BEHAVIORAL ASPECTS OF WATER RESOURCES DEVELOPMENT*

by

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INTRODUCTION

There is a need to develop an effective conversation between sociologists and those concerned in a practical way with the systematic management of water. Evidence from other areas of research on natural resources problems, such as agricultural development[1] and forest fire prevention,[2] suggests that substantial benefits of both a practical and a theoretical nature can be gained through carefully designed and focused cooperative programs. Relatively little social science research to date has dealt with water resources, and that has been primarily in economics and recently, political science.[3] Sociologists have barely entered the field, owing partly to their tendency to underestimate the significance of such an area for the development of social theory and partly to the fact that only recently have they been invited. If insights are to be effectively shared between sociologists and those in the field of water management, problems of language, perspective and role definition, which arise in any conversation, must be resolved. A strategy is described in this paper by which the resources of sociology may be applied to problems of social behavior in water management. The aim of this strategy is to develop a cooperative relationship which can contribute to the solution of practical problems and to the articulation of meaningful generalizations about man's fundamental relationships with his natural environment.[4]

The foundations for a cooperative relationship may be found in observations by planners, administrators, and physical scientists to the effect that social relationships are critical factors in the success of water management programs. Programs of planned change involve people, singly or in groups, organizations, and communities. Water management programs ofte encounter resistance from those whose interests they are designed to serve Occasionally established customs and institutions are threatened, power structures and communication channels are circumvented, and firmly held values are challenged by development programs. In other instances few, if any, conflicts occur, and programs are initiated, planned and implemented efficiently. In a paper to a recent national conference on water resources, a civil engineer summarized the point as follows:

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> If the success of water management ventures appears questionable at times, if it is delayed or considerably reduced, the main reason more often than not might prove to be related to sociopolitical elements rather than to physical ones. Consider the position of the engineering disciplines whose tasks are to implement those plans formulated out of recommendations from diverse committees and groups of experts. Their position is by and large much less precarious than that of other disciplines whose prognostications and decisions are based on the vagaries of social response.[5]

These "vagaries of social response" characterize not only the behavior of "audience populations," but the behavior of those in water resources planning agencies as well. Problems of organizational effectiveness reflect internal as well as external difficulties no less in the field of water management than in other areas.

That sociology has not been used as effectively as it might have been to approach these problems is accounted for by a number of factors. One is the unfortunate image that sociology has acquired. Even among many men of knowledge sociology is seen as a highly abstract, theoretically oriented discipline, dealing with stubbornly unpredictable subject matter. It is true that one of the principal objectives of sociology is to develop general understandings, or theories, which may be applied in a wide variety of social situations. It is the conviction of many sociologists, however, that valid theories grow out of intimate contact with concrete phenomena. It is also true that sociology deals with unpredictable subject matter, and this arouses suspicion among program planners oriented to the physical sciences where probability factors approaching unity are common. On the other hand, there are physical scientists who will agree that absolute prediction even of physical forces is an unobtainable goal and that the difference between physical and social sciences on this count is only a matter of degree.

A recent review by Maynard M. Hufschmidt developed the position that the highly theoretical nature of sociology has restricted its representation in the field of water resources education. Hufschmidt noted the following incident which occurred during the early 1950's as part of the planning phase of Resources for the Future:

> A few leading sociologists...were consulted about the contribution that their field might make to water resources. Careful investigation revealed, both to the sociologists and to the RFF staff, that the kinds of research in which sociologists were interested were not easily adaptable to the kinds of natural resource problems that RFF was considering at the time.[6]

This image is particularly unfortunate in light of the close relationship which has prevailed between sociology and several of the professional fields, such a close relationship in fact that many sociologists have had difficulty in maintaining their identity as scientists, having been recruited, as it were, into positions of program administration.

