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THE SOCIAL ELEMENT IN SPATIAL PLANNING

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Urban Functions in Rural Development (UFRD) is an operational framework for integrated spatial analysis and regional resource development in the rural areas of the Third World. This paper examines the treatment of the social element in UFRD as presented in two studies -- in Bicol, Philippines [BRBDP 1978] and in Potosi, Bolivia [Evans 1982]. In Part I of this paper a few comments will be made about the basic premises of UFRD. In Part II, the operational procedures used by UFRD in the location of new services will be examined critically. The existing procedure is shown to be a 'supply' approach to the problem. In Part III, a proposal is made to combine the existing methods with a 'demand' induced approach in order to better reflect the preferences of the consumer as opposed to those of the planner. In Part IV, there is a discussion of how to introduce the concepts of 'target group' analysis into spatial planning. In UFRD as it currently exists the principal focus of investigation is the urban center. In the proposed new direction the rural household will play a central role in all phases of the project: data collection, determining planning priorities, implementation, and program evaluation.

PART I: Basic Postulates of UFRD

Recognizing the important role of market centers and small towns in the articulation of the rural economy, UFRD seeks to strengthen urban centers, (1) by adding new functions, and (2) by improving the linkages between centers and their service areas. UFRD begins from the postulate that a well connected system of centers and service areas is a fundamental factor in the diffusion of economic development. This spatial postulate does describe a necessary

condition of economic development, but it is not a sufficient condition to attain goals such as the eradication of mass rural poverty and the reduction of income inequalities. The spatial integration of an economy by itself does not guarantee the improvement of living condition of economic development, and it is not a sufficient condition to attain goals such as the eradication of mass rural poverty and the reduction of income inequalities.

There are several historical and contemporary examples of the pitfalls of focussing exclusively on spatial integration. This point is well covered in the critiques of the geographical theories of modernization [de Souza and Porter 1974] and of innovation diffusion [Blaut 1977 and Yapa 1980]. For example, the rural inhabitants of the central highlands of Sri Lanka are among the poorest people in the island today. The peasant economy is based on the production of paddy and vegetables and occupies the valley bottoms; on the valley slopes are the well-tended modern tea plantations. Over a hundred years ago a good network of roads and railroads was built in the central highlands to serve the plantations; however, it did not contribute to the development of the peasant economy. The explanation for this puzzle is found in the events of the island's colonial history of over a hundred years [Mendis 1944]. The inauguration of a modern transportation system did not help to integrate the peasant economy into the national economy despite its geographical access to excellent transportation routes. In fact the peasants and the plantation owners remained in competition for labor and land resources.

In the Bolivian UFRD study, Evans characterized the Potosi region as being in an early state of urbanization. Presumably the problem was that the area was not adequately integrated into the national economy. The absence of an

integrated economy does not explain why Potosi remains in an early stage of development, since Potosi had a headstart in urbanization in the middle of the seventeenth century by being the largest city in the western hemisphere. The region still continues to be a heavy foreign exchange earner for Bolivia. In his historical studies of Chile and Brazil, Andre Gunder Frank [1967] argued that the system of urban centers was actually a mechanism by which the economic surplus from the rural areas was extracted, much to the detriment of the peasant economy. Increasing the spatial integration of the rural economy in the absence of a concomitant improvement in the terms of trade for peasant agriculture will not improve living conditions for the rural poor.

A more recent example of a focus on spatial integration and infrastructure, to the exclusion of social class, comes from the Green Revolution experience in the Devanahalli district of Karnataka State of India [Yapa and Mayfield 1978]. Due to extreme inequality in access to land and credit, only a small group of farmers benefitted from the massive program of infrastructure which included the building of seed stores, the expansion of agricultural extension, and the provision of rural credit. There were tremendous increases in the agricultural output and the overall income of the district, but the fruits of this growth were distributed unevenly.

Projects that intend to help the rural poor through the development of urban-rural linkages and similar infrastructure must pay <u>explicit</u> attention to social groups in all stages of project operation: data gathering, analysis, project planning, evaluation, and institution building.

