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ASSESSING THE SOCIAL IMPACT OF NATURAL RESOURCE DEVELOPMENT: A RESEARCH OVERVIEW WITH COMMENTARY ABOUT THE CONTEMPORARY USES OF RESEARCH METHODOLOGIES

by

Ted L. Napier
Associate Professor

Department of Agricultural Economics and Rural Sociology
The Ohio Agricultural Research and Development Center
and The Ohio State University
Columbus, Ohio

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ABSTRACT

An attempt is made to employ the major components of the research process to demonstrate how several existing research methodologies may be effectively used in the evaluation of the social impact of natural resource development. Major emphasis is placed upon the positive aspects of quasi-experimental design relative to social impact assessment while cross sectional-case study research designs are criticised. Longitudinal research using designated panels or careful sampling during data collection time periods is also offered as a very valuable research tool. The primary topics selected for discussion are: research design, instrument construction, sampling, data collection, interpretation of findings and dissemination of research output. The substance of the paper is that we have many excellent methodologies at our command but often do not effectively utilize them to the extent we should.

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Introduction

Social scientists have long been seeking mystical methodologies which are hoped will provide significant insight into the sociological or socio-psychological impact of natural resource development upon human populations. While this is a desirable goal, it is highly doubtful that the solution to more precise impact assessment information lies in the realm of newly emerging methodologies. In fact, it is my contention that by more judicious use of existing methodologies we could easily improve upon our research efforts and thus assume a much more important role in policy making relative to natural resource development.

The multitude of social research methodologies represented in this conference which range from research design techniques to analysis of data is indicative of the methods we presently have at our command. Many, if not nearly all, of the techniques which will be discussed are not new but innovative ways of using existing methodological knowledge.

The purpose of this paper is to briefly review some of the research problems that I have observed in the existing social impact literature and comment upon how some of the problems may be resolved. Secondly, I will briefly outline my most recent attempt at social impact analysis of water resource development in the context of the material presented to satisfy the first objective of the paper.

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[1]Associate Professor, Department of Agricultural Economics and Rural Sociology, The Ohio Agricultural Research and Development Center and The Ohio State University. Paper presented at the Environmental Design Research Association 6, Lawrence, Kansas, April, 1975.

Lack of Theory Relative To Social Impact Assessment

Much of the literature that presently exists in the substantive area of social impact analysis relative to natural resources is lacking in theoretical modeling. A typical approach is a brief literature review with quasi-hypotheses presented but theoretical closure is seldom if ever achieved. Either social scientists are unable to construct theory or the phenomena under investigation are so complex that theory formation is not possible. While theoretical closure is difficult to achieve when we are attempting to explain human response to some developmental activity, it is highly probable that several social theories of a macro-level nature could be applied on a micro-level basis. Neo-functionalism, dissonance models, quasi-conflict (confrontation) theoretical perspectives would appear to have utility in hypothesis formation and perhaps stratification models would be applicable. Regardless of the perspective attempted, the literature would suggest that theory has been delegated to a secondary role, especially in the professional journals and in the research bulletins from state research centers. Needless to say, I feel that social scientists are much more interested in proceeding directly to data collection than careful preparation of theoretical hypotheses for testing. I have a very strong suspicion that some of the research reports that tend not to discuss the research findings in a theoretical framework (simply present regression equations, basic substantive findings, and so forth) are lacking theory from which to make extensive interpretation of findings. Another misuse of research findings, in my opinion, which begs the theoretical question, is theory formation after data have been collected and analyzed. I am fearful that the practice of path modeling with data to formulate theory

is being all too frequently done rather than using the very valuable statistical technique for theory testing.

Emphasis placed upon careful theory formation should provide significant insight into means of instrument formation and focus attention upon the type of data needed to answer specific questions. Basic demographic variables continue to be used as explanatory variables when they have been shown to be relatively insignificant in the explanation of the variance in many social impact variables (recreation activity, attitudes toward natural resource development, attitudes toward changed communities, and others). Perhaps better theory formation would suggest other variables for testing.