Whether water resources is a neglected area of inquiry in sociology or simply one which we may regard as "newly emerging," the fact remains

that there are now propositions and approaches in sociology which are of potential value to water resources professionals, and there are now a number of sociologists who view the field of water resources as one in which a highly significant social phenomena may be investigated. The immediate problem is one of articulating the channels and structuring the conditions for a meaningful conversation. One approach to this end is through what has been described as a research interpretation process.[7]

THE RESEARCH INTERPRETATION PROCESS

A research interpretation process is a cooperative arrangement of professional and scientific roles. Four activities or roles form the process. These include (1) identifying practical problems in action programs, (2) reformulating the problems as research topics or questions, (3) conducting objective scientific research on the problems, and (4) interpreting the results of scientific study for application in the action program. The first and fourth of these are interpretive rather than scientific roles, although they may be played by people who are also scientists. In the ideal case practical problems would be identified and the results of study interpreted by practitioners in interaction with scientists. The important point is that both roles must be played if scientific research is to be of maximum significance to action programs.[8]

The scientific roles in the process must be recognized as such, and the leadership of the scientist in these activities must be respected. Activities such as formulating the problem in theoretical terms, designing and conducting empirical studies, and analyzing the results require specialized knowledge. In practice each of these activities is frequently subdivided into a series of roles with different individuals performing specialized technical tasks in sequence. Many of the technical decisions in research involve selection among alternative procedures. Interaction between scientist and practitioner can contribute to decision-making in either a positive or a negative way depending upon the degree to which the role played by the scientist is clearly defined and maintained.

While a research interpretation process may be developed in any cooperative venture between scientists and practitioners, there are specific problems which result from the characteristics of the fields involved. One problem in the relationship between sociology and water resources has to do with the physical location of the sociological research. Much of the interest in sociological research in water resources in this country is likely to arise in agencies of local, state, and federal government. This has been the case in other areas of social research in natural resources and in this area thus far. Attempts to recruit sociologists to work in these agencies on the kinds of problems encountered by the agencies in their programs are likely to meet with limited success in the near future for three main reasons: (1) There is an acute shortage of sociologists and particularly of those who are interested in water resources. (2) Qualified sociologists, who are jealously aware of their status as scientists, hesitate to leave the atmosphere of academica where that status is generally protected. (3) The kinds of research which need to be done in the area of water resources require the efforts of a variety of sociological specialists rather than the work of one or two men who might be expected to have expertise in

a variety of specializations. Similar statements may be made about recruitment efforts in other fields. That these conditions are severe in the case of the sociologist is due in part to his seemingly nebulous subject matter, which leads to threats to his identity except in situations where the identity of his role has been institutionalized.

Grant programs, such as those established at the federal level, provide sociologists in academic institutions with support for research in water resources, but such arrangements typically leave critical gaps in the interpretative phases of the research interpretation process. Problems may be selected primarily on the basis of relevance to theory with limited attention given to practical justification. The academic researcher, lacking in many instances both the inclination and the practical contacts to develop the action implications of his findings, contributes his report to his colleagues and to the corporate body of knowledge in his specialty. The task of interpretation for application is left for the potential user to do as best he can and in many instances is left undone. A loss accrues to the potential user and to the field of sociology when this is the case.

One approach toward establishing a research interpretation process in the sociological study of water resources would be through training water resources professionals to interpret sociology to the practical field and to interpret the practical field to sociology. This may be accomplished, for example, through special seminars and workshops, or through regular graduate training programs. Another would be through focused cooperative agreements between university research agencies and agencies working directly with water resources. Experimental action programs would be designed to provide opportunities for evaluative research, and there would be continuous exchange of information and suggestions among participants.

Both approaches have been used successfully in the Mississippi State University project involving foresters from several agencies and sociologists in the Social Science Research Center. This project provides a model of cooperation and communication which could be applied to problems of water resources as well as to other areas. Each of the major projects of the Social Science Research Center is conceived as an attempt to provide "bridges" between behavioral, academic disciplines (e.g. sociology, social psychology, political science, and social anthropology) and action programs in society. The research is basic in the sense that theories and methods are drawn from scientific disciplines. Focus of the research on problems of action, however, has resulted in valuable rapport with action agencies as well as with audience and subject matter groupings in the state and region.

