disadvantaged by their policies. However, in the case of Mbaracayú, it is possible that the severity of the problem forced the issue. Extension agents working for FMB, myself included, played an important role in making the directors of the organization aware of the gravity of the situation. Violence in the region could attract the attention of the Paraguayan press, and resulting news articles would erode public confidence in the NGO. Furthermore, studies of poaching impact on the Reserve's wildlife would eventually be published in scientific journals. These articles would form part of the criteria on which FMB's performance in the region would be judged by donors and others. By taking steps to eliminate problems, the FMB would avoid much criticism; an approach which simply maintained the status quo would be unsatisfactory to those judging FMB's behavior.

A second alternative was to seek an agreement between the Aché and the colonists, stipulating where the Ache could cross colonist land, and what their conduct would be during that crossing. In exchange, colonists could perhaps be persuaded to cease illegal hunting in the Reserve. Such a proposal, however, suffers from several shortcomings. Significantly, it fails to identify the under-

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lying social processes guiding participant actions. For instance, the alternative is complex—it is a further refinement of use-rights which were already established in the Reserve area, and which were part of the reason a problem had arisen in the first place. Both the original use-rights definition and the proposed alternative suffer from unenforceability, an element of the complexity of the solution. Lack of funds for patrols, fear of armed conflict on the part of on-the-ground managers, and the sheer size of the Reserve all conspire to make such rules largely unenforceable. The "use-rules" alternative also would require colonists to admit that they participate in illegal activities within the Reserve. Although this was widely acknowledged to be true, obtaining such concessions was probably unrealistic. Also unrealistic would be an assumption that after such an agreement the colonists would be able to curtail their own poaching—there is little evidence that colonist communities are able to manage their own activities for conservation in this way. The "use-rules" alternative is also defective in that it fails to acknowledge the Aché claim to original and customary possession of the land settled by María Auxiliadora colonists. Finally, an agreement stating rights and conduct of each party would fail to address the deforestation carried out legally by peasants on their own properties, an issue of great concern to both Aché and Reserve managers because of its impact on species migration in and out of the Reserve.

As mentioned already, the selected alternative was an "integrated" solution, a plan proposing that the FMB purchase, and deed to the Aché, the properties of the María Auxiliadora colonists (Padwe and Weary 1997). In effect, this proposal sought to "undo" a poor policy which had been implemented by the IBR in 1990 when the Institute parceled out these lots to landless peasants. The corrective policy was readily endorsed by both the Aché and the colonists—an indication of the policy's ability to address the problem—and was acceptable to the FMB.

For FMB, the policy appealed both because it eliminated the possibility of future aggressions between the Aché and the colonists, and because FMB's goal of protecting biodiversity was furthered by the removal of many of the illegal poachers from the area. Additionally, by influencing the outcome of the problem, the FMB satisfied its desire to gain more respect for itself as a policy maker in the region. The cost to the NGO was relatively small—the entire project cost $70,000 and funders were supportive of the approach.

For colonists at María Auxiliadora, the policy in some ways rewarded their initial participation in the IBR settlement scheme. The FMB was able to pay colonists an amount they felt was commensurate with the value of the property. The colonists had not been established for a long time in their properties, and they had already reaped the initial rewards of the colonization process (i.e., sale of the easily removable timber and high agricultural yields from initial soil fertility after burning). As well, the policy facilitated their desire to move on to other areas where roads, hospitals and schools existed close enough to give them support—moving to a new area where these were available was more

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feasible than attempting to influence the Paraguayan government to bring those services to the María Auxiliadora area.

For the Arroyo Bandera Aché, the policy resulted in an increase in the size of their land holdings from 500 to 800 hectares. After the policy, they had secured a shared border with the Mbaracayú Reserve, insuring access to productive hunting areas. The threat of violence from *campesino*s was also greatly diminished, both within the Reserve (from poachers) and along traditional access routes which formerly crossed the María Auxiliadora colony. Competition between the Aché and the colonists for status in the region no longer involves the María Auxiliadora colonists, although the Aché still have strained relations with other neighbors.

SOME SHORTCOMINGS OF THE RELOCATION POLICY

The selected alternative thus has gone a long way towards satisfying the participants involved in the problem. It is worthwhile to take a moment to look at some implications of the policy which may be less than optimal. The new conditions which resulted from the policy process will have a bearing on future problems in the region.

It should be noted, for instance, that in agreeing that the colonist lands must be purchased, the Aché claim to "original ownership" of those lands is undermined. Human rights organizations campaigning for rights of indigenous peoples have been wary of pursuing a strategy of "buying back" indigenous properties from governments for just this reason (Rothschild, Amazon Alliance, personal communication).

Furthermore, the precedent set by the FMB in interceding on behalf of the Aché, if not handled properly, may set the stage for a future paternalistic relationship between the NGO and the community it hopes to serve. Similarly, the series of events described here further institutionalized the role of the FMB in the region. In the future, local communities may find that their interests are not congruent with those of the NGO, and may find it more difficult to argue against FMB's policies as the NGO gains power.

It is also important to note that FMB's concern over colonist deforestation on the María Auxiliadora tract may not have been resolved by the selected policy. Although the Aché currently state that their goal of hunting motivates them to maintain forest on the properties, they are subject to many of the same social and economic constraints which faced the colonists. In the future Aché goals may change, they may desire more agricultural lands or money from timber sales, and deforestation may be the result. For the past two years, however, the rate of deforestation on these lands has decreased (Hill, personal communication).

Finally, relocation schemes enacted in the name of conservation have been widely criticized in Latin America and elsewhere. Current efforts to involve communities in conservation around the world have emerged out of the policies to exclude people from protected areas which resulted in displacement

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of human populations and much suffering by those people. In the current case, these negative results were mitigated by the relatively small number of families involved (fewer than thirty), the relatively short tenure of those families on these lands before the policy was adopted, and the satisfactory compensation of the inhabitants.

CONCLUSION

Land conflict along the Mbaracayú Reserve border was the direct result of competing interests of colonists, Aché, and Reserve managers. Where the colonists sought to develop their recently allotted land for agriculture, in order to improve property values and see a return on their investment of labor and effort in obtaining the land, the Aché sought to maintain access to the Reserve over a long-established trail network across colonist property. FMB, dedicated to protecting biodiversity both through conservation of the Reserve and through development work in the buffer-zone surrounding the Reserve, sought to decrease the impact of colonist deforestation and poaching, and to maintain good relations with all stakeholders in the conservation program. These goals and practices were not easily compatible, leading to the problem as this paper has defined it. As the case of land dispute at Mbaracayú illustrates, participants in policy problems operate in accordance with their own expectations, operative myths, and base values, and are constrained by historical trends and conditions which affect their actions. Understanding these elements is crucial to developing a problem-oriented approach to problem solving, and to success in this case.

As the case of land dispute at Mbaracayú illustrates, participants in policy problems operate in accordance with their own expectations, operative myths, and base values, and are constrained by historical trends and conditions which affect their actions. Understanding these elements is crucial to developing a problem-oriented approach to problem solving, and to success in this case.

ACKNOWLEDGEMENTS

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APPENDIX

VISUAL AIDS USED IN THE ORAL PRESENTATION

Slide 1   The title for the presentation.
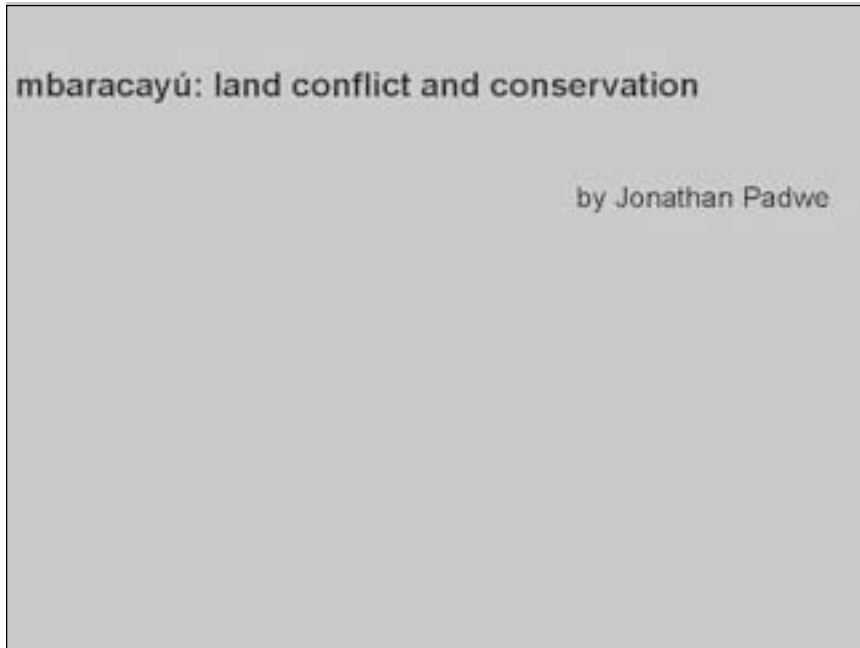
Slide 2   Each participant in the problem is briefly introduced.

Slide 3   The common expectation of all parties conflicts with the individual goals of each group.
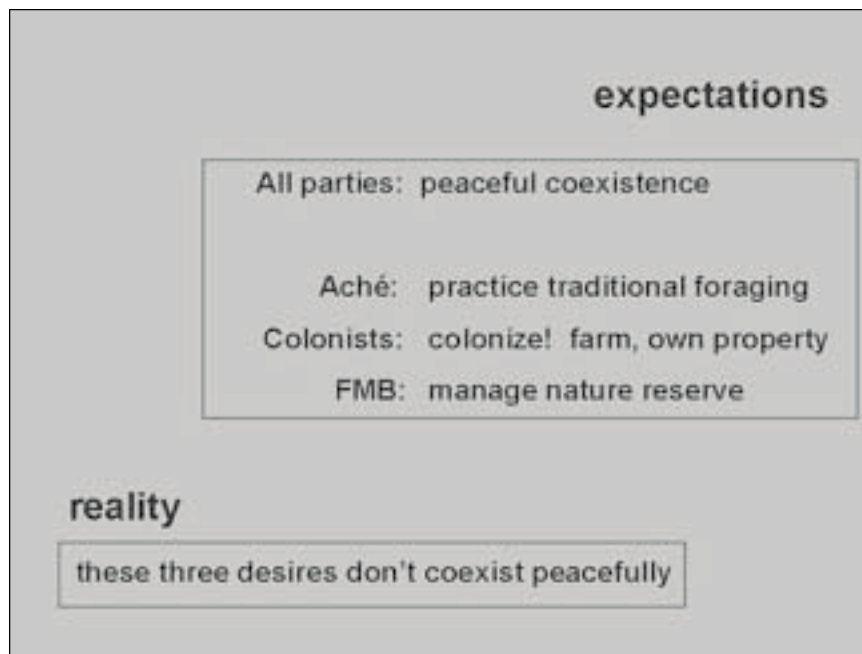
Slide 4   In part because the implemented policy addressed the goals of each participant, the policy could be described as a "win-win-win" solution.
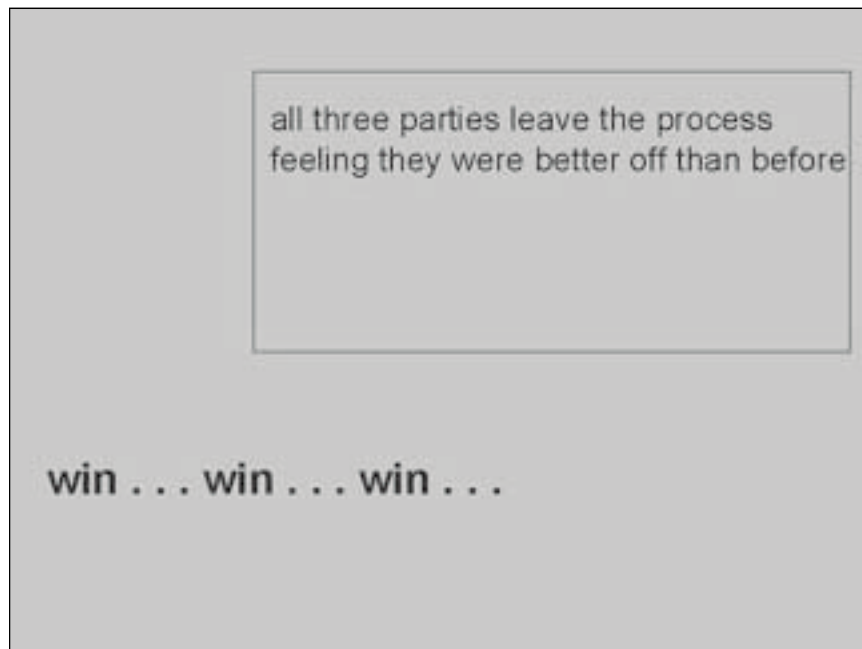
Slide 5   In presenting my involvement as a participant observer, working on development and research
           with the Arroyo Bandera community, this slide helps to identify the presenter's standpoint.
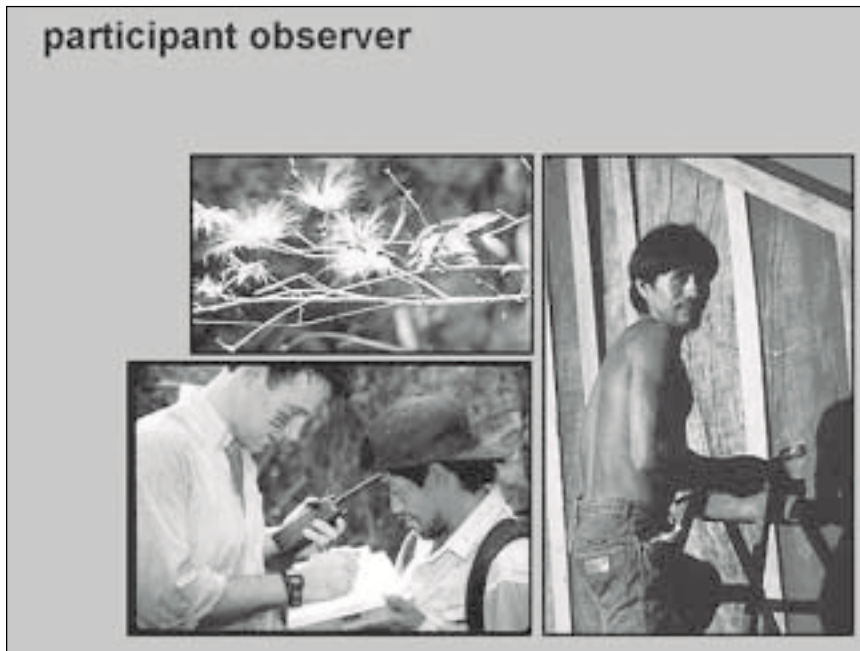
Slide 6   This slide introduces the first section of the lecture, which will focus on the social context of
           the problem. In coming slides, the location of the problem will be reviewed, and each
           participant will be described in detail. Discussions will focus on the social context of each
           participant, and each participant's goals and values.

Slide 7   This slide focuses audience attention on Paraguay and on the Mbaracayú Forest Nature
             Reserve project.

Slide 8   This slide introduces the *Fundación Moisés Bertoni* (FMB) as a participant, provides the FMB
             mission statement, which guides the actions of the FMB. The slide also highlights the goals of
             the participant.

Slide 9   During discussion of the FMB, the graphic image changes to maintain audience attention and interest.

Slide 10   This slide introduces the Aché as a participant in the problem, and identifies the goals which the Aché held during the policy process.

Slide 11   During discussion of the Aché, the graphic image changes to maintain audience attention and interest. The image of an old man and his grandson is designed to demonstrate the historical trends which help to explain current Aché subsistence and land-use patterns; the young boy is symbolic of the future of the Aché.

Slide 12   This slide introduces the María Auxiliadora colonists as participants in the problem, and identifies the social context within which they participate.

Slide 13   During the discussion of the colonists, the graphic image changes to maintain attention and
            interest. The image of the frontier *vaquero* or cowboy, and the image of the settler with his
            horse cart, are intended to visually portray the frontier myth which forms part of the social
            context for the settlers.

participant

- frontier
  myth

•land
speculation

•far from
social
services

colonists from the Maria Auxiliadora settlement

Slide 14   The trends which have influenced the current problems are explained in detail. The image
            depicts an area where valuable timber has been removed and the remaining forest has been
            burned to enable short term agriculture gains.

- violence

- poaching

- deforestation

- state-led developmment

trends

Slide 15   This slide initiated discussion of the second part of the presentation, the policy process. Each
            of six phases of the problem-solving process are discussed.
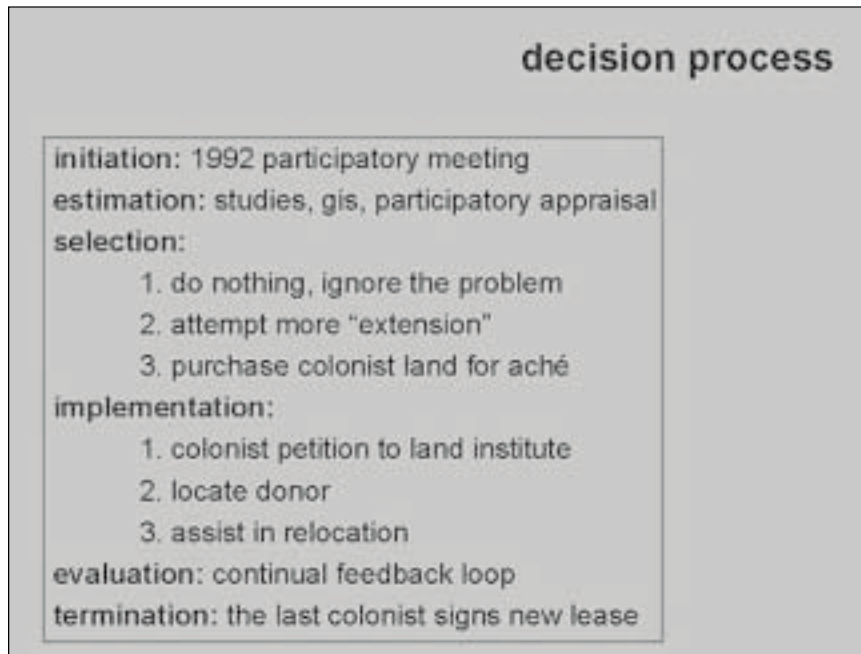
Slide 16   This slide emphasizes how the policy process has attempted to address the goals and
            expectations of each participant. In doing so, the process has created a "win-win-win" solution
            to the problem. The problem-solving process is not wholly positive, of course, and the
            possible "downsides" for each participant are also discussed.
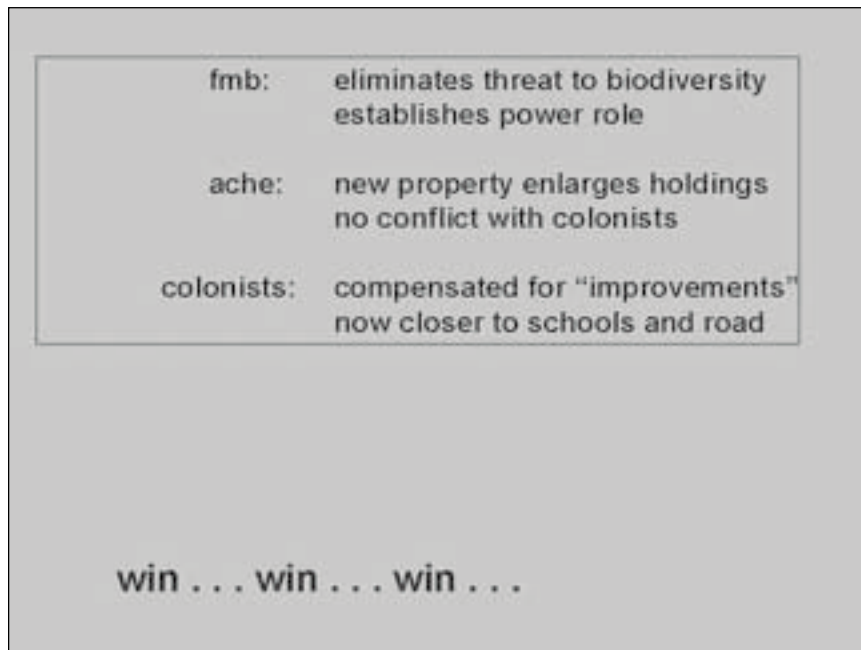
Slide 17   This slide concludes the presentation. Recommendations are given for the use of this case as an example of a mostly successful policy process which can serve as a model for other policy problems. The image of an Aché boy using a miniature bow and arrow is meant to be a hopeful one, affirming human dignity and reminding viewers of the importance of our decisions for future generations.

ABSTRACT

The Illegal Extraction of *Mai hom*, a Non-timber Forest Product, in Khao Yai National Park, Northeast Thailand

Christie M. Young, Yale School of Forestry & Environmental Studies

In 1962, the Kingdom of Thailand designated "Big Mountain," Khao Yai as its first national park. This act was an effort to safeguard rapidly diminishing natural resources as well as further socioeconomic development in the nation. Today, the illegal extraction of the culturally and economically important non-timber forest product, *mai hom*, in the park has become a complex, multi-faceted issue. *Mai hom*, the resin soaked heartwood of the aloewood tree, *Aquilaria crassna* Pierre ex H. Lec. *(Thymelaeceae)* is coveted worldwide for the fabrication of medicines and aromatic products. Ecologically, the illegal extraction of *mai hom* threatens both the long-term viability of the *Aquilaria* population as well as the impressive biodiversity within Khao Yai National Park. This paper analyzes the social, economic, and political issues surrounding this problem. Improper implementation, administrative disorganization and disinterest, and an inability to thoroughly analyze and reconcile the problem of illegal *mai hom* extraction all contribute to the problem. My proposed conservation alternative targets three levels: local, national, and international. First, on the local scale, improved ranger patrols within and around the park perimeter emphasize increased safety and preparedness. The ranger patrol brigade will include ex-*mai hom* collectors in the task force, with the aim of providing employment opportunities, decreasing hostile encounters in the forest, and utilizing the experience of former collectors. Environmental education in local communities is another local component. Second, community-based *Aquilaria* plantations will supply both the demand for mai hom, as well as provide additional employment opportunities to the local population. Third, at the national level, increased penalties for poaching will serve as a greater deterrent against opportunistic collectors and put economic pressure on organized *mai hom* operations. Fourth, at the international level, the Royal Forest Department and non-governmental organizations can place *Aquilaria* on the Convention on the International Trade of Plants and Animals international endangered species list. This will enlist international leverage and advocacy to spread awareness of the situation. The illegal extraction of *mai hom* is a volatile and complex social and ecological issue. This problem may be addressed in large part by the recommended conservation strategy, with greatest emphasis at the local scale. Evaluations and improvements must be encouraged. The resulting policies should be increasingly tailored to the needs of the current situation with an eye toward the future.

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ABSTRACT

Recommendations For a Smooth Ecological and Social Transition into the Future for Agro-pastoralists of the Baringo Lowlands, Northern Kenya

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The Housatonic River flowing through western Massachusetts is contaminated with high levels of polychlorinated biphenyls (PCBs), which originated from Pittsfield's General Electric facility during the years 1929 to 1977. In 1997, public outcry over the extent of contamination and the potential threat to public health and the environment escalated pressure on government authorities for cleanup of the river and surrounding areas. General Electric, the U.S. Environmental Protection Agency, and Pittsfield city officials negotiated for two years the details of a settlement to begin remediation and restoration on the upper reach of the river. The goal is to restore the river ecosystem to a "fishable, swimmable" state. The resultant plan calls for excavation and landfilling of portions of contaminated sediment and soil while capping the remainder in situ. The plan also outlines a generous brownfields redevelopment plan for the General Electric site. The mayor, the media, and others hail the settlement as a great success, however, local environmentalists believe the settlement fails to provide the most comprehensive cleanup within practical limits and does not take necessary precautions against recontamination. Poor implementation of public participation, through a powerless Citizen's Coordinating Council (CCC), prevented the broader public from effectively participating in the debate. Consequently, the economic concerns of more wealthy and powerful participants won out. This paper describes and analyzes the decision process used in negotiating the settlement, to explain why the settlement falls short of previously stated goals for environmental cleanup and protection. The paper offers an alternative for actively involving the public and subsequently improving the decision process for cleaning up the lower reaches of the river. Revising EPA's model of public participation to allow for a CCC representative at the negotiating table would ensure multiple advocacy and thereby promote a more contextual selection process. Although the economic redevelopment issues relevant to Pittsfield will not play a role in Lower River negotiations, pursuing the same model of public participation will likely produce similar unsatisfactory results since the settlement for the Upper River has set a precedent of minimum cleanup. By revising EPA's model of public participation and promoting interdisciplinary problem solving, a more comprehensive restoration of the Lower River can be achieved.

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ABSTRACT

Recommendations For a Smooth Ecological and Social Transition into the Future for Agro-pastoralists of the Baringo Lowlands, Northern Kenya (abstract)

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The semi-arid Baringo lowlands of northern Kenya are inhabited primarily by agro-pastoralists. Each of Baringo's three agro-pastoral ethnic groups historically practiced subsistence ranching on communally owned land. In 1895, Kenya became a British protectorate. Westerners perceived the indigenous health care, education and communal property systems of the Baringo lowlands as inadequate. They implemented powerful new systems of health care, education and property in an effort to modernize, westernize and develop Baringo. As a result, the transition in Baringo from traditional livelihoods on communally owned land to western livelihoods on privately owned land has been ecologically and socially destructive. Grazing land has become increasingly degraded. There has been sharp decline or local extinction of terrestrial flora and fauna species. The human population is increasing faster than the national average. Heavy emphasis is placed on formal, impractical education. Local people experience inner conflict between the traditional values of an interdependent community and the western values of individual wealth, property and power. If current trends continue, increasing land degradation will further compromise local people's ability to survive. Many potential alternatives are unreasonable due to Kenya's poor political and physical infrastructure and the semi-arid climate. Also, foreign aid hand-outs have been neither consistent nor socially beneficial to local people and increased reliance on these programs is therefore not recommended. This analysis focuses on how Western influence can be used for the good of the land and its people. Recommended policies incorporate new economic realities into traditional land uses. They include the facilitation of a smooth, equitable transition into a private property system; stabilization of domestic livestock populations through more sophisticated participation by Baringo residents in the market economy; expansion of family planning to all Baringo residents; and greater participation in and benefits from conservation by local people. These recommended policies have been tested and proven by families, individuals, or communities in Baringo with assistance from a local environmental NGO.

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Part III: Interdisciplinary Problem Solving in Practice–Student Case Studies and Other Applications 1990-1998

Part III of the Bulletin includes five additional cases on species and ecosystem conservation. They illustrate the flexible use of the interdisciplinary problem-solving concept. The first paper examines "problem definition," in fact multiple competing problem definitions, in conservation of biodiversity in Hawaii. The second paper examines the role of zoos in conservation and education, and it questions the policy content of contemporary zoo management. The third contribution focuses on the values at play in a county-level policy process seeking sustainability in Western Wyoming. The fourth analysis critiques the early conceptualization and organization of the Canadian and United States "Yellowstone to Yukon" initiative, a transnational conservation effort. The final paper examines the perspectives that tend to divide people into polarized groups, and the related problems this creates for conservation. All cases offer insights and practical recommendations to improve problem solving in species and ecosystem conservation and move it toward a more interdisciplinary, successful approach.

These five cases were selected from over 130 student cases prepared between 1990 and 1998 in the "Species and Ecosystem Conservation: An Interdisciplinary Approach" course. Table 1 lists, in so far as the record permits, all student names and projects during this period, and Figure 1 maps the locations of the studies.

Table 1   Authors and titles of student papers from the 1990-1998 "Species and Ecosystem Conservation: An Interdisciplinary Approach" course.

1. **Bhatt, Seema, Peyton Curlee, Peter Schuyler, and Mary Taylor.** 1990. Ecosystem conservation: Managing processes-predation and fires.

2. **Cymerys, Peggy, Yance de Fretes, and Rosalyn Johnson.** 1990. Conservation implementation.

3. **Donnay, Tim, Mellissa Grigione, Gina Hirsch, Arnald Marcer-Batlle, Rob Marshall, and Lilli Sheeline.** 1990. Tasmanian tiger: Applying a policy orientation to conservation biology.

4. **Kennedy, Ted, Vicki Nichols, and Rich Wallace.** 1990. Marine policy: Coordinating for improved performance.

5. **Leisure, Blair, and Tim Sullivan.** 1990. Conservation Biology Society awards: Model government conservation programs.

6. **Bennett, Nicholas G.** 1992. The Japanese-American whaling dispute: The importance of national values in biodiversity conservation.

7. **Collins, Charles H.** 1992. The North American Waterfowl Plan: The plan, the history and key actors.

8. **Ebbin, Syma A.** 1992. Conservation policy and the decline of the wild salmon: The stock concept: Biological or political tool?

9. **Eid, Andre-Thomas.** 1992. Biopolitics: Good solutions to wrong problems, Norway.

10. **Gibson, Dean.** 1992. The golden lion tamarin conservation program, Brazil.

11. **Goodyear, Molly.** 1992. The policy process and the decline of the Pacific salmon.

12. **Griffin, Jeffery.** 1992. Conservation policy and the decline of the wild salmon: Developing a policy perspective.

13. **Knoetter, Greg.** 1992. Science and politics in the Adirondack Park, New York.

14. **Lundal, Lisa.** 1992. Olympic National Park conservation.

15. **Musinsky, John N.** 1992. The North American Waterfowl Plan: Organizational structure.

16. **Rahr, Guido.** 1992. The wild salmon: Patterns of decline.

17. **Shemitz, Leigh.** 1992. California riparian restoration.

18. **Simonov, Eugene.** 1992. Greater Yellowstone Ecosystem.

19. **Tabor, Gary M.** 1992. The North American Waterfowl Plan: Problem definition.

20. **Van Breda, Anita.** 1992. Organizational management of biological invasions: St. John's feral donkeys and the National Park Service.

21. **Vernegaard, Lisa.** 1992. Introduction and obstacles to ecosystem management.

22. **Wohlgenant, Tim J.** 1992. The North American Waterfowl Plan: Related policies and programs.

23. **Cohen, Elana, Felton Jenkins, Mary Jensen, Allen Lebovitz, and Lisa Suatoni.** 1993. An evaluation of the Center for Marine Conservation's Global Marine Biological Diversity Strategy: "What's the problem with the problem definition?"

24. **Bertrand, Matt, and Naomi Echental.** 1993. Endangered species legislation in the U.S. and Australia: An analysis of the listing processes and their effectiveness for species protection.

25. **Green, Dawn.** 1993. Strategies for sustainable ecotourism planning.

26. **Enzer, Maia J.** 1993. Social process in the Greater Yellowstone Ecosystem.

27. **Pitt, Jennifer.** 1993. Policy overture and the Vision: What we can learn from failure in the Greater Yellowstone Ecosystem.

28. **Martincich, Melissa.** 1993. Implementation: The employment of means to achieve a given end.

29. **Merbs, Heather.** 1993. Outcome: Termination in the USFWS and endangered species policy.

30. **Weintraub, Bern.** 1993. What's in a name? The missions of the New York Zoological Society.

31. **Brannon, Ed.** 1993. The interface between problem definition and organizational learning: The case of Loon Mountain Ski area expansions in the White Mountains National Forest.

32. **Vachuda, Thomas.** 1993. Organizations, accountability and action: The preservation of Yellowstone's hydrothermal resource.

33. **Doolittle, Amity.** 1993.

34. **Reid, Collen.** 1993.

35. **Mathison, Scott.** 1993.

36. **Filardi, Chris.** 1993.

37. **Heimsath, Arjun.** 1993.

38. **Anderson, Heidi, Tanya Rubenstein, and Eva Witten.** 1994. The Exxon Valdez oil spill: A policy analysis of the post-settlement restoration process.

39. **Balte, Geoffrey.** 1994.

40. **Barrett, Brooke.** 1994. Termination in the Tongass? Creating a new agenda.

41. **Bayindir, Berna.** 1994.

42. **Beckerman, Andrew, and Sarah Cole.** 1994. An analysis of the role of Green Innovations in Australian conservation: Complex issues and the policy process.