Another important feature of UFRD is its concern for <u>integrated</u> rural development. Though sound in theory, such an approach calls for a level of

institutional development and planning skills that are rarely present in rural areas of the Third World. Several investigators are now skeptical about the possibility of implementing integrated rural development. After an extensive review of the literature on integrated rural development projects in Africa, Uma Lele of the World Bank has written:

> The experience of integrated programs indicates that, if there is not to be a considerable sag in the program activities after expatriate managers have departed and project authorities have dissolved, programs may have to undertake only those activities on such a scale which, in the forseeable future, can realistically be taken over and managed by indigenous manpower and institutions (Lele 1979).

Integrated rural development requires a substantial initial concentration of resources in a few regions. This can increase regional hostilities and tension with attendent negative political consequences. The concentration of resources also reduces the possibility of mass participation in rural development over a wide area. Integrated rural development places a great strain on existing low levels of institutional capability. Given the discouraging experience with integrated rural development from the past twenty years, it may be necessary to embrace less comprehensive approaches.

This paper takes the view that UFRD should move away (1) from mechanistic spatial integration to socially sensitive spatial planning and (2) from multi-sectoral planning to sector-specific functional programs. The emphasis should be on broad-based increases in productivity through the initial provision of a minimal level of services and institutional development. Multi-sectoral objectives, to the extent that they exist, can be met through a judicious time-phasing of activities. The actual priorities can be ascertained from a

sampling of the households. As mentioned above, this paper calls for a more explicit concern with the household as a unit of analysis, as an instrument of plan implementation, and as an agent of institution building. A move away from multi-sectoral planning will allow the household a greater degree of participation in the planning process.

PART II: Provision and Location of New Services

In this section I shall critically examine some aspects of the methodology used by UFRD in planning for the provision and location of new services.

The Gap Approach: The complete UFRD methodology consists of ten steps, only five of which are related to the provision of new services [Rondinelli 1980].[1] The five steps are as follows:

1. An overall regional resource analysis and collection of basic data.
2. An analysis of the settlement hierarchy.
3. A description of the physical and human linkages.
4. Mapping of the service areas of the urban centers.
5. Delineation of poorly serviced areas.

The remaining steps relate to the drafting of a spatial plan, the conversion of the plan to an investment strategy, implementation, the set-up of a

[1] In the Potosi version of UFRD a new step relating to accessibility was added to the tool kit of analytical methods [Evans 1982].

system for monitoring project implementation, and the building of local institutional capacity for plan making and implementation.

This method of planning for new functions is commonly described as a 'gap' approach to the problem. Decisions regarding the location of new functions are taken by looking at what is or is not there at different levels of the urban hierarchy. There are several problems with this approach. The absence of a function at a place where the population threshold is otherwise satisfied does not necessarily mean that the function is needed there. The need for a function has to be established by looking at the demand for that function from the consumers who live in the surrounding areas. The UFRD procedure takes a 'supply' approach to the problem. I argue in this paper that supply considerations have to be supplemented by questions of demand for a service at a site.

The Use of Thresholds: Two of the most basic UFRD tools in the analysis of settlements are the scalogram and the concept of thresholds. The scalogram is a rectangular array where the rows represent the centers in the region and the columns stand for services. The presence or absence of a service at a center is indicated by a one or zero placed in the corresponding cell. Reading along any row will show the array of services available at that place. Any column will show all the places at which that service is available. 'Missing functions' can be identified by studying the scalogram along with threshold values for functions. The threshold for a service is the minimum demand required to support a service or facility at an urban center. It is customary to use the population size of the smallest center in which the service is

available as a surrogate for the minimum demand required to supply that function. To obtain good approximations for thresholds in his Bicol study, Rondinelli [1980, 28-29] adapted a technique used earlier by Marshall [1969]. This technique used a sort of modified median to fix thresholds of functions. The threshold was defined to lie at a point where the number of centers with a population above that point lacking that function is equal to the number of centers with a population below that point possessing the function. Based on his Potosi experience, Evans [1982] has argued that this method of determining thresholds, though perhaps appropriate for heavily urbanized regions, is not helpful in predominantly rural areas. Since the threshold method is based on the population of the centers, it is a poor guide to the actual size of the market in the service area. Evans reported that in Potosi the threshold estimates tended to be far too low, and more or less useless for planning purposes. Furthermore, in planning situations where the intervention is designed to increase employment and income, the existing thresholds relating to past conditions may have little relevance for new conditions of increased income.