SELECTED AREAS OF NEEDED RESEARCH

The kinds of problems which might be approached within a research interpretation process in the sociological study of water resources are as varied as there are specialized areas of concern in the two fields. Hufschmidt, for example, listed the following areas of sociology as relevant to water resources: collective and group behavior, social structure,

power structure, communication theory, community conflict and public policy, social statistics, demography, population policy, and technology and social and economic structure.[9] Such a list is necessarily selective and represents only one point of view as to the nature of sociology. The problems which are actually studied should reflect both the social need and the competencies of the investigator and should emerge from interaction in the research interpretation process.

Described in this section are three areas of sociological study which appear, on the basis of limited contacts with practical programs, to be relevant to current water resources problems. These include (1) the study of complex organizations, (2) the study of community, and (3) the study of the attitudes and orientations of individuals. The focus of each area could be sharpened considerably should a research interpretation process be established.

The general orientation used to describe each of these areas is what may be referred to as a field theory approach.[10] The principal assumptions of this approach are that social phenomena result from the dynamic interaction of the interests and wishes of individuals and that social structure is in a continuous state or process of emergence.[11] The focus of such an approach is upon the field of interaction itself rather than upon the elements in interaction, and the future states of social relationships are never regarded as fixed. An alternative approach would be to regard units of social life, e.g. groups, organizations, and communities, as social systems, each struggling toward equilibrium or balance.[12] The latter is the dominant theoretical approach in sociology today. It may be shown, however, that a social systems approach fails to account for the most pervasive aspect of social life in modern society, that being a condition of accelerated social change.[13] The field theory approach emphasizes change, and for that reason seems more appropriate for use in a conceptualization of water resources problems. The field theory approach, in contrast to the systems approach, is a developmental rather than a deterministic model of action.[14]

Complex Organizations

The smallest social unit is the social relationship, that is, the interactional encounter between individuals. A relatively stable social relationship is a group. The field theory theorist assumes that groups form to meet the needs and to express the common interests of men. A group that is expressly organized to pursue a specific category of common interests is an organization.[15] Organized means that rules of behavior and patterns of relationships in the group are formalized. Organizations differ in complexity according to size, degree of formality, extent of specialization or division of labor, and degree to which rational, impersonal rules are used as criteria for decision making.[16] The pure type of the highly complex organization is the bureaucracy.

The importance of organizational analysis in the study of water resources becomes obvious when one considers that planned water management programs are conducted largely within complex organizations. At a highly abstract, cultural level, one may speak of water management as existing within the context of societal values, institutions and philosophies;

but at a concrete level the context of water management programs is provided by a variety of types of agencies in interaction with one another and with other groups, each with internal and external problems of task accomplishment and structure maintenance. There has been a tendency in the study of organizations to focus primarily on problems of an internal nature.[17] Such problems of concern in water management, for example, include intra-organizational communication and control especially as regards relations among subgroups or departments at different levels, decision-making procedures, productivity and morale of members, socialization and promotion of members to play organizational roles, the development of informal groups within work groups, and so forth. Equally relevant to water resources problems is the study of the external relationships of organizations. From a field theory standpoint, internal dimensions of an organization can only be understood in light of external forces. Organizations exist in fields and are related to one another and to other groups through the behaviors of individuals who play multiple roles. One area in which research is greatly needed concerns the field relationships among water management organizations and various community groups concerned with local water resources. The local community provides an excellent arena for highly significant studies of water resources organizations from a field theory standpoint.

Community

Four levels of forces provide the background for the emergence of a community field. First are ecological and demographic factors, the place and the people. Important considerations here are the structure and dynamics of the natural environment and the size, density, and socio-economic characteristics of the population. A second level is the local culture, i.e. the ways of life of locality residents, and the institutionalized patterns of meeting needs and expressing interests. The third level consists of social relationships which emerge to bind residents together as they work for solutions of local problems. A fourth level consists of individuals, their interests, attitudes and behaviors regarding life in the local society.

