

Normative Models and Human Behavior : Some Theoretical Issues in Household Resource Use

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Normative Models and Human Behavior: Some Theoretical Issues in Household Resource Use

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INTRODUCTION

Ultimately, in every society, decisions about how resources are used and transformed to satisfy perceived human needs are made by large numbers of individuals, households and small groups. Economic theory, on which many psychological and marketing models of human behavior are based, is often deficient or irrelevant in understanding the resource use behavior of rural households, particularly in non-industrialized societies. It is especially inappropriate in explaining how small-scale resource users perceive, use and transform the natural resources on which their livelihoods directly depend. Much more must be learned about their attitudes toward risk and uncertainty, about the dynamics of household behavior and about the values and perceptions toward renewable natural resources. Further, conventional behavioral models that are often based on studies of decision-making in Western societies must be modified or replaced by studies of individual and household behavior from non-Western (and particularly Third World) societies. In this brief article I attempt to highlight some of the major conceptual problems inherent in the models normally applied to the study of household resource use in non-Western societies and particularly in the rural areas of developing countries.

BASIC CONCEPTUAL PROBLEMS

With precious few exceptions rural household and community economic studies in developing countries overlook the problems occasioned by intra-cultural diversity, the common right to, or the sharing of, natural resources among families, the diversity of subsistence functions performed by households, and certain "invisibles" that preclude an apparently rational use of resources.

(1) INTRA-CULTURAL DIVERSITY

Patterns of natural resource use usually reflect the decisions of large numbers

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of individuals, households and small groups, and an understanding of the structure and functions of systems of resource use at the more aggregated regional and national levels can only be realistic if decision-making processes at the community level have also been analysed, since in traditional non-Western societies individual needs are generally satisfied through the small group relationships of household, kin group, small community or other such similar social unit. Nevertheless, it is important to emphasize that not all individuals in a community think or behave alike, a common sense observation increasingly supported by a growing body of literature on intra-cultural and inter-community behavior (see, for example, Kluckhorn and Strodtbeck [1961], Minturn and Lambert [1964], Wexler and Romney [1965], Freed and Freed [1970], Sankoff [1971], and Akimichi [1975]). Among the strongest variations in behavior are those stemming from the use of and access to renewable resources, perceptions of biological and physical environments, and in risk-taking and decision-making in a wide range of social and economic activities [JOHNSON 1972; RUTZ 1977].

Most observations on intra-cultural diversities and heterogeneity have been recorded as "deviations" from norms or cultural patterns that were presumed to be standardized. As such they were usually dismissed or ignored when "social structure" or "typical" cultural patterns of behavior were described. Social science descriptions based on the idea of a common, shared, homogeneous culture, and theoretical propositions founded on assumptions of intra-cultural homogeneity, which view culture as the set of standards or rules, are common, especially for simpler, pre-industrial non-Western societies. Many peasant communities, for example, have characteristically been depicted as conservative, fatalistic, suspicious of outsiders, resistant to change and imbued with the "image of limited good." And many social scientists have viewed homogeneity of values, attitudes, goals and other cognitive patterns as essential to the maintenance of developing societies [e.g., ABERLE 1950]. Although more recent studies have illustrated intra-societal and intra-cultural heterogeneity, the predominant tendency continues to reflect fundamental assumptions of cognitive homogeneity and behavioral sharing [Pelto and Pelto 1975].

Concern with intra-cultural diversity indicates that further research and theory-building should be based on intensive and longterm analytical studies of processes at the micro-level. But lest its value be diminished, the study of microlevel behavior must be related to the larger regional and national processes of social change and evolution, such as the relationships between individual and group adaptations to the larger system, wherein lie the more significant social questions [BENNETT 1969]. The relationship between micro- and macro-level interactions has given rise to considerable debate on whether individuals, households and organized groups constitute significant units of adaptation [ALLARD and McCAY 1974; RUTZ 1977] but clearly the nature of the relevant unit varies depending on the ecological context [VAYDA 1976].