The Centrality Index: One of the criteria used in ordering places in the settlement hierarchy is the centrality index of a settlement.

> This index measures the functional complexity of a place by counting the number of functions at a place and by taking into account the frequency of occurence of all functions in the system. Functions are first assigned weights in inverse proportion to the frequency with which they occur. Thus a hospital or a daily market, which is to be found only in a few places, is weighted more heavily than a doctor's clinic or grocery store which are more

> widespread. The centrality index of a place is the sum of the weights of all functions found there: the higher the index the greater the functional complexity [Evans 1982, 44].

These indices are used to group centers into different levels of the hierarchy (Table 1). In Potosi five levels were recognized and each level has an associated range of centrality indices.

Table 1. Functional Complexity of Levels of Settlements, Potosi

	Level	Range of Centrality Indices	Range of Functions
I	Regional Center	56-	675-
II	Sub-regional Center	35-46	209-381
III	Rural Center	20-28	87-156
IV	Local	13-23	46-92
V	Villages	0-12	0-84

Source: Evans 1982, 44

In the case of Bicol a similar index was constructed and four levels were recognized in the settlement hierarchy. The centrality index yields summary statistics of the variety and the importance of services present in the urban centers. However, it has no analytical usefulness beyond the limited application of settlement classification. The knowledge that a center belongs to a particular level yields a general idea of what we can expect to find there, but it does not help us to determine what specifically is needed there. Since the

centrality index has no planning function in determining what services are needed at a particular place, this exercise can be easily omitted from the UFRD methodology. The descriptive classification of settlements into levels of functional complexity can be accomplished through a simple count of the number of funtions.

Wanmali's study of service provision in Miryalguda Taluka of Andra Pradesh, India, is quite similar to UFRD in intent and format, although the Indian study was done independent of the UFRD project [Wanmali 1983]. The study used a measure quite similar to the centrality index, where each service is assigned a weight according to its frequency of occurrence in the region. For example, in Miryalguda, a primary school and a junior technical college were given weights of 1.0 and 64.6, respectively, in 1978. As in UFRD, the weights were all summed to yield a centrality index for each settlement. Unlike in UFRD, Wanmali put these indices to a special use by summing the values for all settlements to arrive at a total score of service provision in the entire Taluka [Wanmali 1983, 39]. The total score for service provision in Miryalguda in 1968 was 3,439, while in 1978 the score was 8,238, an improvement of 239 percent in one decade. Though novel, the validity of the use of the centrality index in this manner is open to some question. For example, consider the value of weights given to a primary school and a junior college. According to these numbers one would have to build more than sixty-five primary schools to reach the degree of service provision obtained from the building of a single junior college. Such interpretations can give rise to serious mistakes in the planning for resource allocation.

The Accessibility Index: The Potosi UFRD study introduced a new step called the accessibility index in order to better delineate the service area of a town [Evans 1982, 63-76]. The model was designed to measure the level of access of the population in different places to specific urban functions. Evans has argued that the model can also be used to evaluate alternative solutions for improving physical access.

The accessibility model is constructed in three stages. First, an expression is derived to describe the level of access of an individual in place "i" to a specific function "j" located in one or more places in the urban system. Second, the individual access of a resident at i to all functions is computed, where each function has a pre-assigned weight reflecting its importance. Third, the total access of all individuals at place i to all functions is computed by multiplying the weighted individual access by the total population at i. These ideas are also expressed mathematically.

(1) Individual access of a resident at i to a specific function j located in one or more places in the system is given by A_{ij}.

$$A_{ij} = \Sigma k(N_{kj}/T_{ik}) \qquad \text{(Eq. 1)}$$

where

N_{kj} = the number of establishments of the function j in place k,

and T_{ik} = the travel time from place i to place k.