Table 1   Continued

43. **Brownlow, Alec.** 1994.
44. **Cleveland, Elizabeth.** 1994.
45. **Conboy, Danielle.** 1994.
46. **Corbett, Miel.** 1994.
47. **Flack, Stephanie.** 1994.
48. **Girdler, Binney.** 1994.
49. **Meyerson, Fred.** 1994.
50. **Naro, Eugenia.** 1994.
51. **Noriega, Rodrigo.** 1994.
52. **Pelletier, Suzanne.** 1994.
53. **Stewart, Jamie.** 1994.
54. **Trtanj, Julie.** 1994.
55. **Acharya, Tanka, Achyut Gyawali, Wendy Brewer Lama, and Jai Mehta.** 1995. An analysis of the policy-orientation on Makalu-Barun Conservation Project, Nepal.
56. **Barry, Dwight.** 1995. An exploration of self-in-context: Teaching and organizational effectiveness on the San Juan Grizzly Project, Round River Conservation studies.
57. **Casagrande, David.** 1995. West River, New Haven: A study of problem definition.
58. **Cole, Andrew.** 1995. Bison, brucellosis, and the Greater Yellowstone Ecosystem: Applying a policy orientation to the problem.
59. **Cooper, Andrew.** 1995. Managing the managers: A case study of the Challis National Forest planning process.
60. **Dumas, Amy.** 1995. Koala management in Victoria, Australia.
61. **Formia, Angela, Joanna Grand, and Zoe Rappaport.** 1995. Sea turtle conservation: An evaluation and comparison of El Salvador and Mexico from a policy perspective.
62. **Foster, Bryan.** 1995. Babbitt's plan for grazing reform in the American West: A critique.
63. **Halberg, Derek.** 1995. Defining the problem of the endangered Hawaiian crow *(Corvus hawaiiensis)*.
64. **Jacoby, Jennifer, Ilan Schoenfeld, and Susan Seyboldt.** 1995. The National Environmental Education Act of 1990: A policy analysis and case study.
65. **Lonergan, Kyle.** 1995. Applying a policy science perspective to the Colorado Nature Conservancy: The Upper Colorado River Basin strategic plan.
66. **Morton, Matt.** 1995. Cascades International Park, Washington and British Columbia.
67. **Nagel, John.** 1995. Qualitative analysis: Examining strategies for a policy theory for management of large carnivores, and challenges of implementation in Idaho.
68. **O'Brien, Kate.** 1995. A critique of the South-Central and North Pacific/Gulf of Alaska action plan (Why professionals should complete the process of explicit problem definition).
69. **Rutherford, Murray.** 1995. A policy sciences view of biodiversity loss: Connecting with base values.
70. **Scheuer, Jonathan.** 1995. The challenge of conserving biological diversity in Hawai'i: What is the policy problem?
71. **Wilshusen, Peter.** 1995. Lake Champlain Basin program.
72. **Ahearn, Laura.** 1996. The Chester Creek Marsh: A prototype for watershed management.
73. **Beard, Karen.** 1996. Bison management in the Greater Yellowstone Ecosystem: An analysis of the draft interim bison management plan environmental assessment.
74. **Beck, Jennifer.** 1996. Private property rights and the planning of the Silvio O. Conte National Fish and Wildlife Refuge.
75. **Davenport, Jane.** 1996. The future of the National Wildlife Refuge system: The need for comprehensive legislative reform (or, bring on the lawyers).
76. **Frohling, Nathan.** 1996. The Connecticut River Tidelands Bioreserve: Case study in ecosystem management.
77. **Hinman, Curtis.** 1996. Central Sierra watershed analysis, California.
78. **Holmes McKenna, Erin.** 1996. Elk management in the Northern Range of Yellowstone.
79. **Huffman, Phil.** 1996. Property rights and river conservation: Using the Wild and Scenic Rivers Act to protect rivers flowing through private lands.
80. **Martin, Bill.** 1996. The Long Island Sound coastal zone: New approaches for coordinated open space management.

Table 1   Continued

81. **Nachiem, Lara.** 1996. Applying a policy orientation to the issue of salt marsh restoration on the West River.

82. **Palden, Jigme.** 1996. Control of wild pigs in the Buddhist kingdom of Bhutan: A policy process.

83. **Peck, Eugene.** 1996. Restoring Massachusetts wetlands: A value-institution process.

84. **Peters, Charles (John).** 1996. Federal government and agency posture in the upcoming cooperative agreement with the state of Idaho for bull trout conservation: A briefing for Forest Service officials.

85. **Portier-Smith, Alice.** 1996. Solid wastes, New England.

86. **Saltonstall, Kristin.** 1996. Education for conservation: The ultimate hope. What's new at the zoo? Lessons in implementation of effective conservation education programs.

87. **Shallcross, Kathryn.** 1996. Policy practices in history: 250 years of Mississippi River control.

88. **Tenissez, Carter.** 1996. Cowboys and critters: The showdown over shiner on the southern high plains.

89. **Valdez, Ryan.** 1996. International wildlife conservation: Case-North Luangwa conservation project.

90. **von der Pahlen, Constanza.** 1996. Greenways to people and people to greenways: A policy approach to conservation.

91. **Woelflein, Louise.** 1996. Beyond biology: Training conservation biologists to solve conservation problems.

92. **Wright, Nancy.** 1996. Endangered species. How to take the environmental bite out of international trade.

93. **Yu, Hsiao-Man.** 1996. Education as a conservation tool: Conservation education programs for protecting declining species.

94. **Eisenstadt, Keegan.** 1997. International conservation issues and strategies: Case study examples in Belize.

95. **Evans, Alexander.** 1997. Conservation in Belize: The leadership of Program for Belize in a policy analysis framework.

96. **Gaginski, Thomas.** 1997. A policy sciences analysis of the Nature Conservancy—Program for Belize Partnership under the Wings of Americas Program.

97. **Gaillard, David.** 1997. Addressing landscape fragmentation in the Northern Rockies.

98. **Garen, Eva.** 1997. Integrating conservation and development: A policy analysis of the Rio Bravo Conservation and Management Area.

99. **Gonzalez, Carlos.** 1997. The FAO's international code of conduct on the distribution and use of pesticides: A good policy or a "feel good" policy?

100. **Kass, Madeline.** 1997. The Grand Staircase-Escalante National Monument: A wilderness designation quandary.

101. **Lamoreux, John.** 1997. A review of the latest AFSEG action plan using the policy sciences.

102. **Landivar, Roger.** 1997. Applying the policy sciences to maximize long-term success of conservation work in Bolivia.

103. **Le Breton, Gus.** 1997. Zimbabwe and the international ivory ban.

104. **Miliken, Sally.** 1997. The upper Androscoggin River Valley: A policy sciences analysis of community-based ecosystem management in New England.

105. **Pinchot, Peter.** 1997. The Balcones Canyonlands Conservation Plan: The role of citizen attitudes in ecosystem management.

106. **Ramanathan, Shalini.** 1997. Swamp things: Marshes, mosquitoes and encephalitis in Connecticut.

107. **Reid, Josh.** 1997. Forest health and the salvage logging rider.

108. **Slosser, Nicholas.** 1997. Consumption and conservation of shark: Integration of science and policy for the future of large migratory elasmobranchs.

109. **Swantz, Shauna.** 1997. Contrasting viewpoints and recommendations on the role of science and scientific uncertainty in Endangered Species Act implementation.

110. **Tighe, Cristin.** 1997. Malaria as a policy problem: Improving problem orientation and policy-making.

111. **Ulgen, Huma.** 1997. An overview of ecosystem management through the policy sciences.

112. **Wojtalik, Amanda.** 1997. Analyzing the red wolf recovery program and determining a successful strategy for its implementation using a policy orientation.

113. **Block, Nadine.** 1998. Public land management: A case study of old-growth management on state lands in Minnesota.

114. **Bryant, Peter.** 1998. Atlantic salmon restoration on the Connecticut River.

115. **Burrows, John, and Christine Chui.** 1998. Policy analysis of the Florida Keys National Marine Sanctuary Final Management Plan/ Environmental Impact Statement.

116. **Bowes-Lyons, David.** Towards a "sustainable" land-management strategy in Hertfordshire, England.

117. **Cucchi, Anthony. 1998.** The Mexican wolf recovery process: Turning short-term success into long-term recovery. Current prospects for wolf recovery in Yellowstone National Park.

118. **Elwell, Chris.** 1998. Analysis of black bear repatriation to the Big South Fork region of Kentucky and Tennessee, USA.

Table 1   Continued

119. **Finkral, Alex.** 1998. Old growth in the White Mountain National Forest: A policy sciences approach to resolving resource management problems.

120. **Gardner, Benjamin.** 1998. Panama Canal watershed management. Mutual incomprehension or selective inattention? Creating capacity for public participation in natural resource management in Panama.

121. **Gillseberg, Anne-Marie.** 1998. Species reintroductions: Improving the process.

122. **Kahn, Brad.** 1998. Integration in natural resources management and policy in the Panama Canal watershed.

123. **Lawrence, Jessica, Evan Preisser, and Jennifer Yelin.** 1998. Vernal pool conservation in Connecticut.

124. **Lieberknecht, Katherine.** 1998. Wildlife conservation, a delicate balance: An analysis of the habitat conservation planning process in Texas.

125. **McQuay, Andrea.** 1998. Conserving mountain lions in a changing environment in the American West.

126. **Paiz, Marie-Clair.** 1998. Forest planning. Public participation in the management planning for Pisgah and Natahala National Forests, North Carolina.

127. **Papazian, Jennifer.** 1998. In search of reason: Bison management in the Greater Yellowstone Ecosystem.

128. **Plavsic, Mila and Jason Sumiye.** 1998. Integrated conservation and development projects: A policy analysis.

129. **Rod, Brian.** 1998. Conservation and development: Finding a balance. Developing an open space conservation strategy for the Adirondack Land Trust: A policy analysis.

130. **Weinstein, Sasha.** 1998. Sustainable land management and design. Regional urban growth planning in metropolitan Portland, Oregon.

131. **Westerfield, Elizabeth.** 1998. Guiding principles of sustainable design.

132. **Whitney, Sarah.** 1998. Will the goals be met? An examination of ARI's general and regional plan with respect to protected areas within the Interoceanic Region, Panama.

133. **Williams, Chris.** 1998. National Park management in the Panama Canal watershed.

Figure 1   Location of study site or region of students' case analyses from 1990-1998 "Species and Ecosystem Conservation: An Interdisciplinary
Approach" course (see Table 1 for key to paper titles and authors).

Conserving Biodiversity in Hawai'i: What is the Policy Problem?

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ABSTRACT

Many of Hawai'i's native species and ecosystems are critically endangered, and attempts to reverse these trends are problematic. No one has produced and circulated a comprehensive definition of Hawai'i's "biodiversity problem" as a basis for successful conservation. Because conservation actions are determined by problem definition(s), it is vital to have an adequate definition. In this article, we review the concept of policy problem definition, standards of adequate definition, and the history, status, and trends of Hawai'i's biodiversity. We then document how diverse perspectives in the debate over "the biodiversity problem" in Hawai'i are themselves problematic. Five competing problem definitions are in currency—scientific, economic, bureaucratic, Native Hawaiian, and educational—and each has proponents and opponents. To evaluate these definitions we ask: Is our science adequate to conserve biodiversity?; Does the economic system help or harm conservation efforts?; Are government agencies capable of conserving biodiversity?; Would increased Native Hawaiian control improve conservation?; and, What kind of educational initiatives would help protect biodiversity? Four recommendations are made. First, improved social and natural science is needed and it must be integrated into an overall picture. Second, trust must be built among competing perspectives. Third, problem-solving capabilities must be developed. And fourth, prototype conservation programs must be designed and tested.

It seems that Hawai'i has a "biodiversity problem," judging by the numerous accounts of the demise of Hawai'i's biodiversity that emphasize the goal of conservation and the difficult prospect of achieving this goal. While the existence of a "biodiversity problem" in Hawai'i has been acknowledged, no one has produced and circulated a comprehensive definition of the policy problem of conserving Hawai'i's biodiversity. A problem is "a perceived discrepancy between goals and an actual or anticipated state of affairs" (Lasswell 1971: 56). Because conservation actions are determined by problem definitions, the lack of an adequate definition of Hawai'i's biodiversity problem is undermining effective conservation action in Hawai'i.

To improve conservation in Hawai'i, this paper (1) reviews relevant policy literature to clarify the nature of policy problems and the tasks necessary to create adequate problem definitions, (2) summarizes the history and status of Hawai'i's biodiversity and projects its future trends, (3) documents diverse perspectives in the debate over "the biodiversity problem" in Hawai'i, and (4) proposes a preliminary definition and recommendations.

Our research was performed in 1995 and 1996. We systematically reviewed approximately 100 newspapers, articles, and journals about conservation problems. Scheuer also carried out approximately 60 hours of open-ended interviews with government, non-governmental, and public representatives.

While the existence of a "biodiversity problem" in Hawai'i has been acknowledged, no one has produced and circulated a comprehensive definition of the policy problem of conserving Hawai'i's biodiversity. Because conservation actions are determined by problem definitions, the lack of an adequate definition of Hawai'i's biodiversity problem is undermining effective conservation action in Hawai'i.

DEFINING PROBLEMS ADEQUATELY

The policy literature describes the concept of problem definition and the tasks which are necessary to create adequate problem definitions. Below we describe the nature of policy problems and the steps in forming definitions, including setting goals, determining and projecting trends, identifying players, their perspectives and values, and assessing what knowledge is at hand and what is lacking.

THE NATURE OF "PROBLEMS"

Everyday speech has us "finding" problems, the way we find our lost possessions or an astronomer finds a star. However, as Schön (1983: 271) says, "Problems are not given. They are constructed by humans beings in their attempts to make sense of complex and troubling situations." Though this observation may seem erudite, this concept of problem definition does not apply solely to the work of academics and policy analysts. Rather, as Primm and Clark (1996) indicate, problem definition "is something we all engage in daily, ranging from common sense spot judgments to more in depth matters." This has been recognized in many places and cultures. For example, a study of a Native Hawaiian group problem-solving practice, *ho'oponopono* (setting things to right), noted that problem identification is a first step in finding a resolution (Shook 1985).

If problems are defined rather than found, it follows that many different definitions of a given dilemma can be constructed. As we discuss in detail below, different human perspectives account for varying explanations of causes, focus on different symptoms, apply different criteria for success, and even result in differing acknowledgment of the existence of problems (Schön and Rein 1994). In the policy arena, the self-constructed nature of problems would be of little concern if all problem definitions put forward were to have an equal chance of solving a dilemma. However, not all problem definitions are equally useful, and actions based on poor problem definitions can complicate matters. Brunner (1991: 291) observes that "Definition of the policy problem is important because further research—and policy recommendations, decisions, and actions—are misguided and probably futile if the policy problem is misdefined in the first place."

An example from Hawai'i illustrates the constructed nature and long-term effects of problem definition. Mamala Bay on the southern coast of the island of O'ahu receives the majority of sewage generated by Honolulu's population. After lengthy court battles between environmentalists and the City of Honolulu over whether or not sewage treatment capacity needed to be expanded and upgraded at great expense, a judge appointed the Mamala Bay Study Commission with a charge to determine the appropriate level of sewage treatment. The Commission in their public statements recognized some of the characteristics and powers of problem definition:

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Definition of the Problem. In order to decide whether a wastewater treatment plant should be upgraded, *the exact nature of the problem needs to be defined*. If clarity of the water is the problem (meaning too much suspended material in the water), then upgrading to secondary treatment may be a good solution. If, however, nutrients are a problem, upgrading may worsen the problem. If pathogens are a problem they may be eliminated by adding a disinfecting step (such as chlorinating) to the primary treatment without upgrading to the secondary level. If however, contaminants are discharged mainly from non-point sources of pollution, improving the waste water treatment plants will have no effect. The Mamala Bay Study will help address some of these important questions. (Mamala Bay Study Commission 1995: 4, italics added).

Here we can see that multiple definitions are possible in any given situation and that the problem definition selected has a large bearing on what kind of future actions will be taken. As Dery (1984: 5) notes, "problem definition is a framework within which certain interventions are considered—and indeed defined—as solutions. Without this framework the same actions would make no sense."

Weak problem definitions are continually created and persist even when it is demonstrated by fact and argument that they are inadequate. This occurs because problem definition is usually a political exercise. Problem definitions are not always advanced "just for beauty's sake or for insight's sake," but, rather, "problems are defined in politics to accomplish political goals—to mobilize support for one side in a conflict. To define an issue is to make an assertion about what is at stake and who is affected, and therefore, to define interests and the constitution of alliances" (Stone 1988: 6, 106).

To understand the pros and cons of definitions, it is useful to understand that all players use rhetoric, "a persuasive discourse between and within 'interpretive communities.'" Problem definition, therefore, "cannot be fully understood apart from the audiences to which it is directed and the styles in which it is communicated" (Throgmorton 1991: 153). Problem definition as rhetoric is the primary way in which groups communicate with themselves and others.

All participants who advance policy problem definitions are addressing their calls to particular audiences in a style that is calculated to further their own goals. Rhetoric serves a useful purpose, particularly when conversing with others in the same interest group, but it acts as a barrier to understanding when communicating with outsiders.

As we illustrate below, the debate over biodiversity conservation in Hawai'i has yet to acknowledge the constructed nature of problems and the central political role of problem definition to conservation policy making and action. To lay the groundwork for our preliminary problem definition, we need to

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examine the characteristics of good problem definitions.

THE TASKS OF ADEQUATE PROBLEM DEFINITION
Creation of adequate problem definitions seeks to avoid the pitfalls of typical policy problem definition through gathering and analyzing a wide range of relevant information and forming clear measurable goals, which support the common good.

To return briefly to the Mamala Bay Study Commission's problem definition, we can see that gathering enough relevant technical data is an important step in problem definition. This task should not be underestimated. Forming adequate problem definitions, however, goes beyond analyzing technical data. The Mamala Bay Study Commission's problem definition is an example of a narrow view of "relevant data" that largely ignores social, political, and economic dimensions of the sewage treatment problem. In actuality, much of the battle in Honolulu over sewage treatment has been fought in the political, legal, and bureaucratic realms, and has been driven by different participants, including scientists, environmental groups, regulators, and politicians, each with unique perspectives and values. Because the Commission did not consider this context, at least one commentator now fears that after spending nine million dollars on the technical study, the model for action produced will not solve the problem because it didn't adequately address its political and bureaucratic dimensions. "On one hand, the model presents a unique opportunity for governmental agencies to tear down institutional barriers that exist between them and better integrate their various functions. On the other hand, unless this takes place, [the work of the Commission] will be of little value" (Marcus 1995: D1).

As in the case of the Mamala Bay Study, people concerned with protecting Hawaiian biodiversity need to recognize that good definitions of policy problems require contextual data to explain the historic, social, political, and economic roots of present dilemmas. Wildavsky (1971: 139) suggests that context is important because "the context in which the issue occurs not only helps determine the decision maker's perception of the facts and values but also the way which he seeks out, receives, and evaluates the information." Because the Mamala Bay Study Commission was composed solely of natural scientists and asked solely for their expert opinions, the larger social context of the problem was largely overlooked. As a result, actions proposed may not be politically viable or achieve goals. Examining the context of a problem and including it in a definition, then, increases the likelihood that the goals will be reached.

In the policy context, players can include individuals and organizations, and one of the most telling ways of identifying relevant players and their perspectives and values is to examine the problem definitions that have been put forward in a particular dilemma. "Perspectives," refers both to the particular socio-economic profiles of individuals and the particular "lenses" of culture and training that they tend to use. Understanding both perspectives and goals

In the policy context, players can include individuals and organizations, and one of the most telling ways of identifying relevant players and their perspectives and values is to examine the problem definitions that have been put forward in a particular dilemma.

of participants is crucial, as the formulation of problem definitions is dependent on people.

Thus, adequate problem definition involves examining all parts of a problematic situation, all the players and their possible interrelationships, what knowledge is at hand and what is lacking, and what circumstances are within control, to the extent possible. Anyone who analyzes a "problem" needs to work through the maze of facts and values involved to decide on a course of future action. "Problem definition is more than mere problem identification and description. At its functional level, it is a diagnostic process that isolates the causes of the problem, and illuminates a range of realistic solutions" (Primm and Clark 1996: 138). It is this process in defining the "biodiversity problem" in Hawai'i that we turn to next. To be politically viable, adequate problem definitions must take into account the myriad extant problem definitions and seek a common interest.

THE HISTORY, CURRENT STATUS, AND POSSIBLE FUTURE OF HAWAI'I'S BIODIVERSITY

A brief history

Creating an adequate problem definition of Hawai'i's biodiversity crisis must begin with a contextual, historical review of the dilemma and a projection of trends. For these purposes Hawaiian history can be broken up into four main periods: the pre-settlement period (70,000,000 B.C.E.-100 B.C.E.), the period of Native Hawaiian control prior to Western contact (to A.D. 1778), the post contact period (to A.D. 1959), and the modern period (to the present). In each period, new players and on-the-ground processes affected Hawai'i's biodiversity.

The pre-settlement period was characterized by the development of Hawai'i's high rate of biotic endemism. Research indicates that the first islands to rise from undersea volcanoes were stepping stones for colonizing species that evolved into approximately 10,000 endemic species present today on the eight high and many low islands (Beverly and Wilson 1985). Ninety-five percent of all native species are endemic, many restricted to islands or parts of islands, resulting in a chain-wide rate of endemism higher than any comparable area. Because of this ecological and geographical specialization, and also the loss of defenses against common continental predators, Hawaiian biodiversity is highly susceptible to degradation by humans (Carlquist 1980).

The second period began approximately 2000 years ago, when Polynesian colonists arrived with new flora and fauna, and fire. This marked the beginning of intensive human use of some resources. It is hypothesized that clearing of vegetation for agriculture and hunting caused numerous extinctions, for which there is evidence among birds (Olson and James 1982; James and Olson 1991; Olson and James 1991). Voyages back and forth continued, resulting in a few introductions of alien species, but from approximately 1778, contact with other islands ceased. In approximately 1200, a system of *Kapu* (taboos) was

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instituted that managed communal resource systems, and protected what could be called "conservation values" (e.g., Kanahele 1986) by restricting social and economic practices throughout the islands and thus Native Hawaiians' impact on the environment. Through the period of Native Hawaiian control prior to conquest, certain key components of Hawai'i's biodiversity were eliminated, though much biodiversity remained when Westerners arrived (Cuddihy and Stone 1990). In 1820 the *Kapu* system was overthrown, and in 1850 land was privatized, ending much Native Hawaiian control of resources and society through a hierarchical, chief-based system (Kame'eleihiwa 1992).

Between 1778, the time of Captain Cook's arrival, and 1850, the Native Hawaiian population was reduced by an estimated 50%-95%, mostly as a result of introduced disease (Stannard 1989; Bushnell 1993). Westerners also brought new, more invasive alien plants and animals that began to degrade Hawaiian ecosystems severely. The commercialization of some forest and marine products also severely affected some species. By the end of the period of Native Hawaiian dominance, indigenous ethical, social, legal, and economic systems affecting biodiversity had deteriorated.

By the time of privatization of lands (1848-1852), Native Hawaiian control was significantly eroded and was completely lost with the overthrow of the monarchy in 1893 and annexation by the United States in 1898 (Kame'eleihiwa 1992). This fifty-year span marked the beginning of the plantation period oligarchy. A few white families had nearly total social, political, and economic control over the population of Native Hawaiians and Asians (imported to work on the plantations) as well as most resources of the islands. In this system, the conversion of lands accelerated: lowland areas (<1,000m) were cleared for sugar cane *(Saccharum oficcinarum)* and pineapple *(Ananas comosus)* cultivation, and streams were diverted for irrigation (Cuddihy and Stone 1990). The decline of endemic biodiversity was recognized to a degree by the elites, and conservation efforts were made when such actions supported the dominant political economic system. In fact, the first statewide efforts at protecting watersheds were begun at the turn of the century. A territory-wide system of forest reserves was established, leaving a legacy of Hawai'i having one of the largest state forest reserve systems in the United States. Fencing of forests and elimination of feral ungulates significantly slowed the rate of deforestation. However, to a degree which is not well known, many areas were also reforested with invasive and exclusionary alien species.

Statehood in 1959 marked the end of the plantation period. Political control and economic power diffused to the descendants of plantation laborers and other immigrants through the processes of American democracy. Today the economy is largely based on tourism and military operations. In 1991, slightly over one-half billion dollars of revenue was generated by agriculture, over 3.3 billion dollars by military spending, and over 10.5 billion dollars by tourism (Oliver 1995). About 20 percent of the populace claims Native Hawaiian ancestry, and no ethnic group constitutes a majority (Bushnell 1993).

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A bureaucratic apparatus is legally responsible for the conservation of biodiversity, assisted by a variety of non-governmental organizations (NGOs). In the last two decades several relatively well-funded research, management, and educational efforts have been undertaken by government and NGOs as well as private individuals (Department of Land and Natural Resources *et al.* 1992; Mehrhoff 1993). A few notable successes, described in greater detail below, include the removal of feral ungulates and the eleventh-hour salvation of a few species. Simultaneously, Native Hawaiians have had a cultural and political resurgence that includes demands for an increased role in land management, which has led to much conflict. One long-standing, unresolved issue is the legal claims, by Native Hawaiians, to almost one-half of the state's land, including almost all protected, and biologically diverse, lands now managed by state and federal governments.

Current status and possible future

As the result of this new mixture of people, species, and resource uses, Hawaiian biodiversity has declined across taxa. The flora has suffered tremendously. Thirty-six percent of all plant species listed under the Endangered Species Act (ESA) are Hawaiian (U.S. Fish and Wildlife Service 1995). Of 1,102 indigenous plant species and 1,020 endemic species, 95 are extinct and 271 are listed under the ESA.

Invertebrates are also declining. The terrestrial invertebrate fauna of Hawai'i comprises about 9,000 species, including over 1,400 land snails (Kaneshiro 1989). "Probably only 25-35%" of the total original land snail fauna is extant, and most will go extinct in "at best, a very few years. It can certainly not be measured in decades" (Solem 1990: 28).

The situation is similar for birds. Pre-conquest, Native Hawaiian activities destroyed at least 60 species of birds, and 200 years of Western influence has eliminated 20-25 more species (Olson and James 1982; James and Olson 1991; Olson and James 1991). Of the 70 species remaining, 30 are endangered and half of those are predicted to become extinct before the turn of the century (Department of Land and Natural Resources *et al.* 1992).

Only three native land mammals were ever present in Hawai'i. Today, one is extinct, and the Hawaiian monk seal and hoary bat are endangered (U.S. Fish and Wildlife Service 1995).

Aquatic and marine taxa are also declining, although their status is less known. Humpback whales and Pacific green sea turtles are listed under the ESA (U.S. Fish and Wildlife Service 1995).

In terms of natural communities, two-thirds of Hawai'i's forest cover is gone, including 50 percent of the native rainforests. Eighty-five of the 150 native natural communities are considered critically endangered (Department of Land and Natural Resources *et al.* 1992). Development of Honolulu turned a formerly productive coastal wetland into one of the most heavily fertilized

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estuaries in the world (Laws *et al.* 1993). Current fishing pressure has harmed reef fish biodiversity in the main islands (Grigg 1994).

The precarious status of Hawai'i's biodiversity is historical; yet new threats continue. Presently, "the destructive effect of non-native species introduced to the islands by people" is the chief mechanism of decline (Department of Land and Natural Resources *et al.* 1992: 8). Yearly, 12 to 35 species invade the islands, and it has been estimated that alien species outnumber natives by two-to-one to three-to-one (Department of Land and Natural Resources *et al.* 1992; Institute of Pacific Islands Forestry 1995). Natural disturbance processes also affect biodiversity. Wildfires destroy native plants (Department of Land and Natural Resources *et al.* 1992) and hurricanes damage communities already weakened by other forces (Dougherty 1993).

What does this brief examination of the history and current status of Hawai'i's biodiversity tell us? While data is incomplete, particularly for all periods except the most recent, we know that the trend before human contact was diversification; since human colonization it has been the opposite. If present trends continue, Hawai'i will lose the majority of its remaining taxa and communities by the middle of the next century. Why have recent conservation efforts not been more successful? One reason might be the lack of a coherent, comprehensive definition of the policy problem that would garner broad political support. While not wholly sufficient, adequate policy problem definition is a necessary condition for designing effective solutions.

FIVE DEFINITIONS OF HAWAI'I'S BIODIVERSITY CRISES

Many scientists, such as E. O. Wilson (1992), recognize that Hawai'i is a global biodiversity "hot spot." In 1992, an unprecedented coalition of state and private conservation agencies in Hawai'i jointly published and circulated to the public a document (funded by private industry) declaring that hundreds of species and 85 of Hawai'i's 150 native communities were critically endangered, and that urgent action was needed to prevent their extinction (Department of Land and Natural Resources *et al.* 1992).

Having considered the historical context of Hawaiian biodiversity loss, we can now move towards developing a new problem definition by describing and analyzing the current problem definitions found on the islands. The debate over conservation in Hawai'i is often rancorous and contentious. Although few have tried to define the problem of Hawai'i's loss of biodiversity explicitly, all people have an implicit policy problem definition that drives their actions. Getting at these definitions, however, is difficult. "Sound bites" and their academic equivalents, short research papers and book abstracts, are an inadequate bases for formulating policy and for determining what policy definitions different players hold. They are, however, useful in the sense that they reveal the most important parts of the definitions that actors hold. In Hawai'i's case, where a comprehensive problem definition is lacking, they also form the only readily available data from which to determine existing definitions. As we

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will comment later, the lack of any comprehensive policy definition in Hawai'i is a chief part of the conservation problem.

From a survey of diverse materials, we have identified proponents and opponents of five major definitions, what we call the scientific, economic, bureaucratic, Native Hawaiian, and educational definitions. Each definition has persisted over the past two decades, though an increasing number of voices are trying to bridge this conflict.

THE SCIENTIFIC DEFINITION

Proponents—Proponents of the scientific definition say the problem for Hawai'i's biodiversity is inadequate scientific knowledge, and they assert that more scientific knowledge is needed as the solution. The chief proponents are scientists, and the main argument is that the "challenge for conservation in Hawai'i [is] the almost total lack of information on the basic ecology of native biota and ecosystems. Without such knowledge, designing management programs is problematic at best"(Conant 1992: 144-145). This definition is often phrased in disciplinary terms. Botanists have suggested, for instance, "that available time and resources be focused on field studies and analyses of plants with specific taxonomic problems" (Lorence *et al.* 1989: 46).

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Opponents—Opponents usually do not question the value of protecting Hawai'i's biodiversity, but do question whether more scientific knowledge is needed as a prerequisite to protection. They hold that inadequate knowledge is an intrinsic characteristic of science in general. Further study is, therefore, not justified and science moves too slowly to protect biodiversity. As a prominent environmental journalist in the islands stated, "too often, development pressures outpace the ability of scientists . . . to determine what areas should be protected and to take the necessary action" (Tummons 1992: I-1). People question the supposedly "value-free" nature of scientific knowledge, thus questioning science's role as means and end, as in this quote from a member of a hunting club: "You [scientists] say 'God made a mistake in creating the wild boar' [but] the pig is for the people of our island, not the scientists" (Dougherty 1994: 22). Another hunter, arguing about the characterization of feral pigs as an alien species, was more succinct: "Why should some *haole* [white] scientist from America get to come here and tell us that this plant or that bird is more important than us? We will decide these things for ourselves" (Adler 1995: 5).

This strident opposition to the scientific definition illustrates the complexity of the policy arena in Hawai'i. What first appears to be a simple, technical matter for conservationists—defining which animals are native and which are not—becomes polemical when different problem definitions conflict.

THE ECONOMIC DEFINITION

Proponents—Many people assert that the main problem in protecting Hawai'i's biodiversity is the current economic system, which favors activities that degrade biodiversity. Proponents assert that the solution is to change the eco-

nomic system via regulation or other means and that, in the long run, native ecosystems will provide greater economic returns to people in the islands than conversion of those ecosystems for immediate, short-term, financial gain. As a result, they also use the economic argument as a justification for protecting biodiversity.

The University of Hawai'i's environmental coordinator defined the difficulty: "In practice, economics is in the driver's seat when it comes to the environment. The irony is that ultimately our state's coffers depend so much on our environment" (Paris 1994: 21). Others concur: "The challenge we face is how to balance the needs of a growing population and island economy with the preservation of Hawai'i's limited natural resources….Our survival today depends on saving what is left of our native ecosystems" (Department of Land and Natural Resources *et al.* 1992: 8). Frequently, the problem is phrased as the differential valuation of native biodiversity vs. market-driven forces: "Sometimes issues of insects and feral pigs aren't as high profile and media-sexy as the spotted owl controversy or the humpback whale (because they are not seen as directly affecting the economy). Unlike the Pacific Northwest, when we lose native forests here, nobody makes anything out of it because there is no big commercial stake" (Mark White, personal communication).

Opponents—On the other hand, private property owners feel that the current economic and conservation regulatory system threatens their economic well-being, and they claim they would be better enabled to protect biodiversity if they were given positive economic incentives and could freely exercise private property rights. No one disputes the idea that "economic well-being" is desirable, but they disagree on the specifics of what resources should be used for economic return. Essentially, opponents state that protection of land (and by implication its resident biodiversity) is a social value that can best be protected by private interests.

