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EXTENSION PROGRAMS IN
NATURAL RESOURCE ECONOMICS

by

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Since at least the 1930's, University of Wisconsin faculty have been conducting extension programs in natural resource economics and policy. Some of the resource issues of that day are not very different from those of today: Should the public regulate private land use decisions? Should the public sector subsidize private forestry or forestry investment? How much land should be devoted to state-owned parks or forests? Natural resource economics is a very ancient subject-area for agricultural economists and extension programs in the Land Grant University System.

Although the subject matter may not have changed drastically over the past half-century, it is certainly clear that the nature of extension programs has changed dramatically -- if nothing else, the state specialist's grand tours of the state by rail have gone the way of the dinosaurs. It is useful, at least occasionally, to try to gain some perspective on the work of one's profession, so the remainder of this paper will be a response to the following questions:

1. What is natural resource economics?
2. What is an extension natural resource economics program?
3. Who is the audience (users) of these programs?
4. What are the appropriate goals of a natural resource economics extension program, with respect to the audience?
5. Where does one reach this audience?
6. Where does one find the substance of the program to deliver?
7. How can "success" in a program be recognized?

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The answers to these questions will define the substance of natural resource economics extension. After a half-century of work it is not inappropriate to reflect on the answers.

WHAT IS NATURAL RESOURCE ECONOMICS?

Natural resource economics is a sub-discipline of economics, and there are no economic concepts that are exclusive or unique to the field. It is more useful to define natural resource economics by what natural resource economists do, which in turn highlights the type of economic concepts which natural resource economics uses heavily relative to other sub-disciplines of economics.

One small branch of natural resource economics is akin to traditional farm production economics and marketing, where the products happen to be natural resources or very tightly tied to natural resources, and where the focus is on the producer and the production unit. Parts of forestry economics, work with timber producers or mills, are good examples. Another small branch of natural resource economics concerns the monitoring and analysis of markets for natural resources, such as the markets for land or forest products.

Most of natural resource economics deals with institutions. Institutions are the rules that structure the interaction among economic agents, such as the rules defining what constitutes property, the rights and duties of the owners of various types of property and how various owners may interact in the market and in the legal system. Institutions define the market and provide the structure by which economic activity occurs. Much of natural resource economics deals with institutions, and more specifically, the implications of institutions or institutional change on natural resource use. Much of the "policy" orientation of natural resource economics is in fact a focus on institutions and proposals for change in the rules by which economic interaction occurs.

The focus of natural resource economics on institutions is tied to the preoccupation with market failure that characterizes most natural resource economists. Various forms of market failures are closely associated with natural resources, whether because of the physical and biological nature of the resources or the institutions which have historically governed their use. Institutional change is usually focused on some form of market failure. Natural resource economists are unique in their focus on market failure and institutions -- most other sub-disciplines of economics focus on the activities of economic agents within the structure of existing institutional rules that define the market. Natural resource economists tend to focus more on the rules that define the market, rather than the actions of economic agents within those rules. This interest in the rules governing human interaction in the economy arises because natural resource economics is replete with cases in which the private market fails to allocate resources efficiently, or cases in which the society rejects the outcome of the market even though it may be functioning perfectly.

Three types of market failure dominate natural resource economics. The first, and most widely discussed, is externalities. Although it is impossible to give a thorough discussion of the externality literature here, it is important for extension work that the essence of the economic theory of externalities is the issue of property rights in resources. The issue, at its most fundamental level, is who has which rights with respect to natural resource

use. For example, who has the right to use of the air resource? Does the manufacturer have unlimited right to use of the air to dispose of industrial wastes, or does the public have a right to some level of pollution-free air? Does a landowner have the right to unilaterally decide to develop land that is in a river floodplain, or is that right jointly held by the owner and the public? These are the types of externality issues that often become the subject matter of extension programs. And, most important, economic theory cannot be used to give an unambiguous answer to the question of the best distribution of property rights.

A second type of market failure that dominates thought in natural resource economics is the distribution of resource use over time. The temporal pattern of resource use is extremely important with respect to stock resources and for flow resources with a critical zone which can be depleted over time. The selection of an appropriate discount rate for future net benefits has been widely discussed in resource economics for many years. The inter-generational distribution of resource use and benefits is a central theme of resource economics.