Individual access of a resident at place i to a function j is proportional to the number of establishments of type j at place k, and is inversely proportional to the travel time from i to k. Observe that in the expression for A_{ij} the summation is taken over all places k where the function is available.

(2) Individual access of a resident at place i to all functions is defined to be A_i.

$$A_i = \Sigma_j(A_{ij} \times W_j) \qquad \text{(Eq. 2)}$$

The summation is over all functions j where W_j is the weight assigned to function j.

$$W_j = N_j \times T_j \times P_j \qquad \text{(Eq. 3)}$$

where

N_j = average number of visits by an individual at i in time t to the function j,

T_j = average travel time to the function j,

P_j = the proportion of the population at i that uses function j.

(3) Total accessibility of all residents at i to all functions j.

$$A(P_i) = A_i X Q_i = \Sigma_j A_{ij} X W_j X Q_i \qquad \text{(Eq. 4)}$$

where

Q_i = the population at place i.

The accessibility model contained in equations 1-4 has two serious drawbacks. First, the expressions in equations 1-4 do not correspond to attributes of actual travel behavior of a household. Second, equation 4 leads to an ambiguous, if not contradictory, objective function of accessibility.

To discuss the first drawback, according to equation 1, the accessibility of an individual at place i to function j is directly proportional to the number of functions j at place k where the summation is taken over all places where function j is available. Clearly, some places in the urban system where function j is available will be beyond the maximum distance that residents at i are willing to travel. The number of establishments offering j at such places

and the travel time from i to such places are quite irrelevant to considerations of accessibility made by the residents at i. Further, consider the stated postulate that accessibility to function j will increase with the number of establishments offering that function. Suppose the number of establishments offering a certain function at place k increases from one to two. According to equation 1, this implies a two-fold increase in accessibility of the people at i to this function at k. An increase in the number of establishments at k will certainly increase the choices available to the residents of place i, but it is not clear as to how this will increase the accessibility of an individual to that function. To continue, the accessibility of an individual to all functions which is computed in equations 1 and 2, i.e., (A_i), bears little relationship to actual travel behavior of individuals. People are concerned with convenience of access to specific services, but the abstract concept of general accessibility to functions plays no part in the way individuals make travel decisions. In equation 2 accessibility to functions are weighted by using the term W_j. In the Potosi study marketing was assigned a weight of 68.6 and a junior school was assigned a weight of 8.6 [Evans 1982, 67]. This implies that by building a market rather than school, accessibility can be increased by a factor of 8. However, it is difficult to see what is gained from such a system of weighting when both markets and schools are in fact essential services.

The second objection to the use of the accessibility index is my argument that the objective function relating to accessibility is ambiguous. This can be demonstrated by expanding the expression in equation 4. For the purpose of exposition I shall assume only two urban functions without any loss of generality.

$$A(P_i) = A_i \times Q_i$$

$$= A_{i1} \times W_1 \times Q_i + A_{i2} \times W_2 \times Q_i$$

by equation 4,

$$= Q_i(A_{i1} \times W_1 + A_{i2} \times W_2) \text{ by factoring } Q_i,$$

$$= Q_i(A_{i1} \times N_1 \times T_1 \times P_1 + A_{i2} \times N_2 \times T_2 \times P_2)$$

where P_1 and P_2 are the proportions of people at i using functions 1 and 2, respectively.

$$A(P_i) = Q_i(A_{i1} \times N_1 \times T_1 \times (P_1/Q_i) + A_{i2} \times N_2 \times T_2 \times (P_2/Q_i)) \qquad \text{(Eq. 5)}$$

where P_1 and P_2 are the actual numbers of people using functions 1 and 2, respectively, and Q_i is the population at place i. By cancelling the term Q_i from the denominator and numerator in equation 5, and rearranging terms we get,

$$A(P_i) = A_{i1}XP_1XN_1XT_1 + A_{i2}XP_2XN_2X\ T_2$$

But $P_1N_1T_1$ and $P_2N_2T_2$ are the total travel times for residents at i for functions 1 and 2, respectively. So,

$$A(P_i) = A_{i1} \times \text{total travel time for function 1} + A_{i2} \times \text{total travel time for function 2}$$

By equation 1 and the definition of A_{ij} we have

$$A(P_i) = \Sigma_k(N_{k1}/T_{ik}) \times \text{travel time for function 1} + \Sigma_k(N_{k2}/T_{ik}) \times \text{travel time for function 2.}$$

Note that in the foregoing expression travel time appears in both the denominator and the numerator, implying that total accessibility is both directly and indirectly proportional to travel time which is a very ambiguous, if not contradictory, mathematical expression.