Some people are extreme in their opposition to changing the economic system or enhancing enforcement of existing regulations to protect biodiversity. One landowner, who created an endangered species preserve on his land, said: "As I get older and feebler, they just take everything away that I've worked for and spit on my rights. I promised the scientists and environmental groups that if they tried to take it over, I would destroy the whole thing" (Zeck 1994: A-1). Some landowners are more conciliatory, while still stressing private property rights. Commenting on a formal requirement to replace a wetland that would be lost on his property from a proposed housing development, one landowner said: "A pond like that enhances the area, but the idea of just condemning a person's property without some kind of incentive to do something like that … I think that's wrong" (Kubota 1993: A-6).

The clash over the economic definition comes sharply into play only when a specific development proposal threatens a plant or animal. Testifying against a planned development of over 3,000 homes, a hotel, shops, and a marina that would threaten an endangered spider, an entomologist said: "Even in an area

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as special as Hawaii, these spiders are extraordinary…and if they are going to survive [the developer] has to leave the areas where the spiders survive pretty much alone" (Conrow 1994: A-3). In another instance, many business people opposed establishing a marine sanctuary to protect humpback whales which winter in Hawai'i, claiming the sanctuary would restrict or eliminate their livelihoods while not giving the whales any greater protection. One tour boat operator's definition was that there was no problem: "We don't need a whale sanctuary here, we think it already is one" (Todt 1985: 6).

Fortunately, some efforts are being made to reconcile the extremes, as illustrated by a government employee: "The long-range challenges are to help people benefit from their natural environments—thereby instilling an understanding of why biodiversity is so important—and to protect native biological systems so Hawai'i can sustain its rich genetic heritage" (Conkle 1993: 7).

THE BUREAUCRATIC DEFINITION

Proponents— Proponents assert that the main problem is that state and federal bureaucracies are inadequately funded and staffed and that increased funding, staffing, and power will protect biodiversity. For example, the head of the state's Division of Forestry and Wildlife said, "So what does [passage of the Hawaiian Tropical Forestry Recovery Act] mean? Not much unless we use it as a tool to bring in more federal resources [to our agency]" (Buck 1992: 19).

The perception that agencies need more money is widespread. One environmental advocate felt strongly about the problem of agency funding: "The state's environmental programs are woefully understaffed" (Paris 1994: 21). Later, he himself joined an agency's staff and, when asked about framing the biodiversity conservation problem most effectively, said: "What do you mean, problem definition? That's bullshit. The problem with conservation in Hawai'i is that it needs more funding [for the agencies]" (Frankel, personal communication, 1995). U. S. Senator Daniel Akaka expressed a similar sentiment when he announced funding increases for Department of Interior programs, which "are our best hope of preventing further loss of Hawai'i's rich natural heritage. With Secretary Babbitt at the helm, Hawaii's endangered species and alien pest problems are finally getting the attention they deserve" (Morse 1994: A-4).

Opponents—Opponents claim that bureaucracies themselves are the problem and are organizationally incapable of managing and protecting biodiversity. Many conservationists are particularly critical of the agencies charged with protecting Hawai'i's biodiversity:

> Many who would preserve native ecosystems express distrust of the administering bureaucracies, which sometimes seem to act ultimately for political, economic, or self-serving reasons rather than conservation values….Inertia, unresponsiveness, and lack of concern sometimes seem to predominate in State and Federal agencies…[They] are sometimes seen as excessively bureaucratic, with uninspired and inefficient leadership…There is a certain amount of skepticism that

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administrators do not know what preservation priorities are most important (Stone and Scott 1985: 508).

Some specific cases of mismanagement have exacerbated this public perception. In 1993, for instance, a state forestry division bulldozer operator destroyed the last known example of a native tree on the federal endangered species list while clearing a roadway. One botanist said that there was "no excuse" for such an action (TenBruggencate 1993: A3). Today, this terrible example is given often as proof that the agencies are a main part of "the problem."

THE NATIVE HAWAIIAN DEFINITION

Proponents—Proponents assert that Native Hawaiians are intrinsically capable of conserving biodiversity by virtue of cultural values, and that the cause of biodiversity loss is that Native Hawaiians do not have the control they once had. This definition of the policy problem has gained considerable currency in the past decade, reflecting the increasingly active political role of Native Hawaiians today. Proponents also state that because traditional Native Hawaiian practices are dependent on endemic biodiversity, their cultural survival is a justification for protecting biodiversity. This view appears frequently in the debate. For example, as the main conservation organizations in Hawai'i stated in a report: "The survival of Hawaii's native plants and animals is important for the continuing cultural traditions of Hawaii's people. The material culture of the Hawaiians cannot survive without the land and natural resources from which their cultural traditions evolved" (Department of Land and Natural Resources *et al.* 1992: 7).

Many people, particularly Native Hawaiians, assert that Native Hawaiian control—in and of itself—will protect biodiversity, based on the idea that traditional values such as *malama 'aina* (caring for the land) qualify Native Hawaiians as good stewards of biodiversity. When asked how to protect endangered species, one advocate of sovereignty said, "Our answer is the independence of Hawai'i [in Native Hawaiian control]" (Conrow 1995a: A-6). Another leader in the sovereignty movement agreed that "for many of us, environmental destruction is directly traced to non-Native control" (Trask 1993: 250).

Opponents—Opponents claim that, prior to conquest, Native Hawaiians were very destructive to biodiversity within the limits of their technology, that there is nothing inherent about native culture that would conserve biodiversity, and that, consequently, no benefit to conservation can be gained by giving them control. Pointing to past extinctions of birds, one scientist said flatly that "When people get to islands, there are large rates of extinction, it's as simple as that" (Pichaske 1995: A-6). An environmental author echoes this claim: "The Hawaiians were no different from any other people who began as determined pioneers and expanded their culture onto a yielding landscape" (Culliney 1988: 321).

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Again, a few voices can be heard trying to moderate each view. One Native Hawaiian, also a scientist, noted that "since most Hawaiians have become disenfranchised from their *'aina* [land] and cultural heritage, they have not maintained the traditions, knowledge, and spiritual values that their ancestors had for nature," but suggested that "we can use the Hawaiian conservation values…to guide us in our decision making when questions arise in economics, recreation, and land development that may have a bearing on critical biological habitats" (Burrows 1989: 203, 212).

THE EDUCATIONAL DEFINITION

Proponents— Nearly everyone, even those who disagree about other aspects of the issue, agrees with this definition, which asserts that the main problem is that people are not knowledgeable about the biodiversity issue and that more education is needed. Consequently, this definition, more than any other, illustrates the political and rhetorical role of problem definition.

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Several examples illustrate the form this definition takes. The debate over use of trails is a good case. Hawai'i's numerous populations of endangered species often lie along heavily used public trails, and a number of conservation professionals advocate increased access and use of resources, even if it means potentially damaging species. As the head of the state's trails program noted: "How are our youths to appreciate or save the environment if they can't even see what the endangered species are? The onus for environmental protection now falls on everyone, not just a select few who are trying to put a glass bubble over everything" (Wagner 1993: B-4). This idea is echoed by others: "The only way we're going to take better care of the environment is if people feel more connected to it, and the only way we're going to do that is with more hiking trails" (Wagner 1993: B-1). Their assumption is that more experiential education would bring about better protection and more support for conservation.

When scientists call for education, however, they frequently focus on scientific education: "Educators should strive to cultivate an appreciation of viable native ecosystems and the evolutionary processes which have led to the biological diversity for which the Hawaiian flora and fauna are famous" (Stemmermann 1989: 53). Many scientists' views of needed education are based on perceptions of the legitimacy of their own fields, revealing their personal perspectives. This can be seen clearly in the statements of a biologist and environmental educator who was asked, "What are the major problems?"

> We are still only on the verge of society-wide reception and understanding of environmental education, conservation biology, and related topics. Society still views these areas as "soft science." The one full-time environmental education specialist in Hawai'i's public schools translates to a serious lack of preparedness among most interested island teachers;

> there is a dearth of appropriate written and other materials
> that can be put to use (Gagné and Gill 1989: 181).

Other proponents also adopt the educational definition, but mean something very different. Proponents of the Native Hawaiian definition claim that scientists don't understand that there are different methods of education; they feel it is the scientists who need to be educated. One native activist said at a conference that dealt with biodiversity protection:

> My library is not at the university or in a building. My library
> is the ocean and the mountains and the land, and the fish that
> I catch would not look good on the pages of a book. So I say
> to you, please keep that library, not in a book, but where it
> belongs, out in our universe, where we can touch it, feel it, and
> use it (Dougherty 1994: 23).

A few players in some specific instances have tried bringing together at least two of the many diverse groups. Describing the fights between scientists, local hunters, and Native Hawaiians, one person stated that "each side needs to be educated: the conservationists need to learn more about cultural sensitivity, and the local community needs to learn more about conservation" (Noyte 1995: 33).

ANALYSIS OF THE FIVE PROBLEM DEFINITIONS

Keeping in mind the various roles of problem definitions in the policy process, we feel that none of the five definitions cited above explicitly considers vital details about context—participants, perspectives, situations, base values, strategies, outcomes, and effects—and how these interact with evolving problem definitions over time (see Lasswell 1971). Nor do the five definitions thoroughly orient to the problem at hand, a task that requires a clarification of goals, description of history and trends, analysis of conditions, projection of future trends, and invention, evaluation, and selection of alternatives (Lasswell 1971). Thus, none of the definitions meets these criteria of adequacy. Additionally, none of the definitions can be fully justified relative to the basic needs and desires of a diverse democratic society. All five seem constructed from the relatively narrow standpoints of particular interests. While in some areas the debate has evolved to recognize the acontextual nature of the arguments, a coherent definition has not yet been forwarded.

Five questions are logically raised by these problem definitions.

IS OUR SCIENCE ADEQUATE TO CONSERVE HAWAI'I'S BIODIVERSITY?

The proponents base their argument on three assumptions—that the current scientific knowledge base is inadequate for effective conservation, that science is a prerequisite to conservation (i.e., conservation cannot proceed without

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more or perhaps complete knowledge of biodiversity), and that science is valuable for its own sake. But these assumptions are not supportable, for several reasons. First, the scientific knowledge base and ongoing research efforts on Hawai'i's biodiversity are formidable. Uncertainty remains, to be sure, in many realms, including control of alien species, captive propagation techniques (especially birds), and the status and ecological functioning of marine communities. But there will always be scientific uncertainty on most issues, no matter how much science is done. As Soulé (1985: 727) noted, "in crisis disciplines, one must act before knowing all the facts…Tolerating uncertainty is often necessary." This will certainly be the case in Hawai'i for the foreseeable future. Lack of science should not be used as an excuse to prevent or postpone management.

Second, existing scientific knowledge has not always been effectively applied. For instance, the state's Natural Area Reserves System has not implemented its science-based management plans, in part, because of inadequate funding, staff support, and political unfeasibility. Conservation of certain taxa also suffers from failure to use existing scientific knowledge. For example, it was evident at the time of their introduction that cannibal snails *(Euglandina rosea)* would decimate endemic snails, but scientific data as presented was insufficient to convince authorities to prevent the introduction (Solem 1990). Also, according to the National Research Council (1992), the captive breeding program for the *'Alala (Corvus hawaiiensis)* suffered from failure to employ available techniques. Finally, the bulldozing of the last member of an endangered plant species described above is a gross example of communication and coordination failure between scientists and managers. Clearly, lack of science was not the limiting factor in these cases, and more attention to nonscientific details would likely improve conservation.

Third, many other factors besides science determine what kind of conservation takes place. For example, angry local residents removed the *Pu'u o 'Umi* pig fence on Hawai'i Island in March 1993, despite solid scientific data that showed pig removal would protect forest biodiversity (Case 1993). In *'Alala* recovery, population trends improved partly because of improved scientific knowledge and its application, but also because of improved management processes, increased funding, and a better relationship between the conservation community and the owner of the land where the last wild population resided (Carson, personal communication, 1994). These contextual factors need explicit attention.

Finally, in the complex social, political, and economic context of Hawai'i today, there are hundreds of players who want to control at least part of the policy process and the resources in question. Science-for-its-own-sake has been roundly rejected by many of these people; their resistance is, in fact, a major obstacle to solely science-based management.

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DOES THE ECONOMIC SYSTEM HELP OR HARM BIODIVERSITY

CONSERVATION?

Understanding the utility of the economic definition does not depend on rejecting or supporting either proponents or opponents, but rather on analyzing the role that economic forces play in biodiversity conservation and identifying common points of interest in actual contexts. First, it needs to be made explicit that economic issues are not the sole concern of Hawai'i residents. If they were, the high cost of living would force many people to move. Economics is intertwined in complex ways with many other issues. Even in the well publicized cases in which economic development has directly threatened native biotic communities (e.g., development of geothermal energy in a native rainforest on Hawai'i Island), there were numerous other forces that threatened biodiversity. The economic system serves as a "manifold" or "backdrop" that affects peoples' daily decisions, but it is not the sole problem facing biodiversity conservation.

Highlighting the economic benefits of the services and goods provided by native species and communities is potentially a useful strategy, as proponents suggest. Hawai'i's economy is supported by fresh water from native forested watersheds, and some sort of "tax" on that service could provide funding for biodiversity management. Interests concerned with biodiversity conservation need to consider non-market economic issues, how they are related to many other island values, and how the economic system can be used to further biodiversity conservation and peoples' well-being.

Both sides of the economic argument tend to under-appreciate the complexity of the issue in actual contexts. Conservationists are not always the good guys and businessmen the bad guys (Brewer 1992). The real challenge is to find ways to conserve biodiversity given the properties of the economic system—to be more benign to biodiversity while accommodating healthy human communities.

ARE GOVERNMENT AGENCIES CAPABLE OF CONSERVING HAWAI'I'S BIODIVERSITY?

A large part of the debate has been whether biodiversity conservation would best be served by increasing the power and funding of the responsible government agencies or de-bureaucratizing conservation efforts. Whenever agency performance is a part of any policy problem, the subject must be addressed openly and fully.

Agency performance depends on structure, culture, and operating procedures. Rigid bureaucratic structures, fixed hierarchies, (dis)incentive systems, and fixed routines of operation simply may not be the best organizational arrangements to address the biodiversity conservation task (Clark *et al.* 1989). Organizational options other than bureaucracy are open to agencies, including designs with flexible structures, limited hierarchy, and organic working arrangements that may be more suitable to the task (Clark and Cragun 1991). The range of organizational options for biodiversity conservation needs to be

A large part of the debate has been whether biodiversity conservation would best be served by increasing the power and funding of the responsible government agencies or de-bureaucratizing conservation efforts. Whenever agency performance is a part of any policy problem, the subject must be addressed openly and fully.

considered far more seriously than it has been to date.

One particular issue illustrates that a focus solely on the bureaucracies is inadequate. The constantly varying levels of funding and staffing that fluctuate with political and economic winds are an issue of long-term significance. For instance, the Natural Area Reserves System now has four managers for all reserves (19 reserves of 44,000 total ha on five islands), and has operated with a declining budget for the past four years. If people are unwilling to pay more taxes, securing more funding will be difficult, and thus this cannot be the sole problem for biodiversity protection since the solution it proposes is potentially unachievable.

WOULD INCREASED NATIVE HAWAIIAN CONTROL IMPROVE BIODIVERSITY CONSERVATION?

There are really two issues in the Native Hawaiian definition of the policy problem: will Native Hawaiians gain some control of lands and natural resources, and will they protect biodiversity if they do regain control? It is most likely that the United States will retain at least some control of the islands for the foreseeable future and that the population will remain multicultural; thus, putting the Native Hawaiian definition to a compete test will be problematic. However, some reparation to Native Hawaiians, including the return of some biologically rich lands, is likely. Increased recognition of native claims has occurred recently elsewhere in the Pacific, such as New Zealand. Additionally, there are already lands which are, in one form or another, under Native Hawaiian control, including those of Bishop Estate, and the Department of Hawaiian Homes Lands. There are already opportunities for some experimentation with increased Native Hawaiian control of resources.

Thus, the second issue can be considered regardless of whether the first scenario occurs. It is clear that different cultures have different values, knowledge, and tendencies toward the protection of biodiversity (Kellert 1995). Regardless of the culture in dominance, history has shown that biodiversity conservation has not been very successful, although concerted efforts may have slowed the loss. Simple, uncritical assertions about which culture can best conserve biodiversity—independent of other contextual variables—invite poor conservation as well as inter-cultural conflict and resentment. Even if pre-conquest Hawaiian culture was not completely concerned with protecting biodiversity, it showed a tendency to do so—a fact that resonates with many people in Hawai'i. What is unclear, however, is how Native Hawaiian culture will fare in the modern ecological, economic, and political context. Nevertheless, to the degree that Native Hawaiian values and practices foster conservation efforts, they should be nurtured.

WHAT KIND OF EDUCATIONAL INITIATIVES WOULD HELP PROTECT BIODIVERSITY?

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to their own way of thinking. This kind of education is lopsided. Biodiversity conservation in the common interest, not for special interests, requires mutual education. It requires that all players cultivate an openness and willingness to carry out a respectful interchange of ideas.

The need for mutual education is illustrated on Kaua'i, where off-road vehicle users have damaged some of the last remaining plants of an endangered species. What difference will teaching users the facts about this damage make in this case? As one administrator noted: "Some people may be ignorant [of the damage they're doing], but a lot of them just don't care" (Conrow 1995b: A6). Rather than insisting that these people's values are wrong or immoral, it might be more useful to ask how the values they hold might be "realized" in the process of protecting biodiversity, if that is possible. Such an endeavor requires mutual education, a willingness to cooperate for the common interest.

Asserted uncritically, the educational definition sounds good and has wide appeal. No one promotes ignorance. However, even an ideal "mutual education" is not sufficient to resolve biodiversity conservation issues. Vague calls for education will do little for conservation or the common interest. Education must be tailored to specific issues and contexts concerning single species today and large-scale biodiversity conservation in the long term.

All five definitions could be improved if proponents clarified their own standpoints in terms of values, operational goals, and contexts. Because the five definitions are in fact highly interrelated, it is even possible to create a single meta-definition that encompasses them all in a way that can be justified in the common interest. The alternative is to continue partisan assertions about the validity of one's own problem definition, in isolation and without context. We find the status quo unacceptable. That is the chief policy problem as we see it.

Meeting the challenge of conserving biodiversity in Hawai'i is not primarily scientific, bureaucratic, economic, Native Hawaiian, or educational. Rather, the problem is complex, multi-dimensional and a combination of all of these sub-definitions. The policy problem is also how to organize an effective decision process that can clarify and secure the common interest.

AN ALTERNATIVE DEFINITION AND RECOMMENDATIONS

Meeting the challenge of conserving biodiversity in Hawai'i is not primarily scientific, bureaucratic, economic, Native Hawaiian, or educational. Rather, the problem is complex, multi-dimensional and a combination of all of these sub-definitions. The policy problem is also how to organize an effective decision process that can clarify and secure the common interest. As Brunner (personal communication) noted, "in the face of profound ambiguities and uncertainties, good policy is experimental and self-correcting on the basis of experience." Our alternative calls for an experimental and self-correcting policy response, such as "prototyping" (Clark *et al.* 1995).

There may be fundamental points of agreement among all interest groups: (1) much of Hawai'i's endemic biodiversity has been lost, and the remaining biodiversity is being degraded rapidly, (2) despite tremendous efforts we have not significantly slowed or stopped this decline, (3) this decline should, in some measurable way, be halted and reversed, and (4) we should take actions to protect biodiversity to improve the quality of life for all people in Hawai'i and elsewhere. Starting from this consensus, the policy problem is how to construct a more coherent,

contextually-anchored problem definition that can be widely supported by a majority of Hawai'i residents, keeping in mind the inadequacies and incompatibilities of the current problem definitions. If this is possible, the new and larger political coalition might work more effectively for biodiversity conservation.

The purpose of the policy-making exercise is threefold, according to Ron Brunner (personal communication, 1995). First, it should produce considerable insight by bringing factors about the biodiversity issue more reliably into conscious awareness for the purpose of decision making. Second, it should result in a more rational approach by examining discrete alternatives, perhaps testing them, and diffusing and replicating successful elements, thereby allowing for adaptation of goals and alternatives. Third, it should build political consensus by enhancing trust and credibility based on experience. The values and beliefs of all involved, including scientists, need to be made transparent to the public and their representatives. The next question, then, is, what kind of a process can maximize chances of success?

The problem is comparable to an onion with its multiple layers, to use Primm and Clark's (1996) analogy. A good problem definition must consider all the layers. The outermost layer of the onion is the skin that is visible to all—the degradation of biodiversity by alien species and other on-the-ground forces. Considered out of context, the problems in this area seem to be scientific (e.g., finding the most useful types of biological control). Even the problems of misuse and non-use of scientific information seem to be solvable with slight organizational fixes. However, dealing only with these issues does not cut through the underlying layers that give the problem its form.

The next layer consists of land managers, both bureaucracies and individual property owners, who try to shape how conservation in Hawai'i will be conducted. Their decisions are driven by numerous factors, including available information, demands of neighboring landowners, and funding availability. But some of the properties of this layer are actually transmitted from a deeper layer—the political/economic system in its widest sense. In terms of individuals, conservation will be enhanced when the political/economic system allows people to make a living in ways that maximize their well-being and other values.

At the heart of the onion lie various human values, standpoints, and cultures. The problem is not that peoples' values are "wrong," but rather that people cannot realize their values (or achieve their goals) in the course of protecting biodiversity. For instance, no matter how successful control of alien species is, more aliens will continue to arrive unless peoples' values are maximized simultaneously when they take action to conserve biodiversity. While least easily observed, understood, or addressed, it is the core problem that shapes the outer layers.

We have shown in this exercise that "working through the process of problem definition in turn illuminates the need for a particular type of problem-solving strategy that accounts for contextual constraints" (Primm and Clark 1996: 142). To solve any policy problem requires a method and an

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organizational design. Participants need an approach that forces them to look at the whole problem fully, systematically, and contextually. The policy sciences offer a method that is problem oriented, contextual, and multi-method (Lasswell 1971). Many models also exist for appropriate organizational designs for carrying out a policy exercise. For example, the decision seminar, invented by Lasswell (1971), is a group problem-solving and decision-making procedure that uses various effective strategies to sharpen participants' insights, explore alternative solutions, assign institutional responsibilities, and manage data. Prototypes are another way of gaining useful information: they are small-scale interventions, similar to pilot projects, to implement trial changes in social or policy systems. Prototypes establish a process to detect and correct "errors," a means by which to accumulate successes and weed out failures (Ron Brunner, personal communication, 1995). Both techniques can be conducted in ways to encourage democracy, i.e., participation, representation, and deliberation (Dryzek 1990; Dahl 1994). Models such as these can be used to build up individual and organizational capabilities if results can be successfully diffused.

RECOMMENDATIONS

Based on our preliminary problem definition, we make four general recommendations for future action, keeping in mind that looking at only one layer of the onion will incompletely address the problem. Specific, concrete applications are possible.

Improve understanding— Natural and social science is a highly successful way of obtaining reliable knowledge about phenomena. In our problem definition, science can be applied to address all layers of the problem, not just the surface. Surveys, interviews, and other social science tools can be used to understand people's perspectives, their values, and the strategies they use to achieve particular outcomes. Economics and political science can be used to understand how Hawai'i's economic and political systems can be adapted to enhance the well-being, power, wealth, enlightenment, etc., of people in the islands. Various organizational studies can help improve the operations of complex bureaucracies like the land management agencies. Finally, conservation biology and other disciplines can be used to understand Hawai'i's biodiversity and necessary management tools. However, there must be an explicit method to integrate these sciences, in context, into a comprehensive view of the problem and to invent, evaluate, and select alternative solutions.

It is possible to overcome the dilemmas resulting from scientific uncertainty, varying uses of existing knowledge, and different abilities to integrate scientific knowledge with other concerns in policy formation. To overcome uncertainty and increase our knowledge base, we can improve communication between managers and scientists and we can treat all applications of scientific information to management as opportunities for experimentation. Furthermore, we can begin to integrate science-based knowledge and values with those of other players by rethinking our definitions of education and acknowledging

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that there are many things to be learned from others during the policy process.

Build trust—According to our definition, improved information and understanding alone will be insufficient to develop consensus or conserve biodiversity. We need to focus on building trust among the myriad players involved in the process. To date, much trust has been lost among various interests in the political process of advancing various problem definitions. If we are to engage in meaningful education—two-way learning—we need to re-build this basis for cooperative interaction.

Build capabilities—We also need to begin a process of developing capabilities. On both individual and organizational levels, this means improving the ability to recognize wide varieties of information as reliable, rather than being swayed solely by the rhetoric that characterizes many interactions. Analytical and critical thinking skills must be upgraded. Communication paths need to be established and learning institutionalized. Many models of activities exist for increasing individual and organizational capabilities (Lasswell 1971; Argyris 1992).

Build and test prototypes—This kind of active learning is best accomplished in the course of building and testing prototypes. The process of problem definition is adaptive and ongoing. The most effective way to enhance problem-defining abilities and gain practical knowledge about techniques for solving them is to view all opportunities for conservation as prototypes. Prototypes are small-scale, experimental efforts constructed to encourage learning and success (Lasswell and McDougal 1992). They are low-cost, low-risk ways of implementing new approaches and alternatives and may provide easily quantified measures of success or failure. Regular meetings for sharing and discussing results further serve to increase trust, enhance the abilities of institutions and individuals, and upgrade our ability to define and solve problems.

Good problem definition is central to solving policy problems. The existing problem definitions concerning the massive loss of Hawai'i's biodiversity are inadequate by themselves to consider all the relevant data, to stem the biodiversity loss, or to coalesce the political will to achieve successful conservation. A more coherent, realistic, and pragmatic problem definition is needed.

CONCLUSIONS

Good problem definition is central to solving policy problems. The existing problem definitions concerning the massive loss of Hawai'i's biodiversity are inadequate by themselves to consider all the relevant data, to stem the biodiversity loss, or to coalesce the political will to achieve successful conservation. A more coherent, realistic, and pragmatic problem definition is needed. We suggest that the core difficulty is that human values are not being maximized by protecting biodiversity and that the overall policy problem is how to form a large political coalition that will be effective in biodiversity conservation.

Note that problem definitions need to be open, flexible, and learning-oriented; we suggest that numerous ongoing, experimentally-minded prototypes be designed, with low financial and political costs. We further suggest that all of these prototypes utilize our problem definition on some level, rather than addressing the single-interest issues of the existing problem definitions. After some period of time, the results of these prototyping exercises should be appraised and shared across communities to improve trust and understanding

as well as conservation. This process should be repeated as learning occurs until the future of Hawai'i's biodiversity is secured.

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Zoos and Conservation: Policy Making and Organizational Challenges

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ABSTRACT

The zoo community seeks improved relevance to society by contributing to restoration of biological diversity, but faces special challenges to meeting this admirable policy goal. We examine zoos' effectiveness in endangered species restoration, public education, and policy and operations. We suggest that the zoo community can improve its performance in a complex context by better clarifying its aims, avoiding defensive activities, and enhancing its policy analytic skills. Also, zoo professionals can secure more effective operations if organizational structures and activities are better tailored to the task environment, organizational learning and change mechanisms are nurtured actively, and decision makers fully capitalize on all staff knowledge and skills. Every effort must be made to ensure that zoos' policy, public, and technical roles effectively support conservation of local and global biological diversity.

The "zoo" is a monument to a long-standing tradition of people's fascination with non-human nature. Since the early societies of the Egyptians, Greeks, and Chinese, wild animals have been maintained in captivity in order to satisfy human curiosity with exotica. Most western zoos today, however, embrace far more benevolent values—supporting the conservation of biodiversity through specialized animal breeding, research, and education programs. These aims are intended to move zoos along an evolutionary continuum that will see them eventually transformed from "living natural history cabinets" to "environmental resources centers" (Rabb 1994: 162).

While zoos have changed significantly since their origins, further progress may be frustrated by some zoo professionals' understandings of and reactions to significant philosophical and practical challenges. Debates about zoo policy include questions such as: what constitutes zoos' conservation obligations? What is the moral and scientific basis of zoos? Should zoos exist at all? (Norton *et al.* 1995). Traditionally, zoo professionals have responded to the zoo debate by re-emphasizing zoos' technical or logistical capabilities to deliver conservation programs. As we see it, the process of resolving the competing ideas, beliefs, and perceptions about the appropriateness and feasibility of zoos' goals and operations is far more central than defending zoo performance. It may be that before zoos can complete their evolution, more attention must be turned towards a greater understanding of zoos' collective decision-making processes and organizational arrangements. That is, to what degree do zoos' organizational structures, cultures and operations impede or enable realization of their conservation goals?

While zoos have changed significantly since their origins, further progress may be frustrated by some zoo professionals' understandings of and reactions to significant philosophical and practical challenges. Debates about zoo policy include questions such as: what constitutes zoos' conservation obligations? What is the moral and scientific basis of zoos? Should zoos exist at all?

In this paper, we examine: (1) the context of zoos' conservation policies, (2) the nature of decision making in zoos, and (3) some organizational arrangements in zoos. We seek to analyze and clarify a problem of zoo policy formulation and implementation, and we offer recommendations for accelerating zoos' progress towards achieving their own goals.

METHODS

Contradictions in principles that structure social life can create tensions or conflicts among individuals, groups, and institutions (Habermas 1971). Given our interest in how such contests come about and are resolved in environmental policy-making contexts, we used the policy sciences as the theoretical and analytic framework for our analysis (see Lasswell and Kaplan 1950; Lasswell and McDougal 1992). This interdisciplinary approach focuses on how decisions are made in public and private institutions, on the way certain types of knowledge are used in those processes, and on identifying and resolving discrepancies between goals and actual performance ("problems;" Clark 1997a).

We used a triangulation of methods and sources of data to achieve a comprehensive and selective research design. Our data is drawn from international zoo policy documents and literature, and from a four-year study of nine major Australasian zoos (see Mazur 1997 for details). This research used a qualitative and naturalistic approach to identify people's professional and personal experiences with zoos (Patton 1990; Strauss and Corbin 1990). Open-ended interviews were conducted with 126 zoo staff and 48 personnel in wildlife agencies and non-government organizations (NGOs). Questionnaires were administered to wildlife agency staff, academics, and environmental activists attending two environmental conferences (N=116), and to zoo visitors at eight of the study zoos (N=1,200). Content analysis was used to identify recurring themes in the qualitative data, and simple descriptive statistics were used to highlight broad attitudinal trends in the questionnaires (see Mazur 1997 for details). In addition, we made informal observations at the nine Australasian zoos and at several North American zoos over the last ten years.

We refer to "zoos," the "zoo industry," the "zoo community," or to individual zoos throughout the paper. These terms allow for a more accurate representation of the zoo's multiple identities: a traditional and persistent institution of western society, an "industry" pursuing professionally-defined goals, and a "community" of people striving to obtain greater relevance and meaning for their organizations. We use the term "community" as a collective unit of analysis, similar to the way DiMaggio (1983) uses "organizational field." That is, international and Australasian zoos have a common purpose (conservation), but pursue their objectives in varied arenas using diverse strategies. Many of our findings can be generalized to the international zoo community because of the early, predominant effects of European colonialism and the more recent and continuing influence of North America on the development

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of a Western model of zoos (Mullan and Marvin 1987), and the recent influence that the Australasian region has brought to global zoo circles.

CLARIFYING ZOO POLICY AIMS

When environmentalism became a significant political force in the late 1950s and early 1960s, much of Western society was alerted to the harm that humans were causing the biosphere. The cumulative effects of industrialization and increased material consumption by an expanding population were considered to be serious problems (Pepper 1984). Awareness of mass species extinctions was also building. Subsequent redevelopment of zoo policy during the 1960s and 1970s incorporated new philosophies and program priorities.

Today, many Western zoos pursue a central role in solving the problem of worldwide declines in biodiversity by participating in endangered species conservation plans and environmental education programs (e.g., CBSG&WZO 1993). Zoo-based captive breeding programs are used to assist with species restoration by placing individuals from captive populations into the wild to sustain the size and genetic variability of natural populations. Zoos' education programs seek to teach people about the need to conserve biodiversity. Field research and training programs are also used by zoos to support conservation programs of other agencies and non-western zoos.

These efforts demonstrate that important and valuable changes in zoo policy have been made. There are, however, some problems with zoos' species conservation efforts and education programs. These weaknesses reveal discrepancies between zoos' formal goals and their actual performance. Such shortfalls inhibit zoos' capacity to contribute to the restoration of biological diversity.