(2) The Diversity of Household Functions

The activities of households are especially important since in non-industrialized societies the household sector produces a large proportion of the "non-monetized" goods and services for its own use. Whereas in some countries the household sector may produce some 40 percent of the accounted and unaccounted national income, the share of the household is even greater in producing those goods and services required to satisfy basic human needs [BURKI 1980]. Although the role of the rural sector in the processes of social and economic change is now wellrecognized, scientific knowledge on traditional rural economies and small group and household behavior is grossly inadequate for most applied purposes, such as the formulation of realistic national policies or for the design and implementation of effective rural social and economic development programs.

The "new household economics" approach may offer the possibility of developing a theory of the traditional rural economy useful for understanding the dynamics of poorer rural areas and should comprise an important element in the analysis of resource use at the micro-level [BECKER 1965, 1974; LANCASTER 1966; EVENSON 1978; HAYAMI 1978]. A major problem in the analysis of traditional rural economies is the difficulty of separating the various household functions, since in the peasant household production, consumption, saving and investment are not independent activities and are generally governed by simultaneous family decisions. Thus for meaningful analyses, data should be collected simultaneously on these activities. Unfortunately, although the large body of survey statistical data available on small farm management and production costs, for example, is useful for piecemeal studies, it has little value for the study of resource systems at the micro-level, since it artificially discriminates among the various farm household functions. Another serious complication arises from the self-contained, subsistence nature of most communities in marginal areas. Typically, locally available renewable natural resources are used to satisfy household and community demands, and the major product and factor flows do not enter, or enter only minimally, into the market place.

The production activities of most households in marginal areas consist of several complementary economic activities that as a whole provide a balance of subsistence goods. Commonly, small-scale fishing, animal husbandry, hunting, and collecting of forest products are the economic complements of cultivation in traditional societies; and in many parts of Southeast Asia traditional integrated farming systems, such as those that combine cropping with animal husbandry and aquaculture, or ricefield fisheries are commonplace [RUDDLE 1980, 1981]. Artificial discrimination is also introduced into those economic studies of traditional farming that focus only on the cropping component as the principal activity: other economic activities, which together might account for more capital, labor or time inputs, are overlooked or downplayed [RUDDLE and CHESTERFIELD 1976]. Clearly, such a fragmented view of traditional household economic activities is grossly

misleading.

(3) The Sharing of Resources

Moreover, in many cases normative economic models are of little value in the analysis of traditional rural economies, since individual households rarely function without reference to others in the community. Typically, a high degree of interaction exists among rural households, and normative economics is constrained by tradition, kinship and the community wide needs for security and survival. In the long run, household welfare depends on that of other households and on such relationships as mutual assistance, welfare and patronage.

Social motives for cooperation have been succinctly illustrated in Szanton's [1972] study of a subsistence market in the rural Philippines:

More fundamental than increasing profits, spreading risks, and gaining assistance is the concept of the individual's right to survive. This is expressed in many ways, always emphasizing the importance of a person's humanity and the general responsibility of all that no one should fall beneath some basic human level. Everyone has a right to survive and provide for his family—a right which transcends all other economic or legal considerations. This leads to an obligation to share one's surplus with those who are in need of it for necessary or indispensable goods, particularly when the need is made obvious....

The sanctions against vendors who refuse or hesitate to share are both social and economic. They are labelled ungenerous and unaccommodating, and their status declines in the community, a loss which may ultimately lead to economic sanctions.... The refusal of a man's request (to a male vendor), especially when made on the grounds of his basic human right to survive, is considered degrading and easily leads to blows or a knife attack.

Similar relationships have been reported among artisanal fishermen and small-scale farmers from Java. Sharing the proceeds of the sale of a fish catch and working together as a crew has a more profound meaning for Javanese artisanal fishermen than that of simply dividing income and opportunities for employment. Sharing is an ingrained philosophy in the traditional Javanese fishing community and is based on the belief that nobody should go hungry and that everybody should receive a certain share of the fishing activity itself. Any asset such as a fishing boat or gear has a social function, and sharing, therefore, goes beyond the fishing activity. The entire catch is not auctioned, for example, and a small amount is divided among the crew in the same proportions as are the proceeds of the sale. When this in-kind share is large, the individual fisherman often sells it to provide pocket money. When the catch is only minimal the boat-owner, who is generally richer than the other crew members, will forego his share. Sharing goes beyond the crew members to include poor people of the village. A small share of the

