Forum Summary

Natural Resources Forum '98: Linkages in Ecosystem Science, Management & Restoration

Paula J. Posas, Center for Natural Resources

We cannot solve complex ecological problems with the perspective of one discipline alone, and not without the collaboration of all stakeholders. Collaboration among resource managers, policy makers, and the general public is an essential element of building consensus views on conservation and restoration issues. Natural resource issues are important not only for human health, environmental health, and aesthetic pleasure, but also for sustaining a healthy economy in Florida. Whether speaking of sustainable food and fiber production, restoration of habitats, preserving biodiversity, or promoting ecotourism, ecosystem integrity must be maintained. Wetlands, uplands, coastal areas, and invasive and exotic species all present their own challenges and opportunities for problem-solving and greater understanding.

Land management strategies prior to ecosystem management fell short of protecting Florida's most important natural resources. Their inadequacies stemmed from focusing too narrowly on particular issues in a disconnected fashion. Fixing one problem often engendered another problem. The perspective of these earlier strategies did not help managers reconcile the bigger picture and recognize possible balances and interactions between environmental objectives (deHaven-Smith). While some argue that the ecosystem management mandate still suffers from some nebulous central concepts and basic definitions, it has advanced maintenance and restoration of ecosystems by encouraging managers to consider ecosystems, humans, and linking land and water management all at the same time. In fact, the Ecosystem Management Initiative of 1993 is getting much clearer, with a proliferation of tools, programs, and strategies for more effective use and stewardship of Florida's natural resources (Barnett).

Presenters at the Forum '98 took a variety of tacks in their presentations. Several offered case studies (Gjerstad, Greening, Miley, Steward) and identified specific problems, challenges, and potential models (Costanza, Rice) for ecosystem management. Some presenters laid out principles and guidelines for ecosystem management (Barnett, Duever, Lowe). Others addressed process issues (Heller, Mills, Reddy), obstacles within the system (de Haven-Smith, Scarborough, Sims) and potential solutions (Haas, Humphrey, Monroe, Sims, Swain).

Conceptual issues such as penalty vs. incentive-based conservation programs stirred up some discussion (Bendick, Humphrey). On the theme of communication, multiple speakers underscored the critical urgency in effectively transmitting information to the intended audience, particularly to policy makers (Culen, Kelly-Begazo, Monroe, Percival). Theme presenters stressed the need for greater visibility and attention to coastal, estuarine, and marine issues (Gilmore, Seaman) and invasive and exotic species issues (Austin, Langeland). Still other speakers imparted warnings about the recently discovered dangers of changing freshwater inflows into estuarine systems (Miley) and the likely shift toward an increasingly business-oriented Florida Legislature (Latvala).

Despite the wide diversity of topics covered, some themes and threads of continuity emerged from the presentations. Interestingly, they can all be categorized within the headings of the model Col. Terry Rice outlined in his Keynote Lecture.

Rice proposed a four-stage model for making and implementing effective policy based on sound science. The four stages identified were science, education, policy, and management; the four agents then are scientists, educators, policy-makers and managers. In this model, also known as a theory of agency, science is transmitted to educators who then inform the public and policy-makers. Policy makers, in turn, write policy, and then managers carry out that policy. In this way, wise, science-based management of

natural resources is achieved. In reality, the system does not play out in this manner. In fact, it may not even be ideal, since stakeholder involvement in policy decisions is not explicitly included. Science is not the cure-all if we are not standing on a strong foundation of linked interests and a wide stakeholder support base. The ideal model is more of a complex linkage exercise than a relay race. Stephen Humphrey mentioned that in his experience, policy is arrived at in a rather piecemeal way. Particular interests discern ways to avoid or reduce their share of the costs of linked research, education, and policy outcomes, and then they influence or direct policy accordingly. In order to move in a less biased, more systematic direction and have a society that invests in science-based policy, he recommends that we recognize and develop alternative theories of agency. This will help us visualize how to build and sustain necessary linkages (Humphrey).