The community field is primarily a social phenomenon, but one which is influenced by demographic, ecological, cultural and individual factors. The distinguishing social characteristic in a community field is a process through which activities reflecting a wide range of local interests are coordinated. Not all localities have a community field, and among those that do there is variation in the breadth of interests coordinated and in the effectiveness of the coordinating process. The coordinating process is carried on by individuals interacting through informal and formal groups. A community field may be analyzed in terms of its actors, associations, and activities.[18]

Water resources programs at the local level frequently operate in relative isolation from the community field. This is the case, for example, in a watershed development program in which the major participants are all employees of a federal agency and in which few local resources are required to implement a technical plan of action. Other situations have been studied in which local watershed development programs are firmly embedded in the community field.[19] Analysis of this relationship deals with the interaction among individuals representing specialized and

generalized interest fields in the local society. Findings from studies of industrial development, health and mental health planning, and vocational education, for example, indicate that the success of a special interest program is generally enhanced to the degree that actors in the program also play roles in programs representing other interests.[20] Conditions under which this generalization holds for water resources programs may be identified through comparative studies in a number of settings in which variations may be noted both in types of technical programs and in degree of integration of the community field.

One important water resources problem in the context of community study is the degree to which action on water problems is initiated locally, rather than by the state and federal organizations which operate in the locality. Implications of this variable need to be specified. Another research problem would be to identify the procedures by which local leaders and landowners come to be involved in on-going programs. Another is the degree to which water management issues become identified with factional and other cleaveages in community life.

Attitudes of the Individual

The field theory approach used to conceptualize water resources problems in organizational and community affairs may also be used to describe relevant positions and behaviors of the individual.[21] The field theory approach has been more widely used in psychology than in the social sciences.[22] Personality, from the field theory view, consists of the individual in interaction with his environment. That is, the individual and his environment are viewed as a single dynamic entity. This is not in opposition to the psychoanalytic approach which tends to regard the individual as a relatively fixed body of psychological processes and structures, but extends that view to account for the fact that an individual's inner life is constantly stimulated by his experiences in the environment. Just as the ecologist cannot distinguish the living organism from the environmental conditions which sustain its life, so the social psychologist, as a field theorist, cannot sharply differentiate between the social and personal dimensions of social experience.[23]

Attitude is basically a field theory concept having to do with the qualitative relationship between an individual's inner life and some object in his psychological environment, i.e. with some object of which he is aware. Two kinds of attitude objects appear to be of great significance in the study of water resources problems. One is the attitude of the individual toward water resources as such. The other is his attitude toward programs of water management. The few studies which have been conducted dealing with either of these raise interesting questions and suggest a direction for future research. Differences in socio-economic status influence these attitudes, but there are also important differences at each status level. One variable which apparently influences such attitudes independently of social status is the extent of the individual's knowledge of and behavioral participation in conservation and resource development efforts.[24] Where favorable attitudes of local residents are required for success of a water management program, the planners apparently would be well advised to encourage widespread participation in certain phases of the program. Another area of needed study is the influence individuals have upon one another in formulation of attitudes toward water

resources. Studies of this problem would attempt to identify the patterns and channels of influence and communication in a community. A high correlation between attitudes and behavior, as would be predicted by field theory, has been found in a number of studies.[25]

CONCLUSION

This description of needed research is intended to illustrate certain of the contributions which sociological research can make to the practical matter of water management. That sociology is a relatively young discipline, containing at present more in way of approaches and questions than answers and solutions, must be recognized. Too often sociologists are called upon for recipe-like solutions to action problems and then criticized for not being able to produce them. Likewise sociologists often fail to recognize the contributions which practitioners can make to their work. The professional field of water resources management is also relatively young, at least in terms of its present orientation. This paper has argued that there is a sound basis for a conversation between the two disciplines and that through careful division of labor and intensive communication, progress may be made toward the main objectives of each discipline. The research interpretation process provides a model for this field of interdisciplinary interaction.

REFERENCE NOTES

1. See Avtar Singh and Harold F. Kaufman, A Behavioral Approach to Agricultural Development, Mississippi State University, Social Science Research Center Preliminary Report No. 7, March 1965.

2. See, for example, George R. Fahnestock, Southern Forest Fires: A Social Challenge, Mississippi State University, Social Science Research Center Preliminary Report No. 2, March 1964.