catch is given to the boys who clean the boat; trash fish are sold cheaply to women petty traders who then retail them to earn a small income; children from poor households are allowed to pilfer fish from the baskets passing en route to the auction stalls; and a small quantity of fish is donated for communal sale to provide funds for community-wide needs [COLLIER *et al.* 1977]. Traditional fishing communities are bound by close interpersonal relationships via these institutions for sharing, which demonstrate that all people in the community are linked together in one way or another, and that everybody has access rights to a common property resource. Traditional fisheries on the north coast of Java are not a business undertaking but rather a subsistence operation that is involved with the welfare of all members of a community [RUDDLE and MANSHARD 1981].

Although sharing of resources and products among households is widespread in traditional societies, in many cases sharing may be differential, based to some extent on the economic stratification within a community, and it may also rely heavily on kinship or other organized group linkages. In rural Javanese society there is considerable evidence to suggest that "...people with land are sharing their wealth with those in the same class and usually with their relations or close friends and that the poor are simply sharing their poverty amongst themselves.... First in importance to a Javanese household is to have good relations with close neighbors, then with others in the same hamlet, and lastly with households in other hamlets" [Collier *et al.* 1977].

(4) THE ROLE OF "INVISIBLES"

Many models of resource use in rural societies also overlook other "invisible" elements that exert strong controls on the operation of resource systems. In the supply of labor, for example, although it is widely recognized that what many outsiders would consider to be optimal labor supply is constrained by sociocultural factors, such as kinship obligations or the time needed to prepare for festivals, that a great deal of time is invariably invested in the socialization and enculturation of children, particularly to prepar ethem to procure food, is invariably overlooked [Ruddle and Chesterfield 1976]. Food, being essential for survival, is of continuous and conscious concern. Its procurement is institutionalized, purposive, and intimately connected with all social subsystems in society. Few domains are as critical in the eyes of a traditional farmer as the instruction of his children to perform the tasks of food procurement. Only through such training will the continuity of the family and the community be assured, and, in the absence of a viable, external social security system, will the needs of old people be guaranteed. Thus in this context, household decisions on time allocation are clearly based in part on central government policies regarding the provision of a social security and old-age pension system. Many such macro-micro linkages, or more appropriately their absence, constrain decision-making at the household level, and make it imperative that any analysis consider carefully the various

levels of scale involved.

The adaptive strategies—"the patterns formed by the way the many separate adjustments that people [or other significant units of analysis] devise in order to obtain and use resources and to solve the immediate problems confronting them,"— [BENNETT 1969] of individuals and households confronted by changing, problematical and often hazardous environments provide a valuable means for understanding how societies organize resource systems and relate to the macro-level or larger processes of man-environment relationships and social change [McCAv 1978]. The concept of adaptive strategies is also closely related to evolutionary ecology and to micro-economic theories of optimization and choice. As such it provides a valuable means of understanding the functioning of resource use and of elucidating the relationship between micro- and macro-levels within it.

ECONOMIC THEORY AND RESOURCE USE

A fundamental premise of traditional economic theory is that economic activities are motivated by the desire to maximize income. To the rural household, then, the price that it receives for the product derived from a particular local use of resources is of the utmost importance. In terms of market prices much of the most relevant economic theory in understanding renewable natural resource uses involves the concept of pure competition and assumes that the laws of supply and demand operate in a predictable manner, based on changes in product prices. Among the most important concepts in understanding renewable natural resource use patterns, marketing procedures, rural incomes or other related phenomena, is the price elasticity of demand [STARR 1963].

Another of the fundamental concepts in normative economic theory, and one that provides the basis for a great many other dependent concepts, is that of the production function, which describes the relationship between input and output in a system. From the general production function relationship two indices may be derived; "average product," or the total product divided by the quantity of inputs at a particular level, and "marginal product," or the change in output resulting from the last quantity of input. In both indices the "Law of Diminishing Returns" operates.