Research Methods and Social Impact Assessment

Heberlein (Andrews, et.al., 1973) observed that social scientists could play a much more useful role in policy making if the research methodologies employed were more closely aligned to the general methodological norms that should be invoked in social research. In this regard, I am in complete agreement with the author's assertion. In several of the research publications presently existing in the field of social impact assessment, particularly in water resource development and its subsequent impact upon directly affected groups, the validity and reliability of the measuring instruments are questionable and documentation of reliability measures is often not presented. Research designs are seldom justified by the authors relative to the rationale for employing the design selected over alternative mechanisms. Statistical measures used in social impact assessment range from excellent to gentle massaging of the data in which the obvious is made more obvious. Given these research problems, it should

be of little surprise that social impact assessment information is seldom used in social policy decision making.

Heberlein (Andrews, et.al., 1973) raised other valid research questions which have been largely ignored since the paper was presented particularly in terms of research design used in impact studies. It is striking that cross-sectional design using single case study communities is still the major emphasis. Data from these type of research efforts are manipulated with sophisticated statistical tools and called impact studies. Seldom is a cry raised relative to the conclusions drawn from case studies using cross-sectional design that social impact is not being measured.

If we are concerned with social impact, how do we determine from case study, cross-sectional design research output what has happened within a group affected by natural resource development? At best we are able to describe the situation and have the data to demonstrate what factors are related to each other and how they were related but we are able to say little about the social impact of a development stimulus using such research efforts. Perhaps the phenomenon under study, which is assumed to be indicative of social impact assessment, was present in the same degree within the study group prior to the application of the stimulus of natural resource development.

As you will observe, I am a proponent of quasi-experimental design (Napier, 1971; Napier, 1972; Napier and Wright, 1974; Napier, 1974) and longitudinal research (Napier and Wright, 1975; Napier and Wharton, 1974). To evaluate social impact one must have something to which comparisons may be made. Cross-sectional, case study design does not lend itself to comparative analysis of the type needed to evaluate the social impact of a developmental stimulus upon a group. Some provision must be made for a

control group. Even multi-group comparisons of communities affected by natural resource development without pretest-posttest evaluations or control groups can not isolate the social impact of a stimulus but will only demonstrate that the groups are basically different or similar in nature relative to the variables under study. To conduct a study of several communities simultaneously to which stimuli of natural resource development have been applied and to attribute observable differences to the operation of the developmental stimuli is methodologically unsound. The differences may have been identifiable before the development occurred. General descriptions of the community groups' situation relative to the variables analyzed are possible but assertions that generalizable inferences may be drawn relative to the social impact of the developmental stimulus have very little merit.

There are basically two research designs using cross-sectional research design which may be employed to evaluate social impact and both have been discussed in one form or another by Campbell and Stanley (1966) and reiterated by Heberlein (Andrews, 1973). These two basic designs are quasi-experimental design used by Napier (1971) and longitudinal design with panel[2] of subjects. Over conformity to the expressed norm of a rigid panel of subjects is probably unrealistic in terms of actual practice eventhough it is the ideal to be achieved. Certain natural resource development activities do not lend themselves to panel type longitudinal studies. In the case of a major reservoir project, many long-term residents may elect to sever relationships and move away. If the research study is organized to evaluate the social impact of the lake project upon the

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[2]"Panel" is narrowly defined as the selection of subjects at the first data collection period and maintaining the same group for the duration of the study.

directly affected restructured group, then those people who leave could not be included in the pre-stimulus study. If the decision to leave should follow the selection process and the first data collection phase, then the severance of community association would effectively exclude those panel members from further study participation. Assuming that the original sample (panel) was representative of the universe any attrition of the original sample would have immediate impact upon the reliability of the study findings. Continued study of the people who have left the area would prove of little interest given the stated research objective. Another factor must be considered which is anonymity of the research participants. Many people prefer to remain unidentified in certain types of studies, therefore, participation rates as well as validity of responses to instrumentation could suffer if one insists upon panels in longitudinal research. Factors such as type of natural resource developmental project and the type of phenomenon under study must be carefully considered before a decision should be made to use panel methodology.