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Ex-situ conservation can and does help in certain high profile, single species cases (e.g., eastern barred bandicoot, *Perameles gunnii*, in Victoria, Australia). However, the value of captive breeding programs for conserving biodiversity at a broad level remains in dispute (Snyder *et al.* 1996). Species-based conservation is essentially an emergency measure that is biased towards restoring populations of charismatic fauna and may discourage longer term, more comprehensive, ecosystem approaches (McIntyre *et al.* 1992; Rojas 1992; Fiedler *et al.* 1993). In addition, the feasibility of zoo-based captive breeding programs is severely constrained by extreme costs, the need for intensive management and high levels of inter-agency cooperation, and zoos' finite organizational, financial and spatial resources (McNeeley *et al.* 1990; Groombridge 1992; Fiedler *et al.* 1993; Magin *et al.* 1994; Balmford *et al.* 1996). Systematic use of this technique can mislead the public about "real," practical solutions to declining biodiversity.

Public education is another of zoos' central formal policy goals. The capacity of zoo education to promote positive action for environmental conservation remains unclear. First, many zoo professionals are concerned about discrepancies between zoos' verbal commitment to education and actual

organizational and financial resources committed to education programs (e.g., Hamilton 1993). Second, while it is generally accepted that zoo education should encompass more than formal school programs, many zoos still emphasize these activities (Mazur 1997). Third, studies on informal learning in zoos show that the zoo experience does little to improve knowledge of biological facts or motivate people to act on behalf of conservation (Kellert 1987; Kellert and Dunlap 1989). Fourth, some zoo professionals are concerned that over-emphasizing charismatic fauna, "especially the diurnal, social, large, colorful, cute, typically mammalian…species," does little to educate people about the "diversity and complexity of the planet's fauna" (Hancocks 1995: 34; and see Robinson 1993). Finally, public relations campaigns featuring humanized caricatures of animals may discourage visitors from developing realistic perceptions of human-animal relationships (Mullan and Marvin 1987).

Parts of the international zoo community recognize these weaknesses of ex-situ conservation and education programs. Suggestions for improvements include a greater emphasis on in-situ conservation, education, and research programs (e.g., CBSG&WZO 1993; Hutchins and Conway 1995). Species management plans now rank species, stressing in-situ conservation and education values by prioritizing those species which are (or will be) part of active, inter-organizational reintroduction programs (CBSG&WZO 1993; ASMP 1996). Zoo education programs are moving away from strictly taxonomic and natural history themes toward ecological interpretation and conservation implications (Hunt 1993). Finally, many new captive management and breeding techniques have been devised and employed.

Despite the fact that some members of the zoo community recognize the need to upgrade the relevance of zoo policies for modern environmental problem solving, systemic problems remain. Both inside and outside zoos, dissatisfaction with the persistence of traditional zoo policies and practices, even with incremental improvements, persists (e.g., Norton *et al.* 1995; Mazur 1997). Established practices, such as the preference for charismatic, exotic mega-fauna in zoo collections, function to sustain an image of the zoo as an "old-fashioned" institution operating on the margins of conservation (Kellert 1987; Mullan and Marvin 1987; Mazur 1997).

Conflicts between certain goals also discourage more extensive environmental policy reform. Many zoos' current market-oriented approaches and corporatized organizational practices result in an emphasis on maximizing and stabilizing revenues (Mazur 1997). Official pressures and budget constraints balance conservation against corporate efficiency and other demands. Hence, conservation values translate into activities—not that the zoo must do—but that it must be able to afford to do. Special tensions are created when conservation programs and animals' biological needs are balanced against zoos' financial and public relations imperatives. Since zoos consider visitors' recreational motives to be vital to their mission and survival (Chiszar *et al.* 1990; Bostock 1993; Maple 1995), it remains unclear what trade-offs are reasonable.

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These competing definitions of zoos' role in conserving biological diversity are an important example of the conflicting values that humans have about the use of environmental and natural resources (Kellert 1996). Technocentric values lie at one end of the spectrum. They place ultimate faith in rational scientific approaches that assign instrumental value to non-human nature and prioritize the use of advanced technologies and economic rationalism to achieve material advancement (O'Riordan 1981). At the other end is ecocentrism, which promotes the intrinsic value of, and our moral responsibility for, non-human nature, and endorses ecological limits to growth and low impact technologies (O'Riordan 1981). Zoo practices reflect the entire range of environmental values, from the management-oriented goals of technocentrism to the more ecologically inspired ideals of ecocentrism (Paehlke and Torgerson 1990).

The aforementioned problems with zoo programs demonstrates that zoos are not being clear about the multiple and competing values which frustrate their conservation achievements. Zoos' operations may not be conducted in a way that enables effective communication with their own staff, related organizations, and the general public. The zoo community will need to regularly and continually clarify its aims, monitor the relevance of its policies for restoring biological diversity, and consider the full context of environmental problems it seeks to address.

AVOIDING DEFENSIVE ZOO POLICIES

Zoo policy is formed in response to changing ecological, political and social contexts, environmental values, and economic imperatives. Such societal dynamics have resulted in various criticisms of zoo practices.

Zoo policy is formed in response to changing ecological, political and social contexts, environmental values, and economic imperatives. Such societal dynamics have resulted in various criticisms of zoo practices. Some cite the shortcomings of zoos' captive breeding and education efforts (e.g., Jamieson 1985; McKenna *et al.* 1987; Seidman 1993; World Society for the Protection of Animals and The Born Free Foundation 1994; Jamieson 1995; Snyder *et al.* 1996). Similarly, our interviews and surveys conducted with members of the conservation community reveal concerns about the methodological and ideological flaws of zoo-based, ex-situ programs, and resistance to zoos' attempts to expand their role in wildlife conservation (Mazur 1996, 1997). Despite the zoo community's efforts to promote a conservation role and image, perceptions persist of zoos as places of entertainment rather than institutions of scholarly, scientific, or conservation pursuits (Mullan and Marvin 1987; Bitgood 1988; Kellert and Dunlap 1989). If these perceptions are held by decision makers in government wildlife agencies or non-government conservation organizations, they may resist zoo participation in conservation and education projects (e.g., government recovery plans or public advocacy programs, Mazur 1997).

The persistent notion of the zoo as "old-fashioned" may in turn encourage defensive policy responses from the zoo community. In their desire to stay abreast of a changing environment, zoo professionals often create official position statements that may misrepresent or overstate zoos' actual

contributions to conservation and education. Criticism is often answered by citing zoos' ability to deliver tangible and substantial benefits to wildlife and people (e.g., Hutchins and Wemmer 1991; Tudge 1992; Hutchins and Conway 1995; Maple 1995). Zoo professionals also respond to fault finding by distinguishing between "good" zoos that show concerted efforts to change and "bad" zoos that deserve criticism and should eventually be eliminated (e.g., Bostock 1993; Maple *et al.* 1995). Another common response is to construe critics as "opponents" who, because of dubious motivations or poorly constructed arguments, do not understand zoos (e.g., Seal 1991; Allen 1995; Hutchins *et al.* 1997; and see Snyder *et al.* 1997). Consequently, energy and resources are unnecessarily devoted to warding off critics and officious media through the extensive use of public relations campaigns.

Argyris (1993) maintains that while defensive policies may protect individuals, groups, and organizations from embarrassment or threats, they also prevent them from identifying and reducing the causes of those assaults. The potential to learn from critics is complicated by the fact that the zoo community contains a diverse range of people with varying ideas of what constitutes appropriate conservation policies. Zoo policy is established not only by the directives of top executives, but also by the multitudes of decisions of people at all levels as they go about their daily work (Bullis and Kennedy 1991), although not all people have equal access to formal decision-making processes. Our research on zoos' conservation policies shows that those zoo staff who more freely advocate ecocentric values for conservation programs often do not hold powerful enough positions to ensure that such initiatives are consistently entertained, much less realized (Mazur 1997). Generally, economic and market-oriented concerns held by more powerful senior managers (e.g., Smith 1993; Beattie 1994) tend to come to the fore in decision making (Sebag-Montefiore 1993; Hancocks 1995; Jamieson 1995; Mazur 1997). Consequently, the principles and practices that constitute appropriate zoo operations may remain unclear or lack consensus.

More substantial policy reforms will come from zoos remaining open and responsive to criticisms, particularly those critiques that mirror perceptions inside the zoo community (Mazur 1997). The American and Australasian zoo communities have made a concerted effort to benefit from scrutiny by holding a symposium and national conference to debate the future of zoos and aquaria, the treatment of animals in captivity, and appropriate foci for conservation (e.g., Norton *et al.* 1995; Healesville Sanctuary 1996). These efforts to redress inconsistencies in zoo conservation principles and practices can be accelerated by a greater knowledge of policy analysis.

SECURING SKILLS IN POLICY ANALYSIS

The use of the policy sciences is largely absent from zoos' efforts to establish and demonstrate an effective role in the conservation of biological diversity. Considerable attention has been devoted to scientific, technical, and logistical

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aspects of captive breeding programs and their contribution to conservation (e.g., Olney *et al.* 1994) and, more recently, to selected management issues (e.g., Atkinson-Grosjean 1992; La Rue 1992; Anderson 1994; Gray 1994), but there remains a dearth of research on how policy-making and organizational processes influence zoos' conservation capacities (Mazur 1997).

"Policy" is made as people clarify their values, set goals, define the problems relative to the goals, and invent, evaluate, and select alternatives to achieve their goals and solve their problems (Lasswell 1971; Lerner 1976). Zoos face many choices in designing and implementing relevant and potent conservation policies. These decision-making processes are highly political because they consist of numerous "interrelationships between different groups of actors" (Nakamura and Silkwood 1980: 9) who must vie for resources and rationalize their decisions about personnel, animals, and money to themselves and their constituents. In addition to the highly political nature of decision-making processes, the very structure of zoos fundamentally affects policy creation. Clark *et al.* (1994) and Clark (1997b) have shown that the ability of organizations to solve endangered species problems is a product of their structure, culture, management systems, and their contextual setting, as well as professionals' particular approaches to problem solving (e.g., reflective practice vs. technical rationality). These considerations are just as relevant to zoo policy processes as they are to other organizations.

In order for zoos to improve their conservation policies, they must address the same questions that Clark (1993) urges wildlife professionals to consider: how well matched are zoos organizationally to what they are trying to accomplish? Are zoos appropriately staffed? Are budgetary processes allocating sufficient funds to conservation goals? What is the nature of leadership in both the zoo community and in individual organizations? Do zoos have sufficient political autonomy to achieve their objectives? What kind of information is used in zoo decision-making systems? What conservation values are represented in zoos' decision-making processes? How much are zoos learning from their mistakes? These considerations move beyond narrow problem definitions (e.g., opposition from the animal welfare groups or resistance from the conservation community) and provide professionals with a type of adaptive "peripheral vision" that constantly refers them back to the social, scientific, economic, political, and moral dynamics that contribute to zoo problems. This policy orientation can reduce gaps between stated aims and actual practice by providing new ways of viewing the problem (Lasswell 1971). Such an integrated approach necessarily involves systematic consideration of how zoos function as organizations.

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APPROPRIATE ORGANIZATIONAL OPERATIONS

Zoos face a formidable challenge in addressing biodiversity loss in the new millennium. Managing wild animals in captivity for exhibit purposes, conducting inter-organizational endangered species breeding schemes and in-situ

conservation programs, and formulating and implementing education and research require substantial resources and flexibility. These requirements become even more important as zoos attempt to regionalize their animal collection plans further and increase both their research profile and participation in endangered species recovery. Some attention has been devoted to measuring zoos' performance (Smith 1993), fostering cultural diversity in personnel (La Rue 1992; Gray 1994), and breaking down hierarchical divisions and adopting team-based management structures (Atkinson-Grosjean 1992). However, our research reveals that, overall, zoos have failed to link policy sciences' principles with conservation practices (Mazur 1997; and see Lasswell 1971 for principles).

Zoos' organizational forms are directly relevant to achieving their conservation aims. Several public and private Australasian zoos have bureaucratic structures. Bureaucracies are often highly specialized, they have a strict hierarchy of authority, and they maintain impersonal, rigid rule systems (Blau and Myer 1987). However, appropriate organizational designs depend on the task at hand. Morgan (1986) has shown that bureaucratized, divisionalized organizations are effective when their tasks and their operating environments are simple and stable. When meeting changing circumstances, however, these highly centralized systems of control and their fixed rules, roles, and regulations make them slow and ineffective. The unique challenges of conserving endangered species or shaping public understanding may exceed bureaucratic capabilities (Paehlke and Torgerson 1990). Given the complex nature of zoo tasks and zoo environments, it is unlikely that their bureaucratic structures, cultures, and operations are entirely suitable.

The 1980s saw a new management philosophy enter the public sector—corporatization. Today, the influence of corporate management permeates both public and private zoos in Australasia (Mazur 1997). These managerial values are actualized through the heavy representation of business expertise in expanded senior management strata and the use of corporate tools (business strategies, product formats, performance measures) to promote a paradigm of economic rationalism. Statutory zoos in New South Wales, Victoria, and Western Australia have been highly vulnerable to these sweeping reforms.

Corporate management, and the economic rationalism it embodies, has been soundly criticized by Considine (1988), Painter (1988), Rees (1994), Rhodes (1996) and Sinclair (1989), because it narrowly construes economic efficiency as organizational effectiveness. Corporatization has serious ramifications for all zoo policy. For example, animals may be managed as commodities and conservation may become a public relations ploy, all justified in terms of economic efficiency. The mission of endangered species restoration and public education may easily fall prey to cost-benefit accounting (Adams 1996). Consequently, animal welfare, wildlife conservation, and public education may be overshadowed by a standard of economic efficiency common in corporate boardrooms.

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The ideological bureaucratization and corporatization of many zoos have incited significant frustration among some zoo personnel (Mazur 1997). Evidence suggests that zoos' performance to date in terms of endangered species conservation and public education is more a function of exceptionally dedicated and motivated individual staff members, rather than a bureaucratic and corporate framework (Mazur 1997). The zoo community can combat these problems by considering what type of environmental conservation and education values are served by corporatized industry methods and whether their organizational structures and policy development can be streamlined to provide greater support for conserving biodiversity. The basic challenge for zoos remains how to "devise and introduce appropriate organizational changes to match the very rapid changes in the nature and size of its task, in the nature of the society it serves, and in the skills and aspirations of its staff" (Frazer *et al.* 1985: 13).

ORGANIZATIONAL LEARNING AND CHANGE

Zoos have demonstrated a certain willingness to examine their own practices. By the late 1950s and early 1960s, declining species in the wild, and animal rights and welfare activists' criticisms, stimulated the realization by zoos that their consumptive practices were no longer sustainable (e.g., Jarvis 1965). Throughout North America, northwestern Europe, Australia and New Zealand, zoos continue to question their own industry and its future (e.g., Norton *et al.* 1995). Questioning and change necessarily involve learning, i.e., to what degree can zoos, as organizations, detect and correct operational mistakes to become learning organizations (see Clark 1996a).

Argyris and Schön (1978) state that organizational learning can occur at two levels—simple and complex. Simple learning occurs when an organization detects a mistake, corrects it, and resumes operations such that basic premises stay unchanged. This is called "single-loop" learning. In single-loop learning, people do not look below the surface and question the organization's operating values (Leeuw *et al.* 1994; Clark 1996b). Complex learning occurs when an organization discovers mistakes and corrects them in ways that require it to modify its underlying premises or norms. This is "double-loop" learning.

History suggests that much of zoos' evolution has come from single-loop learning (Mullan and Marvin 1987; Mazur 1997). Examples of industry-wide learning and change are evident in the substantial progress in environmental and behavioral enrichment that has vastly improved conditions for most zoo animals. Yet, the degree to which those developments represent systemic and systematic shifts in zoo philosophy, policy, and organization remains in question. Davis (1993), for example, detected some hypocrisy in the so-called "greening" of zoos' principles and practices, particularly where designs and materials of naturalistic exhibits rely on high tech concepts, artificial materials, and excessive amounts of energy. Prohibitively high costs of these state-of-the-art exhibits will also limit the extent to which zoos can afford such advances

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(Seidman 1993). Moreover, Australasian zoo-keeping and curatorial staff worry about patchwork development patterns that may result when exhibits are quickly planned around acquiring a corporate sponsor, unrealistic deadlines for completing exhibit construction, and media fanfare surrounding new exhibits (Mazur 1991, 1996, 1997). These are important issues that deserve the critical analysis of double-loop learning.

Double-loop learning in zoos has been constrained by bureaucratized structures that restrict the acquisition of new knowledge and the modification of routines (see Hellriegel and Slocum 1976; Jackson and Morgan 1982). Instead, defensive behaviors, such as media releases touting the success of a zoo's conservation efforts, are encouraged by systems rewarding "good behavior." Consequently, there is a low tolerance for uncertainty, and people attend to those problems that have immediate, simple, economic solutions such as those offered by corporatized management practices.

The zoo community must become proficient at examining its own operating assumptions in an open, honest, and systematic fashion as a basis for future learning, improvement, and adaptation. Warwick (1975) offers suggestions for facilitating change in highly bureaucratic organizations, and specifically endorses modification of traditional authority structures (distributions of power), reward and incentive structures, and narrowly-defined divisions of labor. Senge (1990) lists five procedures that should be simultaneously incorporated into all structures and operations to foster organizational learning: (1) conceive of the organization as a system with interrelated parts, (2) encourage personal mastery of a wide range of skills by all staff, (3) expose the mental models used to understand and act on the world, (4) foster team learning, and (5) build shared visions. As zoo performance is based partly on staffing practices and the knowledge and skills of staff, following these principles would enable zoos to learn, improve, and adapt.

STAFFING, KNOWLEDGE, AND SKILLS

Zoos' conservation role is actualized by knowledgeable individuals representing a range of professions and disciplines and performing a variety of tasks. A zoo's greatest strength is the dedication, concern, and creativity of its staff at all organizational levels. Securing knowledgeable and skilled staff is vital for successful zoo policy and operations.

Evidence suggests that the specialized skills of zoo staff are not always channeled productively into policy reform. Mazur (1991, 1996, 1997) found "subcultures" in Australasian zoos grouped around particular views about suitable conservation roles and practices for zoos and the dominance of certain perspectives over others, which creates fairly widespread staff discontent. In zoos and other organizations, dominant goals often reflect influences of the most powerful individuals or groups and their special interests (Pfeffer 1981). We have found that the views of senior management currently dominate zoo policy and practices, in what may be described as an ideological tug-of-war

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between the business-oriented concerns of senior management and the animal/education-based concerns of operational staff. Many zoo personnel are worried by the poor communication among departments (e.g., animal management and administrative divisions) and organizational levels (e.g., management and operational staff). Additionally, some operational staff fear that their enthusiasm for working with animals or in zoos is exploited by an uncaring management and that their views regarding zoos' conservation policies are not taken seriously enough. These sentiments suggest that a major underlying policy problem exists and is not being addressed.

In order to improve performance, there must be a dedicated effort in zoos to replace highly segregated departments and rigid hierarchies with more participative decision-making processes. Chief executive officers, zoo board members, and senior managers have the authority needed to address these problems which staff at lower organizational levels do not. Zoo leaders can encourage creativity, information sharing, and honesty (Westrum 1986; Clark *et al.* 1994) by nurturing the considerable motivation, leadership, conservation knowledge, and skill that already exists at the middle and lower levels of most zoos (e.g., curators, animal keepers, teachers, horticulture staff).

Westrum (1986) suggests seven principles for implementing this strategy (which reinforce the recommendations of Senge 1990): (1) encourage an organization-wide awareness in all members, (2) encourage creative and critical thought in all participants, (3) link the parts of the organization that have interdependent work, (4) scan the organization's parts for relevant solutions or contributions to problems, (5) reward communication and activities that show the desire to contribute to the entire organization's thought processes, (6) avoid over structuring, and (7) examine mistakes honestly. Finally, the zoo community must educate politicians, senior-level bureaucrats, and corporate sponsors about the worth of ecocentric values for zoo conservation and education. This is particularly important for zoos receiving sizeable government and private subsidies since they may be more susceptible to special interest manipulation (Zawacki and Warrick 1976).

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CONCLUSIONS

In the last several decades, zoo conservation policy has evolved considerably. The desire to conserve the integrity of the biosphere and exhibit compassion towards sentient beings has presented zoo professionals with substantial philosophical and practical challenges. Yet the degree to which zoo practices can help bring about the restoration of biological diversity has been questioned. The zoo community continues to grapple with how best to create effective environmental policies.

Today, the destruction of the biotic world continues at an alarming rate: entire biomes are endangered and whole ecosystems are threatened by human pressures on biodiversity (CBSG&WZO 1993; Primack 1993).

While these urgent ecological conditions impel zoo professionals to create policies with demonstrable conservation benefits, current political and administrative contexts may still promote opposing values. The growth of economic rationalism as a powerful ideology and method of governance in Australasia (and many other Western nations) has seen the rise of corporate management frameworks in zoos. This outlook frustrates the realization of ecologically oriented conservation principles and programs, because it ranks order and control above flexibility and participative processes, and it rationalizes the feasibility of most activities strictly in terms of economic efficiencies.

These matters pose a complex challenge for those members of the zoo community who demand that zoo-based programs unequivocally support biological diversity. We hold that zoos' capacity to fulfill conservation goals will require a policy orientation—a stance that provides a greater understanding of the myriad dynamics of policy and organizational processes that ultimately determine zoos' conservation role. The zoo community's efforts to design, implement, and appraise its own conservation policies ultimately depend on how the community defines its problems and to what degree it recognizes changing contextual factors. Unclear and contested policy goals will fall short of solving conservation problems. "Reactionary" policies may deflect criticism temporarily, but they will confound constructive and proactive responses to fundamental policy challenges.

Collectively, zoo professionals require more knowledge and skills in policy analysis to enable them to respond more effectively to zoo demands and aspirations. Greater attention must be paid to how zoos' organizational functioning affects policy-making processes. The suitability of organizational features, modes of organizational learning and change, and staffing patterns and use of staff have a significant bearing on the nature of zoos' conservation policies and roles. Thus the overall policy challenge for zoos is to ensure that organizational designs, cultures, and operations promote ecological values through flexibility, innovation, and adaptation. Interdisciplinary policy consultants can help zoos meet these goals, and zoos can establish organizational infrastructures that help zoo staff gain policy analytic skills (e.g., conducting workshops and seminars, providing sabbaticals). Pursuing policy-based analysis and organizational understanding will advance the zoo community towards its conservation goals and increase the societal and ecological relevance of zoos.

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The Policy Frontier: Sustainability Planning in Teton County, Wyoming

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ABSTRACT

After two land use planning cycles over twenty years, Teton County, Wyoming, is still losing its distinctive natural and social amenities to development pressures. There is declining trust that local government can maintain the remaining community character and other values desired by locals. Sustainability planning offers a way to increase the effectiveness of current plans, but it requires substantial community participation to legitimize policy decisions. Our study reveals that the planning process to date has resulted in a drawing down of public trust and increasing frustration between the government and its community. Conflicts among values and a sense that decision making has not been properly inclusive have added to the sense of disaffection. We recommend an alternative policy process to reinvigorate and strengthen civic engagement to produce flexible, effective sustainability policies for the community.

The approximately 12,000 residents of the Town of Jackson and Teton County, Wyoming, are beginning to think publicly about sustainability. Current land use practices do not meet citizens' expectations for maintaining community character and the valley's unique environment. Although the precise number of citizens who share this view is unknown, evidence suggests it may be the majority. Although the town and county passed concurrent growth management plans in 1994, the joint planning process left many residents feeling that living and environmental conditions were deteriorating. Many were also disaffected and mistrustful of the public policy process, especially government's ability to provide leadership for sustainability. Continuing pervasive resentment could become a significant obstacle to the future public involvement that is essential for clarifying and securing the common interest. The problem Teton County faces is how to produce a policy process that reinvigorates civic engagement to produce sustainable practices that are workable and adaptable.

The approximately 12,000 residents of the Town of Jackson and Teton County, Wyoming, are beginning to think publicly about sustainability. Current land use practices do not meet citizens' expectations for maintaining community character and the valley's unique environment.

Our paper describes historical value demands, appraises the decision-making process that produced the two plans, and suggests ways to strengthen civic engagement and problem solving so that future processes become genuinely sustainable. We seek to improve community capacity to formulate and realize appropriate policies reflecting broad public support.

Our analytic methods are those of the policy sciences (Lasswell and Kaplan 1950; Lasswell 1971; Lasswell and McDougal 1992). Primary research included interviews using eleven open-ended questions about the decision process and its outcomes. Seventeen people who were active in 1990-1992, including both supporters and opponents of the plans, were chosen from public meeting rosters. Additional data about citizen perspectives and the decision process

came from approximately 150 informal conversations from 1990 to 1997 with citizens, conservationists, business people, county commissioners, county and city planners, and activists. Data also came from local weekly newspapers since 1990. Chapters 1 and 2 of the 1994 Teton County Comprehensive Plan were reviewed (Teton County Board of Commissioners 1994). Histories of the 1978 plan and accounts of the 1990-1994 planning process and its consequences were also consulted (e.g., Read 1995). Recent materials from two 1997 public sustainability planning meetings were examined. This paper reflects the status of planning in 1997-1998. We have followed the planning process to date and it remains unchanged from our descriptions.

TETON COUNTY PLANNING AND THE VALUE PROCESS

Planning in Teton County is touched on daily in discussions among citizens. Concerns abound regarding community character, growth rates, business activities, tourist accommodations, housing starts, and the like. Fundamentally, though, planning is a value-balancing process about who gets what, when, and how (see Lasswell 1958). The creation and distribution of values (that is, the shaping and sharing of values) is the heart of any policy-making process. Planning in a culture that emphasizes individual rights and principles of the free market is a controversial undertaking in the best of circumstances. Planning has historically been a government response to externalities caused by the private sector, such as land use conflicts, pollution, and other inadequacies in living conditions that pose threats to the health, safety, and welfare of citizens (Hoch 1994). There is an inherent tension between allowing the market to be the mechanism that shapes and shares values and an understanding that government intervention is necessary to protect greater community values against the unbalanced distribution of values caused by market failure. It is important for the purposes of this appraisal to make the point that planning is an inherently controversial activity because of the competing ideals in our culture. It is also a complex value-balancing process since it implicitly and explicitly affects all community members. Before examining this value process, we describe Teton County and past and current challenges to planning.

CHALLENGES OF PLANNING

Teton County is located in the scenic mountains of northwestern Wyoming. It is part of the Greater Yellowstone Ecosystem, which has Yellowstone National Park at its heart (Clark and Minta 1994). The county's showcase center is the 301,291 acre Grand Teton National Park, just six miles south of Yellowstone National Park. A fifty-mile-long valley called Jackson Hole bisects the county from north to south. Less than three percent of the 643-square-mile county is privately owned although private lands contain critical habitat for many wildlife species. National forests and a national wildlife refuge make up the rest of the county.

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For most of the valley's settlement history—the earliest homestead was in 1883—ranching has dominated the economy of the area (Nelson 1994). Establishment of the two national parks shifted the economy toward tourism and resort development. Increasing popularity and accessibility, especially over the last two decades, has led to rapid growth and changes in the biophysical and built environment. These threaten many of the natural and social values important to both old and new residents (Teton County Board of Commissioners 1994). Growth from 1980 to 1990 was 19.4 percent according to U. S. Census figures. Updated U.S. Census figures indicate that the growth rate accelerated to 21.6 percent from 1990 to 1996, putting the area in the top five percent of the fastest growing counties in the nation (Teton County Board of Commissioners 1994; Hayden 1997a).

Teton County and the Town of Jackson have undergone two planning exercises in the last twenty years. The county passed its first comprehensive plan in 1978, and the town and county each passed similar comprehensive plans in 1994 (Read 1995). Planning goals in both periods were to protect the unique natural and social character of the valley. One county commissioner who served in 1978 noted that the plan sought to regulate land uses, maintain ranching as an important economic and cultural element of the community, and preserve open space and environmentally sensitive lands such as river bottoms and wildlife habitat.

The process for creating the 1978 plan included public meetings throughout the valley, moderated by elected officials and a planning consultant. These were designed to solicit residents' views on growth, the county's future, and regulations. Passage of the 1978 plan by a 2-to-1 vote of the county commissioners was contentious and prompted a demonstration by builders and developers (Read 1995).

The 1980s brought rapid population growth and development, which exposed weaknesses in the first plan's design. For example, if all private land were developed in the grid pattern allowed by the plan, all open ranch lands could be converted to a suburban landscape. The public gradually became aware that the character of the valley could not be preserved by the 1978 plan. A new round of planning began in 1990, which resulted in two comprehensive plans in 1994 at the town and county levels (Read 1995). Framed as "property rights vs. community rights," the planning process was again highly contentious. Perceptions that decision makers chose solutions before allowing the public to indicate preferences may have diminished trust in local government's ability to protect community interests (Simpson 1991a).

In this context, future public involvement in planning is not assured. Teton County's civic infrastructure, formal and informal institutions, and the processes through which the social contract was written and rewritten have been eroded by past failures to protect public values (see Parr 1993). If another public process is carried out without learning and improvement on the part of all participants, further loss of trust and involvement is possible (Potapchuk

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1991; Yankelovich 1991). Government effectiveness may decline because much time and energy could be spent managing unproductive conflict. Lack of trust and escalating conflict weakens government's authority and power to set and achieve common interest goals (Gamson 1968).

The town and county have several alternatives. They can administer current plans without changes as best they can; amend the plans to enhance their abilities to meet stated goals; or adjust the land-use planning process and undertake a new planning effort that may better reflect citizens' value expectations. Continuing to administer current plans without changes will not meet community goals. It can be inferred that the 1978 and 1994 plans and their implementation have not been sufficient to preserve unique community characteristics, nor have they been able to manage growth effectively or meet community needs such as affordable housing (Gregor 1997; Hayden 1997b, c; Schechter 1997). Yet, to hold a new public planning process similar to the 1990-1994 effort may result in further erosion of trust in government and little consensus.

If the county chooses this latter option, the reasonable focus of the next process would be to seek economic, social and environmental goals that are long-range, integrated, and community-based—in other words, sustainable (Kline and Goodman 1993; Potapchuk 1996). Sustainability planning is more contextual than other approaches. It suggests that, for the community's future to be healthy and stable, policy decisions should be both environmentally and economically beneficial (Campbell 1996). High public participation is desirable (Kline 1995). Producing a plan that will reflect the community's common expectations with wide endorsement requires a decision process that is smoothly run and informed by a rigorous and accurate understanding of problems and the social process (Lasswell 1971). Can Teton County meet this standard?

THE VALUE PROCESS AND PLANNING

Planning allocates values—that is, desired objects, ends, states, conditions, or processes that bring gratification. The outcomes of the planning process differentially "indulge" or "deprive" people with regard to different values. Public reaction to planning in Teton County since 1990 indicates that many people perceived that they were left worse off by planning decisions. The policy sciences recognize eight fundamental values that encompass all of people's desires: power (support for decisions), enlightenment (information), wealth (material resources), well-being (the opportunity for safety, health, and comfort), skill (the opportunity to acquire and exercise excellence in a particular operation), affection (intimacy, friendship, and loyalty), respect (recognition), and rectitude (ethical conduct) (Lasswell 1971).

Understanding this value shaping and sharing process is key to appreciating the responses of interviewees, comments in newspapers and informal conversations, and the dynamics of the policy process itself. A sample of comments provides insight into how values were shaped and shared in the Teton County

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planning process. All eight values are evident in the following examples, and most comments reveal concern for more than one value. These examples illustrate the eight values at play and people's perspectives based on them, including demands held by interviewees and others.

Power:

"Most of the old-time landowners refuse to even go to the meetings because they've gone to meetings over the years and were so totally outnumbered that they have a fatalist attitude about it."

"The officials would not give the responsibility to the stakeholders and the community to make those decisions. I've read about this a lot: as is usually the case, though I can only judge from this community, there were people in power who felt they could make better decisions for the community than the interest groups and the stakeholders. As a result, various groups were excluded from the process in the final document."

Enlightenment:

"[T]here should be more information for us in the paper about how it's done in Carmel, or whatever. There's some success that we need to know about and be able to say we could do that, too. Maybe the public is becoming educated, but I don't think it ever hurts to do more."

"I really think, again, being able to foresee the data you're going to need and getting it way in advance so that you've got something to base your regulations on [is necessary]. You need to have that kind of information being disseminated in the media so that, when people finally hear the solution, or how we're going to achieve a goal, it already makes sense to them. They don't have to go, "Well, I've never understood why this is a problem," because there's been no information given to them."

Wealth:

"I don't really look at this plan as influencing the social element other than how it affects cost of living. To me, that drives everything else socially. It's sort of a performance zoning plan, whatever that is. The social element of your community can be affected by what you do with planning simply because there isn't enough of a developable land base with all kinds of mixing of housing types. You can have a very stratified community."