Part III: A Demand Approach to Urban Functions

The techniques of UFRD, such as the scalogram, the centrality index, and the accessibility index, are all related to the measurement of what is there, i.e., the supply aspects of urban functions. The absence of a function from a center which may have otherwise satisfied the threshold criterion does not necessarily mean that the function is needed there. Likewise, the lack of an adequate threshold at a place does not necessarily mean that the function is not needed nor that it cannot be located there. The decision to locate a new service must take into account certain issues of demand: (1) what are the needs of the people, (2) how do people view their own priorities, and (3) to what extent can we transform the expressed needs into effective demand.

The M-Center Location-Allocation Problem: In UFRD, the twin issues of provision and location of new services are considered jointly through the use of the same techniques. The knowledge that a function is absent from a center which had otherwise satisfied the threshold criterion answers two questions simultaneously: (1) can a new function be supported, and (2) if so, where should it be located. In the demand approach to urban functions presented here, the issues of provision and location of new functions are treated separately. Assuming for the moment that the question of the number of facilities to be provided is answered, the problem of locating the facilities can be settled through the use of location-allocation algorithms. I shall discuss the question of location first. Stated formally, the problem is as follows:

> Assume there are n given, possibly weighted, points in a plane (demand points), each of which is to be allocated to the closest of m points (centers). Determine the locations of the m centers such that the sum of the (weighted) distances from each demand point to its closest center is a minimum. Mathematically, the problem is to minimize
>
> $$R = a_{ij} w_i \, (x_i - x_j)^2 + (y_i - y_j)^2$$
>
> where R is the aggregate distance
> w_i is the weight of the i-th demand point
> x_i, y_i are the coordinates of the i-th demand point
> x_j, y_j 1, if demand point i is assigned to center j and 0 otherwise, subject to
>
> $$\Sigma_j a_{ij} = 1, \text{ for all } i$$
> $$1 \leq \Sigma_i a_{ij} \leq n-m+1, \text{ for all } j.$$
>
> The first constraint ensures that each demand point is allocated to one and only one center; the second that each center has at least one demand point allocated [Rushton, Goodchild, Ostresh, 1973, pp. 29-30].

Both exact and heuristic solutions to this problem now exist thanks to the earlier work of Tornqvist [1968] and the subsequent work of Rushton and his co-workers at the University of Iowa. Efficient computer programs exist for the M-center location-allocation problem and work is underway for adapting these programs to be used on the micro-computer. The location-allocation algorithms tell us how to optimally locate M service centers, but they tell us nothing about how many centers are needed in the first place. We now turn to a consideration of this question.

<u>The Provision of New Functions:</u> When issues of demand are taken into account, the decision to provide new functions becomes a complex one. This is an area of UFRD which requires some new thinking and modelling procedures. The

following are a few preliminary notes on the topic. The supply approach in UFRD views the entire regional system from the vantage point of the service center. The demand approach requires that we view urban functions from the point of view of the rural households. One operational procedure is to partition the area into Basic Economic Areas (BEA), these being the smallest spatial unit for which regular statistical data is collected. In the Bicol basin and in most regions of South Asia the Basic Economic Unit is the village. In the demand analysis, samples of households will be taken from each BEA of the region. For the purpose of service provision the household surveys should include at least the following information.

1. Services needed by BEAs along with statements of their priorities,
2. Present travel patterns and willingness to travel,
3. The frequency with which services are needed,
4. The nature and extent of multi-purpose trips undertaken.