A third type of market failure that is widely discussed in natural resources is the provision of public goods (or quasi-public goods, or more generally goods that are not valued in the market). If a good is not traded in markets, then the price system fails to record its value to the society and registers, in effect, a zero price. Under these conditions less than the optimal amount of the good will be provided and the problem for natural resource economics is to somehow assign value to these goods or to devise some appropriate mechanism for their provision.

A fourth type of market failure that provides much of the subject matter of natural resource economics is not a failure of the market mechanism per se but a rejection by the society, or some segment of the society, of the outcome of the market process. The market may function perfectly but result in a pattern of resource use, a distribution of resource benefits, a level of exploitation of the resource, or a pattern of resource ownership that the society, or some groups in the society, feel is inequitable, unjust, or otherwise unacceptable.

Many natural resource economics topics or issues are a mixture of this type of performance failure and one or more of the other types of market failure. For example, the recent debate over land use policy contained arguments that farm and nonfarm land uses are incompatible when mixed in the same area (externalities), open space is needed on the urban fringe (some externality and some public good characteristics), agricultural land and open space should be preserved for future generations (allocation of resources over time), and a rejection of the basic urban form that results from operation of the market in land and housing (performance failure).

Perhaps the most important fact for natural resource economics extension is that neo-classical economic theory cannot be used to derive the optimal pattern of resource use. The resolution of the externality issues hinges on the definition of property rights, one of the rules of the game for the market system and something that is taken as given in neo-classical economic theory. The resolution of the public goods problem depends critically on whose preferences count in the decision-making or valuation process and there is no theoretically- correct specification of the process. The allocation of

resources over time depends on the weight given future generations' consumption relative to that of the current generation, a matter appropriate for ethics but not answerable with neo-classical economic theory. Finally, the concept of performance failure itself implies that the society rejects the outcome of the well-functioning market, but the question of who speaks for the society cannot be resolved using neo-classical economic theory.

Inevitably, natural resource economics is drawn into the realm of political science and the subject matter of institutional economics, where the "rules of the game" that establish the market are themselves established, and where the process for making decisions about resource issues is set. The contribution of the natural resource economist is to bring the concepts and tools of institutional and neo-classical economics to the discussion of natural resource institutions and policy issues. The issues that are the subject matter of natural resource economics are often resolved or addressed in the public arena, in the political system, as well as in the economic system. Thus, the natural resource economist is often dealing with matters of public policy interest in which the values and interests of different groups are in conflict. Ultimately, the choices are made in the political system. The natural resource economist who works in extension uses the concepts of the general economist but works in the policy arena.

WHAT IS NATURAL RESOURCE ECONOMICS EXTENSION?

Natural resource economics extension is the "reality trip" for natural resource economics. The subject matter for natural resource economics extension is essentially the same as that of the natural resource economist who conducts applied research, and in fact it is often the extension natural resource economics specialist who conducts the research used in the natural resource economics extension program. But the extension work is the "reality trip" because the differences in values or the interests of different groups cannot be dealt with in the abstract -- the people are real and usually present when the natural resource economics extension specialist is at work. The simplifying assumptions about the relative value of resources or the relative magnitude of the interests of members of various groups are much more difficult to make in the thick of the policy debate. In short, the natural resource economics extension specialist is forced to rely on the basic principles of natural resource economics and to deal directly with the differences in values of different individuals or groups.

A second important differences between natural resource economics extension and natural resource economics theory or research is that, in the real world, very few issues are "pure" natural resource economics issues. Usually a natural resource economics issue arises in the public policy arena as a mixture of a natural resource issue and economic development, farm management, public finance, or other sub-discipline within economics. For example, many forestry issues arise in connection with the management of public lands and the local employment effects of different management strategies. Discussion of groundwater pollution from farm chemicals must involve farm management principles in the analysis of the effects of the use of different chemicals or of different regulations on farm operations and income. The land use policy debate over farm land use and urban sprawl involved public finance because one of the main policy options debated was the differential assessment of farm land

for property tax purposes. This mixture of natural resource economics and other types of issues makes the natural resource economics extension program a hybrid of natural resource economics and other fields of economics.

