Speaker Summaries

Keynote Lectures

Transdisciplinary Approach to Ecosystem Management: Integrative Modeling of Ecological and Economic Systems Keynote Address, June 9, 1998

Robert Costanza
Director, University of Maryland Institute for Ecological Economics

(Video Available, Click Here)

Ecological economics transcends disciplinary boundaries. As people have noted in the business community, many important innovations happen by "thinking outside the box." In academia, we've boxed ourselves in with disciplinary definitions. It's time for us to also get outside the box. This approach needs to be increasingly emphasized, because we cannot solve any of the complex environmental problems with the perspective of any one discipline alone. And we certainly cannot solve them as academic researchers and scientists working in isolation from the rest of the policy and decision-making process and in isolation from the general public.

First of all, we need to think about modeling. In a broad sense, modeling is any conceptualization or abstraction of the problem that we can use to help us understand and move forward. This particular integrative modeling approach has certain characteristics we need to keep in mind.

- We can use the process as a **consensus-building tool** as well as its traditional role of analytical device. If academics conceptualize the problem and do their mathematical models in isolation and say here's how the world works and here's what you should do about it, most people will react negatively to that. So, if we bring the stakeholders into the process as early as possible and actually build the model together, I think we can make much more progress toward a group understanding.

- These models are **most appropriate at the landscape and watershed scale**, because at that scale the interaction between ecological and economic systems and their components are obvious.

- When doing this type of thing we need to acknowledge very clearly the uncertainty involved in our understanding of these systems. We may never know precisely the impacts of our actions in the future, because we are dealing with complex, adaptive systems. Due to the fact that we are dealing with this in designing regulatory and management systems might the **"precautionary principle"** which says that where there is limited predictability, we must err on the side of caution.

- There really is **no such thing as value-free science**. Even the decision of what to study involves a value judgement. Rather than pretending that our values and assumptions do not exist, it is much more valuable to acknowledge them so we can have a science that is less biased and more fair, but not one that is free of values because that is not possible.

All models are simplifications of the real world. There are different ways of making those simplifications. In the past what we have tended to do is to narrow our focus and simplify by breaking the linkages between the parts and simplifying the system. To do this kind of integrated model we have to take the reverse approach and simplify by keeping the linkages between the parts and synthesizing their interactions while losing some of the detail of the individual pieces.

This is not the only way to approach modeling. We need to take a pluralistic approach to this kind of modeling. There is no one right way to do it. It is a matter of putting together several different perspec-

tives and seeing how they all fall out. In addition to a pluralism of approaches, we need approaches that acknowledge the history of these landscapes and watersheds and the fact that these natural systems are evolving. Representing these systems is more of an evolution process than a strict optimization process.

One final point to keep in mind is to approach this kind of modeling in a step-wise fashion. As scientists, we often jump down to the most detailed kinds of models that we know how to do, whereas to actually build this participatory and consensus component we need to go through the process in a slightly different way. I use this three-step model and start with:

Scoping Models-high generality, low resolution models that you can build with broad participation by all the stakeholder groups affected by the problem and allow that kind of exercise to then determine what goes into the more detailed and realistic attempts to represent the dynamics of the system,
Research Models-calibrating and testing the models; how well do they represent the behavior of the system,
Management Models-scenario analysis and looking at the implications of various kinds of policies.

Since this list is in order of increasing complexity, cost, realism, and precision, it is cost-effective. You do not want to end at the bottom spending a lot of money on a management model that does not incorporate the interests and concerns of stakeholders that are part of the problem.

In the case studies of the Florida Everglades (protected) and Maryland Patuxent Watershed (unprotected and subject to development pressures) we used the principles and went through the stages mentioned above.

Many of these maps and models are good for understanding ecosystem history, communicating with stakeholders, estimating the value of ecosystems, and making projections and informed decisions about future policies.

For more information on ecological economics, specific modeling studies, and details (calibrating, scaling, representing complex ecological relationships over time, etc.) please refer to the following websites (** sites visited during the talk).