The type of service is an important factor in the decision to provide a new service. The locational requirements for markets, public utilities, social facilities, and so on are quite different from each other. Services such as road building can be provided only by the public sector. In the case of markets, the public sector may provide the initial infrastructure and building facilities. Unlike education, administrative services, for example, are demanded only infrequently. The demand for hospital services is usually irregular, but hospitals need to be located within critical distances. Some marketing functions lend themselves to multi-purpose shopping trips. A model for the

decision to provide new functions needs to take into account many factors. The following are a few of these:

1. Existing and future demand for services,
2. Existing thresholds for services,
3. People's willingness to travel,
4. Fixed and operating costs of providing the service,
5. The willingness of private enterprise to provide the service,
6. The role of a specific function in the general economic development of the region.

Within the framework of our research on urban-rural linkages, a major effort should be directed towards the building of such a model. Considerations of accessibility to services should remain at a highly disaggregated level. People are not concerned with general notions of accessibility of a place to services. However, people do care about the convenience of access to concretely specific services. Indices of accessibility may help us to compare one settlement with another, but they do not play a useful role in helping us to make decisions of what precisely is needed.

Assessing Rural Needs -- The ITEC Manual: Household surveys are rich sources of information on rural conditions, yet they can be enormously expensive when hundreds of small communities are involved. Few methodologies exist for inexpensive collection of household information in rural areas. Through more than two and a half years of technical cooperation with the government of Costa Rica, a Cambridge-based group called ITEC developed a low cost, rapid

system to determine conditions in rural communities and their priority needs for development. Their methods are summarized in a document called Assessing rural needs: A manual for practitioners [Ashe 1978]. Based on information collected through community surveys, this system:

1. establishes basic social and economic trends such as migration, employment, and changes in agricultural production,

2. provides inventories of infrastructure, services, rural enterprises, and businesses in small communities,

3. indicates miles of roads that need construction, the number of villages that need water and similar services,

4. indicates perceived community priorities for development projects and establishes priorities between regions, counties, and communities,

5. provides a baseline against which the effectiveness of programs can be measured by comparing the number, type, and location of projects completed compared to needs established by the research program.

Along with many other features, the manual contains (1) the questionnaire, (2) coding procedures, (3) systems for establishing priorities, and (4) formats for preparation of community profiles. All research is different, but the 'cookbook' questionnaire can be adapted for our uses with very little change.

The manual was originally field-tested in Costa Rica. Given the need for quick results, tight budgetary constraints, and the relatively low level of training of those who were to carry out the interviews, ITEC decided on a novel methodology of conducting a single interview for each community through a conversation with a group of local people considered to 'know the area.' This decision cut down the time required to collect information in each

community to about three hours. The single community interview was supplemented by the interviewer's observations, census data, and secondary sources of information. Although it was not done in Costa Rica, there is nothing to preclude us from conducting a few household interviews directly. The major criticism that has been levelled at the single community interview is that the information is not sufficiently accurate or fully representative. However, in Costa Rica a comparison of the community interview results with data from a survey of 1,500 households showed that the ordering of community priorities was the same in both studies.

Part IV: Focus on Target Groups

There are at least three criteria that are useful in assessing the social impact of a project: (1) an increase in employment, (2) reduction in poverty, and (3) a reduction in inequality.

Despite its explicit concern with the rural poor majority, UFRD has no methodology for addressing the poor except as an undifferentiated aggregate. The poor in the Third World consist of divergent groups, often with conflicting interests, that exhibit varying causes for their poverty. General poverty programs lose much of their effectiveness by failing to address the needs of carefully specified groups. Production-oriented programs such as the Green Revolution in South Asia, though quite successful in raising grain production, showed mixed results, with some instances of actual harm done to the interests of rural poor [Yapa and Mayfield 1978]. In conventional analyses of poverty it is customary to arrive at a definition of the poor through the use of a fixed poverty line. It is necessary to go beyond this and to begin to identify

groups of households whose members have similar access to the means of production in order to pinpoint 'target groups.' Such a methodology confers several advantages:

1. it gives a more accurate picture of the composition of the poor,
2. it helps us to identify different mechanisms that cause poverty,
3. it helps us to seek-out and implement group specific measures,
4. it facilitates the evaluation of projects by allowing the comparison of results against base-line data collected for target groups.