In situations where panels may not be effectively used, the researcher may resort to careful sampling using the same group (community, for example) during the various data collection time periods and the data sets which are generated should provide means of valid comparisons. The sampling methodology becomes much more critical in such research efforts. If a study of the social impact of a major watershed project upon a community group was considered, then in-migrants during and after the construction stages of the project should have the possibility of being included since they will form part of the reconstituted interaction framework of the group (Munch and Campbell, 1963). This would not be accomplished if the panel was determined prior to the in-migration and remained unchanged. While

panel studies are certainly desirable, in reality they are not very feasible except for specific phenomenon and on a short-term basis (time period would have to be constrained in certain studies for them to be effective). If age, for example, was a correlated variable with some phenomenon under study and the aged composed the major cohort group which was most negatively affected, then death of panel members alone could result in significant differences among the observation periods. Very large samples would permit deletion of panel subjects thus controlling for attrition but often samples are not very large and little data can afford to be lost and there are other problems as a result of loss of subjects.

Measurement Problems In Natural Resource-Social Impact Studies

An area of research emphasis in recent years has been attitudinal studies (Yoesting and Burkhead, 1971; Napier, 1971; Napier and Wright, 1973; Burdge and Ludtke, 1970; Wilkinson, 1966; Peterson and Ross, 1971; Dasgupta, 1967; and numerous others) relative to natural resource development impact. Attitude scale formation poses a major problem for researchers not skilled in the construction of such measurement devices. The first step in scale construction should be the development of a mini-theory relative to each scale from which concepts may be derived to form the construct being measured. Once the items have been developed using established criteria for scale construction (Edwards, 1957), it is highly useful to submit each scale to people who have knowledge of the construct being investigated. A panel of "experts" should be formulated to review scale items in terms of wording, content, response set and so forth. A pretest of the scale is practically essential but quite time consuming and often expensive. The pretest population should be similar in nature to the sub-

ject population and extensive statistical evaluation of the pretest data should be conducted. Either item analysis or factor analysis should be applied to the data as a means of establishing the internal consistency of responses to the items and to eliminate uncorrelated statements from the scale. Once the scale has been reformulated and administered to the subject group, the newly generated data should be subject to the same statistical procedures again to aid in the determination of the reproducibility of the scales.

While I have relied heavily upon item analysis in the past, recent use of factor analysis has produced excellent results. Data from a mass media use study have been factored into three factors and the factors have been shown to explain a large portion of the variance within the data set. Yoesting and Burkhead (1971) effectively used factor analysis in a study oriented toward recreation and pollution in Iowa. While their items did not load very well together and the variance explained was small, the factor analysis technique was demonstrated to have significant potential in index construction.

Factor analysis should provide natural resource development impact researchers with an excellent tool for reducing the number of variables with which we must work. Should a researcher need to reduce the number of variables used to explain a specific natural resource development phenomenon (attitude toward recreation development or land use change surrounding a reservoir), factor analysis could result in major reduction of the number of variables. Actually the resultant indexes are factors but factor scores may be computed for each subject and treated as observations and thus become independent or dependent variables. The future for

social impact data analysis, in my opinion, will be the use of factor analysis to generate factor scores and then resorting to path analysis (an extension of regression analysis) for path modeling. In this way several variables (25 for example) may be reduced to a very few (5 factors for example) and the resultant factor scores per observation could be used to build path models assuming the factors were theoretically logical and the amount of variance explained by the factors was high. Effective use of factor analysis could result in some excellent indexes and certainly much better scales.

Problems of Sampling In Rural Areas

Since most natural resource development will take place in rural areas or in fringe areas surrounding the city due to availability of "undeveloped" land, the universal research concern for sampling becomes a major research problem. Unlike the numerous methods that may be used in urban communities, drawing a representative sample from a rural population is most difficult. Frequently a non-metropolitan based researcher is faced with the problem of determining interactional boundaries of communities (Munch and Campbell, 1963) to establish the universe from which the sample may be drawn. My experience would suggest that unless the researcher wishes to spend all of his/her time on boundary delineation the researcher should resort to involvement of local people in the determination of interaction boundaries. In several of my studies, the local people were able to demarcate the boundaries very clearly and comments that residents on one side of a particular road were not part of "our" community while the opposite side was part of the "we" group were quite common.