University of Maryland Institute for Ecological Economics
http://kabir.umd.edu/miiee/miiee.html

International Institute for Ecological Economics
http://kabir.cbl.cees.edu/ISEE/ISEEhome.html

Ecological Economics - the Journal of ISEE
http://kabir.umd.edu/ISEE/isee_pubs.html

Distributed Modular Spatial Ecosystem Modeling
http://kabir.cbl.umces.edu/SME3/MetaModelsF.html

****Integrated Modeling and Valuation of Patuxent River Watershed**
http://kabir.cbl.umces.edu/PLM/Welcome.html

****Landscape Modeling in the Florida Everglades**
http://kabir.umd.edu/Glades/ELM.html

Note: The Center for Natural Resources wrote this summary based on Dr. Costanza's presentation.

Keynote Lecture, June 9, 1998

Senator Jack Latvala
The Florida Senate, Senate District 19

(Video Available, Click Here)

I have found in the past two years that the environment is not a partisan issue. I came to the Natural Resources Committee and the environmental issues before our legislature by accident. I was a business person with a very heavy political background. I chose the Natural Resource Committee, because I was interested in fishing, and had seen a steady decline in the fish off my dock. Originally, I had asked to be involved in salt water fishing issues, but I gradually became involved in many other issues and was appointed Chairman of the Florida Senate Natural Resources Committee.

As a business person, my other interest was economics. The environment in Florida is a big economic issue, the key to our growth and development as a state. Our number one industry is the environment which we project to tourists and people who migrate here. They like our beaches, our rivers, the Everglades, our lakes, our natural environment. Thus, the environment is a business issue. As we look at promoting Florida's business interests, it's important to look at the environment as a piece of that package. Two years ago, I was appointed Chairman of the Natural Resources Committee. In that time we've tried to walk down the middle path, striking a balance between business and environmental issues.

We have had several positive accomplishments in the last few years. Clearwater, in my area, has the first Brownfield pilot project in Florida to be acknowledged by the Federal Government. It is in a minority, low-income area in my district. There used to be a lot of industry there, but now it is a lot of abandoned buildings. They asked me to be involved in creating a legislative package and design a mechanism for the redevelopment of those sites. We came up with a bill that brought business and industry into the environmental clean-up of those underutilized lands in the Brownfield Redevelopment Act of 1997.

In the area that I represent, there is no drinking water under much of Pinellas County because of salt-water intrusion. There are a number of bad Brownfield sites with no water wells on them. Under the old law, water had to be cleaned up to drinking water standards even thought there were no water wells around. Now with the Brownfield Act and the mechanism we put in place, the water has to be sufficiently, but not unreasonably, clean and thus industry is more likely to take on the clean-up.

In the first year we established a mechanism and in the second year we introduced incentives to try to get businesses involved. We set up a loan guarantee fund so that an industry that wants to take an old building and rehabilitate it can go to the state and get a partial guarantee of the loan. We set up a revolving loan fund where developers or local government can clear the title to some of the orphan lands that are out there, including old filling stations and land that is so contaminated people cannot even give it away. We have also put in place tax incentives and tax credits for people who want to voluntarily clean up using their own money.

The Dry Cleaning Contamination Clean-Up Program had become like a black hole over the past years. No one could put a dollar figure on how much it would cost to clean up the sites, because it was an open-ended program and sites could be added *ad infinitum*. This year we have closed off the program, put in a risk-based mechanism for the clean-up of dry cleaning sites, and made other efforts to promote that program in general.

On the marine resources, we have slowly added teeth to the Amendment of 1994 to limit gill netting. The commercial interests are very strong, but every year for the past three years we have taken additional steps such as finding where gill nets are, putting penalties in place, and attempting to stop poaching.

I know each of you understands the importance of water and proper planning for our water resources. Twenty-five years ago when we should have been doing planning, we were not and the water situation reached crisis proportions in the Tampa Bay area right when I came to office in 1994. In Pinellas County where only 40% of the water we use comes from under our county, it is particularly important. Wells and lakes were drying up from overpumping. Last year we passed a major comprehensive Water Resource Bill that mandates the water management districts to do the things they were told to 25 years ago and establish minimal water flow levels on a five year planning horizon. If we build roads on a 5-year planning horizon it also makes sense to develop water resources in the same fashion.