AID Strategy in the Philippines: The Country Development Strategy Paper (CDSS) for 1982 produced by the AID mission in Manila has incorporated several features of an excellent target group methodology. The original preparatory work under the leadership of George Carnan and David Korten was conducted as a series of seminars held at the Mission Office under the heading of 'people-centered development.' According to Korten and Carnan [1982]:

> analysis had to go beyond lumping the poor together as a faceless, placeless aggregate...In looking for a more meaningful breakdown, it became evident that one of the more significant distinguishing characteristics of rural households was the nature and size of the resource base to which they had access, and the nature of their rights to such access. This led to a further disaggregation into upland farmers, paddy rice farmers, landless agricultural workers, and artisanal fishermen--the first being dependent on uplands, and the second two on the lowlands, and the fourth on coastal waters.

The utility of this approach was soon evident from the fact that throughout the sixties and seventies the emphasis on rural development in the Philippines had been on rice production, primarily that of small farmers with access to irrigated lands. The Mission work revealed that irrigated rice farmers represented less than 15 percent of the rural poor and were among the least disadvantaged of the rural poor. The production-oriented approach of past agricultural policy with its concept of 'poor in the aggregate' had bypassed the vast majority of the poor among the landless agricultural workers, upland farmers, and the fishermen.

Another major advantage of the target group approach used by the Philippine Mission comes from the fact that conventional analyses tend to focus investments on geographical areas that are considered to be depressed. While this may benefit the area, there is no assurance it will benefit those people in need of most help. The analysis revealed that some of the major concentrations of particularly depressed households were found in provinces showing high performance in economic indicators. A spatial approach without sufficient sensitivity to socioeconomic groupings would have missed this phenomenon.

Jobs, Appropriate Technology, and Natural Resources: One of the major objectives of the new view of development planning is to create the maximum number of jobs per unit of invested capital, particularly when a large foreign exchange component is involved. The number of jobs created per unit of capital depends on the choice of technology. Choice of technology has a major bearing on UFRD because technology affects the spatial configurations of service centers and market towns. I shall illustrate this point using an example from

fertilizer distribution. Imagine the problem at hand is to devise an optimum network for the distribution of fertilizer. In this instance UFRD needs to go beyond the question of locating fertilizer distribution stations to a consideration of alternative means of producing and distributing fertilizer. Of course spatial planners cannot be expected to have such knowledge first hand but they should be sensitive enough to know when expert guidance can help. Relevant to this discussion is a knowledge of the technology of biogas. When organic matter is allowed to decompose anaerobically (without oxygen) it releases methane, a clean combustible gas. The spent solids of the original manure make an excellent nitrogeneous fertilizer. The technology is fairly scale-neutral and can be built on a small scale at a household, farm, or a village level. The smallest economic size generates about 60 cft per day and can cost anywhere from $60 to $250 U.S. dollars. A large plant which produces 5000 cft per day can be built for a cost of 41,000 Indian ruppees and can employ about five people per plant. If 21,150 such plants are dispersed over a large geographical region, they will produce over 230,000 tons of nitrogen fertilizer per year and will generate over six million megawatt hours of energy (methane). The biogas technology will employ 13,750 people for a total cost of Rs 1070. On the other hand, a single modern coal-based fertilizer plant designed to produce 230,000 tons of nitrogen per year will actually consume energy to the tune of 0.1 million megawatt hours of energy and will employ only a 1000 people at a total capital cost of Rs 1200 [Rainbook 1977]. Each of these technologies have very different capital-employment ratios and exhibit fundamentally different spatial configurations in their distribution networks. Labor-intensive intermediate technology has a vital role to play in rural development.

This kind of technology is the key to creating jobs with low capital outlays, and very often it involves the use of unconventional resources such as human and animal waste, solar power, and small-scale hydro power. This implies that a complete evaluation of 'natural resources' present in an area cannot be done without an 'a priori' knowledge of appropriate technology. It is imperative that UFRD build in an appropriate technology component into its planning methodology. For a start this can be accomplished by building a small library on appropriate technology at Clark University. Such a library need contain only the basic manuals and a subscription to about two of the major journals in the field.