Once the geographical boundaries of the universe are drawn, the problem of sampling has just begun. If personal interviews are to be used as the primary data collection technique such convenient urban address books as telephone directories prove to be of little value since rural delivery mail routes may consist of many miles and numerous people. Most telephone directories in rural areas do not give much more than the name of the person chosen at random. Information such as home located 4 miles south of State Route A on Route B and out the first road on your right is lacking. In lieu of such directions, some type of selection process must be employed which prevents clustering of the sample and produces a representative subject group from the universe being analyzed. I have effectively used a modified systematic sampling technique which requires the selection at random of highways from detailed county maps provided by the state highway department. A systematic sample using the Kth occupied residence is then drawn. Comparison of the sample characteristics with known references such as township or county data provides means of checking the representativeness of the sample drawn.

In most research strategy conferences such as this few people address such basic research problems as sampling and if sampling is mentioned, it is usually in the context of assumption that good sampling has been done. In my research experience, sampling in rural areas has proved to be a challenging part of the research process. Unless a total universe may be studied much more research emphasis should be placed upon sampling. For researchers who have not encountered commercial directories of rural addresses, I would suggest that they explore the possibilities of using them if such directories exist for the counties in which they are

conducting research. Such directories have names and addresses of nearly every resident in the county which is a great improvement over telephone books. These directories, however, are of primary use to researchers using a mailed questionnaire and are relatively expensive ($50-$75).

Data Collection Among Dispersed Populations

Most researchers either use secondary data or rely upon primary data which is most often collected by mailed questionnaire or some form of personal interview (telephone or in-depth personal interview using open-ended or structured instruments). Given most budget restraints, the sample drawn on the personal interview basis is often small. A technique that I and several colleagues have used with excellent results has been a "drop-off pick-up later" method. This technique consists of an interviewer approaching the selected subject and explaining the basic purpose of the study and receiving a commitment to participate in the research. The second step is to briefly explain the questionnaire and to leave the data gathering instrument with the subject to be collected at a designated future time. When the interviewer returns to collect the questionnaire he/she scans the responses and provides a debriefing period to probe for additional information or to answer questions. The time involved in securing a completed schedule is quite small and the thoroughness of the responses has been excellent. Comparison of questionnaires completed using the personal interview and the "drop-off method" has revealed few significant differences either in the structured or unstructured responses except that more extensive written responses to open-ended questions have resulted from the "drop-off" method. Another difference which has been observed is that respondents

tend to be more willing to provide education and income information by the "drop-off" method as opposed to verbal responses to those two questions. The participation refusal rates are also somewhat different with about 10 percent rejection for the "drop-off" system and 15-20 percent for the verbal interview. The reason most often given for refusing a verbal interview was the inconvenience of time which is not a problem using the questionnaire "drop-off" method since people can complete the schedule at their own pace and chosen time. On limited budgets I would strongly suggest this technique over mailed questionnaire since we all know that a 25-35 percent return on a mail study is expected (unless you harass people with many follow-up notices or telephone calls). While the drop-off technique is quite good, the researcher must be very careful when constructing instruments so that people may be able to understand and respond to the questions without someone present to explain the question to them.

Researchers Are Stubborn

One research problem in any research program and particularly, in my opinion, among social scientists dealing with natural resource development social impact evaluations is the reluctance on the part of researchers to accept their findings when the data keep suggesting that they are going down the wrong research path. I, for example, was convinced that watershed development would destroy the social relationships within areas significantly affected by forced relocation of population. Popular literature and general nonparticipant observation within affected groups (in 1968 little empirical social impact analysis had been done which I would rate as good research) indicated that the affected groups were highly negative toward water resource development. I proceeded to build theory about the social con-

struct of community alienation and proceeded to test my confrontation model (modified and extended from a model initially suggested by Bertrand, 1966). The findings revealed no significant alienation among affected groups but rather high degrees of community integration were observed (Napier, 1971, 1972). Rather than reject the theory, the model was applied in another social setting (Napier and Wright, 1974) but with two additional scales developed to measure attitudes toward implementation policies of the development agency and attitude toward the project (these scales were the product of open-ended questions and in-depth interviews conducted with informants in the affected groups during and after the primary data collection phase of the first study). The findings from the second study replicated those of the first even though the developmental stimulus was different (forced relocation due to a rural development research center).