"You don't have people coming in and being able to build (expensive) houses like Rafter J [Development], raise their kids, and have them move here."

Most of the old-time landowners refuse to even go to the meetings because they've gone to meetings over the years and were so totally outnumbered that they have a fatalist attitude about it.

Well-being:

"[I]n my own opinion, my own bias, by definition, very narrow, specific interests [dominated]. [It] hurts community values. The overall well-being with the community. And it doesn't even matter if you're narrow in another thing that wasn't money. In just the definition by being narrow, it disallows for the full range of what the community needs to become healthy in—that's sustainable, or whatever."

"Hopefully, I was seeing a community that would have an awareness of what impacts of growth would occur and begin to accept the fact that we have a finite amount of growth we can actually take without really ruining our quality of life."

Skill:

"Perhaps it betrays my academic nature, but I tend to regard expert consultants with a high degree of credibility."

"One of the things I advocated in this process was to get an economist on board so that we could try and figure out what the economic ramifications were going to be."

Affection:

"I think I primarily wanted to have some say as to the future of this place. I just feel a real love and caring for it. I think I have always hoped to help Jackson Hole to grow well, and in a healthy way."

I think I primarily wanted to have some say as to the future of this place. I just feel a real love and caring for it. I think I have always hoped to help Jackson Hole to grow well, and in a healthy way.

"I think a community is composed of people. My thought has always been that community character is its people. It is not in the scenic corridor, and it is not in the setbacks. It is not the regulatory environment which says we will preserve the rural environment. If you drive the ranchers out, the community loses that character. You can't say "cattle free by 93" and take the cattle off the public lands, and out of the park, and expect there to still be ranching. And that is what gave this community a given character, but it's going away."

Respect:

"I wanted my input to be heard."

"The old-time families who have held onto the land and preserved the open space really don't get much of an audience with anybody around here. They are a little resentful of having done a real good job of stewardship, keeping beautiful open space, having taken care of their land, their ranches and not developing for the fast buck. They resent somebody coming in there and saying, "Now we're going to tell you how to do it."

Rectitude:

> "I was hoping that an open dialogue might be created from all of the stakeholders and that the discussion around the table at those meetings would result in common goals and interests being established from all of the stakeholders. I hoped the final product would be a plan that would recognize all of the diverse interests which we obviously have here."

> "I guess I feel like even though I wish I was more knowledgeable about a lot of planning areas, I spoke for a huge percentage of people who weren't represented at these meetings. I think there are a lot of people who are overworked and overstressed and can't afford to be there. So I felt maybe I could represent that side of things."

As seen in these examples, different people dramatically emphasized different value demands. Although all eight values were evident in interviewees' comments, well-being and respect were the values most mentioned and power and wealth least mentioned. Power seemed to be a dominant value for three people, enlightenment for nine, wealth for two, well-being for twelve, skill for one, affection for seven, respect for eleven, and rectitude for seven. This same emphasis is evident in newspaper accounts, letters to editors, and in public meetings over this period.

However, these demands were largely unmet by the planning process and its outcomes. Many people perceived that planning favored wealth and power for people who already had relatively large amounts of these values, according to interview data, informal conversations, and newspaper articles. There was a large gap between people's expectations about the planning process and its outcomes and what they perceived as the actual process and outcomes. This gap produced feelings of dismay, mistrust, and alienation, and blame was laid on local government for "betraying" them. Making appropriate future adjustments to the public process will require elected officials and planning staff to learn from past efforts.

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APPRAISING THE 1990-1994 PLANNING PROCESS

The planning effort used community outreach techniques. There were meetings between citizens and planning department officials throughout the town and county as well as community-wide public meetings for citizen input at different stages of the process. The town and county contracted with a planning consultant who produced position papers based on public input, which were presented at public meetings. The consultant recommended planning regulations, and both officials and the public responded. With input from town and county planning departments and citizens, volunteer planning commissioners appointed by elected officials made preliminary reviews and revisions of the

consultant's recommendations. The town council and board of county commissioners made the final review and were responsible for formal adoption of the plans (Read 1995).

This multi-year planning effort can be broken down into the seven interrelated activities of the decision process (Lasswell 1971). Values are shaped and shared through these interrelated activities. Each activity, collectively making up the overall process, has outcomes. Below we define each activity and specify criteria for adequate performance, summarize interviewees' comments about each activity, and offer our own appraisal about how well each activity was carried out.

GATHERING, PROCESSING AND DISSEMINATING INFORMATION

The *intelligence* activity involves gathering, processing, and disseminating information about the planning problem at hand. The intelligence function is adequately carried out when information is reliable and when the process is creative, open, and comprehensive yet selective with regard to all relevant components of the perceived problem and its particular context.

Basic information was needed in Teton County planning. People interviewed indicated that, although information was presented, it was not comprehensive concerning relevant historic trends, conditions or factors which explained the movement of historic trends, and projections or assumptions about the future if trends and conditions did not change. People with less expertise in land use planning seemed more satisfied with the information availability than those who dealt with land use regulations as part of their professional or focal interest, or those involved in developing property. Developers were dissatisfied with the amount and type of data available as well as analysis of the appropriateness and potential effects of planning regulations. Among the comments from interviewees about the intelligence activity were the following:

> "[T]here came to be some understanding that things which make the place unique are important."

> "They ended up writing the regulations before they generated the data to support them…I'm just guessing, but I would think you would sit down and say, "What information do we have, and what information do we need?"…You need to have that kind of information being disseminated in the media so that, when people finally hear the solution, or how we're going to achieve a goal, it already makes sense to them. They don't have to go, "Well, I've never understood why this is a problem." Because there's been no information given to them."

Shortcomings in the intelligence activity can lead to problems throughout the rest of the decision process. Without comprehensive information, prob-

This multi-year planning effort can be broken down into the seven interrelated activities of the decision process (Lasswell 1971). Values are shaped and shared through these interrelated activities. Each activity, collectively making up the overall process, has outcomes. Below we define each activity and specify criteria for adequate performance, summarize interviewees' comments about each activity, and offer our own appraisal about how well each activity was carried out.

lems face the likelihood of being misidentified. It then becomes impossible to set relevant goals that will address problems and produce appropriate, substantive results. Critical to an adequate decision process is a realistic definition of the problem at hand, but adequate problem definition alone is not sufficient for effective decision making. Since every policy problem is imbedded in a context of social interactions, policy decisions must accommodate the social process involved in each activity.

Gathering and processing data is an expensive budget item, but more creative and comprehensive data gathering would have improved all phases of the Teton County land use planning process. Creativity is important for assessing what data sets do not exist but need to be created to provide comprehensiveness. This may have been a problem for Teton County. For example, in the early stages of the process, there were no socio-economic statistics for the county such as income levels or professions or their relation to housing prices; no reports on the costs of growth such as revenues needed to supply projected infrastructure; poorly organized information on wildlife populations and habitats; little understanding of the relationship of commercial development to the whole; no projection of transportation needs based on various development alternatives. There is a seeming contradiction between comprehensiveness and selectivity, but without comprehensiveness, there is the potential to define problems by what data are available, and without selectivity, there is the potential to assume that any and all data sets can be made relevant to decision making.

DEVELOPING OPTIONS

Next is the *promotion* activity, which is characterized by debate over alternative courses of action to remedy identified problems. Various actors' value demands and expectations are clarified in promotion. Advocacy of different alternatives focuses decision-makers' attention on the justifications for those proposals. A good promotion function occurs when decision makers give integrated, comprehensive consideration to people's values through forums, pluralistic discussion, and recommendations.

The Teton County planning process had a vigorous promotional function. However, most of the people interviewed perceived that the promotion phase was dominated by special interests. In addition, people thought that part of the difficulty in completing the planning process was the wrangling over demands. There was extensive comment by those interviewed on the promotion activities:

> "I think it's weighted inequitably toward the business interests, economic interests, and the professionals who deal with the business of land…because those are the people who directly, monetarily benefit from being at that meeting. And these guys have maps, they have consultants, they have cost-benefit analyses, and they have everything else. It's intimidat-

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ing as hell to me, and it's even more intimidating to most people. They have something to say, but they're not about to go up against the professional person. They're just not."

"There were people who should have been involved in a real dialogue getting mad and quitting the process. People like me… getting pissed off because somebody was being so bullheaded that it couldn't go anywhere."

"[The last two-and-a-half years] twenty or thirty people were making significant decisions about peoples' livelihoods and their real property….It wasn't right….At some point along the line, the people who originally went and made comments and were fired up to   participate lost interest and said, …"You're not going to listen to   me anyway." And sure enough, they didn't….There was a specific agenda with this last process, which was to stop growth and stop development."

Again, those less familiar with planning seemed more satisfied with the overall process, but there was emphatic response—from people at polar opposites with respect to regulating land use—that the promotion phase was far from adequate. Only two of the seventeen people interviewed had only positive comments about promotional activities. In addition, there were complaints that promotion was neither open nor inclusive, and a sense that outcomes had been pre-selected (Simpson 1991a,b). Newspaper articles tended to confirm that perception. The cumulative effect was a perception that the public process was "hollow" and that the adopted plan did not reflect the greater community's values.

Our assessment is that the inadequacy of the intelligence activity left gaps in information that made it difficult or impossible to develop a broad range of supportable alternatives. Participants tended to advance their own special interests. In addition, the consultant seemed determined to use a particular type of planning without open debate on other approaches that might have been equally desirable. The proposed method—performance zoning—would allow a greater range of uses in a given area than traditional zoning, so long as the proposed development conformed to the character of the existing environs by meeting neighborhood-specific design guidelines. The consultant's publicly combative attitude toward those who did not agree with his proposed regulations probably added to suspicions that solutions did not try to integrate diverse values, but were nevertheless acceptable to elected officials (Read 1995). A more integrative approach by decision makers would have enjoyed general support.

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SETTING THE PLAN'S RULES

Prescription entails crystallizing people's demands and then enacting rules or guidelines to achieve common interests. A competent prescription activity will stabilize people's expectations about lawful norms, contingencies, and sanctions for nonconformance through open and comprehensive communication.

The final and formal Teton County plan and associated regulations, along with many unwritten community norms of conduct, constitute the prescription. Interviews suggest that the prescription is supportable as far as broad goals are concerned, but the comments also reveal a belief that the regulations cannot achieve the stated goals of protecting local natural resources, social diversity, sense of community and small town feeling, and outdoor recreation opportunities. Moreover, the regulations are so complex that there is little chance the average citizen can understand them. Comments about prescription included:

> "Coming up with a term like community character is a success which might be a direct result of the process."

> "If you look at the actual plan, it's gobbledy-gook. There's very little that actually determines character. There's a ton of regulations. We have a five- or ten-pound document, but…to say what character is and how we protect it didn't get done. The things that got put in are in tables such as floor area ratios and densities, which are easy to get variances because nobody was quite sure why it was the way it was to begin with."

> "The only people who understood the plan when it was passed would have to be people like Bill Resor [on the planning commission]. Those were people on the planning commissions. Maybe the head planner. The assistant planners still don't understand the plan."

Complaints about the burdensome and obtuse nature of the regulations were ubiquitous among professionals in land use planning as well as citizens.

The prescription activity was carried out in an open fashion since review and revision of recommended regulations were discussed at meetings open to the public. In addition, maps and supporting documentation were available in the planning offices of both the city and county. The two weekly local newspapers carried articles about proposed regulations. The prescription thus stabilized expectations to some degree (Read 1995). The most acrimonious charges and counter-charges about prescriptions were about perceived loss of property rights versus loss of community character from growth and development. Less divisive discussions in the promotional phase, however, might have produced more useable prescriptions. There might have been more in-depth discussion, emotions might not have run as high, and the process might have generated better overall support for decisions.

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IMPLEMENTING THE PLAN

Invocation and *application* (sometimes combined under the rubric of implementation), include approval and enforcement of policies and regulations. Invocation and application should be both authoritative and controlling, and should reflect comprehensive, open, and principled consideration of all relevant proposals advanced during promotion. Formal adoption of regulations and guidelines and their implementation should therefore reflect the common interest.

In Teton County's planning process these two activities were closely associated. Interviewees' views were clear. Criticisms of how the plan and its regulations were implemented varied, but few people interviewed were dispassionate about the regulations' failure to match the community vision as they saw it. Only one person interviewed was satisfied with the outcomes of the new plans. Invocation and application of the new plans, especially at the county level, continue to be a point of controversy.

> "The plan was supposed to be character based. It was supposed to determine what the elements were that make for strong community character."

> "Some of the biggest driving forces were left till the last, and they're still not complete. One of them was the transportation plan which, to me, drives the whole thing."

> "They have stuff all the time where they say, "Oh well, we really don't know how we're going to administer this yet." That makes the public angry. They want an answer. They go in to build a house, and want to put a fence here, and they're told, "Well, we don't know if we're going to let you do that. Because we don't know how to enforce our own plan." It's not clear enough. It's dangerous stuff. People like certainty in their lives."

Comments since the plan's adoption have been consistently derisive about its complexity and inherent contradictions. Application of the plan's regulations relative to its community vision is considered weak by citizens who support growth management. It is viewed as draconian among those who wish to pursue development.

Invocation and application in the Teton County decision process have not been adequate. The plans should represent the common interest, the regulations should not cause severe deprivation of basic values to any individual or group, and citizens should be able to expect the regulations to be applied and enforced in a timely, fair, and nondiscriminatory manner. Interviews and numerous casual comments indicate that, despite the best intentions, the town

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and county plans fail to meet these requirements for adequate invocation and application. Shortcomings include a lack of regulations to ensure that structures and siting will preserve community character, regulatory complexity at a level that citizens cannot understand as a basis for informed comment on proposed developments, and a professional planning staff who cannot apply regulations with uniformity.

EVALUATING THE PLAN

Appraisal is review of the successes and failures of the decision process with respect to goal achievement. A competent appraisal exercise assigns accountability for outcomes. It should include formal and informal, internal and external evaluations. Evaluations should disclose who has been affected by outcomes, both positive and negative, and who is responsible for those outcomes. Thorough evaluations must also account for the context in which outcomes are appraised.

In Teton County there is much informal but little formal appraisal. As with all other activities, there did not appear to be consensus on the success of the public process and the plans it produced:

> "[I had hoped] that there would actually be a step in the process toward creating a system for good land use patterns and for building good community. Maybe a few of those things came about. But as an overall package, I don't feel that the plan that came out is a great plan. It's better than some; but it's not nearly as good as what was hoped for. The more planning there's been, the worse it's gotten. And I'm a believer in planning."

> "A lot of the open space that we have in the valley would probably not be there [if we hadn't had that process]."

> "The power was removed from the people in this plan. It was removed by the process. In other words, if I can't, as a member of the public, understand what this plan says, I can't even come in and comment on projects that are coming along. I can't do it, because I don't understand the plan. But anyone who is proposing a project has probably reviewed it very diligently and probably knows what it says, and that person can then counteract almost anything a person who doesn't understand it says. By making it complex with little black-and-white tables and a bunch of other rules, it says that nobody knows where a project is going to end up when it goes through the pipeline. I think that's created a real problem. I suspect there will be less public input on future projects, partly because of that complexity."

Both those people who supported planning and those who opposed it

Both those people who supported planning and those who opposed it believe that, since the process was not inclusive from their standpoints, the plan does not reflect the aspirations of the community as a whole. Additional criticisms are that crucial factors affecting community character—such as transportation planning, affordable housing, and resort designation—were not part of the plan when it was adopted and that there is little relationship between the regulations and the stated goals of defining and maintaining community character.

believe that, since the process was not inclusive from their standpoints, the plan does not reflect the aspirations of the community as a whole. Additional criticisms are that crucial factors affecting community character—such as transportation planning, affordable housing, and resort designation—were not part of the plan when it was adopted and that there is little relationship between the regulations and the stated goals of defining and maintaining community character. In addition, there are complaints that the town and county plans do not deal adequately with future commercial development, which, under current regulations, would ultimately be triple the existing amount. The impact of this level of development will be significant. Although it was discussed during promotion, no solutions were included in the plan, nor are its potential impacts currently a formal subject of discussion.

Comments from various people in casual conversations indicate a belief that the rest of the regulations for both plans will be almost meaningless if the potential for commercial development is not reduced. The reasoning is simple. Large-scale development exerts a circular form of pressure: more retail space requires more tourists, which increases the need for more lodging, which calls for more retail development to support it. In a service economy where wages are low, the spillover effects on housing and social services requirements to make up deficits between income and needs will be an increasing burden on other residents. In addition, the physical space requirements of both business and workers will require more lands to be developed. This is considered by people to be an indulgence of business interests to the detriment of the greater community.

In short, the plan is too complex to invite meaningful discussion by average citizens about its overall adequacy or about specific requirements. This fore-closes equitable access to discussion and appraisal. Decision-making about appropriate amendments or revisions is then largely limited to people who can afford professional services to influence ongoing refinement or those who, by virtue of their jobs, are required to know the regulations. The future of the plan and its implementation will continue to be influenced by these limited interests.

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MOVING ON

In the *termination* (or succession) activity past practices are discontinued. In Teton County, for instance, the 1978 plan was terminated by the 1994 plan. This activity is typically a response to an appraisal, which concludes either that current practices have achieved the stated goals or that they are not achieving them. A good termination function must account for those who will be harmed by the cessation of current practices. It should be comprehensive, balanced, ameliorative, and respectful of those affected.

Comments from those interviewed, while not in answer to specific ques-tions regarding termination, indicate a need for local government to examine possible termination of parts of the plans that do not meet the community's vision and to replace them with regulations with a better chance of securing the community's interests.

Our analysis of Teton County planning shows that the concurrent plans do not have explicit stipulations for termination. Like all plans, those for the town and county have indeterminate useful lifespans. The plans should specify conditions that will demonstrate that they are no longer meeting the needs of the community along with provisions for implementing alternatives better suited to planning goals.

There has been no authoritative discussion of whether sustainability planning will become a formal process that might terminate current plans, or whether it will be used to inform administration and be adopted through amendments to those plans. The 1997 Citizens Economic Summit public meeting materials, which are not authoritative documents, referred to sustainability decisions as a means to supplement the effectiveness of current plans. The town and county should produce documentation with qualitative and quantitative benchmarks for measuring the effectiveness of various regulations. It should be assumed that practices that do not achieve these standards without strongly defensible cause will be terminated and more effective alternatives instituted. The current plans do have provisions for major review, however, and there have been informal discussions among elected officials and planning staff about the need for review.

RECOMMENDATIONS FOR FUTURE PLANNING IN TETON COUNTY

Teton County might set a new goal for itself—one that reinvigorates civic engagement, creates an open and trustworthy public decision process, and leads to a substantive and practical plan for sustainability (see Brunner 1994). Leadership will be essential at many levels. As William Gamson (1968: 43) notes,

> The effectiveness of political leadership…depends on the ability of authorities to claim the loyal cooperation of members of the system without having to specify in advance what such cooperation will entail. Within certain limits, effectiveness depends on a blank check. The importance of trust becomes apparent: the loss of trust is the loss of system power, the loss of a generalized capacity for authorities to commit resources to attain collective goals.

Despite the apparent contradiction, authorities will be able to commit appropriate resources to the common interest more readily by fostering genuine citizen involvement and sharing power in decision making (Bens 1994; Chrislip and Larson 1994; Pimbert and Pretty 1995; Fulton 1996). Public policy should seek to distribute all values widely. The trust and power sharing generated by such policies is essential for advancing democracy and creating "a commonwealth of human dignity" (Lasswell 1971; Lasswell and McDougal 1992) fundamental to sustainable societies (Meadows *et al.* 1992; President's Council on Sustainable Development 1996).

People in Teton County should think, talk, and act in terms of integrative solutions to their problems—that is, in terms of their common interests. Teton County is a community of diverse individuals, and there may be a widespread temptation for people to promote their special interests and attempt to justify them as common interests.

CLARIFYING AND SECURING THE COMMON INTEREST

People in Teton County should think, talk, and act in terms of integrative solutions to their problems—that is, in terms of their common interests. Teton County is a community of diverse individuals, and there may be a widespread temptation for people to promote their special interests and attempt to justify them as common interests. Clear thinking, commitment and hard work, self-restraint and self-awareness, and public involvement are all needed for the community to clarify what interests its diverse citizens have in common and to find ways to secure those interests.

The public decision process is the authoritative and controlling framework by which people clarify and secure the common interest, or at least a working specification of it. The common interest is understood as broad, shared concerns; fulfillment of the common interest tends to optimize opportunities for everyone to achieve their value goals. Special interests are those which, if indulged, are destructive of the common interest because a minority of people benefit at the expense of the majority (Lasswell 1971). The common interest is not a static thing to be discovered and standardized, situations and conditions under which people interact are not fixed and will both affect and be affected by decision processes in a continuing, dynamic manner. The common interest must be clarified and secured by living members of the community involved under current conditions, not by appeals to long dead personages or historic precedents. The concept of common interest assumes that there are overarching, reciprocal, and recurrent value demands that communities will manifest through informed deliberation about issues before them at any given time. For example, all people have a common interest in a healthy environment and in a democratic public policy process that can secure this goal. The pursuit of common interests, or widely shared values, over special interests depends on open, comprehensive deliberation about people's value demands in actual contexts (Lasswell 1971; Mansbridge 1980; Dahl 1982; Dryzek 1990; Innes 1996). Conflict is to be expected in these processes as parochial identities and special interests clash. Collaborative processes should be used since they usually lead to an understanding that self interests are ultimately obtainable through support of the common interest (Bessette 1994; Chrislip and Larson 1994).

INCREASING KNOWLEDGE ABOUT THE SOCIAL PROCESS AND VALUE DEMANDS

People in Teton County should develop more reliable and comprehensive knowledge about the social process they are involved in as well as the values that are being shaped and shared through this process. The social process may be defined as interactions by which people seek to maximize values through institutions using resources. There are useful ways to "map" or analyze the participants involved, their perspectives and strategies, and to understand how decisions affect value distribution. For example, rather than assuming that

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those people who show up at meetings approximate the actual mix of community values at stake, mapping value demands might indicate that certain perspectives are over- or under-represented and active solicitation of participation may be required to correct those imbalances. Working through planning scenarios and examining value outcomes could be invaluable in helping citizens to understand what values are at stake. Local government and the public could become more proficient in recognizing value demands and analyzing how they affect the policy process. Knowledge of the social process also helps guard against domination of public policy processes by special interests and would also compel various interests to become self-conscious of their own perspectives. The direct benefit of pursuing a strategy of inclusiveness is to strengthen the ability of the community to clarify and secure its common interest.

IMPROVING UNDERSTANDING AND SKILLS FOR PUBLIC POLICY-MAKING

Gaining civic trust and engagement is essential for good policy making. People in Teton County should enhance their knowledge, explicitly and systematically, about how the public policy process works, seek skills to participate productively in these processes, and devise methods to enhance the effectiveness of community-wide decision making. Numerous possibilities exist. Local government and civic groups could assume more leadership in a collaborative, power-sharing approach (Gates 1991; Bens 1994; Chrislip and Larson 1994; Mathews 1994). Trends in local politics suggest that citizens who choose to participate in the public sphere are becoming increasingly demanding about meaningful participation in decision making (Potapchuk 1991; Lewis 1994). Local governments may not understand what constitutes collaborative process. This may have been a problem for Teton County in the past if government officials assumed that holding public workshops and getting input qualified as effective collaboration (Bens 1994). Opportunities for learning the activities of decision making and the criteria for adequacy should be made available to both government and citizens to facilitate collaborative decision making. The process of accumulating successes while working on problems will be reinforced by increasing levels of self- and group-awareness and sophistication in understanding the necessary framework and criteria for good decision making.

CONCLUSION

The uncommon characteristics of Jackson Hole—exquisite beauty, abundant wildlife, an outdoor-oriented, hardy, and friendly population with a passionate sense of place and commitment to the ideals of small-town life—have been the focus of preservation efforts through community planning for over twenty years. Planning is inherently a difficult task since it is a policy process of balancing American cultural and legal primacy of individual and property rights against the societal and legal necessity of securing the well-being of the

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community. Extraordinarily rapid growth and change in Teton County have intensified these deep-seated conflicts. In the current environment, increasing government effectiveness is necessary to deal with heightened demands for both protection and opportunity to share in the benefits the valley offers.

Government efforts in the 1990-1994 policy process produced plans that do not appear capable of meeting community expectations for protection of common values and therefore appear to have reduced trust in local government. The increasing complexity of issues that accompany current growth pressures represent an opportunity to restore citizens' faith in government's abilities and to produce effective sustainability policies to help protect and enhance community amenities.

A policy process that integrates social process, problem orientation, and

decision-making—and includes genuine power sharing by citizens and government—can help in clarifying and securing the common interest and producing flexible, effective policies to sustain a thriving community.

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Organizing an Effective Partnership for the Yellowstone to Yukon Conservation Initiative

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ABSTRACT
We analyze the "Yellowstone to Yukon Conservation Initiative," an innovative landscape-scale conservation initiative in the Northern Rocky Mountains of North America organized by environmental advocates and conservation biologists. We find a shared problem definition in the aggregate among diverse participants, yet a great deal of diversity among individual participants' values, perspectives, and preferred strategies. We analyze reasons for this diversity. We conclude with recommendations that may help the partnership capitalize on its diversity and improve its prospects for success in attaining "on-the-ground" improvements in land management and conservation. In short, the organization must develop a more widely shared, common perspective, build a multi-tasked organizational structure, and employ a practice-based strategy.

There is increasing concern about the sustainability of land management practices in the Rocky Mountains of Canada and the northern United States. Unsustainable practices include the scale of new roads, subdivisions, and other developments, degradation of natural resources, and declines in species that depend on the region's natural ecosystems, particularly those that rely on large areas of contiguous habitat. Traditional conservation—protecting isolated national parks and wilderness areas—is not sufficient to counteract this growing problem. The policy problem is how to find and implement policies and practices that are sustainable, which, in this case, would include reversing habitat loss and fragmentation. To address this problem, a partnership is coalescing around an initiative to improve policy across the entire Northern Rockies landscape of the United States and Canada. The partnership includes natural resource professionals, nongovernmental organizations, and citizens focusing on the design and implementation of an interconnected system of reserves throughout the 2,500-km long region between Yellowstone and the Yukon. The challenge before this group is to organize diverse participants across a huge area around a complex problem and to achieve tangible improvements.

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In this paper we examine this Yellowstone to Yukon initiative (Y2Y) and offer recommendations for how the partnership might organize itself most effectively. We share Y2Y's goal of sustainability, because we believe it serves the common interest. The analysis in this paper is an initial example of how the policy sciences might be applied to increase this group's prospects for success.

Our methods are intensive and extensive. In the summer of 1996, Gaillard met with 37 participants in Y2Y and in other large-scale conservation efforts from Wyoming, Idaho, Montana, British Columbia, and Alberta and

conducted 49 hours of open-ended interviews. Clark has carried out natural resource management and policy studies in the region over the last 25 years (e.g., Clark and Minta 1994; Clark *et al.* 1996a; Primm and Clark 1996). This paper presents a view of Y2Y in 1996-1997. Since 1996, we have followed the Y2Y initiative in many meetings, in the literature and media, and in scores of open-ended, informal interviews with key participants. Our analysis was guided by the interdisciplinary framework of the policy sciences (Lasswell and Kaplan 1950; Lasswell 1971; Lasswell and McDougal 1992). We plan future work on the evaluation and effectiveness of the Y2Y initiative.

WHAT IS THE POLICY PROBLEM?

The interviews gave us a snapshot into the early process of how participants are orienting to the problem at hand. This basic pattern continues down to the present. Interviewees reflect diverse individual perspectives, including demands, expectations, and identities. Nevertheless, a great deal of common ground is evident overall. Below we describe the emerging common goal, the participants' views on historical trends in demographic, social, economic, and conservation arenas, the conditions under which these trends are taking place, and expected future trends. Finally, we look at the alternative that the partnership is adopting.

WHAT IS THE GOAL?

The Y2Y group has yet to define a clear, specific, consensual goal for itself, yet a broad, emerging vision can be gleaned from interviews and published materials (e.g., Forman *et al.* 1992; Locke 1994. 1996a). Participants are linked by a shared interest in keeping native species from becoming extinct, particularly wide-ranging species like wolves, grizzly bears, and eagles. In protecting these species, they believe that they will contribute to a larger goal of conserving biodiversity. More specifically, participants seek long-term "functional connectivity" of wildlife populations up and down the 2,500 km. northern Rocky Mountain chain. They share the conviction that the Northern Rockies is the best hope for maintaining large North American species. Related goals include shared aesthetic values—a "love for wild beauty"—and spiritual, emotional, and cultural values inherent in wildlife and its habitat.

WHAT DOES HISTORY TELL US?

The Y2Y initiative is being carried out against a backdrop of regional and global changes that are perceived to be significant and rapid. Understanding this context is essential to appreciate current organizational and promotional activities and policy challenges. We have organized the trends described by participants into categories that reflect the focus of their attention: demographic, social, economic, and conservation issues.

Regarding demographic trends, interviewees shared a perception that the human population is sharply increasing throughout the Northern Rockies, and

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natural resources are deteriorating as a consequence. Evidence exists in national park visitation records and the growth of "gateway" communities on park borders. Yellowstone National Park visitation now exceeds 3 million annually and Banff visitation has increased from 450,000 visitors in 1950 to 5.5 million in 1996.

Social trends are perceived to be dynamic and include the arenas of politics, institutions, law, and public opinion. Some data exist to support these perceptions but this data needs to be better organized. Existing power elites strongly favor growth and natural resource exploitation over sustainability and preservation. Public opinion has traditionally reflected the same—emphasizing economic returns over ecological, aesthetic, and other values—but that is changing with the influx of new people to the region. Legal measures to protect the environment are not implemented well. Many natural resource management institutions are overly compartmentalized and focused on narrow, short-term ends. These trends are clearly evident in many local contexts. This seems to be particularly true in Canada, where the vast majority of public land was ceded to the provinces in the 1930s and 1940s and is now largely under lease to private lumber, oil and gas, and mining companies. In the U.S. most of the Rocky Mountain region remains under federal management, but there appear to be similar trends toward parochial control, such as an increase in county ordinances directed toward gaining more local control of the national forests (e.g., USDA 1995).

Economic change is evident. Extractive natural resource industries that traditionally drove regional economies are perceived to be in steady decline, being replaced by a booming service sector (e.g., Rasker *et al.* 1992; Rasker 1995; Rasker and Hackman 1996). Yet, in the short term, participants see extractive industries stepping up activities in a "last gasp" response to their pending termination. Forestry in particular has become a very contentious issue in Canada. The recent U.S. Congressional "salvage rider," which opened previously reserved forests to logging, is evidence that the timber industry still has considerable influence in the Rocky Mountains of the U.S. as well.

Within the "conservation" category we include perceptions of ecological trends and responses to them among the conservation community. The conservation of regional biological resources is perceived to be under growing threat as change takes place in demographic, social, and economic spheres. Several species of large carnivores are threatened or endangered with extinction (Paquet and Hackman 1995). There is a growing list of "candidate" species for official protection. Wide-ranging species are particularly at risk (Clark *et al.* 1996a). There is increasing awareness of the damaging effects of landscape fragmentation under current management policies and practices. There is also rising interest in the professional conservation biology field and in environmental advocacy for comprehensive, big-picture conservation strategies centered around restoring landscape connectivity. One manifestation of this trend in conservation is the emergence and growth of the Y2Y initiative itself, as well

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as several other large-scale conservation initiatives underway in the Northern Rockies.

WHY ARE THESE EVENTS TAKING PLACE?

Y2Y participants perceive diverse conditions behind these trends. The demographic trend—people flooding into the area—is simply the result of people seeking improved quality of life. The air is clean, water is pure, there is peace and quiet, national parks and forests are near at hand, outdoor recreational opportunities abound, and land is cheap. Previous disincentives to living there—extreme winters, isolation, and lack of services—are lessening significantly because of improved services, transportation, and communication networks. The region is becoming increasingly popular as more accessible areas, which used to boast comparable natural amenities, are becoming overcrowded. These are all conditions behind the rapid growth now underway throughout the Rockies.

The social arenas of Canada and the U.S. provide somewhat differing sets of conditions. There are significant differences between the two countries in the public's ability to influence land management practices. In Canada, even gathering information pertaining to land management can be difficult and costly compared to the U.S., where information is typically available for free. There are minimal opportunities for Canadians to review or influence land management decisions. In the U.S., the public can challenge decisions affecting the national forests through an administrative appeals process and the *National Environmental Policy Act*. National park management illustrates some differences in environmental policy and practices between the two countries. Much land in the Canadian Rocky Mountain parks is leased to private interests (e.g., resorts, shopping malls, private residences), which reflects their history as resorts rather than nature preserves. This has led, for example, to today's population of 7,500 year-round residents within Banff National Park. Thus, though it is still considered by many people south of the 49th parallel as a "great white north" of contiguous wilderness, Canadian wildlands suffer from development pressures comparable to the U.S.