Tomorrow in a historic agreement, the Governor will sign the legislation in which, by democratic vote, all three counties in the Tampa Bay area will pay the same price and all get water from the same supply. We are all in the proverbial tank together. We sink or swim together in the future. This will bring a much more regional approach and perspective to solving the natural resource problems we have.

Additionally, the "Local Sources First" legislation puts into statute the legislative intent which mandates that people use their water locally before looking any place else. A partnership agreement with the Southwest Florida Water Management District will put in place the alternative sources that we have lagged behind in developing over the last few years and undercut our reliance on underground pumping.

Some shortcomings of the few years include not getting an extension on the Preservation-2000 Land Acquisition, failing to make any changes with the Oklawaha River, and not passing any significant legislation on the Everglades. Governor Lawton Chiles did, however, veto a measure promoted by the sugar companies that would have been harmful to the environment.

The dynamic of the decision-making process of Tallahassee is changing and has changed. We now have a legislature that is comfortably in conservative, business-oriented control. It happens to be Republican, but there are a lot of conservative Democrats that also assist in doing some of the things that the business and industrial community like to do with regard to the environment. The dynamics over the past year or two are that the House of Representatives has been the most oriented to the business, industrial, and agricultural communities. The Senate has been more in the middle trying to bring compromises between those communities and our environmental needs. And the Governor has been the traffic cop to stop or threaten to stop things that are really bad and force us to make compromises in the Senate.

This system has worked fairly well for the past two years. But what I want to dwell on is the future of that decision. If "the creek don't rise," we are going to have a government starting in January that is controlled 100% by Republicans, conservative Republicans. Right now we have a Republican candidate for governor who is 13 points ahead in the polls; there is potentially no traffic cop on the other end demanding a compromise between business and industrial communities and the environmental community. This is not to say that I think Jeb Bush is going to be anti-environment, in fact the opposite. We have worked with him and gotten him to support some things such as Preservation-2000, but I think it is going be much easier in the future for business and industrial communities to get their legislation passed and signed.

One thing I have learned from my time on the Natural Resource Committee is that the environmental community and the environmental activists have not learned how to compromise. This year we had a few examples. I thought the time and political climate were right to pass P-2000. I think we should be able to use those lands and put water wells on them, but the environmental community sees many of these small concessions as major stumbling blocks. Some people want all or nothing, they are only willing to go through with it if it is 100% their way. I do not see how that will help the state of Florida with Preservation-2000 or in general. We need to find the right balance. We have to look at the big picture, the

change in political demographics, and the taxpayer's opinions, and then make what headway we can.

As we continue to promote the growth and healthy business climate of Florida, it is important to understand we have to find the right balance. We have to draw the lines on certain things, our natural treasures—the coastal areas, the Everglades, St. Johns River, and Lake Okeechobee—but before refusing to permit some timbering in a big forest out in the middle of nowhere, we need to think twice.

I want to leave you with the thought that government is changing, and that we need to look at the big picture and not all the little ones when we make decisions in the best interest of our state.

Note: The Center for Natural Resources wrote this transcription of Senator Latvala's presentation.

Environmental Issues and Legislation: Creating an Agenda for the Future
Keynote Lecture, June 10, 1998

Jon Mills, J.D.
Founder and Director, UF Center for Governmental Responsibility

(Video Available, Click Here)

As I stood in the middle of the Atlantic rain forest in the coastal Brazil State of Paraná, these words came to mind:

"Do not mess with Mother Nature or She will get you."

As we look at environmental policy for the next millennium, there are several "Do's" and "Don'ts" we need to keep in mind:

The next generation needs to remember to try to exert less command and control of the environment. They should keep in mind the successes of their predecessors with such projects as the Vistula River.