Marginal product analysis can be used to determine optimum intensity of resource use as well as optimum level or quantity of output. From this it is not particularly difficult, assuming "economic man" and pure competition, to determine the best combination of inputs required to attain a given level or several different levels of production or to determine the best combination of resource uses with fixed input levels. Over a longer time period, however, producing households might vary the types and quantities of both inputs and outputs, and according to normative economic theory would alter their use of resources in order to

maximize net income. Linear programming, a mathematical method of allocating resources to maximize or minimize a particular objective, has become the principal practical method of solving theoretical resource-allocation problems. One of the major problems of this method is the assumption of the linearity of all functions, an inflexibility that sometimes creates problems in analysis. This linearity of objective and constraint functions is not, however, required for nonlinear programming, but this approach is severely handicapped by requiring much more data than does the former.

Although a state of static equilibrium may be approached, it can never be completely achieved in a resource system. Change in any one component of a system can and usually does lead to changes in others. Changes in commodity prices or in any cost of production, for example, set-off a sequence of events. Invariably, the process of change is highly complex also because of the relationships between a particular resource system and other systems.

Both exogenous and endogenous factors cause change in resource systems. The former is easier to conceptualize. Examples would be the development of new technologies that affect production costs or the availability of alternative employment that increases the opportunity cost of household labor. Universal are oscillations in prices, levels of production and the area used for resource procurement as former positions are regained after unanticipated, adverse weather conditions. More difficult to specify is endogenous change as it relates to the reciprocal relationships among components of a resource system. In normative theory and models some variable is always assumed to be independent and affecting the others: for example, production techniques affect net profits, but in the long term profit margins also affect production techniques. The feedback effects of such reciprocal relationships reduce even further the likelihood that a state of equilibrium can ever be achieved. Thus normative economic models become even more tenuous since they assume a undirectional relationship and the constancy of given variables.

Dynamic aspects do exist within a number of traditional economic models, especially in models of general equilibrium. It is recognized, for instance, that although demand is defined for a particular time period, it depends in part on future demand; so many traditional economic models can function in dynamic situations when a continuity in relationship among different specified time periods is assumed to exist. Recursive or dynamic programming models have utilized linear programming and similar models to add a dynamic quality to empirical models. Among the simplest types are those in which resource use patterns are developed from a static theoretical model over successive time periods. Apart from the definition of functional relationships among the variables, each time period is independent. The model becomes dynamic when the values of some variables, or the variables themselves, change through the time periods. Recursive programming models may optimize a specified objective in each time period, where parameters of the system in the current period are related to optimal solutions obtained in the previous periods. The program can also be developed to limit the amount of change possible between time periods, in order to replicate the effects of time lag or inertia in real life, such as cautious response to environmental changes in order to minimize risk and uncertainty, and to make resource use patterns at each time period depend on the specified functional relationships and on preceding patterns.

RISK, UNCERTAINTY AND DECISION-MAKING IN HOUSEHOLD RESOURCE USE

A large element of unreality enters normative economic theory with its assumption that future events can be anticipated. Yet one of the all-pervasive aspects of decision-making it renewable natural resource use is that many events, such as weather conditions during an agricultural cycle, cannot be predicted with complete accuracy. As a consequence, more recent models have been developed that account for the uncertainty inherent in prediction. But many models still assume that some objective in resource use is optimized, although it is not necessarily income maximization.

The term "risk" assumes that decision-makers can, based on past experience, estimate the probability of occurrence of some future value or event, such as the change of drought destroying rice crops, but that the estimate is subject to varying degrees of error. Assuming a state of competitive production and that a farming system with only monocultural land use is practicable during a given year, the problem becomes one of deciding the best land use. The straight forward decision is one that notes that "average" weather conditions occur most frequently and that rice yields are the highest under such conditions. However, "average" weather conditions do not really occur that often and in very dry years sorghum yields the highest income. The situation becomes more complex in marginal areas where biological and physical factors such as soils that drain too rapidly or higher elevations subject to lower temperatures make conditions far less suitable for rice cultivation. Somewhat more complex, but yielding better decisions, is the use of an elementary probability technique that reveals which crop would yield the highest "expected" income, taking into account all the possible weather conditions.