Economic conditions are forcing a change towards service-based economies, as more people move into the region, new service-related, "footloose" industries arrive, and extractive industries decline. Despite this, interviewees recognize that the current influence and power of extractive industries remains high and will probably continue for many years. In local pockets, extractive industries are still dominant (e.g., in parts of British Columbia the timber industry is still a great revenue generator). Pro-development laws and government subsidies present a further obstacle to terminating unsustainable practices. For example, the extensive road network on public lands in both countries has been identified as a major component of the problem facing conservation in the Northern Rockies. It was heavily subsidized by taxpayers and is still maintained at the public's expense. Continuing U.S. Congressional support of

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the grazing industry is another example that illustrates how substantial political power does not directly depend on either employment or revenues. The transition to a service-based economy does not come without its own environmental costs. Increased demands for more transportation, residences, recreation, and businesses result in loss and fragmentation of wildlife habitat. For example, communities within and adjacent to undeveloped lands are considerable "mortality sinks"—areas where many species, and particularly large forest carnivores, suffer a disproportionately high number of human-caused mortalities.

Regarding the conservation arena, species declines are due to human-caused mortality, destruction of habitat, and increased isolation of populations. Long assumed to be core refugia, national parks pose serious mortality risks for a number of species, particularly large carnivores. It is known that Banff National Park is no longer a source of bears or wolves to colonize surrounding areas; at best it is neutral, and it may even be a sink, absorbing and depleting animals from surrounding areas. Developments in Yellowstone National Park have long been a major source of human/bear conflicts and deaths (Craighead *et al.* 1988). Aquatic environments have been the subject of dramatic manipulations, resulting in irreversible ecological changes (e.g., replacement of native species by exotics and loss of riparian areas). The current level of interest in conservation science and policy reflects an increasing understanding of this loss of species and a realization that time is running out to reverse these trends and alter the conditions behind them.

WHAT DOES THE FUTURE HOLD?

If historic trends and conditions persist into the future, significant change is in store for the Northern Rockies. The future economy in the region is expected to be dominated by the fastest growing sectors today—that is, tourism, recreation, and a service sector to accommodate the rush of new visitors and residents. The visitation level in Banff National Park, which is already close to double the three million annual visitors to Yellowstone National Park, is expected to double from its current level by 2006. There are sporadic efforts to design and implement actions to prepare for these projections (e.g., the recently commissioned Banff Bow Valley Study (1996). In many sectors, however, the prevailing attitude is to wait and see, and welcome new economic opportunities. Political trends in the region are perceived to be becoming more conservative and parochial, as evidenced by a growing and vocal discontent with central governments, and the election of very conservative representatives in both the U.S. and Canada. The impacts on conservation are expected to become worse before they improve, if ever. If Y2Y is to clarify and meet its goals and overcome diverse problems, it must invent, select, and successfully implement practical strategies.

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WHAT SHOULD BE DONE?

Many alternatives are being considered by group members. Consensus is forming around Y2Y, but is not well-defined beyond its biological conservation component. Discussion of alternatives is wide-ranging, including, for example, ideas such as stopping promotion of the West as a tourist destination, minimizing ill effects by concentrating populations in cities, and rigorous, cautionary planning and zoning to protect wildlife, open space, and other values. In general terms, Y2Y has articulated a broad vision about sustainable human systems and practices, but without much detail in areas other than conservation biology. Participants acknowledge the importance of the social, economic, and other contextual forces, but do not have a comprehensive vision or a practical plan to address them in detail.

The above account of Y2Y participants' perspectives and their problem orientation masks the diversity of perspectives involved. These differences have led, in turn, to differences in goals, problem definitions, evaluation of possible solutions, and selection of strategies.

DIVERSITY WITHIN THE Y2Y PARTNERSHIP

The Y2Y partnership must appreciate and manage its inherent diversity effectively. Participant diversity can be a strength because the coalition must address diverse problems, which requires diverse knowledge, skill, and experience. Three issues are examined here: diverse perspectives within the partnership, multiple and competing problem definitions, and promotion of different action strategies.

DIVERSE PERSPECTIVES AMONG KEY PARTICIPANTS

We categorized the participants we interviewed into four major groups. Interviewees included those directly involved in the Y2Y initiative, and other people whose work is closely related to the Y2Y agenda, but who are not directly involved. First, the majority of participants coalescing behind the Y2Y vision are activists who represent environmental groups of various sizes and missions. We divide this group into "leaders" (n=5) highly influential in decision-making, "followers" (n=7) participating at various levels other than leadership, and "rebels" (n=5) supporting Y2Y and large-scale conservation in general, but concerned about the leadership and its practices. We label the second major group of direct Y2Y participants "scientists" (n=9). This group is primarily wildlife biologists, especially those who specialize in large carnivores, and experts in Geographic Information System technology with an interest in landscape fragmentation issues. The third group consists of agency representatives (n=5) who are involved in similar efforts to address the conservation of biological diversity at large scales. Government officials were excluded from direct participation in Y2Y meetings during its preliminary stages, but efforts may soon be made to gain their support. The fourth group is diverse,

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including some individuals representing environmental groups and some independent citizens not directly involved in the Y2Y initiative (n=6).

Central to understanding the participants and their perspectives is the notion of the "frame of reference" through which each individual sees the world. Frames of reference are evident in the stories people tell, which reveal the links between their perspectives and values. Limitations on human cognition (i.e., bounded rationality, Simon 1957) and other factors force us to construct models of reality (including our own roles) that are always simpler than the world we live in. As Lippmann (1965: 11) noted, "to traverse the world men must have maps of the world." His famous chapter title, "The world outside and the pictures in our heads," captures this thought and points out the necessity of matching our cognitive pictures with the actual world to the extent we can (see Berger and Luckmann 1967; Kuhn 1970; Rappaport 1979). Without such effort, realistic and practical problem orientation is impossible.

In actuality, many individual, subjective differences are at play among Y2Y participants. The causes of these need to be appreciated, and the differences respected. Among these differences are the value orientations of participants. Functionally, each individual possesses unique base values (i.e., power, enlightenment, wealth, well-being, skill, affection, respect, and rectitude, see Lasswell and Kaplan 1950). Value orientations and other aspects of identity lead to subjective perceptions of self and context. Finding common ground—that is, clarifying and securing the common interest, even within a highly motivated, like-minded group—is not always easy if value differences are too parochial, diverse, and rigid.

Other factors need to be considered as Y2Y conducts its activities. Decades of social science work stand behind the "maximization postulate," which says that individuals tend to behave in ways that they perceive will leave them better off (Lasswell 1971). As a result, each individual is predisposed to actions that he or she perceives will satisfy his or her needs and desires. For reasons of subjectivity mentioned above, individuals perceive the world differently even when they apparently live in the same context. The story of the three blind men, each of whom perceived an elephant differently, makes this point well.

The dynamics of personality and group behavior under the maximization postulate imply the principle of contextuality (Lasswell 1971). That is, the significance of any detail depends on the context. Because each individual lives in and is concerned about different parts of the Y2Y region, further differences enter their perspectives. As a result of all these factors, apparently like-minded and committed people can significantly disagree on goals, the problem, trends, conditions, projections, and how best to respond.

MUTLIPLE AND COMPETING PROBLEM DEFINITIONS

Despite general agreement on broad goals and the context of operations, we found multiple and competing definitions concerning more specific problems facing Y2Y. This is evident in perceptions of the "conservation" component of

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the problem which are dominant among the various subgroups of participants: environmental activists (leaders, followers, rebels), scientists, agency representatives, and citizens. For example, some interviewees believe that landscape connectivity is already happening to a large extent and that the challenge is merely to keep it intact, while others believe that the Northern Rockies landscape is largely fragmented and will require centuries of restoration. These differences are manifest in positions taken on specific actions. For example, there is disagreement over whether the 50-meter wide wildlife overpass now under construction in Banff National Park can be considered a success. Assessments vary in calling it a success story, an important start, or a hollow victory that simply gives a "green stamp" to escalating highway development. In another example, some interviewees pointed to the success of stopping a major oil development proposed for the heart of the Canadian Rockies, while others remarked on the 10,000 other wells that were approved during the same year. Conservationists have put together a string of impressive victories in the Northern Rockies, but the new paradigm of conservation biology is prompting some to take issue with the traditional standards of success. For example, it inspired one activist to criticize the approach now adopted by the Canadian government of setting conservation goals as a percentage of total land area: "Protecting 10% of the landscape is like leaving on a plane to L.A. with only 10% of the fuel you need. You are never going to get there!"

The diversity becomes more pronounced when attempts are made to broaden the problem definition. A problem definition based on ecological status and trends may be an important start, but it is not likely that the ecological systems themselves are the source of the problems. Rather, the concern is elements of the social landscape imposed on ecological systems. An adequate problem definition must address all of the social forces that influence the course of natural resource policy. Only then will implementation actions be accurate in addressing the factors that drive current and future policy.

As noted above, reliance on experiential knowledge and conventional thinking has resulted in a problem definition biased toward the "conservation" component of the overall problem. Y2Y has just begun to define the demographic, social, and economic components of the broader policy problem. An electronic mail communication in the spring of 1996 from one of Y2Y's principal participants, entitled "Coarse filter for evaluating issues/threats," was a preliminary proposal to organize the problem definition. It contained a list of specific criteria by which to rank potential Y2Y implementation actions. The criteria addressed ecological components of the problem (e.g., "involves a major threat, biologically") and also some of its social components (e.g., "good opportunity to build a constituency for the [Y2Y] vision . . . would set a precedent") (Willcox 1996). The message triggered a response that such criteria were too much of a departure from a strictly ecological definition: "[Is there] any general support for tying such criteria to principles of conservation biology/landscape ecology?" (Stewart 1996). We argue that the Y2Y initiative

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is ripe for this sort of interchange in order to build a shared problem definition that is broader than just its ecological component. The electronic mail system is not an ideal forum in which to conduct such an interchange, however, because it does not allow for free and open communication. In this case, the biological criteria must be probed for intersections with social and political criteria to reveal opportunities to develop and implement the Y2Y agenda. For example, efforts to stop a massive gold mine on the border of Yellowstone National Park were recently successful because opponents were able to demonstrate not only the dramatic impacts to conservation, but also serious negative social impacts to the local community and surrounding region.

DIFFERENT STRATEGIES PROMOTED

A diversity of strategies has been proposed and promoted among the Y2Y participants. We have organized these into issues of centralized vs. decentralized, big vs. small, persuasion vs. coercion, and the role of science.

Centralized vs. decentralized

A fundamental question is whether Y2Y should be organized centrally as one systematic campaign, or should result from a series of smaller-scale, decentralized campaigns that might be loosely coordinated but not systematically or formally directed. "Leaders" say that a loose vision and network will not survive unless it receives continual nurturing. "Rebels" fundamentally distrust centralizing power and funds in any single institution or individual, while "followers" are willing to do so to proceed toward shared goals. For example, it was readily apparent that those we classified as leaders share an interest in organizing Y2Y more formally. During interviews these individuals shared stories of how disorganized, decentralized efforts had failed to achieve their objectives, such as a recent failure to organize a strong coalition around the lands within and adjacent to Glacier/Waterton International Peace Park, called the "Crown of the Continent Coalition." They felt that organized efforts tended to succeed, such as a recent, hard-fought battle to stop a massive oil development in an area known as the "Whaleback."

Rebels, on the other hand, tended to favor less formal organization, and related different stories of the same events. For example, in their view, the Crown of the Continent Coalition held great promise until it was co-opted by a large environmental group. They believed that cooperating with the government and industry neutered the initiative into its current ineffective condition. They believed, too, that the success of environmentalists in stopping the Whaleback development was the exception rather than the rule. They felt it had been particularly damaging, in fact, because this project became the government's "poster child" and misled the public into thinking that the current environmental review system was working.

Big vs. small size

Participants also differ over whether to launch a large, centralized, comprehensive campaign, or to partition the work into small, decentralized, incremental

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efforts. This issue is obviously an extension of the first one. The pressing need for a comprehensive, holistic approach was what prompted the Y2Y initiative in the first place. It was a response to widely perceived failures to protect species and ecosystems, described by one activist as "a bunch of specialists walking off of a cliff."

The argument to keep Y2Y small stems chiefly from local groups who are concerned that large campaigns lose touch with specific locales and issues and thus lose the vital grounding of their judgment and leadership. There is concern that high-profile campaigns serve as lightning rods for the opposition, and there are recent examples of well-intentioned campaigns that have rolled back environmental protection (e.g., the GYCC "Vision" process, see Lichtman and Clark 1994). Not unlike criticism directed at government bureaucracies, there is concern that large, centralized projects are slow, cumbersome, and unable to advocate issues effectively.

Persuasion vs. coercion

Strategies vary along a continuum from persuasive to coercive measures. At the persuasive end is a basic respect for other persons and their perspectives and, perhaps, a belief that balance can be attained between the needs of people and maintaining the integrity of the natural world. Accompanying this is the belief that to proceed without the support of the public is futile because conservation ultimately relies on public tolerance and support for the natural environment. For example, if roads must be closed to increase habitat security for forest carnivores, simply installing gates will not work because the public will find a way around them, plus they will be antagonistic and more inclined to shoot any carnivore they run across.

On the opposite end of the strategic continuum is a different sense of respect that suggests putting heavy-handed pressure on the opposition. One interviewee said cooperation with government and industry "has gotten us nowhere!" Some individuals believe that environmentalists do not have time to appease or to work slowly and persuasively with local communities. They feel that they are so far apart from the government and industry that they should not be expected to sit in the same room with each other, let alone work together toward an agreement. This situation suggests to these participants that power and pressure are therefore needed.

This distinction can also be conceived of as an "inside" versus "outside the system" approach. Many groups and individuals have had to decide whether to participate in government-sponsored roundtable planning sessions. Those that chose to participate framed it as "hard to be there, but irresponsible not to be." The advantage of staying outside the system is that non-participants are not implicated in the results. But the disadvantage is that the decision process will proceed without groups or individuals who might have had a beneficial influence. In some cases the two approaches—persuasion and coercion—can be complementary. Even extreme tactics of outsiders may strengthen the hand

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of those who stay on the inside (e.g., the threat of civil disobedience may be a deterrent against dismissing environmentalists from the negotiating table).

The role of science

Immersed in the Y2Y partnership is an uneasy alliance between scientists and activists. Again, at least two views exist. Scientists view science as a fundamental prerequisite to progress in environmental protection. They have already won part of the problem definition war in Y2Y as evidenced by the adoption of a large geographic information system project. By contrast, activists emphasize skillful persuasion and politics over science. They argue that putting more resources into ecological research and mapping is misguided because natural resource policy depends not on a better understanding of these systems, but on a better understanding of the myriad economic, political, and sociological forces at work in the region. Their argument is that we do not need "rocket scientists" to know what the problem is in the Northern Rockies: it is simply that more and more people are moving in and making unsustainable demands upon finite resources. Some even believe that spending conservation dollars on mapping problems to finer resolution not only fails to solve the problems, but is symptomatic of them because it is itself a consumptive activity! This argument was summarized by one activist who said that "scientific conclusions will be tenuous at best, island biogeography a loose foundation, and in the end success will depend on human emotion, and convincing the public." Social and political scientists tend to agree that people ultimately make decisions based upon what is emotionally satisfying and only "rationalize" them afterwards (Lasswell 1971). And, as another advocate said, the most carefully considered science will ultimately be up against the local "mountain boys" and their attitudes.

OPTIONS FOR THE Y2Y PARTNERSHIP

Despite promotional advances since its inception seven years ago, the Y2Y initiative has been slow to become formalized and effective in crucial ongoing policy processes affecting the region. This may have resulted from the nature of volunteer membership, lack of a clear, well-supported vision and practical agenda, and difficulty in melding the diverse perspectives of its membership into a true and effective partnership. With conflicting and competing strategies resulting from different perspectives and experiences, it is likely that the fractures will get wider as Y2Y progresses and the partnership is increasingly tested. In this section, we discuss some alternatives that could help Y2Y to avoid this outcome.

The immediate, practical goal of Y2Y should not be to speak with one voice, but to make its problem orientation more rigorous so that it can promote and implement rational, practical, and justifiable policy and actions. Procedures have been devised over the last fifty years to aid people in clarifying and securing their common interest in such situations (Lasswell 1971), which suggest some options that can move the Y2Y partnership closer to its broad goal.

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Y2Y participants can strengthen their partnership and improve their chances for success by: (1) building a shared problem orientation, (2) organizing the initiative into a multi-tasked structure to capitalize on the diversity of the partnership, and (3) implementing the Y2Y vision by employing an explicit learning strategy based on "adaptive management" in its fullest sense. These three recommendations address weaknesses in the current approach in the areas of problem definition, social process, decision process, and organization.

BUILD A SHARED PROBLEM ORIENTATION

How can Y2Y participants come to a more widely shared conception of the problems to be solved? We recommend that the Y2Y partnership embark on the five tasks of problem orientation as illustrated recently in carnivore conservation by Clark *et al.* (1996b). The five tasks include exploring several questions: What are the goals? What problems prevent achievement of the goals? What alternatives exist or can be invented to meet the goals and overcome the problems? How should alternatives be evaluated? Have they worked in the past? Under what circumstances did they work or not work? Will they be likely to work in the present case? Additionally, it should be kept in mind that all problems have contexts that must be mapped and understood. If this is not appreciated, then realistic problem orientation is impossible. These questions should be asked repeatedly and interactively by all Y2Y participants as a basis for a problem-oriented approach.

The growth of the Y2Y partnership to date reveals that this kind of orientation has occurred to some extent, but if the initiative is to stand the test of time, the group must go through more rigorous exercises to define the problem to be solved. The process could specify an appropriately firm mission statement. Important but incomplete precedents for this include the two-page mission statement of The Wildlands Project (Forman *et al.* 1992) and a three-page document by Harvey Locke (1996b). Efforts should be made to write the mission broadly enough to encompass all the dominant factors that influence natural resource policy in the Northern Rockies (Primm and Clark 1996). Our brief description of demographics, politics, economics, and ecological issues could serve as a partial starting point.

Of equal importance is the task of gathering reliable data on trends, conditions, and projections of future trends. This process has begun in Y2Y meetings by sharing knowledge and experiences. Objective data need to be gathered from these experiences, particularly on the trends, conditions, and projections of the dominant factors influencing land management policy. Gathering objective data over so vast an area is inherently difficult, but the goal is to bring to light evidence that could be used to convince a diverse and skeptical audience. Gaps in data need to be identified and ranked, and then strategies to gather missing data need to be designed and implemented. An atlas of maps showing protected areas, species distributions, threats to both, and other relevant information has been proposed, and gathering information for

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its completion is a step in the right direction. Some people, however, believing that ecological science is not the highest priority when implementing the Y2Y, question whether it places too much emphasis on a technical ecological assessment. Considering the interests and skills of the participants—which are substantial overall—it is not surprising that they should focus on ecological analysis first, but this must not be the end of the intelligence gathering and interpretation phase of the decision process. For example, advocates may be inclined to concentrate on mapping wildlife habitat, but perhaps they should be spending their time in county planning offices addressing changing human demographics. The problem definition cannot be confined to limited areas of knowledge and expertise, but must encompass the broader policy arena of relevant players and forces.

This information must be applied toward the construction of a suitable Y2Y alternative. Again, the Y2Y vision, as it has been articulated, is a good start, but it must be expanded to address all the relevant, contextual components of the policy problem, such as the demographic, social, and economic issues described above.

CAPITALIZE ON DIVERSITY

How can Y2Y participants capitalize on diversity? We recommend defining the diverse tasks to be accomplished at varying geographic scales and social arenas and then encouraging participants to address the tasks and arenas to which they are the most inclined. The diversity of tasks before the Y2Y partnership can be organized into three groups by scale: those that promote the overall vision in both countries; those that help operationalize the vision regionally by working closely with government; and the numerous local and site-specific tasks that embody the Y2Y vision in practice. All three scales must be successfully addressed if the Y2Y vision is to become reality.

Regarding the first set of tasks, participants must convince government, industry, and the public that the Y2Y vision is sound and worthy of their active support. Y2Y promoters who are active in these tasks should be high profile "leaders," comfortable working with the "big" issues in more formal and public forums, who rely primarily on persuasion and diplomacy to accomplish their ends. Y2Y participants working on this task, either locally or across the whole Y2Y arena, should promote the integration of landscape connectivity and the reserve design strategy, and develop broad policy and management initiatives.

The second set of tasks involves integrating ecosystem management and landscape connectivity practically into existing land management planning and practices. Opportunities are gradually opening to work with the agencies in cooperative planning and management. Y2Y participants at this level should be comfortable working with the U.S. Forest Service and many other local, regional, and national agencies. They should also seek new working arrangements (e.g., project teams that include non-agency members) and promote adaptive management in trial management exercises to learn explicitly and

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systematically. Perseverance and longevity will be required to be effective. These Y2Y participants might use a blend of persuasion and coercion as well as science and advocacy as the situation requires.

The third set of tasks will address innumerable local issues practically, including the siting of logging sales, access management, recreation planning, riparian protection, wildlife habitat restoration and mitigation, as well as a host of public educational issues with local schools, leaders, and the public. These kinds of tasks can best be accomplished in a decentralized manner. Many semi-independent efforts to protect wildlands and landscape corridors should be carried on simultaneously by Y2Y participants who live near the issues and know the most about them. These tasks will best be accomplished by people who prefer to operate on a local scale and whose tactics tend to be less organized and smaller, employing persuasion and coercion, science and advocacy.

All these tasks can be loosely coordinated via a board of oversight, an executive director, a newsletter, annual meetings, and support of local efforts by the board, director, and other members. Small grants from a central fund administered by the director could be distributed to local Y2Y participants on a competitive basis. The success of Y2Y will come from adequate attention to social and decision process issues as well as to the substantive content of those processes at multiple scales. Our final recommendation addresses these implementation efforts in particular.

EMPLOY ADAPTIVE MANAGEMENT

How can Y2Y participants employ adaptive management explicitly and systematically? We recommend selecting a few smaller-scale issues that fall under the landscape connectivity umbrella—which the Y2Y partnership may be uniquely suited to addressing—and building a record of successes with them. These issues should be featured as a means to develop improved problem-solving skills. One area of focus might be where north-south connectivity is tenuous because of topography, vegetation, and threats such as human developments. Ideally, a few sites should be located in both the U.S. and Canada, along with perhaps one or two transboundary issues. Once sites have been selected, then the agencies should be approached and encouraged to set up a prototype specifically designed for adaptive management and learning. The benefits from a dozen such prototypes throughout the Northern Rockies would accrue not only to the sites themselves but also to the Y2Y vision, policy, and management (see Brunner and Clark 1997). For each of these sites, rigorous problem definition should be pursued contextually and inclusively. All relevant components of the problem and potential strategies should be explored.

An essential component of prototyping in adaptive management—regardless of how successful a project may seem initially—is a rigorous, systematic, consensual appraisal process. Ideally, this should be an opportunity for all participants to share and compare their individual experiences and begin to construct a common understanding that promotes shared learning. This is how

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trust and credibility are won. Thus, one of the most promising roles for the Y2Y initiative may be to organize an appraisal function, involving Y2Y members and many other people. This would accomplish the dual purpose of improving ongoing conservation management efforts and building a common foundation of standards or expectations from which to build successful future implementation of the Y2Y vision.

CONCLUSIONS

Successfully devising and implementing the Y2Y vision is a formidable task. The policy problem for Y2Y participants is how to find and implement policies that are sustainable. The emerging Y2Y partnership must organize itself to be an effective policy force by describing, then analyzing the problems, and devising and implementing solutions. Because the Y2Y group is made up of diverse individuals, it will be a difficult task to clarify its goals, map trends and conditions, and make projections, as well as find viable alternatives. The diverse perspectives—that is, different identities, expectations, and demands—within the Y2Y partnership have led to multiple and competing problem definitions. Competing problem definitions differentially emphasize details of ecological and social dimensions and link them in different ways. In turn, differences in problem definitions lead to the promotion of different strategies to solve them. For example, should Y2Y be centralized or decentralized in its organizational structure? Should it be big or small in size? Should it use persuasion or coercion? What is the best role of science?

Successfully devising and implementing the Y2Y vision is a formidable task. The policy problem for Y2Y participants is how to find and implement policies that are sustainable. The emerging Y2Y partnership must organize itself to be an effective policy force by describing, then analyzing the problems, and devising and implementing solutions.

We have explored three options for the Y2Y partnership. We recommend that the Y2Y members embark on a process to build a shared problem orientation, capitalize on diversity, and employ adaptive management explicitly and systematically. We believe that pursuing these options will result in a stronger partnership with a broader, more realistic understanding of its goal, the obstacles it faces, and the strategies to surmount these obstacles.

ACKNOWLEDGMENTS

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Finding Common Ground in Biological Conservation: Beyond the Anthropocentric vs. Biocentric Controversy

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ABSTRACT

A generalized demand for public decision processes to be open, integrative, and adaptive is increasingly evident in the environmental debate. In biological conservation, however, as in most other environmental controversies, we continue to find that our basic nature (evolutionary and cultural) generally predisposes us to exclude and confront one another in words or deeds, sometimes violently. In this essay we look at how differences in perspectives, how we deal with differences in perspectives, and how we deal with each other as people may work against broad democratic participation and the search for common ground. We argue that widely-invoked dichotomous classifications of perspectives such as the "anthropocentric vs. biocentric" characterization can be an obstacle to finding the common ground, because they tend to be rigid, exclusive, and confrontational in nature. The conditioning factors which underlie the habitual use of such characterizations include the "we vs. they" phenomenon, the age old debate pertaining to the relationship of humans with the rest of the world, and overly simplistic views of self and others. As an alternative, we suggest the use of more open, flexible, and constructive approaches that account for differences in people's perspectives. We provide an example of such an approach based on people's identities, expectations, and demands, and we encourage the exploration of better ways to find common ground for environmental sustainability.

Making a decision about biological conservation is no different than the policy-making process in any other arena. It is a process of human interaction wherein people try to clarify and secure their common interest. People may succeed or fail for a variety of reasons, not the least of which are differences in perspectives, how we deal with them, and how we deal with each other as people. This paper examines the concept of diverse perspectives as it relates to a commonly debated issue in conservation—the anthropocentric vs. biocentric controversy.

PERSPECTIVES AS OBSTACLES TO FINDING COMMON GROUND

DIVERSE PERSPECTIVES AND DICHOTOMOUS CLASSIFICATIONS
People's perspectives are made up of their *identities* (i.e., who or what they identify with), *expectations* (i.e., set of expected outcomes), and *demands* (i.e., patterns of claim-making) (Lasswell and McDougal 1992). People with perspectives of like kind tend to gravitate toward one another and develop a common, mutually reinforcing cultural outlook, based on similar core beliefs (also called a paradigm, doctrine, framework, outlook, myth, or ideology). Gravitating towards one another, however, does not necessarily result in a loss

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of individual perspectives. People, for instance, may share a group identity but have different expectations and demands. Likewise, people may have similar expectations and demands but retain somewhat different identities. Figure 1 illustrates the way these differences may result in diverse perspectives. The three interconnected elements of people's perspectives—identities, expectations, and demands—always come into play in a biological conservation debate or any other process of interpersonal interaction or decision.

Many diverse people participate in processes of deciding about the environ-

Individual	P1	P2	P3	P4	P5	P6	P7	P8	P9
Identity	■	□	●	■	■	●	○	●	□
Expectations	✚	★	✚	☆	✚	★	★	✚	☆
Demands	⬭	⬭	⬭	⬭	⬭	⬭	⬭	⬭	⬭

Other people involved in the same process may be committed to different perspectives. These differences must be overcome in order to find the common interest.

Figure 1   Differences in people's identities, expectations and demands result in unique perspectives among participants in a decision process. For example, participants P3, P6 and P8 may share an identity (shaded circle) but have considerably different expectations and demands. Likewise, participants P2 and P7 may have similar expectations (shaded star) and demands (blank vertical ellipse) but retain considerably different identities.

ment, biodiversity, and other public matters (see Clark and Brunner 1996). Participating in these processes compels us to view ourselves in relation to others, and we generally rely on the basic belief systems at the core of our identity to sort or classify perspectives in a given social decision process (e.g., in a given endangered species case). For example, a scientist who adheres to a belief in experimental, reductionistic science wants the empirical "facts," and knowledge of how they were derived. Other people involved in the same process may be committed to different perspectives. These differences must be overcome in order to find the common interest.

In the biological conservation debate some people have suggested that participants tend to fall into two basic perspectives, which are founded on two fundamentally different paradigms, thus giving rise to the widely discussed anthropocentric vs. biocentric dichotomy (e.g., Spash and Simpson 1993; Grumbine 1994; Stanley 1995). Table 1 lists features commonly used to contrast these two types of perspectives. As with most characterizations of perspectives, differences are both descriptive and normative, that is they not only pertain to how participants think "the world is" but also how they think

Table 1   Commonly invoked differences between the anthropocentric and biocentric perspectives.

ISSUE	ANTHROPOCENTRISM	BIOCENTRISM
Placing of humans with respect to nature	Humans are uniquely different from, and superior to, the rest of the biological world.	Humans are but another member of the world biological community.
Limitations on the human-environment relationship	There are nearly unlimited possibilities to what humans can do with the environment.	There are important limits to what humans can do with the environment.
Sources of meaning	Progress, efficiency, independence.	Stability, conservation, interdependence.
Criteria for allocation of resources	Decisions should be made to maximize the value of total net benefits to humans.	Decisions should be made in context where all organisms - humans included - have equal standing.
Focus of attention in the environmental problem	Human social processes, the here and now.	Environmental processes, now and later.
Vision of future based on current trends	The world is becoming an increasingly better place to live in.	The world is becoming an increasingly adverse place to live in.

"the world should be." Moreover, the contrast between the two types of perspectives is regarded as a central issue to be reckoned with directly in the biodiversity conservation debate. Indeed, for many participants, resolving the controversy between these two perspectives and arriving at more satisfactory conservation outcomes seems to turn on one side convincing the other side of, or converting the other side to, the first side's perspective. We contend that classifications like this are just versions of the "us vs. them" phenomenon, which is overly simplistic and rigid. It tends to limit an inclusive and constructive participatory process of decision about conservation in the common interest.

EXCLUDING AND CONFRONTING PEOPLE WITH DIFFERENT PERSPECTIVES

Dichotomous characterizations of perspectives such as anthropocentric vs. biocentric can be an obstacle to an open, participatory, integrative, and adaptive process for finding the common interest. Classification systems include or group together like elements and exclude dissimilar types. In human affairs, this can lead to a "we vs. they" dichotomy. No matter which camp one is in, there is a predisposition to exclude and confront those in the opposite camp. For instance, when the "we-biocentrics" take the form of "conservation biologists," the "they-anthropocentrics" is often a catch-all for everyone else in the debate. The list of potentially excluded people labeled "they" is rather large and diverse, often including decision-makers, managers, politicians, miners, ranchers, fishers, members of the business community, the general public, and scientists in other disciplines, such as economists and sociologists. Broad categorization is exclusionary, leads to stereotyping, and is often confronta-

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tional. On this predisposition to confront, Sahurie (1992: 91) notes "The 'ours' is to represent 'our' most cherished values, while 'theirs,' the foreign and unknown, is regarded as dangerous…almost inevitably, it also accentuates a competition that, no matter how desirable the outcome it tends to produce in terms of efficiency, is nurtured precisely by the provincialism of the we or they."

The tendency to exclude and confront alternative perspectives needs our explicit attention because of its limitations and divisiveness. First, the notion that the anthropocentric vs. biocentric characterization accounts for the majority of perspectives with respect to biological conservation issues is often taken for granted. It seems to demand or expect that all of us fall into one or the other camp and that this dichotomous outlook should be appealing to every participant, especially to those of us assumed to be in the "we" camp. Unfortunately, this dichotomy leaves out people who see themselves falling into (i.e., identifying with) neither camp, perhaps because their views reflect a blend of the two perspectives or because the contrast is of little meaning to them.

Second, there is a tendency to confront people with different perspectives. The dichotomy separates people by placing them in opposing camps. Once battle lines are drawn, often considerable intellectual and political resources go into determining whose perspective is more legitimate, appropriate, or useful according to some set of standards, which may or may not be explicit or fully articulated. To date this human tendency to exclude and confront has led to a failure to resolve many of the basic differences among humans, and better conservation outcomes have not been produced as hoped for (e.g., Holling 1995). Livingston (1981: 2) recognized this by noting that:

> In conservation we have always assumed a dialogue between ourselves and everyone else; a civilized, adversary proceeding in which reason, logic, and meticulous argument, liberally laced with horrible precedent, would persuade just men and women to our position. Unfortunately for reason and logic, for ourselves and for wildlife, it has not worked. One would like to know why.