We must be careful not to lull ourselves into thinking that there is a "scientific genie" who can solve all the problems that we have brought upon ourselves. No genie, only Nature, can supply hard-to-replace resources such as air and water.

We must be equally careful not to believe in past trends. After all, Florida would not be like it is today if it were not for unforeseeable events such as air travel, mosquito control, air conditioning, Fidel Castro and Walt Disney. Who, of those living in 1845, would have ever thought that Florida could be anything but uninhabitable? And in 1943, the chairman of IBM said, "I think there is a world market for maybe five computers."

We must also not let ourselves believe that price signals will be sufficient to conserve vital resources such as water and clean air.

Here are some basic principles I would like all of you to keep in mind for the future:

1. Environmental issues are broader than governments and corporations. Such issues will require more and more multijurisdictional agreements concerning sovereignty, etc. over the natural resources in question.

2. Science and Policy MUST work together. We need to stop thinking that we can control nature. We must ALL work together and remember that we cannot fool science or nature. Ultimately, whether we like it or not, we cannot make environmental policies that would dictate results in opposition to the laws that govern science and nature. It is imperative that we develop systems in which science and policy makers work more closely together.

3. We must learn to make decisions with interdisciplinary considerations, decisions that take into account such fields as science, trade, economics and international policy as well as the environment and natural resources. We must accept that this will be a very complex phase in the development of successful environmental policies. Keep in mind however, that, as we globalize the economy, we will globalize environmental issues. (Mexico tuna policy)

4. We will have to determine the role of the developed world in establishing global environmental policies. Are we going to lead, conserve or dictate? We must recognize all the issues that are linked to any given environmental issue and bring those to the table as well when we develop any future policies.

5. While we can use our common sense to develop some of the solutions, such as mitigation, easements and buying land, we also need to remember that penalties do not always work and that enforcement of a policy is as critical as the policy itself. It is equally important that we recognize the logical arguments of opponents and seek to develop coalitions among all kinds of environmentalists, uniting tree huggers, redneck ECO freaks, cocktail party environmentalists, poll respondent environmentalists and NIMBY environmentalists.

Now is the time to seek the values and a vision that describe the issue. That is, how do we make sense of reality? How do we describe this issue of the environment? As a legacy for future generations? As a way to make life better for the rest of the world? Will some people have to be made worse off in order to make someone else better off? Should the environmental issue be one of aesthetics? Of economics? Of survival? We must help to define the issues in a way that is real and relevant.

I remain an optimist. I believe that complexity is not a bad thing and that the internationalization of many diverse issues can have a beneficial impact on environmental issues.

We should be inspired to work on issues larger than ourselves.

We should create a vision that recognizes the value of natural resources to our basic well-being and survival.

Being part of nature is part of being human.

When the wind and trees are no longer part of the human spirit, then we are a kind of cosmic outlaw.

I think we must think in terms of basic values. We should be willing to plant the seed to grow a tree that will shade our grandchildren. That is something we should all be able to believe in.

Keynote Lecture, June 10, 1998

Terry L. Rice, Colonel (Ret.), Ph.D., P.E.
US Army Corps of Engineers

(Video Available, Click Here)

I did not realize the problems we face in this region. Although we are at a different level of development, the issues are the same as in any less developed country; how to live in harmony with this world and have a smooth interface between protecting the environment and developing economically. If we cannot solve these problems here at home where we have people who understand the problem, who recognize the problem, who are bringing resources to the table, and who really care about the resources, how are we ever going to be able to solve them in the developing world? We have an auspicious situation. Maybe our role is to make an example here and spread it to the rest of the world.

Florida's 5.5 million current residents are projected to grow to 15 million by 2050. Can we ever be successful with restoration when we cannot catch up with all the people who are continually destroying the environment? As we mentioned yesterday, you have to have growth management that accommodates not only the environment, but people's growth. Right now we do not have a system that allows that to happen.