The analysis of decision-making, however, is complicated by the personality characteristics of the farmer or members of the farm household. He might be willing to gamble for the highest "expected value" and take his chances on the occurrence of drought. On the other hand, a conservative farmer would wish to minimize losses in case of the worst possible weather conditions. Relaxing the above assumptions somewhat, most farmers would probably plant a combination of crops in order to spread the risk, as is done in many tropical agricultural systems.

Optimum combinations that yield the highest "expected value" can be calculated using linear programming. However, in addition to representing an attempt to reduce risk, crop diversification can also be an example of complementary production, optimizing the use of varying ecological conditions in different parts of the farm, or a long-run rotation system, or indeed a combination of the various factors. Distinguishing a single motive is a complex problem, particularly if costs per unit area per crop partly depend on the degree of crop diversification. Depending on cost, for example, a farmer might be forced to decide between risk benefits of diversification and the cost benefit of monoculture. Most small-scale farmers have no way of estimating certain of the risks involved in their enterprise, and are forced to make decisions under conditions of uncertainty. Under such circumstances, decision-makers may estimate or impute risk probabilities in accordance with their own psychological characteristics, rather than on the basis of empirical evidence.

BEHAVIORAL CONCEPTS IN HOUSEHOLD DECISION-MAKING

Over the past 25 years, partly in reaction to the unrealistic behavioral assumptions of normative economic theory and as a consequence of the work in other social sciences, knowledge of the behavioral characteristics of decisionmaking theory has advanced considerably. Normative economic theory is predicated on highly specific assumptions about decision-makers and the conditions under which they operate. Complete information regarding, among other things, all prices and returns is assumed, as is the ability to compare precisely all inputs and outputs, the capacity to perform all the calculations necessary to determine an optimum decision, to optimize an objective such as income maximization, and to have the capability of operationalizing the decision once it has been reached. Few small-scale users of renewable natural resources come close to this ideal pattern of behavior. It is now apparent that theories based on assumptions that more realistically align with observed human behavior would provide better descriptive or normative models. The problems of using normative economic theory are particularly acute in non-market economies where no criterion such as prices or monetary value exists.

Some behavioral concepts such as utility, transitivity and subjective probability, together with the basic decision-making models to which they give rise, are fairly close to those of normative economics, and having been developed by both psychologically and economically oriented social scientists are transitional between economic and behavioral theory. In an attempt to overcome the problem of not having market prices for use as an evaluative criterion by decision-makers in non-market economies, economists have used the concept of utility to describe comparative value. But there are problems inherent in this concept. It may work in a free enterprise, commercial agricultural system, for example, where market value and utility may be fairly close, but the relationship between personal utility and price may not be linear, and if linearity exists it probably varies among individuals and communities, especially where ethnic differences exist [EDWARDS and TVERSKY 1967]. In any event, such a discrepancy will be an important influence on decision-making, particularly in the willingness to make the extra inputs required to increase income. Utility is even more difficult to measure in non-market economies with no market prices. The problem then becomes one of comparing different commodities. An example of intransitive choice is a situation in which A may be preferred over B, and B over C, but then C may rank over A. Where rankings are consistent, transitivity is said to exist. Moreover, different individuals have different choice ranking. In subsistence economies with a polycultural balance that satisfies dietary requirements, minimizes risk or fulfills some other function another problem arises. For instance, a subsistence household in a marginal area may prefer one papaya to one handful of rice, but would probably prefer 100 handsful of rice to 100 papayas.

Subjective probability (imputed risk or personal probability) lies at the core of behavioral theory, and its importance derives from the fundamental behavioral hypothesis that decisions stem from a tendency to maximize expected utility (the product of the utility of a pay-off and the subjective probability of the occurrence of a pay-off). It can be defined as the extent to which an individual thinks that a given event is likely to occur [SAVAGE 1951]. Research indicates that where individuals are forced to make a decision that they maximize expected probability based on a subjective probability rather than on an objective or real probability. Subjective probability is related to personal characteristics (e.g., optimism) and the prior experience of the decision-maker. Research also indicates, as might be logically anticipated, that individuals gradually and in a predictable fashion improve their estimates of probability. Among the considerable recent research on non-market agriculturalist's patterns of subsistence a careful maximizing in the use of their resource assemblages emerges, and if behavioral theory, especially game theoretic concepts, are applied, small-scale subsistence farmers can be viewed as optimizers [KATONA 1951]. This work also clearly shows that, in the absence of behavioral modifications, normative economic theory offers little explanation of subsistence-level resource use characteristic of marginal areas.