Perhaps it has something to do with the ways we deal with diverse perspectives, especially those ways that exclude and confront.

In the next section we offer a view as to why we have had very limited success in reaching a consensus in terms of which perspective is more legitimate, appropriate or useful in biodiversity conservation. Or paraphrasing Livingston, why we think it is unlikely that all just men and women will ever be converted to either biocentrism or anthropocentrism in the foreseeable future.

PERSISTENCE OF DICHOTOMOUS DIVISIONS

Understanding clearly what has conditioned us to employ dichotomous divisions of perspectives readily in the biological conservation debate is somewhat difficult. When we consider this issue we are forced to take ourselves as objects of study at the same time that we are being ourselves as either biocentrics or

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anthropocentrics. Taking one's own perspective into account scientifically as a variable in the biodiversity conservation debate is challenging. Among the conditioning factors likely to be involved in dichotomous and divisive characterizations of perspectives are the following three.

THE "WE VS. THEY" PHENOMENON
One conditioning factor in dichotomous characterizations is a human predisposition to use labels to accentuate group identity and exclusivity of membership. Terms like "us-biocentrics" are examples of group identity that take on added meaning when contrasted with "them-anthropocentrics." Indeed, distinguishing between "us vs. them" or "we vs. they" is universally common for reasons of individual and group meaning. Sahurie (1992: 90) explains that "we and they" constitutes the central leitmotif that holds together groups and larger societies and that this collective notion identifying "us" as against all "those" is a major component in virtually all human cultures. Still, the degree of exclusiveness in the collective notion of just who "us" is varies among human groups. Lasswell (1994) described perspectives on a continuum from *parochial* to *universal* depending on who is included in the group. Groups with a local cultural perspective excluding most other people are parochial whereas groups with a global view that includes all humans are universal. There are great differences between a parochial and a universal identity in regards to what is meant by the terms "we vs. they."

THE AGE OLD DEBATE
Another factor predisposing the use of dichotomous classifications is a strong legacy of use and cultural reinforcement. First, there is considerable inertia maintaining the use of dichotomous accounts of perspectives in the biodiversity conservation debate. Indeed, the current anthropocentric vs. biocentric controversy is partly an outcome of a broader and longer debate pertaining to the relationship of humans to the rest of the world (e.g., Marsh 1864). This perennial debate has surfaced at different times in the history of biological resource management in the United States (Sellars 1997). At least two debates can be distinguished as predecessors to the one that is ongoing today. The first is the utilitarian vs. preservationist controversy of the early conservation movement at the beginning of the 20th century. The second is the ecocentric vs. anthropocentric debate of the conservation movement in the 1970's and 1980's (Dunlap and Mertig 1992). In both cases, diverse perspectives were similarly dichotomized.

Second, there is a pattern of positive reinforcement for the continued use of dichotomies in the conservation debate. On the one hand, there is reinforcement by example. Outlooks have been reinforced generation after generation by the use of such terms and behavior and the "education" of new in-group members. On the other hand, there is reinforcement by discrimination. By historically discouraging participation of people whose perspectives do not

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match the in-group's "official" views, out-group people are selected against. These people are considered dangerous because they may bring in new ways of thinking.

OVERLY SIMPLISTIC VIEWS OF SELF AND OTHERS

Still another factor conditioning us toward dichotomous classifications of perspectives is our sometimes simplistic views of self and others. As mentioned earlier, participation in a decision process compels us to view ourselves in relation to others. By clarifying our own standpoints in relation to the public decision process and participants involved, we distinguish ourselves, our purposes, and procedures from the events we observe, including the purposes and procedures of other participants in those events (Lasswell and McDougal 1992). Unfortunately, standpoint clarification is often done in a cursory, highly implicit or otherwise simplistic fashion to the detriment of more effective overall participation (Clark and Wallace 1999). A widespread lack of more deliberate and explicit standpoint clarification in the biological conservation debate has prevented us from carrying out a critical self examination that would question, among other things, the validity and utility of several aspects of our own perspectives, including the way we view and classify other people. This deficiency can be associated with a more general lack of problem orientation particularly evident in participants with an academic orientation. Lack of problem orientation is partly fueled by a positivist scientific outlook in which goal and context are subordinated to detachment and universality. Goal orientation and context delimitation, however, are key to the appraisal of the utility and validity of different elements in the process, including the very accounts of participant perspectives (Lasswell and McDougal 1992).

THE FUTURE?

There is little indication that this widespread tendency to divide issues and people into "us vs. them" will disappear soon. Regardless of the issue, dichotomies in perspectives are likely to surface again and again. However, more than ever before there is presently an opportunity to make the transition to a more flexible, integrative, and effective approach to resolving differences. Several lines of evidence suggest that this is true.

First, many of us find dichotomies such as the anthropocentric vs. biocentric characterization unsatisfactory as working premises. Some of us may not identify with notions held by either camp. An example is the anthropocentric view of humans having "unlimited" possibilities or a "free hand" with respect to the environment, and the alternative biocentric notion of humans having "limited" adaptability in the face of increasing natural resources scarcity. Others may find strong features shared by both perspectives, thus undermining a truly dichotomous taxonomy. For example, one shared premise regarding ecological systems is feedbacks. For the most part, both biocentrics and anthropocentrics either gloss over the issue of feedback mechanisms or imply

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an overwhelming existence of positive feedbacks (i.e., re-enforcement of historic trends) when discussing, for instance, the fate of society, wilderness or biodiversity. On the other hand, many of us see that we all share important common interests that are rarely, if ever, brought out or discussed fully in the current debate. Clearly, there are numerous reasons why many of us may feel that our perspectives are not adequately represented by the anthropocentric vs. biocentric account.

Second, the increasing demand for more extensive participation in the conservation policy debate will likely continue into the foreseeable future. There is abundant and growing evidence that more and more people want to take part in decisions affecting their biological and environmental heritage. This is part of a much larger and expanding demand worldwide that individual human beings be accorded a greater role than ever before in the shaping and sharing of all kinds of value—power, wealth, enlightenment, respect, well-being, affection, skill, and rectitude (Lasswell 1994). On the other hand, the trend towards globalization continues to extend the scope of identities to become more universal, as the space shuttle picture of planet earth beamed down on Earth Day 1998 symbolizes. Both trends compel recognition of a multiplicity of perspectives with various degrees of diversity at different levels of inclusiveness that renders conventional dichotomous characterizations even less realistic.

Third, the influence of positivistic science is eroding, giving way to more inclusive, contextual outlooks (Sullivan 1995) that will facilitate—if not de-mand—a more deliberate and explicit clarification of standpoint and context among all participants of a decision process. Michael (1995: 462) noted that despite biophysical "reality," we "construct social reality. We create and choose among narratives—stories—that give motive and meaning to social action." With the increasing acceptance that social reality is at least partly constructed, people's focus is turning more to "meaning" and away from detachment and universality (Dryzek 1990). In short, more and more people want a meaningful life wherein human dignity in the broadest sense, and not detachment, is the overriding goal (McDougal *et al.* 1988). This is part and parcel of the global human rights movement (McDougal *et al.* 1980). In light of this current window of opportunity, exploring alternatives to business as usual is timely.

FINDING COMMON GROUND AND IMPROVING CONSERVATION OUTCOMES

We need to find workable alternatives to the status quo, which is dominated by an "us vs. them" dichotomy, to move us all closer to the goal of sustainable conservation of the planet in the common interest. It may not be inevitable that all resource use has to lead to permanent injury to the environment. In this section we examine three alternatives to the present situation ordered along a continuum.

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Alternative 1: Continue to use dichotomous characterizations of perspectives that divide people into two camps, but with a better understanding of the limitations. Dichotomies are appealing because they afford a strong and simple way to differentiate perspectives and map where people stand in the conservation process. Following the example in Figure 1, the nine participants in a hypothetical conservation decision process can readily be divided into two camps based on highly discernable aspects of their identities (Figure 2). Moreover, dichotomies clarify, accentuate, and forge individual and group identity. Unfortunately, uncritical use of dichotomies can lead to outcomes that are more divisive than integrative. For example, overly rigid adherents to either side of the biocentric vs. anthropocentric dichotomy tend to believe that conversion of others will come about by more "education" and increasing the volume of the message. The rigidity of a divisive "we/they" trap works against democratic participation of many people, contributes to sentiments of competition and misunderstanding, and may ultimately lead to gridlock in the conservation process. Certainly, boxing ourselves into only two perspectives is highly undesirable. This often leads to destructive conflict. An increased appreciation of the practical limits of this approach wherein people realize that few biocentrics will be converted to anthropocentrics and vice-versa in the near future is a first step in the right direction. This realization, however, does not take us very far. While some tension may be eased and some understanding may be gained, the alternative is still not fully adequate to find common ground for improved conservation.

The rigidity of a divisive "we/they" trap works against democratic participation of many people, contributes to sentiments of competition and misunderstanding, and may ultimately lead to gridlock in the conservation process.
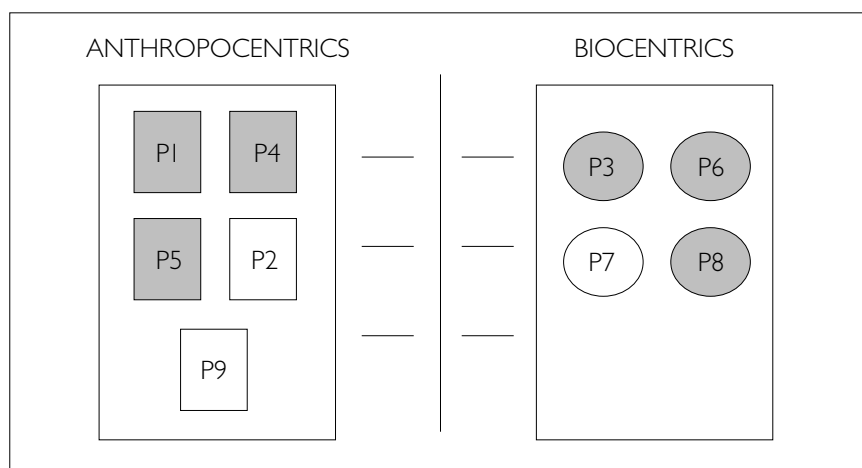
Figure 2   An example of a dichotomous account of participant perspectives. Dichotomies like the biocentric vs. anthropocentric characterization tend to be rigid, exclusive, and confrontational in nature. They have a great appeal, however, because they afford a decisive and simple way to sort perspectives and map where people stand in a decision process. The nine participants in Figure 1. can be readily divided into two camps based on highly discernable aspects of their identities: squares = P1, P2, P4, P5 and P9 (e.g., anthropocentrics) vs. circles = P3, P6, P7, and P8 (e.g., biocentrics).

Alternative 2: Move toward the use of more flexible accounts of perspectives. This alternative recognizes that there may be considerable overlap among perspectives grouped on opposite sides of the dichotomy, as well as considerable discrepancy among perspectives grouped on the same side of the dichotomy. Figure 3 shows an example of a more flexible account of perspectives. In this example, differences in perspectives among anthropocentric and biocentric participants are recognized. Indeed, more flexible approaches to dichotomies can provide space for many participants who somehow identify with one or the other group of perspectives, yet do not fully subscribe to all aspects of either. Moreover, such approaches could also recognize that a participant can identify with one perspective most of the time, but with another or a blend of the two at other times, depending on the issue and realistic knowledge of the context of application. By definition, this second alternative is more inclusive, contextually relevant, and less confrontational. Still, this alternative is not enough to break from the "we/they" trap.

Alternative 3: Move toward a fully integrative classification of perspectives where many conventional divisions are abandoned as a basis for understanding other people and for taking practical, just action. We noted earlier that many diverse people participate in the process of deciding about biological conservation and one need not be restricted by reducing this diversity into two polarized camps. Alternatively, one could use, for instance, the three elements of perspectives—identities, expectations and demands—as the basis for distinguishing and clustering participants. An example of this is given in Figure 4. Identities can be contrasted in a variety of ways according to actual situations or contexts

Move toward a fully integrative classification of perspectives where many conventional divisions are abandoned as a basis for understanding other people and for taking practical, just action.
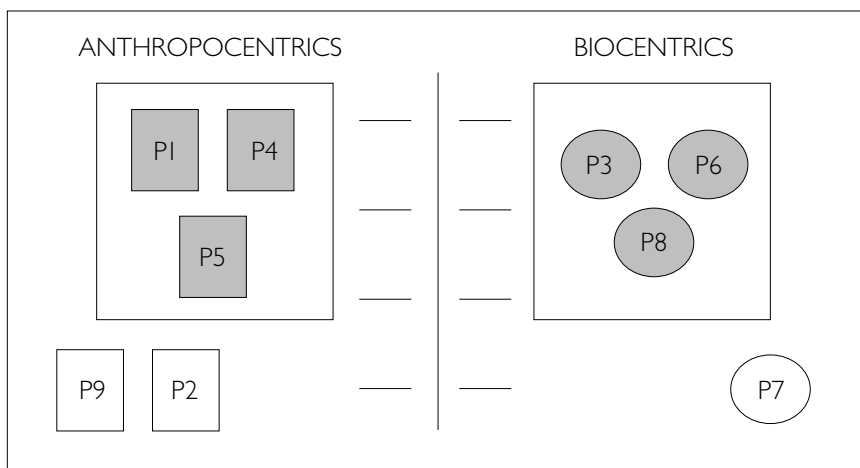
Figure 3   An example of a more flexible dichotomous account of participant perspectives. Shown here is a variation of the anthropocentric vs. biocentric account depicted in Figure 2 that entertains four variations of perspectives: purely anthropocentric (P1, P4 & P5 = shaded squares), anthropocentric with some elements of biocentrism (P2 & P9 = blank squares), purely biocentric (P3, P6 & P8 = shaded circles), and biocentric with some elements of anthropocentrism (P7 = blank circle). By definition, this alternative is more inclusive, contextually relevant, and less confrontational.

(e.g., identity with a job, an organization, a profession, an ethical position, and so on). Moreover, identity need not be the first or only criterion to distinguish among participants. Participants can also be distinguished by the kinds of demands they make or the expectations they have.

		EXPECTATIONS		DEMANDS	
		🔲🔳	⭐☆	⬭⬭	⬯⬯
I D E N T I T Y	▪️▫️	P1 P5	P2 P4 P9	P2 P9	P1 P4 P5
	⬤◯	P3 P8	P6 P7	P3 P7	P6 P8

Figure 4   An example of a more dynamic, realistic, and integrative classification of perspectives that includes all three elements—identities, expectations, and demands. Participants can be distinguished and clustered in several ways using a single element or a combination of elements. Following the example in Figure 1., the participants can alternatively be grouped, for instance, by their identities in combination with their demands (P2 & P9 vs. P1, P4 & P5 vs. P3 & P7 vs. P6 & P8).

*How can the recommended strategy be successfully implemented? First, more leadership in diverse professional and public meetings and publications would help. There is no reason why a "we" perspective cannot take a universal form, including all humans and all plants and animals.*

This alternative is more inclusive as it more fully recognizes and accepts diversity among people. It is appealing to many of us who do not identify strictly with either the anthropocentric or the biocentric camp, or may think that contrasts afforded by sharp dichotomies are unhelpful to integrated decision making about the environment. This alternative is consistent with a goal of human dignity for the many, which includes freedom to establish and change identification and the fostering of the broadest possible identifications with all groups, functional and territorial, including collective loyalty to human kind, and by extension to a rich biological world (see McDougal *et al.* 1980).

How can the recommended strategy be successfully implemented? First, more leadership in diverse professional and public meetings and publications would help. There is no reason why a "we" perspective cannot take a universal form, including all humans and all plants and animals. Second, more teaching about these subjects in schools and universities would help. As Michael (1995: 461) advises, "minimize learner's sense of vulnerability by acknowledging feelings of vulnerability and the challenges to values; use the notion of error-embracing: trial and error search for the appropriate account(s) of perspectives—being adaptive; use metaphors to define boundaries and span them—

they reinforce entrenched views but also ease reforming views." Third, more practice in the field would help. All of us could do a better job of mapping participant perspectives and interacting more constructively based on those maps (Clark and Wallace 1998). This includes doing a better job of being self-aware of our own perspective(s) on issues and working toward democratic, integrated solutions to common problems.

CONCLUSION

Seeking inclusive democratic processes that are effective in achieving biological conservation in the common interest requires recognizing that rigid dichotomous notions about people's perspectives, such as anthropocentric vs. biocentric characterizations, could be an obstacle. Such notions can discourage broad participation because they tend to exclude and confront people. In advancing democratic process and biological conservation, we must understand our own as well as other people's perspectives (i.e., identities, expectations, and demands) realistically to the extent possible. In many instances this requires that we expand our own and other people's perspectives to be more encompassing of other people and more universal. In seeking the common interest in conservation we do not necessarily advocate a compromise of one's value perspective. On the contrary, we do not believe that the best alternative to clarifying and securing the common interest is always the middle ground between two polar perspectives. We do argue though, that more open and contextual understanding of people's perspectives will be helpful to achieving practical conservation. Three possible futures are offered: (1) continue with the current approach, (2) move toward more flexible perspectives, or (3) seek a fully integrated perspective. Alternatives 2 and 3 are recommended and can be implemented with more skilled leadership, greater introspection and active learning, and improved interpersonal working relationships in the field.

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ACKNOWLEDGEMENTS

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Conclusion: Knowledge and Skills for Professional Practice

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Most professionals beginning their careers in species and ecosystem conservation conceive of their future work in terms of hands-on tasks in the field ("doing something important in the real world"). Whether on the domestic or the international scene, typically the forester sees themselves laying out timber sales, the fisheries biologist looks forward to surveying streams, and the range specialist expects to be classifying grasslands. Current curricula in most universities largely mirror this common view. We train future foresters to address logging problems in the Pacific Northwest or in the tropics, or conservation biologists to design a reserve or study an endangered species. But in actual practice, most professionals spend only part—and sometimes a small part—of their time attending to technical tasks in the field.

Professionals, over a career or a lifetime, participate in many activities well beyond fieldwork, and there is much more to building a successful professional practice today than skills in technical work in the field. But what specifically are these other activities? What theories, approaches, and skills are needed to be successful? What are the standards of effective, efficient, and ethical practice? In this concluding chapter, we provide our answers to these questions by (1) presenting what we view as a broader and more realistic conception of a modern professional's natural resource practice; (2) reviewing the interdisciplinary problem-solving approach discussed throughout this Bulletin; and (3) demonstrating the usefulness of this approach in professional practice, using examples from the student papers included in this volume.

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THE MODERN INTERDISCIPLINARY PROFESSIONAL

If you look at the literature of conventional natural resource conservation, most of it is unrelated to the performance of interdisciplinary professional functions. Stated more broadly, most of the knowledge and skills that have been developed for natural resource conservation are not connected to solving social and policy problems at multiple scales. This is because natural resource

conservation, as a profession, evolved originally to deal with narrow discipline-specific problems. Conceptions of these disciplinary problems were based on social goals and values that have subsequently shifted and metamorphosed into produce different issues of contemporary social concern. For example, where previously the focus of conservation might have been on a single species or a geographically localized issue, today the public is calling for ecosystem management and biodiversity conservation as major public policy goals. But many natural resource professionals do not understand or are resisting these new goals, or do not know how to adjust their practices to achieve them (Grumbine 1994; Cortner and Moote 1999).

What are universities and in-service agency training programs doing to prepare professionals for the need to change, understand change, and participate in and guide change effectively? Unfortunately, in contrast to the new societal demands, much of our current university training and agency in-service training still teaches conventional concepts and techniques of technical natural resource management, and conventional professional norms and problem-solving approaches. Many of these are irrelevant to understanding and performing critical interdisciplinary professional functions in today's rapidly changing world.

Natural resource conservation is a problem-solving profession. It functions in translating knowledge, values, and ideas into fair, workable plans and, ultimately, on-the-ground actions. Professionals require a set of concepts, theories, and working methods (or "practices") that permit them to grasp the socio-political as well as the ecological dimensions of the problems they face. They must have the skills to understand the contexts in which they operate, the objectives to be achieved, and the obstructions likely to be encountered; and they must have some appropriate method of making decisions or choices. In short, they need to have a way of clarifying and understanding goals and values at all levels, from the smallest decisions to the largest societal policies, to determine what the problems are and how they should be resolved. This is not to say that the technical problem-solving concepts and techniques taught in most universities are unimportant, but they are of limited usefulness in this task. As Jones *et al.* (1995: 166) observe about the challenges faced by professionals attempting to conduct ecosystem management: "Although natural resource managers schooled in traditional programs may have the technical proficiency to manage the physical resource, they lack the skills to identify and interpret societal demands."

Professionals need to be both good builders of natural resource conservation projects and good architects who design what should be built in the first place. The basic conceptions and procedures useful to both tasks are the essential subject matter of the policy sciences (Lasswell 1971; Lasswell and McDougal 1992), the comprehensive approach to the study and practice of decision and policy matters used throughout this Bulletin. This volume is about successful professional performance and the vital conceptual and

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applied tools of the policy sciences that will contribute to a rewarding professional life. It is designed to contribute to improved problem-solving capabilities for all natural resource professionals and for society at large.

TOOLS FOR THE MODERN PROFESSIONAL

Those of us in the natural resource profession who share the perspective of the policy sciences come from many different backgrounds, cultures and languages, but we have all experienced the difficulties of trying to apply conventional disciplinary concepts, norms and problem-solving approaches to modern conservation problems. Our common objective is to promote, use, and refine an alternative approach to natural resource conservation which enables each individual professional to carry out problem solving, contextual mapping, and decision activities with the greatest efficiency and responsibility possible. As we have demonstrated throughout this Bulletin, the instrument for achieving our objective is the policy sciences, a set of existing conceptual and applied tools that can serve natural resource professionals and can be applied in any setting. These tools have "contemplative, explanatory, evaluative, predictive and manipulative or interventionist applications" (Reisman 1989-90: 232).

The policy sciences are a theory about, rather than a theory of natural resource conservation. This means that the policy sciences do not directly dictate the outcome that should be pursued in any given setting, but instead guide the professional as to what kinds of information will be useful and what procedures should be followed in making decisions about the best outcome to pursue and how to pursue it. The components of the policy sciences are tools, and with these tools in hand the natural resource professional can better contribute to decision making that meets the promise of sustainable natural resource conservation in the common interest, a goal being sought by societies all over the planet. Note that the tools of the policy sciences are justified only in terms of how they contribute to the attainment of the ultimate goal of human dignity—which, given current trends in the world, demands improved natural resource conservation. Using the policy sciences, the modern natural resource professional can contribute to the continuing clarification and implementation of the common interest, in a world that is multi-cultured and manifestly divergent in major values orientations.

Let's look again at the theory of the policy sciences and the full range of tools at the disposal of a professional who wishes to promote better species and ecosystem conservation (see Figure 1). The tool kit is made up of four major components:

1. The first component, **observational standpoint**, is designed to make the person using the tool more effective. It requires that the professional carry out several operations to critically assess his or her own viewpoint and role.

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FOCAL LENS

Selectivity
Comprehensiveness

TARGETS of OBSERVATION and INQUIRY

SOCIAL PROCESS ⟷ DECISION PHASES

Participants	Initiation
Perspectives	Estimation
Situations	Selection
Base Values [1]	Implementation
Strategies	Evaluation
Outcomes [2]	Termination
Effects [3]	

[1,2,3] POWER · WEALTH · ENLIGHTENMENT
SKILL · WELL-BEING · AFFECTION
RESPECT · RECTITUDE

OBSERVATIONAL STANDPOINT
(SELF SCRUTINY)
· Base Values [1]
· Biases (personality and discipline; parochial, epistemological, organizational)
· Critical thinking skills
· Self-in-situation (unconscious, preconscious, conscious

PROBLEM ORIENTATION
Goal Clarification
Trend Description
Condition Analysis
Trend Projection
Alternative Invention,
Evaluation, and
Selection

D. Casey © 1993. Adapted from Lasswell 1971,
Brewer & deLeon 1983, and Reisman & Schreiber 1987.

Figure 1   An illustration of the interdisciplinary approach to understanding and participating in the policy process. Participants should carry out a thorough problem orientation. They should observe and understand the social and decision process of which they are a part. And they should be clear on their observational standpoint. All participants in social and decision process reflect the eight base values.

2.   The second component, **problem orientation**, concerns how the professional orients to the situation and issues at hand. They must determine what they want to have happen (goals), verify that it is unlikely to happen by itself *(trends)*, identify pertinent *conditions* that are causing or contributing to trends, make *projections* of the probable future if conditions are not changed, develop and evaluate *alternatives* and ways to achieve them, and then select the preferred alternative and calculate actions needed to implement that alternative. This portion of the process aids the professional in gaining better perspective on the "problem" at hand, and thus in defining the issue both more expansively and with fuller detail.

3.   The third component is called **social process or contextual mapping**. It concerns how the professional looks at the target community of interest. A collection of *participants* is usually involved, with some shared and some conflicting *perspectives*, interacting in some *situation*,

which can be identified in terms of spatial location, degree of organization, and perception and duration of crisis, using *bases of power*, which may be tangible and/or symbolic, and using those bases in a host of *strategic ways* and programs with a variety of *outcomes* and longer range *effects.*

These first three components of the toolkit are observational tools, and can be likened to a set of lenses which are used to look both at the person doing the observing and at the targets of observation. A good set of lenses serves as both a telescope and an electron microscope. The lenses should be both comprehensive and selective. Note that not only does the observer look at, or seek to influence, a process or context, but in turn the process or context influences the observer and the decision-makers.

4. The fourth component of the toolkit is called the **decision process**. It is made up of the actual techniques or functions of decision or choice over time. As a consequence of the social process, decisions are made and actions undertaken comprising the conservation policy process in question. A decision is a "choice and a lawful decision is a choice made in conformity with appropriate procedural and substantive norms" (Reisman and Schreiber 1987: 7). Each choice is made up of distinct functions, operations, and phases, all inherent in the term "decision."

These components of the toolkit—observational standpoint, problem orientation, social process/context mapping, and decision process—must be unpacked and made ready for application in the real world of species and ecosystem conservation.

The discussion to this point has reviewed the outline of the theory for performing professional tasks. These concepts provide a way of examining yourself and your work, the social process in the communities you want to influence, and a set of operations for actually making choices. Together, they constitute an effective and well-equipped toolkit for understanding, a toolkit which can guide constructive change. The real power of the components of the toolkit, though, becomes apparent when they are coordinated and used together as a single tool, sometimes called the "framework." The policy sciences' framework is an extremely powerful tool to effect improved outcomes in species and ecosystem conservation.

It may seem strange to some readers to think of concepts as tools. Some people think of tools only in terms of tape measures, computers, and the like. Broadly, however, a tool is any artifact used to carry out a task. The coordinated concepts or methods described, employed, and promoted in this Bulletin are artifacts based on decades of experience and refinement by many people, especially Harold Lasswell and his colleagues and students. These concepts— observational standpoint, problem orientation, social process/contextual map-

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ping, and decision process—serve as tools for all people wishing enhanced understanding of, and influence on, decision-making choices, including choices about species and ecosystem conservation.

THE POLICY SCIENCES' FRAMEWORK AND THE MODERN PROFESSIONAL AT WORK

It may be helpful to review again the components of the toolkit in systematic detail, using examples from the papers in this Bulletin as illustrations. Lasswell (1971), Brewer and deLeon (1983), Reisman and Schreiber (1987), Lasswell and McDougal (1992), and others have introduced and described the components of the policy sciences' framework in great detail in the past. Much of the following is based on Reisman and Schreiber's descriptions, which in turn were based on Lasswell's many books and papers.

We can begin to demonstrate the usefulness of the framework for the kinds of non-technical, non-field problems a practicing natural resource professional is likely to encounter by considering a hypothetical generic example. Imagine yourself as a newly minted natural resource professional assigned to a rural community. There is much technical work to be done, such as watershed analysis, habitat improvements, and community education. In performing your technical work, you are aware that you must work with the community and enlist their support if you are to be successful.

How do you begin to understand the new situation or context of your assignment? Because of your training and the assigned task, you may begin with a scientific perspective, by examining the biological conditions in the natural areas surrounding the community. It is likely, though, that the residents could assist you in this endeavor; and in fact, much of the information you want may have already been gathered. What do you need to know? What do you ask? Who do you ask? If you are to enlist the support of the community for natural resource conservation, and accomplish your work effectively, you will need a picture of the community, its behavior, and how it makes decisions. In order to construct a reliable picture, you will need to understand your own perspective and biases. Critical self-examination is crucial to this process, for it is only by consciously examining your own standpoint that you will be able to make a valid effort to comprehend the perspectives of others.

Your success will largely be determined by the community. As you orient to the present, you need to constantly consult the past. You need to identify key individuals and groups in a concrete way, what they did in the past, what conditions existed that might have influenced them, what conditions are likely to exist in the future, how different individuals and groups responded, and the effects of each on your goal of natural resource conservation. You must also understand the process by which decisions are made in the community so that you can estimate how officials and non-officials will respond to your initiatives. This kind of information will help you to fashion a course of action for yourself that will increase the likelihood of achieving your conservation aims.

We can begin to demonstrate the usefulness of the framework for the kinds of non-technical, non-field problems a practicing natural resource professional is likely to encounter by considering a hypothetical generic example. Imagine yourself as a newly minted natural resource professional assigned to a rural community.

How do you learn about these processes? At first, you might employ some methods of science, but these dynamic human interactions do not lend themselves to easy measurement. Moreover, you are not merely an observer and recorder in the traditional scientific sense; you are now part of the process—both observer and participant. One challenge of any new context is to find out exactly which individuals and organizations make decisions. These things cannot be learned by consulting your wildlife biology or forestry and range management texts. In real life, designated officials as well as influential citizens, groups, and, more broadly, the general populace determine how decisions are made. These groups are not always in agreement, and there are often distinctions between formal and effective power. You may find out that they are indeed separate in your community. How should you proceed in both formal and informal decision-making arenas? What are the ethical issues you will face?

This example demonstrates that to deal effectively with a problem in context requires information about basic social structure and decision-making processes. The kinds of information needed to understand and participate in these processes require a type of inquiry that is neglected by traditional natural resource education programs. In the social sciences the terms "process," "system," and "decision" refer to the many interrelated features of human behavior—biological, psychological, sociological, and ecological. Your work in the community will require your successful understanding and participation in the many social and decision-making processes found there.

WHO IS LOOKING AND HOW? OR: WHAT ARE THE ASSUMPTIONS OF THE OBSERVER AND THE OBSERVATIONS, AND THE IMPORTANCE OF SELF SCRUTINY (OBSERVATIONAL STANDPOINT)?
As a natural resource professional you are at the heart of management and conservation activities. So let's focus on you for the time being. You are at the center of all efforts to solve problems and understand and affect the social process for improved natural resource conservation. You are often both the instrument of observation and the instrument of decision. You are an individual with a distinct personality and intellect and these interact to influence perception and choice.

You have a unique vantage point from which you comprehend problems and observe the social and decision processes. That is, you are an observer and it is important to understand the viewpoint of your observation. You also have a way of thinking about what you observe. Hopefully, you are always trying to improve your observational and critical thinking skills with regard to the world and problem solving within it. By doing so you will increase your personal and professional effectiveness. Philosophically and practically, you can never actually take a vantage point outside of yourself. Nevertheless, you can and should try to take a standpoint "outside" the conservation group, management organization, or disciplinary tradition of which you are part.

One challenge of any new context is to find out exactly which individuals and organizations make decisions. These things cannot be learned by consulting your wildlife biology or forestry and range management texts. In real life, designated officials as well as influential citizens, groups, and, more broadly, the general populace determine how decisions are made.

Remember that you are the instrument of observation. Accordingly, one target of observation in the overall policy process is you. You need to observe yourself from this outside viewpoint. You, like all the other people in natural resource conservation, are subject to many influences. Each person is subject to a host of psychological, sociological, and other factors and forces that shape their perceptions and choices. Any or all of these factors and forces can potentially be distorting. Four major sources of distortion are commonly recognized. The first is emotional bias, which is a basic human property, but which can sometimes include neurotic behavior. The second is parochial bias, which is a result of socialization within language, cultural, or political groups (for example, small rural conservative America). The third is disciplinary bias, which often comes about as a result of in-depth technical and/or university training (for example, in forestry or soils science). The fourth is institutional bias, which occurs because people identify with the employing organization or other institution with which they are affiliated, and adhere to its standard cultural values, cognitive outlooks, and policy preferences.