Part IV: Conclusion

UFRD takes a spatial approach to planning without a fundamental inquiry into the causes of poverty within a region. A poorly integrated space economy is usually a manifestation of deeper maladies in the socioeconomic base of the society. UFRD and other schemes of spatial planning need to develop a greater sensitivity to the role of the social element in economic development. In the past UFRD has advocated an integrated, i.e., a multi-sectoral approach, to rural development. Though sound in theory, such an approach increases the continued dependence on expatriate expertise and in the long run hinders the gradual development of local institutional capability. It is necessary to develop a sector-specific approach to urban-rural linkages with a scheme to synchronize and time-phase the implementation of individual projects. Some parts of the existing UFRD methodology, such as the centrality index and the accessibility index, help us to describe the centers; beyond that they do not

serve any planning function for deciding what services are needed in which places. Given the expressed need for less complicated methods, it is perhaps best to omit some of these techniques from the analysis.

The approach of UFRD to urban functions was characterized as being from the supply side. This has to be supplemented with considerations from the demand side. In the demand approach it is necessary to separate the two functions -- (a) the provision of new services, (b) the location of new services. Effective computer alogorithms now exist for making decisions on the location of new services. Provision of new services involves the prior determination of the demand for that service. The existing analytical techniques are inadequate for this task and new modelling techniques are required.

Finally, one useful way of introducing the social element into spatial planning is through the adoption of the target group methodology. The demand analysis and the adoption of target group methodologies place a new and important focus on the household and its role in the rural economy. Developing rural areas with low capital outlays require that we look closely at the techniques of appropriate technology which use unconventional but local 'natural resources.' The adoption of appropriate technology introduces a new dimension to the analysis of 'natural resources.'

REFERENCES

Ashe, J. 1978. Assessing rural needs: A manual for practitioners. Cambridge: MA: ACCION/AITEC.

Bicol River Basin Development Program. 1978. Urban Functions in Rural Development: A Research Project in Spatial Analysis and Planning. Philippines: BRBDP.

Blaut, J. 1977. Two views of diffusion. The Annals of the American Geographers Vol. 67.

de Souza, A.R., and P.W. Porter. 1974. The underdevelopment and modernization of the Third World. Washington, D.C.: The Association of American Geographers.

Evans, H. 1982. Urban functions in rural development: The case of the Potosi Region in Bolivia. Part I. Washington, D.C.: USAID

Frank, A.G. 1967. Capitalism and underdevelopment in Latin America. New New York: Monthly Review Press.

Korten, D.C., and G. Carner. 1982. Planning frameworks for people-centered development. Mimeo.

Lele, U. 1979. The design of rural development: Lessons from Africa. Baltimore: The Johns Hopkins University Press.

Marshall, J.U. 1969. The location of service towns. Toronto: Toronto University Press.

Mendis, G.C. 1944. Ceylon under the British. Colombo: Apothecaries.

Rainbook: Resources for appropriate technology. New York: Schocken Books, 1977.

Rondinelli, D.A. 1980. Spatial analysis for regional development: A case study in the Bicol River Basin of the Philippines. Tokyo, Japan: The United Nations University.

Rushton, G.; M.F. Goodchild; and L.M. Ostresh, eds. 1973. Computer programs for location-allocation problems. Iowa City, IA: Department of Geography, The University of Iowa.

Tornqvist, G.; S. Nordbeck; B. Rystedt; and P. Gould. Multiple location analysis. Lund, Sweden: C.W.K. Gleerup.

USAID. 1982. Philippines country development strategy statement FY 84. Manila: USAID.

Wanmali, S. 1983. Service provision and rural development in India: A Study of Miryalguda Taluka. Washington, D.C.: International Food Policy Research Institute.

Yapa, L.S. 1977. The Green Revolution: A diffusion model. Annals of the American Geographers 67: 350-59.

Yapa, L.S. 1980. Diffusion, development, and ecopolitical economy, in John Agnew, ed. Innovation research and public policy. Syracuse, NY: Syracuse University Press, pp. 101-41.

L.S., and R.C. Mayfield. 1978. The Non-adoption of innovation: Evidence from discriminant analysis. Economic Geography 54: 145-56.