As an engineer, I organize my thoughts using models. The themes of the Forum keep coming back to the "institutional model." This model essentially says: The institution at the foundation of what we are trying to do is science. You have to know what the truth is. Then we have education, so people can understand what the truth is. Then those people are supposed to elect officials to carry out that truth, set the policies, establish the laws. Then managers are supposed to go out, execute, and implement the laws the policy-makers have promulgated.

This is not how things work right now. All the Forum discussions seem to be trying to figure how science, education, policy, and management are they linked. How do they work together, how should we proceed in the future to ensure they are working harmoniously? Much of the time you get policy makers implementing things not based on science, not based on an educated population. That is not a clear, sustainable path to the future. We are making some progress, though.

PROGRESS

There are three things I like to identify that are helping us make some progress in South Florida.

1.) A HOLISTIC APPROACH: You have to look at a whole ecosystem. I can give you numerous examples in South Florida where we have messed up because we have tried to solve one problem and ended up creating another. One example is draining agricultural lands, pumping water to Lake Okeechobee, and raising phosphorous levels. With the Everglades, 18,000 sq. miles, you have got to look at the whole thing at one time. It is a big area. You do not just look at one aspect of that. If you do not know how that effects the rest of the system, then you had better be careful of what you are doing.

The Army Corps of Engineers went through a process to develop the South Florida system back in 1948. Through 1969, we had done flood control, addressed water supply, and prevented salt water intrusion, but we did not know much about environment, because we sure messed up. In 1992, Congress passed two resolutions and a law directing the Army Corps of Engineers to figure out the entire ecosystem and tell them what should be modified for the environment plus take care of those other initiatives that were part of the project. Before that, a project like that was unheard of. The Corps of Engineers typically does one little thing here and one little thing there, continuing to mess things up. Congress directed this. All at one time simultaneously. In July 1999, there will be a report submitted to Congress telling how the Corps and all the stakeholders believe that the system should be restored.

2.) TEAMWORK: We need people working together. The Corps used to be famous for going out to do something. This is what we are going to do for you, and at the end you are going to like it. Unfortunately that does not always work well. Not only do you send the wrong perceptions, but you get the wrong results. In September 1993, in a watershed moment, Secretary Babbitt established the Federal South Florida Ecosystem Restoration Task Force bringing together six agencies in Washington, DC; the Department of Army, Interior, Agriculture, Commerce, Justice, and the Environmental Protection Agency. He directed them to go out and work together. The working group meets every month except August. That working group was later followed up by the Governor's Commission for a Sustainable South Florida. We want to make sure economics, policy, public and private sectors, and environmentalists are in there to be sure that all of it is working together for a sustainable South Florida.

3.) ADAPTIVE MANAGEMENT: A.) Do not build things for only one level of operation. Build in flexibility. B.) Take a little bit and try it first. If you're going to fill in the Kissimmee River, try it, do a test plug of the 25 miles. Do all kinds of monitoring to make sure it works. We have done that this time, and in March of 1999 we start the full scale moving of dirt back into the Kissimmee. C.) If you are going to spend a lot of money, you need to have a high probability that it will work. There are things such as Lake Okeechobee that I have a hard time looking at without seeing the whole plan. We have boxed ourselves into too many canyons, and we need to not do that in the future.

CHALLENGES WE ARE GOING TO FACE IN THE FUTURE

1.) ACCOUNTABILITY—When you cannot find accountability in this process, agencies and people from agencies can do things and be wrong. If you do not have accountability in process, people get away with murder and no one even notices. Lake Okeechobee at its highest levels ever—that kills the littoral zone which is important for biological productivity; it is dangerous for the levee because it was built in the 1930s when they did not have the best engineering techniques. The water has been well over historical levels, and is even backed up into the Big Cypress Swamp where it has killed pine tree islands. Water is being pushed out into the estuaries, and endangered species have suffered. Freshwater pollutes the estuaries which is evidenced by lesions on fish in the Indian River Lagoon and the Caloosahatchee. This is all because people have not done their job. The system is suffering, because people are not being accountable for what they have to accomplish.