Natural resource economics extension is almost always conducted in the context of a policy debate. The "teachable moment" arises because groups with opposing interests or values realize that there is conflict over resource use and that the conflict will be resolved (or at least addressed) in the public arena. Thus, the natural resource economics extension specialist is involved in the policy debate in almost all cases, because it is the debate which creates the interest in an audience for the natural resource economics extension program. So, natural resource economics extension deals with the same subject matter as natural resource economics research, except that the work is almost always in the policy arena, closely tied to the public decision-making process.

WHO IS THE AUDIENCE FOR NATURAL RESOURCE ECONOMICS EXTENSION?

The audience for natural resource economics extension is different from the typical rural or agricultural audience of most other extension programs. Because natural resource economics extension programs deal with natural resource issues that are matters of policy interest and debate, a wide variety of interest groups are included. Almost by definition, a natural resource economics extension program is not limited to farm people or groups. For example, a land use policy program typically involves farmers, city property taxpayers, environmentalists, city planners, segments of the urban business community (real estate and development interests), natural beauty advocates, and numerous others. These are the groups with different values or different stakes in the issue, and these are the groups that will form the audience for the natural resource economics extension program. Any attempt to limit the program to the traditional farm audience would be inappropriate and would risk attack from the interest groups excluded.

The audience is partly defined by the issue -- who's affected and wants to know -- and partly by the natural resource economist -- who needs to know but is not aware of the issue or their stake in it. In any natural resource economics extension program there are the usual questions about audience, such as: (1) Should the program be designed for a mass audience using a mass media approach, or should it be focused on a smaller number of strongly-affected or highly-aware leaders? (2) Should the program attempt to develop an in-depth understanding of some aspect of the issue or a more broad understanding of the economic and public policy principles involved? (3) Should the program focus on the general public or should it be designed for those with decision-making authority or influence? The answers to these and other questions about the appropriate audience are not possible to develop in the abstract but depend on the specific issue, timing, the financial resources of the extension program, the level of public interest, and a variety of other factors.

WHAT ARE THE GOALS OF A NATURAL RESOURCE ECONOMICS EXTENSION PROGRAM?

Obviously the goals of any program must be designed specifically for the policy issue, the context of the policy debate, and the audience. In general, the goals of a natural resource economics extension program should be to promote

a better understanding of the issue by helping people understand the economic principles involved. The most useful context is often to pose the policy alternatives and their consequences, and to teach the basic economic concepts during this discussion. The goal is to help people apply the basic principles of economics to the natural resource issue under consideration. The basic principles of economics include those of institutional economics as well as those derived from neo-classical theory.

The situation in initiating a program is rarely so clear that the teaching process can begin with alternatives and consequences and proceed to illustrate the basic principles of economics. It is necessary to start with people's own concerns and values, and their own definition of the issue. Often, the main job of the natural resource economist is to help people understand that the real issue is quite different from what they imagine it to be, but this learning process must begin with the issue as defined by the audience, not the issue as defined by the natural resource economist. In most cases the values of people are closely tied to their perception of the issue, and what they regard as "fact" may be greatly influenced by their values. Part of the job of the natural resource economist is to help people separate their values from the facts surrounding the issue. This separation will not only help people better understand the issue but will also help them recognize the trade-offs in policy options more clearly. The goal is to work toward a better understanding of the issue, the trade-offs inherent in the policy choices, and some notion of the opportunity costs involved.

HOW IS THIS AUDIENCE REACHED?

The means of reaching the audience obviously depend on how the audience is defined. If the audience is the general public and the goal is to reach as many people as possible with a relatively straightforward message, then the print and electronic media are appropriate vehicles and the natural resource economics extension specialist uses his/her contacts with the press, radio, and television media along with the media resources of the University. On the other hand, if the audience is elected officials, then the natural resource economist must use personal contacts to gain an entrée to the relevant decision-makers. Writing is important, both to use as a teaching aid and as a means of gaining the visibility on the subject which may be necessary for an entrée with the appropriate audience. And, the process of writing forces one to clarify the ideas and sharpen the analysis of the issue, a good (if painful) source of discipline.

HOW IS THE SUBSTANCE OF THE PROGRAM DEVELOPED?

