RESEARCH CONTRIBUTIONS TO WATER RESOURCES DEVELOPMENT

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Research is the process of evaluating the outcomes of alternative procedures or actions. It implies that some optimum, or ideal is an objective. In water resources development, the objective may be the total satisfaction of society, or a maximization of monetary gain to the individual. Therefore, we are concerned both with the general public and the individual, the different objectives of the individual and society may not be consistent and result in conflicts of interest and of action.

In my discussion I am making several underlying assumptions. They are: (1) That the demand for water is increasing rapidly and will continue to increase; (2) the supply of usable water is not increasing at the same rate as the demand; and (3) the cost of developing additional usable water will increase. Thus, demand, supply, cost and efficiency in water use are important.

These assumptions lead us to the problems which require research for their solution. My immediate concern as an agricultural economist is the economic implications of these problems, and therefore, I will talk about economic research.

I will discuss these problems under three general headings: (1) Problems associated with increased demand for water, (2) problems associated with the development of increased supply of usable water, and (3) problems of conservation and use of water. These three types of problems are not independent of each other and the study of one necessitates some evaluation of the other.

Economic Problems Associated with the Demand for Water

Research and investigations are needed to estimate future water needs. Demand for water results from our needs for such things as: (1) food and fiber, (2) industrial or manufactured products, (3) recreation, etc.

We need research to test alternative criteria and methods of allocating water among uses and users. The uses are usually multiple in nature and form a complex problem of allocation. The problem is complicated even more because the source areas of the water supply are usually a complex of private and public ownership patterns. Furthermore, some uses are competitive and other complementary. Competition

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for water arises between two or more public uses, between the public and the private uses and between private individuals or firms. Examples of the uses are: (1) domestic, (2) industrial, (3) irrigation, (4) power, (5) recreation, etc.

We need research to determine and test improved alternative methods of measuring benefits from, or putting values on water development and use including: (1) Direct and indirect benefits, and (2) the calculation of present values on future products from water use. Public and private decisions can be more accurately made if our methods of evaluating these benefits can be improved.

Economic Problems Associated with the Development of an Increased Supply of Water

We need a more complete survey of the potential water supplies. This is not economic research as such but is basic to economic research.

The questions of how, when and who should develop water resources needs further study. There are, of course, several alternative ways to develop water resources and we need to know which alternative will result in the most efficient development of water. Many questions need answering. Examples are: (1) Should public agencies do the developing, if so at what level of government? and (2) What part should the individual play in water resources development?

Research is needed to evaluate alternative organizational arrangements that will lead to efficient water development. The alternatives may include: (1) More local participation in planning and development, or (2) ways for local groups to participate in cost sharing.

Alternative methods of cost sharing need to be evaluated. The following questions need answering: (1) If benefits can be determined, should cost be assessed on this basis? or (2) Should costs be assessed on the basis of ability to pay? and (3) What other methods of cost sharing will lead to most efficient development of water?

There are many legal problems associated with increased supply of water. Our legal structure has an effect on who develops water and the rate of development. In most states of the West, we need to take a good look at the legal structure governing water development and use. Much has been theorized on the two major categories discussed above. We need more theoretical discussion but also we need some imperial testing of these theories.

Economic Problems of Conservation and Use of Water

This type of problem is more or less associated with the individual. In the agricultural section of our economy, the problem is primarily concerned with the efficient conveyance, application and removal of water.

More specific examples are: (1) The economic evaluation of new and improved methods of water conveyance, (2) the economic evaluation of methods of water application for different climatic and physical land situations, and (3) the economic evaluation of different methods of water removal or drainage.

Many of our action agencies have been recommending methods of water use and management without the economic evaluation of costs versus returns. Many new water conveyance and application techniques need to be tested. Much work is needed in this problem area in the form of economic evaluation of the different techniques.

Economic Research of the Land Grant Colleges

In 1950 a regional committee of agricultural economists was set up to discuss problems and develop research projects in the area of water resources use and development that could be financed by federal money appropriated for regional research. As a result, several regional research projects have been initiated. They are: (1) Economics of Alternative Methods of Water Application, and (2) Economics of Alternative Legal Arrangements in Ground Water Development.

Three more research projects are being considered for regional activation, they are: (1) Economics of Reorganization and Rehabilitation of Irrigation Projects, (2) Economics of Small Watershed Development, and (3) Economics of On-Farm Use of Irrigation Water. In addition, individual states in the West have initiated research in many of these and other problem areas.

Several other research groups in the West have been interested in water development problems. In recent years, groups of economists, sociologists, political scientists, and engineers have held regional conferences to specifically discuss water problems. To me this indicates a growing interest and consciousness of these various groups in water development.

Conclusions

In summary I would like to make the following points:

1. We can truly say that research workers are aware of the water development and use problems.

2. Trained personnel are presently doing research on these problems but not enough is being done.

3. Research can lead to a more systematic and economical development, use and conservation of our water resources.