3. A preliminary list of studies is available in Wade H. Andrews, "Bibliography of Sociological and Other Related Social Science Publications on Water," Utah State University Center for Water Resources Research, mimeographed, March 1966.

4. An excellent move in this direction is the work at Utah State University. See Wade H. Andrews, "The Sociology of Natural Resources," paper presented to the annual meeting of the Rural Sociological Society, Miami, Florida, August 1966.

5. Iury L. Maytin, "Planning Versus People--The Great Uncertainty Game," paper presented to the Second Annual Water Resources Conference sponsored by the American Water Resources Association, Chicago, Illinois, November 1966, p. 2.

6. Maynard M. Hufschmidt, "The Role of Universities in Water Resources Education: The Social Sciences," Water Resources Research, 3 (First Quarter 1967), p. 5.

7. This process is described in Harold F. Kaufman, Frank D. Alexander, and Herbert A. Aurbach, "A Case Study in Research Interpretation," Rural Sociology, 22(June 1957), pp. 156-159.

8. The phases are illustrated in the case of agricultural development in Ibid.

9. Hufschmidt, op. cit., p. 8.

10. Field theory has developed in several disciplines, most notably physics, biology and psychology. For a review, see Edward R. Fagan, Field: A Process for Teaching Literature (University Park, Pennsylvania: The Pennsylvania State University Press, 1964), pp. 8-32.

11. Social field theory is an emerging perspective, growing out of the social behavioralistic tradition in sociological theory. See Don Martindale, Institutions, Organizations, and Mass Society (Boston: Houghton Mifflin Company, 1966), and R. M. MacIver and Charles H. Page, Society: An Introductory Analysis, Revised Edition (New York: Rinehart and Company, 1949).

12. The best example of this is Talcott Parsons, The Social System (Glencoe, Illinois: The Free Press, 1951).

13. This and other weaknesses are discussed in Martindale, op. cit., pp. 133-139.

14. See Robert Chin, "The Utility of System Models and Developmental Models for Practitioners," in Warren G. Bennis, Kenneth D. Benne and Robert Chin (eds.), The Planning of Change, Readings in the Applied Behavioral Sciences (New York: Holt, Rinehart and Winston, 1962), pp. 201-214.

15. Cf. MacIver's definition of "association." MacIver and Page, op. cit., pp. 11-15.

16. Characteristics of complex organizations in behavioral terms are described in Martindale, op. cit., pp. 140-149.

17. This criticism is developed as the principal justification for an "open-systems" approach in Daniel Katz and Robert L. Kahn, The Social Psychology of Organizations (New York: John Wiley & Sons, 1966).

18. This approach has been described in a number of places. The most recent is Harold F. Kaufman and Kenneth P. Wilkinson, Community Structure and Leadership, Mississippi State University, Social Science Research Center Bulletin No. 13, May 1967.

19. An example is reported in Kenneth P. Wilkinson and Peyton A. Hughes, "Community Factors in Watershed Development," in Proceedings of the Mississippi Water Resources Research Conference, Mississippi State University Water Resources Research Institute, Spring 1966.

20. See Singh and Kaufman, op. cit.

21. An explicit formulation of this approach is in J. Milton Yinger, Toward A Field Theory of Behavior, Personality and Social Structure (New York: McGraw-Hill, 1965).

22. This development is especially associated with the work of Kurt Lewin. See his Field Theory in Social Science, ed. by Dorwin Cartwright (New York: Harper and Row, 1951).

23. This follows the discussion in Gardner Murphy, Personality, A Biosocial Approach to Origins and Structure (New York: Harper & Brothers, 1947), pp. 880-902.

24. An example of such research is reported in Kenneth P. Wilkinson, Local Action and Acceptance of Watershed Development, Mississippi State University, Social Science Research Center Preliminary Report No. 12, July 1966.

25. A forthcoming report by Satadal Dasgupta treats this relationship in the case of watershed development in Mississippi. Satadal Dasgupta, Attitudes of Local Residents Toward Watershed Development, Mississippi State University, Social Science Research Center Preliminary Report, forthcoming, May 1967.