The substance of the natural resource economics extension program is derived in a variety of ways. First, basic economic principles almost always form part of the substance, although neither the natural resource economists nor audience may identify them as such. Applied research projects often provide part of the substance for natural resource economics extension programs, although it is often the natural resource economics extension specialist who has generated the applied research results which he/she then uses in the extension program. Extension programs in other states on similar issues are a good source of materials, often well-adapted for immediate use.

In many extension programs the research base is developed by a research specialist and the results are provided to the extension specialist who plans a program of meetings, bulletins, or other activities several years in advance. This model is not as useful in natural resource economics as in other fields. First, it is most appropriate to have the natural resource economics extension specialist do research himself/herself, because: (1) the specialist's understanding of the issue will be much deeper in this way; (2) the specialist will have more flexibility to adjust his/her research agenda to the changing needs of policy than will other researchers who may be pursuing more basic topics or who are less able to make rapid shifts in time allocation to a topic as it nears the political agenda. In addition, the usual cycle of extension program planning is not appropriate for natural resource economics extension because: (1) natural resource economics extension is policy oriented; (2) the program must start with an issue as people define it, so the definition of the problem cannot be predicted years in advance; (3) the program must be available when people are ready to learn, which is a function of when the issue reaches the political agenda, which is unpredictable years in advance.

HOW CAN SUCCESS BE MEASURED?

How to recognize success or evaluate a natural resource economics extension program is a difficult question, but an important one to address. The most useful way to address the question is to ask "Who cares?" about the impact of the program. One possible answer is that the natural resource economics extension specialist cares about the program's success. If this is the driving force behind evaluation, then the forces will be on improvement and learning rather than on documentation of results. The natural resource economists can design his/her own evaluation to learn whether the audience learned the most important points, or whether the program addressed the issues in a way that was meaningful to the audience. This type of evaluation is likely to be less formal or statistical than most evaluation studies, is likely to use smaller numbers of respondents, is likely to be conducted at an early stage of the program and be repeated frequently, will focus on improving the program, and will be designed to convince only the natural resource economist, rather than others, that the objectives are being met.

On the other hand, it may be that University administrators "care" about measuring program success, success as defined by the administrator rather than the specialist. The key question for the natural resource economist is whether the administrations' definition of success is appropriate, whether the goals are compatible with his/her own. If so, the natural resource economics extension specialist can proceed much the same as if he/she were designing the evaluation. If the administration's definition of success or goals for the program are not appropriate, then the specialist is best advised to tolerate the evaluation but design a more meaningful evaluation to implement independently.

It may be that legislators or other state officials "care" about the results of the program. If so, it may be best to emphasize case studies from areas known by the officials and involving individuals whose opinions and judgements are trusted by the officials. In any case, the evaluation of a natural resource economics extension program should not be undertaken just because it is fashionable to evaluate programs, and the specialist should not assume that a rigorous statistical evaluation is best, or that an evaluation

that would convince him/her of the program's success will necessarily convince anyone else.

SUMMARY

Natural resource economics is dominated by the study of the role of institutions in determining or influencing natural resource use. The institutional focus of natural resource economics results from various types of market failure and the need to address the rules by which market economic activity is organized. The areas of concern most often emphasized are externalities, public goods (or non-market-valued goods), allocation of resources over time and distributional results of the market process. Because these types of issues are usually resolved in the public sector, natural resources is closely tied to the economics of public decision-making and the politics of the policy process.

Extension programs in natural resource economics involve these same issues and concepts and are distinguished by the fact that the conflicts of values and interests are immediate and pervasive. Almost always, natural resource economics extension programs are closely tied to the policy arena and are conducted as the policy debate proceeds. The audience is determined by the nature of the issue and the timing and nature of the policy debate, but the audience is almost always broader than the traditional farm and rural audience of most extension programs. The goals of natural resource economics extension programs vary with the issue and the needs of the audience but generally include a better understanding and application of economic principles to the issue at hand. The techniques for reaching the audience vary with the issue, the type of audience, the timing of the issue and the financial resources available. The subject matter for natural resource economics extension programs comes from the research base of the University and other organizations and is often supplied by the specialist or his/her counterparts in other states. Evaluation of natural resource economics extension programs is useful and important but the design of the evaluation, the definition of success and the appropriate methodology depend on who cares about success or who needs to know about the results of the program.