Decision-making has been classified by psychologists into various types that range from very deliberate problem-solving to automatic, subconscious decision behavior. Most tends towards the latter type [SIMON 1957]. This clearly is in complete conflict with the assumptions on which normative economic theory is based. It appears that automatic, subconscious rather than deliberate problemsolving is a response to most individual's inability to process large amounts of data and desire to simplify that process by avoiding an overload of demanding work [Hull 1964]. Traditional assumptions of optimization must therefore be modified to incorporate these findings. Probably individuals could be said to attempt to optimize some utility objective while minimizing the personal effort required to achieve it. Moreover it also appears that most decision-makers prefer, rather than personally processing large quantities of data, to follow the precedents of already established patterns. These findings may go far in explaining "tradition," "conservatism," and "habit" in resource use, and may help to explain the considerable observed uniformity in decision-making among farmers in given regions (e.g., with respect to the adoption of innovations) [SIMON 1956]. In defense of traditional models it should be noted that although human limitations do not permit accurate, deliberate decision-making aimed at optimizing at a given point in time, existing patterns are gradually adjusted so that an optimum pattern is approached over longer time periods. Massive decisions perhaps cannot be usually made, but individuals do make small, incremental decisions that in aggregate might lead to large-scale changes.

Another weakness of traditional models is the assumption of the availability of all the information needed for decision-making. Seldom is this the case in real life, where the decision-makers "decision environment" rarely, if ever, coincides with the complete set of information available in the "extended" or "real environment" [SIMON 1957]. The completeness of an individual's decision environment is a function of his educational level, the communication system and his willingness and motivation to make the effort required to obtain information. Further, all aspects of decision-making are closely related to culture, technology and to peer group pressure. The assumption that man optimizes some objective or even seeks to maximize expected utility, is dubious. Individuals, rather than analyzing all possibilities, probably seize on the first satisfactory decision encountered. An individual may seek to optimize but he is usually unwilling to make the huge effort needed to uncover courses of action that gradually come closer to optimization. This is greatly influenced by an individual's level of aspiration. Moreover, most theory assumes that man seeks to reach only one objective, the maximization of utility. Multiple objectives, however, are more likely, and short cuts are taken in decision-making to enable action to be taken on several fronts.

Another basic feature of human decision-making appears to be stochasticism, a degree of randomness such as is manifested when the same individual makes different decisions about the same object at different points in time under otherwise identical conditions. Such patterns of randomness can normally be determined based on a statistical distribution of probabilities with known variance. . An individual's decisions are not usually static, as they are portrayed in most models, but rather are dynamic, with later decisions depending on those that preceded them. Related to this is the fact satisfaction or aspiration levels also change as decisions are made in sequence.

Finally, it is imperative that the difference between group and individual decisions be understood. Group decisions appear to be more deliberate, explicit and often better publicized and, generally, they are of greater importance in establishing and maintaining patterns of resource use within communities and regions.

Several other important behavioral factors must be considered in the study of resource use. Spatial variations in the decision environment must be considered, for instance, because production functions vary spatially in accordance with ecological differences and with variation in the decision environment in addition to depending on such individual factors as motivation, and are strongly influenced by group behavior and geographical access to information. The ways in which innovations diffuse in given areas, information systems and communications networks, and the individual's perception of his environment and its resources and the constraints and opportunities that it presents are also critical in planning for resource transformation.

A dynamic approach that fully considers the factors and problems briefly discussed in this article is imperative in any meaningful analysis of resource utilization.

CONCLUSION

This article has briefly touched upon some of the major problems involved in most prior attempts at the study of household resource use in the rural regions of developing nations. It is apparent that a dynamic approach that fully accounts for the factors and problems discussed in the foregoing is imperative in any meaningful analysis—particularly for applied purposes—of rural resource use, since the powerful influences of urbanization and industrialization are forcing major and rapid changes in most traditional patterns of rural resource use, and are leading increasingly to the need for a fuller evaluation of better uses for available and often diminishing renewable natural resources.

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