A responsible observer/participant in any social process should be keenly aware of these sources of distortion, and possess methods of self-scrutiny and compensation. All individuals are subject to emotional, parochial, disciplinary, and institutional biases, which can and do distort observation and choice. The social sciences have examined each of these biases extensively, and numerous methods exist to study and account for these common characteristics. As Socrates said, "Know thyself."

In each of the full length student papers included in Part II of this Bulletin you will find a statement clarifying the author's standpoint with reference to the topic. For example, in both Barry Muchnick's analysis of wolf policy in Minnesota and Jonathan Padwe's land management case in Paraguay the authors played the role of participant-observer. For them it was especially critical that they understood and were explicit about their values and motivations, as they could directly influence outcomes. Moreover, each had a personal interest in the way the processes and outcomes were evaluated and reported.

Muchnick worked at the International Wolf Center in Ely, Minnesota as a naturalist intern. In conducting his policy analysis, he needed to be cognizant of, and candid about, the possible influence of his affiliation with that institution, and his training as a naturalist, on his understanding of the wolf issue and his views about other participants in wolf management in Minnesota. Padwe worked as a community development extensionist in Paraguay in cooperation with the Fundación Moisés Bertoni, the agency whose policies he was evaluating. He actually developed the policy proposal which was eventually implemented in his case. Although it is highly unlikely that he could completely eliminate the influence of these factors on his analysis, by paying careful attention to his own standpoint he increased the likelihood that his evaluation would be valid and useful. In addition, by being explicit in reporting his standpoint he has provided readers with crucial information to assess his

A responsible observer/ participant in any social process should be keenly aware of these sources of distortion, and possess methods of self-scrutiny and compensation. All individuals are subject to emotional, parochial, disciplinary, and institutional biases, which can and do distort observation and choice.

reasoning. All of the other authors in this Bulletin also attended to the task of carefully scrutinizing their own observational standpoints (although all of the papers do not expressly discuss this task).

LOOKING AT WHAT? OR: WHAT IS THE CONTEXT OF THE ISSUE? (PROBLEM ORIENTATION)

As a professional, you want to make constructive changes to resolve problems in conservation. In order to determine what you should do, you must ask and answer several questions. You must ask yourself: What goals or ends, biological and social, do I want, and what does the community want? What has happened regarding these goals historically, and what is happening currently? What has caused or influenced these trends? What is likely to happen in the future if these causes or influences do not change? What alternatives are possible, which of them is the most desirable, and how can it be implemented? Asking and answering these kinds of questions is called problem orientation, which can be summarized as follows:

1. Clarify **goals** (normative standpoint),

2. Describe **trends** (historic standpoint),

3. Analyze **conditions** (scientific standpoint),

4. Make **projections** of the future (projective standpoint),

5. Invent, evaluate and select **alternatives** (operational standpoint)

Problem orientation is not done just once at the beginning of a problem-solving effort. It is an endless process—once you work through these five tasks, you will need to repeatedly review, refine and redefine both questions and answers, over and over as long as time and resources permit. In the most comprehensive sense, natural resource conservation is the practice of problem solving for yourself, your clients, or for society at large, and problem orientation is a fundamental tool in problem solving.

In their paper on conserving biodiversity in Hawai'i, Jonathan Scheuer and Tim Clark focus mainly on problem orientation. They argue that the major participants in the conservation policy process in Hawai'i have not adequately oriented to the problem of biodiversity loss, and as a result have been working from flawed definitions of the problem. These weak problem definitions have led participants to develop strategies that are inadequate to halt losses of species and ecosystems. Scheuer and Clark begin their analysis by discussing a *goal* that is widely agreed upon by most of the participants: conserving Hawai'i's unique biological diversity. Then, after a brief theoretical discussion of the nature of problems and problem definition, they review historical *trends*, including

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massive losses of Hawai'i's flora and fauna, and current patterns of ongoing loss. They argue that a major *condition* underlying these trends is "the lack of a coherent, comprehensive definition of the policy problem that would garner broad political support" and that would motivate changes in behavior. Their review and critique of the dominant existing definitions of the biodiversity loss problem in Hawai'i supports their argument.

Clark and Scheuer make the *projection* that if present trends continue, Hawai'i will "lose the majority of its remaining taxa and communities by the middle of the [21st] century." They propose an *alternative* definition of the problem: "We suggest that the core difficulty is that human values are not being maximized by protecting biodiversity and that the overall policy problem is how to form a large political coalition that will be effective in biodiversity conservation." The authors conclude by recommending four *alternative* strategies to address the problem as they have redefined it: (1) improve understanding and integration of both the ecological and socio-political aspects of the biodiversity loss problem; (2) build trust among participants; (3) build problem-solving capabilities, including analytical, critical thinking and communication skills; and (4) build and test prototypes, or small scale experimental interventions, designed to learn about and improve conservation in specific local settings.

Mazur and Clark's paper on zoos and conservation is another good example of problem orientation. First, the authors clarify "zoo policy aims" *(goals)*, by discussing competing conceptions of the goals of zoos, and comparing formally promoted goals with actual performance. In doing so, they begin to outline some of the important historical *trends* in the bio-physical and social context in which zoos operate, such as world-wide declines in many species and ecosystems, changing human values and attitudes toward conservation and the role of zoos, and ongoing conflict about the relevance of zoos and their ability to contribute substantially to conservation.

Mazur and Clark discuss five main *conditions* that have caused or influenced these trends:

1. The widely held perception of zoos as old fashioned places of entertainment rather than modern centers of science, education, and conservation—to which zoo managers have reacted by developing defensive policy responses (a related condition).

2. Weak policy analysis skills among zoo decision makers and their advisors, which hamper their abilities to define and resolve the problems they face.

3. Inappropriate organizational structures—especially bureaucratic and corporate structures—for achieving zoo goals.

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4. An emphasis on single-loop learning (correcting perceived mistakes without addressing flaws in underlying premises or norms), rather than double-loop learning (using mistakes to learn about and revise underlying premises and norms).

5. Structural impediments within zoo organizations that prevent key staff from applying their knowledge and skills to zoo problems.

If these conditions are not addressed, the *projection* of the future for zoos is fairly clear: continued conflict, marginalization, and ineffectiveness in conservation. The authors' *alternatives* are linked directly to their analysis of conditions, and are discussed together with their treatment of conditions. For each problematic condition they identify, they propose a strategy designed to alter the condition or alleviate its detrimental effects.

In their study of the Yellowstone to Yukon Conservation Initiative (Y2Y), Tim Clark and David Gaillard use explicit problem orientation to develop strategies to make the Y2Y partnership more effective. Although the aims of Y2Y had not been definitively spelled out, they found general agreement on the *goals* of preserving species and improving wildlife connectivity in the Northern Rocky Mountains. They discuss demographic, social, economic, and conservation *trends* in the region, many of which are discouraging for the members of Y2Y and other conservationists. *Conditions* underlying the trends include an aging and wealthy population that is moving to the region seeking quality of life; weak or inappropriate institutional structures that cannot adequately manage rapid growth; regional, national, and international economic forces that are shifting the area toward a service-based economy; and habitat destruction, habitat fragmentation, and direct human-caused mortality of species. The authors' *projections* are that the region will become much more heavily populated, that the perspectives of the population may become more parochial, that the economy will be dominated by tourism, recreation, and other service-sector operations, and that species and ecosystems will suffer.

Clark and Gaillard's own problem orientation provides a strong foundation for their evaluation of the efforts of Y2Y. Their systematic analysis of the problem makes it immediately apparent that, at least at the time they conducted their research, Y2Y's biologically-oriented strategies were not effectively addressing the major demographic, social, and economic conditions causing the problem: "Y2Y has articulated a broad vision about sustainable human systems and practices, but without much detail in areas other than conservation biology. Participants acknowledge the importance of the social, economic, and other contextual forces, but do not have a comprehensive vision or a practical plan to address them in detail." The authors suggest a number of *alternative* strategies designed to remedy this failure, taking advantage of the diverse skills present among the Y2Y partnership.

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In each of these cases, careful orientation to the problem exposed the inadequacies of existing problem definitions and generated effective alternative problem-solving strategies. Remember when considering the five intellectual tasks of problem orientation that they should not be treated as a simple sequence. In real life, you may go through all five tasks many times. The order in which the tasks are presented here is a guide to the order in which they should be undertaken, but as you get into history (trends), science (conditions), or projections you may decide that your preferences were ill considered in the first place. As a result you will need to re-evaluate them. In natural resource conservation, as in all aspects of life, the five intellectual tasks of problem orientation should be ongoing and continuous throughout the conservation effort.

Note also that in society there are individuals and institutions that specialize in each of the five tasks of problem orientation. For example, philosophers are specialists in goal clarification. Historians are specialists in trends analysis. Scientists are specialists in the analysis of conditions. Futurists are specialists in projections. Several different professions claim to specialize in evaluative analysis—with mixed success. Individuals, disciplines, and whole communities are organized around these problem orientation tasks.

LOOKING AT WHO? OR: WHAT ARE THE TARGETS OF OBSERVATION? (SOCIAL PROCESS)

The purpose of undertaking the tasks that we have been discussing is to make changes in the "world out there." That is, to effect improved conservation of species and ecosystems in the real world. You want to change behavior in society to bring about a more desirable distribution of values, according to your goals and those of the community. The processes you want to influence are "out there," and can be systematically examined. We all have notions of how the world works—what we think is going on—but these notions are only "pictures in our heads," incomplete representations of the real world (Lippmann 1965). Mapping the social process or context of a problem is essential to improving your representation of the world outside—the representation on which you base your choices. The policy sciences' framework includes a complete set of categories for mapping social process, to ensure that your picture of the world has not omitted or under- or over-emphasized any important dimensions.

Recall that social processes can be thought of as being made up of seven elements. You can describe each of them to the extent that is necessary for your purposes. To review, the seven elements are as follows (based on Lasswell 1971: 15-26):

1. **Participants:** Who are the relevant actors (individuals or groups, unorganized or organized, producers or sharers of values)?

In each of these cases, careful orientation to the problem exposed the inadequacies of existing problem definitions and generated effective alternative problem-solving strategies. Remember when considering the five intellectual tasks of problem orientation that they should not be treated as a simple sequence.

2. **Perspectives:** What are the subjectivities of the participants (identifications, expectations concerning the past, present and future, value demands, myths)?

3. **Situations:** In what settings are the participants interacting (spatial dimensions, temporal dimensions, organized or unorganized, value inclusive or exclusive, crisis or inter-crisis)?

4. **Bases of Power:** What are the resources, or values, being brought to bear in the particular interactions in order to influence outcomes?

5. **Strategies:** How are those resources being manipulated and used (diplomatic, ideological, military, or economic)?

6. **Outcomes:** What are the short term, culminating events of the interactions (indulgences and deprivations of values)?

7. **Effects:** What are the long term results of the interactions (value accumulation and distribution, institutional and societal change)?

In your observation of social processes it is imperative to develop a good understanding of what outcomes are being sought by different actors, individual and group actors . Outcomes are the things or events that people want, and generally people want more of everything: "In the contemporary world community, there appears to be an overriding insistence, transcending most cultures and climes, upon the greater production and wider distribution of all values" (McDougal *et al.* 1988: 834).

What are the values that people are seeking? Lasswell (1971) devised a list of eight types of values that describe all basic human desires. The eight value categories are: power, wealth, enlightenment, skill, well-being, affection, respect, and rectitude. Most people do not articulate what they want explicitly in terms of these eight types of values, but nevertheless, the demands of all people can be characterized in these terms. In real life all people want some mix of these values, but some people want more of some than of others. People express their value preferences in many different ways and terms, but all human beings want to have at least some of all of the values (for example, to be healthy, receive and give affection, and be respected).

From your viewpoint, as a person who is interested in bringing about change, and from the scholar's viewpoint, as one who is interested in studying change, knowledge of the values that people demand and the values they possess as bases of power is essential. All social processes can be thought of in terms of participants interacting cooperatively and competitively, using their bases of power to get a more desirable distribution of values for themselves and others. This is called the *maximization postulate*: all organisms seek to act in

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ways that they believe will leave them better off than if they had not carried out those behaviors.

At any moment in time all people possess some mix of the eight values. Once acquired, these values can be used as bases of power to attain more of the same or other values. For example, wealth can be invested to gain more wealth. Or wealth can be exchanged to gain other values. College students use their wealth to pay for education, to obtain enlightenment, skill, and respect, often in the hope that these enhanced values will get them interesting, rewarding, and important jobs which also embody these values. The greedy real estate developer may try to maximize their wealth at the expense of their own well-being, affection, or respect. The overly zealous conservationist may seek maximal skill or rectitude as they fund and manipulates research to support their ethical position. It should be clear by now that people's demands and activities can be effectively described in terms of the eight value categories.

People, individually and collectively, make demands on institutions in society for particular distributions of values. For example, many members of the public belong to conservation organizations such as The Wilderness Society, which may promote certain values of rectitude, enlightenment, and respect. The U.S. Forest Service, the National Rifle Association, or an animal rights group all also promote values, but each represents a different mix of demanded values and uses different combinations of values as bases of power. All of these institutions promote various mixes of values and represent and serve different segments of society. To repeat, individuals and collectives make demands on institutions in society in diverse ways, and it is these institutions that very much affect how a society distributes values to its citizens.

An institution may withhold values or share values with its members or citizens. Which values are withheld and which are shared with which segments of society by the National Park Service? Do wealthy and poor citizens receive the same kinds of values from recreational opportunities on public lands in the United States? What about from educational and social institutions? For dramatic comparison, which values are withheld and which are shared with which segments of society by the Ku Klux Klan or the Neo-Nazi Party? Institutions differentially withhold or share values for various reasons. The entire policy process at the national level or the local level can be understood in terms of value shaping (production) and sharing (distribution) activities. Which institutions have been shaping and sharing what values through reintroducing wolves into Yellowstone National Park? In considering your answer, think in terms of value demands of key participants: the National Park Service, conservationists, ranchers, and others.

The point is that once you know about this spectrum of values, you can describe any process, including all natural resource conservation efforts, in these terms in whatever detail is needed. In any particular conservation matter, you can see the outcomes sought by various participants in terms of the real distribution of values at issue: power, wealth, enlightenment, skill, and so on.

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The insight provided by this method helps you to identify and work toward changes that will result in more desirable distributions of values from your point of view.

Tracy Scheffler's paper on faith-based stewardship in Chesapeake Bay clearly demonstrates the importance of understanding social process when addressing conservation problems. In that case, which involved exploitation of the blue crab stock in Chesapeake Bay, the major organizational *participants* were the Chesapeake Bay Foundation, the Virginia Marine Resources Commission, and the Virginia Institute of Marine Science. These organizations shared the *perspective* of positivistic science. The values which they tended to *demand*, and use as *bases of power*, were enlightenment, skill, respect, and power. As Scheffler points out, "These values are embedded in the common goal of wanting to wisely manage the Bay's living resources. Also, each of the three organizations strives for long-term conservation and management of the Chesapeake's blue crab stock, through maximizing their value outlook."

The principal individual *participants* in the faith-based stewardship case were the watermen of Tangier Island, and other members of the small community of which they were a part. As it was the fishing practices of the watermen that were at issue in the case, let us focus for a moment on the roles of those watermen in the social process. Most of them shared a *perspective* which included a strong sense of pride in their knowledge of Chesapeake Bay and their ability as fishers (enlightenment, skill), and in their personal and community history in the region (respect). They *demanded* not only the maintenance of their income (wealth) but also the preservation of their lifestyle (well-being, respect), and the ability to participate in decisions which could potentially affect their interests (power, respect). They perceived a problem in that, in contrast with their demands, their values were being deprived rather than indulged in the management of the blue crab fishery, and their *expectation* was that these value deprivations would continue. Importantly, most of the watermen shared a strong religious conviction (*myth*— remember that there is no negative connotation to this term, myths may be true or false) which dictated certain norms of moral conduct (rectitude).

The interactions of the watermen with other participants took place in organized and unorganized *situations*, including board meetings of the Virginia Marine Resources Commission (which the watermen felt were exclusive of their values), church services and gatherings, other public meetings, and on the water. The possibility of impending crisis was evident in the banners put up by watermen criticizing the regulatory authority, and in their violation of fishery regulations. Their *bases of power* were similar to their value demands. They possessed little wealth or direct power, but had important experiential knowledge about the fishery and the Bay (enlightenment), some degree of respect from other participants (for this knowledge and for their skills and community history), and the mutual affection and sense of rectitude that

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could bind them together in a common cause. Their *strategies* prior to the policy intervention discussed in the case study were mainly counterproductive: violating fishery regulations, hanging banners, and grumbling. The *outcomes* included escalating conflict and possible over-harvest of the blue crab stock; the eventual *effects* might be deterioration of the resource, with negative consequences for all participants, and diminished faith in the democratic process.

The Chesapeake Bay Foundation's attempts to develop an environmental ethic on Tangier Island failed because they did not understand the social process, particularly the fundamental differences between the science-based perspective which they were promoting and the perspectives of the residents of the island. In contrast, by structuring an approach to conservation that fit well with the perspectives of the watermen, and particularly with their religious beliefs and sense of rectitude, Susan Drake Emmerich's intervention was more successful. Note that she introduced the idea of biblically-based stewardship at a joint session of the two churches on Tangier Island—important institutions which shape and share multiple values, especially rectitude, well-being, affection, and power. The Watermen's Stewardship Covenant, FAIITH, and the Tangier Island Watermen Community Stewardship 2020 Vision indulged demands of the watermen and other Tangier's residents for all eight values, but especially rectitude, respect, well-being, affection, wealth, and power. Scheffler notes, however, that there is still some ongoing dissent from a minority of watermen who do not share the religious myth and rectitude values of those who support the Covenant.

Drake Emmerich found an excellent "intervention point" in the social process on Tangier Island, which she used to advance her goals and those of the broader community of Chesapeake Bay. Social process mapping often brings to light such intervention points. In this brief example, we have focused on the watermen, but a more comprehensive map of the social process might reveal other opportunities for successful policy intervention.

Michael Stevenson's paper on managing introduced species in the Galapagos Islands makes a series of recommendations aimed at improving decision processes, but his analysis is also based on a solid understanding of social process. For example, he discusses the conflict between the Charles Darwin Foundation, which insists on the enforcement of government fishing regulations around the islands (reflecting its demands for rectitude, respect, well-being, and possibly power), and the local fishers, who violate the regulations and fish illegally (reflecting their demands for well-being, wealth, and power). Meanwhile, the government of Ecuador demands respect and power in its dealings with the islands, but because of its demands for wealth, it draws funds away from conservation. Other participants have different perspectives and demand different combinations of values.

Policies designed to eliminate introduced species on the islands have been ineffective because policy makers have failed to understand or address this social process. Research information is not communicated to locals (depriving

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them of enlightenment and respect). Top-down legislation introduced by the national government is not enforced by local governments because they have not been involved in the legislative decisions (thereby being deprived of respect) and their value demands have not been incorporated. Local fishers and other residents violate the legislation because they know it will not be enforced, and in any event they do not see how it reflects or indulges their own values. "Educational outreach" or propaganda programs are ineffective at changing their behavior because these programs do not connect with local perspectives. Technical solutions, such as attempts to eradicate feral goats, fail because they do not address the social factors that lead to reintroductions. Meanwhile, demands for wealth and well-being are bringing many more people to the Galapagos Islands, a trend that is exacerbated by political conflict in Ecuador.

Stevenson's recommendations are designed to change decision processes in the region to deal more appropriately with this social process. They include involving diverse participants in decision making, and providing economic and social alternatives for locals who will otherwise suffer value deprivations because of conservation. As Stevenson concludes, "To best achieve goals to eliminate or reduce invasive species, human social interactions and their impact on the biology of the islands must be factored into both analysis and management."

In the paper by Alejandro Flores and Tim Clark on finding common ground in biological conservation, the authors focus selectively on one aspect of social process. They discuss the tendency in society for people with similar perspectives to group together, "excluding and confronting" those who have different perspectives. At a broad level, this leads to the practice of classifying people's perspectives according to dichotomous mutually exclusive categories, such as "anthropocentric" versus "biocentric" views of conservation. After discussing some of the conditions that foster this tendency, Flores and Clark show that there are many possible areas of common ground among what appear to be mutually exclusive perspectives on conservation. They suggest strategies to move toward more flexible and integrative perspectives.

These examples, and all of the other papers in this Bulletin, show that inquiry into the social process or the context of a natural resource problem is a crucial task. The social process can be at any scale, small or large (for example, a local landscape planning group, a state wildlife management agency, or a national government). It is important to discern who has effective power and how it is used. You need to identify not only how decisions are made, but also how decisions are made about the decision-making process itself (the latter is called the "constitutive decision process" and is discussed in the next section). You also need to understand the outcomes and effects of decision.

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Recall that you observe a social process or the context of a problem using "lenses." What are the appropriate observational tools you need? Should you start with a microscope or macroscope? Social processes and scientific and management problems rarely come in neat, well-defined disciplinary packages with clear labels: "This is a population viability problem," "This is a watershed problem," or "This is a community-based planning problem." All problems have a multiplicity of dimensions and boundaries in terms of discipline, space, time, complexity, interrelationships, and so on, which each discipline sees as "real" relative to its own traditional viewpoint. Unfortunately, the actual problem rarely conforms to the viewpoint of any one disciplinary perspective. Two approaches must be taken simultaneously: comprehensiveness and selectivity. You must make an effort to be comprehensive, taking in the full view of the problem at hand. But time and resources are always limited, forcing you to also be selective in what you examine. It is vital to keep both a comprehensive and a selective view in mind on all species and ecosystem conservation problems. To summarize:

- Focus comprehensively.

- Focus selectively in detail on relevant features of:
    a. the environment,
    b. the processes of effective power,
    c. the process by which legal decisions are made, and
    d. the outcomes in terms of production and distribution of things (the benefits or burdens or values) that decisions involve, including the effects on the environment.

Subjectivity also affects focus. Subjective factors figure prominently in individual behavior. People often say and write one thing and do something different. Understanding how and for what purposes this happens is critical. A balanced view is needed, taking account of what people say and what they in fact do. This includes a view of expectations on everyone's part, especially expectations about what is "right." Expectations about what is actually going to happen and expectations about what is effective are also important considerations.

Having a useful theory or framework is vital in making observations, because it helps you avoid omitting or mis-emphasizing any aspects of the phenomena that you are observing. Science is typically reductionist and positivistic, and seeks fundamental laws to explain events and processes. Good observers of real social processes or contexts may not be scientific in this sense, but they are no less empirical or systematic; they seek fundamental explanations of events and processes. Differences in the philosophic bases of observation can lead to different observations, conclusions, and explanations. Clearly, having a useful framework in hand to focus on the social process, or the problem's context, is essential.

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LOOKING AT HOW? OR: WHAT ARE THE PROCESSES OF AUTHORITY AND CONTROL? (DECISION PROCESS)

Natural resource conservation progresses through decision-making processes. Good decisions advance conservation, bad decisions set it back. Decisions may be made in an explicit, systematic fashion, or quickly with little thought. Many personal, professional, and organizational decisions are made hastily and without much analysis, often based on precedent or "standard operating procedures." Other decisions, such as choices about people's careers or other weighty matters, are made after much more time and deliberation. Societal-level decisions about natural resource conservation involving the coordination of millions of people may take years, if not decades, to make.

As mentioned in the previous section, there are two main types of decision processes: "constitutive" and "ordinary" (Lasswell 1971). Constitutive decision processes produce the rules and procedures which govern how other decisions—the ordinary decision process—are to be made. Thus, higher-order constitutive decision processes establish the rules for lower-order ordinary decision processes. For example, a natural resource professional setting up a new conservation program, such as an endangered species recovery project or an interagency task force for cross-jurisdictional watershed management, makes many choices about institutional design and how future decisions will be made. This is constitutive decision making. The subsequent day-to-day choices made by the recovery team or the interagency task force, in accordance with the rules and procedures under which they have been constituted, are ordinary decision making.

You should also be alert to the difference between "authority" and "control" in decision making: "To be authoritative is to be identified as the official or agency competent to act; to be controlling is to be able to shape results" (Lasswell 1971: 99). It is the expectations of those who are governed or affected by the decisions that matter. For example, the U.S. Forest Service may have the legal mandate to govern off-road vehicle use in the National Forests, but may not have the staff or resources to enforce its decisions. If the Forest Service decides to restrict off-road use in an area and that decision is ignored by users, the decision is authoritative but not controlling. If, however, a group of armed conservationists is successful in blocking off-road users from an area that the Forest Service has declared open to off-road use, the conservationists' decision is controlling but not authoritative. Good decisions are both authoritative and controlling.

Decisions are at the heart of all change, good or bad. A single big decision or the accretion of many smaller decisions can amount to a major policy shift. This in turn may result in a substantially different distribution of values than that which existed before the new policy was put in place. It is obviously imperative, then, that natural resource professionals develop a thorough understanding of how decisions are made, and how they should be made.

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Policy scientists analyze decisions by examining the constituent functions, or phases, which are involved in all processes of decision making. In the two papers in Part I of this Bulletin, Tim Clark introduces and describes a model of decision process that includes six phases: initiation, estimation, selection, implementation, evaluation, and termination. This model is used by most of the authors in this Bulletin, and is also outlined in our discussion about the policy sciences toolkit earlier in this paper. To review, the phases are as follows (Brewer 1973; Brewer and deLeon 1983; Brewer and Clark 1994: 400):

1. **Initiation:** Recognition of a problem; creative thinking about it; preliminary investigation of concepts and claims.

2. **Estimation:** Scientific study of the problem, likely impacts, and outcomes; normative assessments; development of outlines of a programmatic response.

3. **Selection:** Focused debate on the issues; choice about a program to solve the problem.

4. **Implementation:** Development and application of a specific program.

5. **Evaluation:** Comparison of estimated performance of the program with what was actually attained; reconciliation of the differences.

6. **Termination:** Ending the program or modifying it to be more effective or to solve a new problem.

By mapping decision phases, you will be able to determine how decisions are being made, who is participating in which aspects of the process, whether all phases or functions are being adequately attended to, and where breakdowns are occurring. You will be able to evaluate decision processes in terms of recognized standards for the performance of each of the phases (see, e.g., Lasswell 1971).

This six phase model of decision process is an easily understandable simplification of a slightly more detailed seven phase model originally developed by Harold Lasswell and his colleagues (Lasswell 1956, 1971; Lasswell and McDougal 1992). The original model is also still used by many policy scientists. Sue Lurie and Tim Clark, for instance, use Lasswell's original seven phase model in their paper on sustainability planning in Teton County, Wyoming (discussed below).

The model of decision process is the final component of the policy sciences' framework. It applies to both constitutive and ordinary decision making. By mapping decision phases, you will be able to determine how decisions are being made, who is participating in which aspects of the process, whether all phases or functions are being adequately attended to, and where breakdowns are occurring. You will be able to evaluate decision processes in terms of recognized standards for the performance of each of the phases (see, e.g., Lasswell 1971). In addition, you will be able to watch for commonly occurring weaknesses or pitfalls, which have been identified and catalogued for each phase by the many policy scientists who have previously used the framework to evaluate

other decision processes (see, e.g., Brewer and deLeon 1983; Ascher and Healy 1990; Clark 1997; and see Table 4 in the second paper by Tim Clark in Part I of this Bulletin).

There are many examples of decision-process analysis in this Bulletin. Jonathan Padwe's paper about land conflict in Paraguay maps the decision process that led to implementation of an effective policy by the Fundación Moisés Bertoni (FMB), managers of the Mbaracayú Nature Reserve. In the *initiation* phase, many participants became aware that there was a problem in the region, evidenced by conflict between the indigenous Aché people and a group of new colonists who had settled between the Aché lands and the Nature Reserve, in which the Aché held traditional rights to hunt. Other indications of the problem included alleged damage by the Aché to colonists' land and alleged poaching by colonists in the Nature Reserve.

Padwe describes how the decision process soon moved into *estimation*, in which the parameters of the problem were more clearly defined, through research into the impact of Aché hunting within the Nature Reserve, studies of deforestation on or near the colonists' lands, and meetings held by the FMB with the Aché and with the colonists. During this phase the policy of purchasing the colonists' lands and transferring title to the Aché was proposed. In the *selection* phase, the FMB chose to implement the proposed policy of purchasing the colonists' land. The choice was made in part because of pressure from the Aché, support from other participants, and apparent feasibility. To *implement* the policy, the FMB obtained funds, purchased the lands, helped to arrange the title transfer to the Aché, and assisted the colonists with relocation. Padwe says that *evaluation* took place in discussions among the parties and in reports given to the donors who funded the policy, but his paper itself is also a detailed evaluation of the decision-making process. Unlike many decision processes, a clear *termination* occurred when all of the colonists had been moved and the Aché once again had unimpeded access to the Nature Reserve.

In contrast, in Barry Muchnick's paper on wolves in Minnesota, the author analyzes a decision process which he depicts as a failure. The *initiation* phase of the wolf management process that he discusses began when the passage of the Endangered Species Act made wolf management in Minnesota a national problem. Since then the decision process has gone through several *estimation* and *selection* phases, such as when the status of the wolf was reclassified from endangered to threatened in 1978, when the recovery plan was revised in 1992, and when the current proposal for delisting was made. Muchnick argues that these phases have been characterized by over-emphasis on pure biological data without adequate consideration of socio-political factors, and that they have occasionally been dominated by special interests such as the livestock industry. For instance, he describes the estimation process for the 1992 revision of the recovery plan as follows: "Drastically oversimplifying the problem of wolf conservation into purely numerical terms, information was only collected about wolf biology, and the complex matrix of social, economic, organiza-

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tional, and political issues in which the wolf issue is embedded was ignored."

Muchnick claims that *implementation* of wolf management decisions has been flawed by poor coordination among agencies and "inconsistent and irregular enforcement," and that *evaluation* has been weak or non-existent. His own evaluation concludes that "the current organization of wolf management in Minnesota has a distinct and pervasive tendency to focus on the technical, biological aspects of wolf recovery instead of reviewing the process's own successes and failures." His analysis suggests that it is premature to propose *termination*—in this case, delisting—and he recommends a number of strategies to involve a broader range of participants and to otherwise improve the decision-making process.

As a final example of decision-process analysis, Sue Lurie and Tim Clark's evaluation of sustainability planning in Teton County uses the seven phase model, and the criteria Lasswell proposed as standards for the performance of each of these phases (Lasswell 1971). They discuss how the *intelligence* phase (gathering, processing and disseminating information) of planning for Teton County was not sufficiently comprehensive or creative, in that it failed to find and include adequate information on key socio-economic variables, costs of growth, wildlife populations and habitat, commercial development, and potential transportation needs. The *promotion* phase (debate over alternative courses of action) was described by some participants as "neither open nor inclusive," and special interests may have dominated the debate. According to the authors, "the inadequacy of the intelligence activity left gaps in information that made it difficult or impossible to develop a broad range of supportable alternatives" in the promotion phase.

Lurie and Clark found that the *prescription* phase (stabilizing expectations and enacting rules) was sufficiently open to allow input from interested participants, but produced overly complex regulations that the public and even county staff have had difficulty understanding. This has led to problems in the *invocation* and *application* phases (interpreting and enforcing, or putting into practice, prescriptions—approximately equivalent to implementation), because the complexity of the regulations precludes many citizens from evaluating and giving feedback on proposed developments, and planners are unable to interpret and apply the rules uniformly.

The *appraisal* phase (evaluation) suffers from similar problems: "The plan is too complex to invite meaningful discussion by average citizens about its overall adequacy or about specific requirements. This forecloses equitable access to discussion and appraisal." Like many other public decision processes, the Teton County planning process did not provide for a *termination* phase, although the plans do include provisions for review. The authors make recommendations to restructure public planning and decision processes in Teton County to share power and meaningfully involve the public, toward the goal of clarifying and securing the common interest: "A policy process that integrates social process, problem orientation, and decision-making—and includes genu-

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ine power sharing by citizens and government—can help in clarifying and securing the common interest and producing flexible, effective policies to sustain a thriving community."

CONCLUSION

In concluding this volume and by way of a summary, we draw your attention again to Figure 1, which illustrates the four major components of the policy sciences' framework, a comprehensive guide to professional operation and participation in decision making and policy-making. This simple framework can direct your attention, thought, and action in species and ecosystem conservation. Considering all components and their interaction simultaneously in the real world of conservation problems is the professional challenge before each and every one of us. To omit consideration of one or more of these components is to invite failure. Neither the professions nor natural resources (e.g., forests, coral reefs, biodiversity) can long endure sustained failure. With the framework as your guide, you can bring about improved professional problem solving and enhanced natural resource management.

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