2.) SCIENCE: Science loses its vote in this process. I can give you some sterling examples of how it is working very, very well, but still yet for the most part there is an inability on the part of science to vote on the critical issues that are out there. When I went to the scientific community for information to make a permit decision, six different scientists would give me six different answers.

Unfortunately the culture of science is hard to bring into the real world. The scientific community frowns on applied science. It is not only in the universities, but also in agencies. They reward people for publishing papers on esoteric things that do not really apply to the real world. Now the question becomes, how do you change all that, how do you get science into the fray?

The scientists could come together internally. How can we as a community be a part? I have always had a dream of a Supreme Court of Science in which scientists could say things without fear of losing their jobs, give their best estimate or guess. Whether scientists come to me with a minority or majority opinion, or with consensus, that helps me make a decision. Something needs to be done so science is in the process.

3.) EDUCATION: I have been doing work in the Everglades for four years, and it is the same 500 people in different permutations, rolling up their sleeves and getting down to business—scientists, engineers,

managers and reporters. Maybe 5000 have some understanding; they are interested and know what needs to be done. Then there are the rest of the people. They are not well informed, they do not understand. They think the Everglades have been saved. Marjorie Stoneman Douglas received over 100 letters on her108th birthday, and over 90% of them said thank you for saving the Everglades. People do not understand what this is about. They do not know what the truth is, they do not know how important it is. The Everglades is not saved. It is a subtle problem, it does not kill you overnight; but it will kill you some day. Your tap works and everybody is happy. Water does not disappear overnight; whereas crime, education, and illegal immigration are with us here every day.

We have to do better at educating people – they have to be able to vote with informed discretion. Education is essential to our future and we need an army of support.

4.) LINKING LAND-USE PLANNING WITH CONSERVATION PLANNING: We do not have a system that allows us to easily link land-use planning and conservation planning. As a regulator, in this Everglades restudy, we are trying to save about 1.7 million acre-feet of water a year. We are pushing it out to the ocean now, but we want to save it, keep it in the aquifers, and use it. There are counties out there rezoning the land for commercial purposes even as we are trying to buy it. They are driving the prices sky high. You never can get ahead of the game. They are not on the team.

In Southeast Florida people build on the coastal ridge, move west, and then what do they do? They dispose of it. It is too polluted to live in anymore. It becomes slums. Our land is not disposable, we cannot treat it like beer cans. We have got to slow down on the development. If I had my choice, when I was the District Engineer, I would have required every county and city to submit their plans to the Corps of Engineers for a 404 permit. That would ensure it complies with Endangered Species, Clean Water, and NEPA. What we are doing now is just applying bandaids. We need to make sure we are mitigating properly, not destroying wetlands, and being careful of endangered species. We cannot do it piece by piece.

A few years back the Governor published an executive order directing the Keys to perform a carrying capacity study. It is a paradigm shift to look at every component of what limits capacity — water quality, schools, roads, habitat, how people want their community to look. Carrying capacity is not going to be a definite amount, it is how much you want to pay for it, how much you can withstand, what quality of life you want. The Corps of Engineers has put up through the Critical Project Program part of the '96 Watershed legislation $3 million dollars that the State is going to match. It is happening, and I hope it continues, because it is the key to the future of Florida.

Those are the 4 keys to the future—accountability, science, education, and linking land-use planning and conservation planning. If we cannot do those and be successful, all the restoration we do will mean nothing. I think this is an extremely exciting business as I am sure most of you also do. I do not think there is room for pessimism, because if we do not do something our children, our children's children or somewhere down the line we are not going to have a place worth living in.

I think some of the things we are grappling with here in Florida are going to hopefully show the way if done properly. As Marjorie Stoneman Douglas said, who recently passed away: "The Everglades is the test, and if we pass, we may get to keep the planet." I believe there is a lot of truth in that. As we move into the future, we need to do the right things here in Florida and other places where we have all these pressures and resources and people coming together trying to solve problems. That way we can set the trend and the tone as we move into the future everywhere we work. It is that important to me, and I think, hopefully to all of you.

Note: The Center for Natural Resources wrote this transcription of Colonel Rice's presentation.