A modified theory of confrontation based upon adaptation and reintegration was formulated and one of the original watershed communities was restudied (Napier and Wright, 1975) using the same instrumentation. The implementation and project oriented attitude scales were modified and included in the study to measure attitudes toward water resource development (the scales were quite reliable instruments). The findings revealed that the community oriented variables were not related to the attitude toward the project in a very significant manner. Attitudes toward the implementation procedures employed by the developmental agency relative to equity and fairness questions were extremely significant and in a much lesser way willingness to accept rapid change (traditionalism) was significant. The coup de grâce had been given to my belief that the social fabric of a

community would be torn apart as a result of external natural resource development and subsequent physical displacement of resident population. The paper (Napier and Wright, 1975) details the regression findings (all variables analyzed on a cross-sectional basis) as well as the analysis of variance findings (community interaction related variables on a longitudinal basis). The findings demonstrated that the residents at the second time period formed a more cohesive unit than in the initial stages of project development but the people were negative about the project.

I am now convinced that the findings from the first study had given me insight to the "real" problem of water resource development but I refused to heed the data. This is probably not an isolated case since there have been repeated replication of research studies using similar variables and researchers producing similar low squared multiple correlations (variance explained). I am reminded of Smith, Hogg and Reagan's work (1971) where they observed a community group which was obviously negatively impacted (over committed to fixed capital goods) by watershed development but was anticipating great things in the future from additional proposed water resource development projects. A similar type of situation may apply to researchers in social impact analysis in that the variables may have been used in the past and shown to be rather poor variables but they are again used in anticipation that the variables will prove to be useful.

I suggest that one of the research problems facing social scientists today in social impact analysis is the "tunnel vision" orientation that some of us tend to have. The same variables are repeatedly "forced" into social impact studies (demographic variables, for example) even when they have proved to be at best marginally useful.

My research findings to date suggest that a rich research area exists in terms of implementation procedures used in the developmental process. Community variables of a structural and behavioral nature should be studied (change in social structure and stratification) and less emphasis placed upon "community" perception. Perhaps others need to more carefully review their findings to determine if significant information has been overlooked in the researcher's zeal to prove a particular point.

I do not see the previous plea for longitudinal research and "openness" in research thrust to be incongruent. In fact, each should compliment the other. Longitudinal research should provide the comparison needed to isolate impact but the researcher must be amendable to embracing new theoretical or methodological models if the models being used are shown to be inadequate. As Kaplan (1964) noted we fall prey to the "law of the instrument" in that we learn a technique and use it without much, if any, consideration of alternatives and cannot effectively use the vast knowledge available to us.

Inadequate Communication Among Social Impact Researchers

A major research problem exists in the relative lack of communication of research findings in a manner that can be rapidly disseminated to researchers. Volumes are written in a very boring manner or published in some obscure journal and filed rapidly away on a shelf only to be opened by graduate students. To construct good theory, to build good valid and reliable measuring devices, and to have impact upon policy makers we must rapidly disseminate information to each other and to the other users of our research. Perhaps proceedings from conferences such as this will help

fill the relative information void in social impact dissemination but I am not optimistic. I fear that many of us will not have the good fortune to discuss, stimulate, disseminate and above all to provide constructive criticisms to each other on a periodic basis but will become relative research isolates in our own institutions or agencies without the benefit of extensive peer interaction.

Conclusion

The conclusion to be drawn from these ramblings is that social scientsits have a wealth of research methodologies at their command in terms of research techniques and statistics. The major research problem in social impact analysis is not in terms of applicable theory, lack of research funds, apathy on the part of development agencies, nor lack of research methods as noted above but rather the problem is in many respects the researcher. Rather than fixing the blame outside, I suggest we shoulder at least part of the burden of guilt and proceed toward the effective implementation of innovative ways we can use existing theory and methods to answer some of the hard questions our client groups have asked of us in terms of natural resource development assessment.

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