One major obstacle in the proposed theory of agency happens even before the first linkage. The culture of science threatens the stability of the model's foundation. There are three main reasons for this: (1) Scientists usually have a disciplinary focus, and are not in the habit of linking across disciplines. (2) Natural science research results often stay within the scientific community. (3) Few scientists have ventured into the area of influencing policy outcomes. Instead of being content to sit on the sidelines, though, scientists need to "get into the fray." This does not have to take the form of being an activist, but rather an advocate and communicator.

The second link in the model involves education. Several strong points were made highlighting the impact and importance of education. In the realm of public education, information needs to be directed into proper channels through a variety of media. The general public is often misinformed or insufficiently knowledgeable about state natural resource issues, particularly the benefits, interrelatedness, and importance of certain ecosystems in maintaining and generating our state natural resources. Our goal must be to convey information in a language that the intended audience can respond to and specifically to target people in decision-making positions.

Some relatively new programs are educating and addressing natural resource issues in innovative ways. "Florida Yards and Neighborhoods," a homeowner incentive/education program, the "Master Wildlife Conservationist" Extension Program, and the "Lake Watch" Program give lay people the opportunity to take account for water quality and contribute to local natural resource management. Specific programs such as these are an important part of sustaining and protecting Florida's natural resource base. In these programs, it is important that educators and program designers address as wide a cross-section of society as possible.

Effective education is necessary for changes in policy and behavior. It needs to transmit not only scientific information but cultivate an environmental ethic, the idea of shared responsibility, and the basic understanding that healthy ecosystems are related to a healthy economy.

Ecosystems are complex adaptive systems whose balances and feedbacks are incompletely understood. In the face of managing with limited predictability, it is wise and advisable to err on side of caution. Adaptive management is one way to do this. Embedded in this concept are the directives to build in flexibility, i.e. take a bit and try it first on a small scale. If the strategy to be implemented costs a great deal and particularly if it involves public funds, there must be a high probability that strategy implementation on a larger scale will work.

Some possible solutions to our environmental and ecosystem problems are teaching linkages, training people to see, make, and promote linkages. Great benefit will come from educational systems that foster the development of more Rachel Carsons, Aldo Leopolds, and Marjorie Stoneman Douglases; there is a need for people who can translate their scientific understanding to the public and catalyze action by

effectively communicating the urgency of public causes. When organizations, agencies, governments, and educational institutions link, care must be taken to forge linkages that are mutually enforcing. Linkages are not just for funding relationships, but for facilitating actual exchange between scientists and people involved in projects. Additionally, linking and educational efforts in this vein need to be institutionalized, so they do not depend solely on good will and constant search for funding.

One important reminder is that local governments must become major players in linking land-use and conservation planning, because in Florida, local governments are responsible for land-use management. Furthermore, regional comprehensive growth management plans must contain regional water supply programs and the five Water Management Districts must provide accurate needs and source assessments (Scarborough). Sound planning and wise use of natural resources becomes increasingly important, since Florida's current population of 15,012,200 grows at an approximate net rate of 700-800 people per day. In other words, every two months Florida gains a new population approximately the size of current populations in Deerfield Beach, Ocala, or Gadsden County. (Statistics from "Supplement to Sales and Marketing Management: 1998 Survey of Buying Power and Media Markets.")

Presenters and participants continually reiterated the importance of "thinking outside of the box." Circumstances in the past were different; we need not circumscribe our actions or limit our scope of influence by perpetuating a *status quo* that applied to different times and less pressured conditions. Instead of becoming complacent or disheartened about our deteriorating environment, we must search for creative solutions by increasing linkages, looking across disciplines, taking stock of available resources and elastic variables, and improving communication between scientists, teachers, policy-makers, managers and the general public. We need to develop ideas, strategies, tools, and values that will help us balance development pressures with our long-term environmental needs. In our individual and collective endeavors we must keep alert to new ideas and take hold of anything that will promote wise ecosystem management and increase our understanding and reaction time to the pressing issues we face as Floridians and world citizens.

Note: Poster Presentation Abstracts and the Forum Proceedings can be found on the Web at http://gnv.ifas.ufl.edu/~cnr_web/index.HTM. Click "SERVICES" and then "Natural Resources Forum."