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Philippine Geographical Journal, Vol. 35, No. 1
(January-March, 1991)

EDITORIAL

SOME IMPLICATIONS OF CLIMATIC CHANGE ON WATERSHED HYDROLOGY

The expected doubling of the concentration of atmospheric carbon dioxide by the middle of the next century leads to the prediction of global warming. As the earth becomes warmer, changes are expected in the various components of the global hydrologic system. Among the most climate-sensitive hydrologic processes are precipitation, evaporation, transpiration and surface runoff. Each of these processes contributes to the water balance on the earth's surface.

The effects of doubling the concentration of atmospheric carbon dioxide on the magnitude and direction of change in global mean precipitation is still uncertain. Even more uncertain are the magnitude and direction of changes in the mean seasonal precipitation by region. Various global climate models give diverse estimates of the change in annual precipitation rate. The most unreliable area of climate modelling is related to predictions at the regional and seasonal levels. Current models do not have sufficient resolution as to resolve many important physical processes that take place in the planetary boundary layer.

It is interesting to note, however, that most contemporary climate models suggest that, the Asian summer monsoon circulation would be intensified as the globe grows warmer. This implies that Southeast Asian areas affected by the summer monsoons would probably experience increased summer rains. Models also predict drier conditions in Southeast Asia during the winter.

General circulation model experiments do not usually predict explicitly evaporation and transpiration. Evaporation is usually parameterized in terms of other meteorological variables such as temperature and wind. Transpiration is more complicated since it is controlled by three factors, namely: atmospheric humidity, soil moisture availability, and the physiology of the particular plant. Most climate models are not sophisticated enough to adequately consider these factors in calculating transpiration.

Surface runoff is another climate-sensitive hydrological parameter. The various climatic factors that affect surface runoff include the amount,

type, intensity, duration and timing of precipitation events, and the distribution of precipitation in a drainage basin.

Aside from speculations that can be generated by the results of general circulation models, there are no studies made in the East Asian maritime region on the impact of climatic change on the hydrology of the region's watershed. Hence, there arises the necessity to influence the various institutions and countries in the region to organize such efforts. It is, however, quite desirable to have a common set of climatic scenario from which the impact studies will be based in order to allow for comparison of results. Experts from international organizations involved in climate impact assessment could be invited to assist local experts. Cooperative studies among countries within the region could also be initiated.

Jorge G. de las Alas*

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ARTICLES

DOES MEDIA HAVE A ROLE IN MARINE ENVIRONMENTAL PROTECTION?

Miguel D. Fortes*

ABSTRACT. A clear and inspired understanding of our marine environment is vital to the sustainable development of its resources. Coral reefs, seagrass beds and mangrove forests have undergone extensive alterations in recent years due largely to biased policy decisions of government which put a higher premium on transitory economic benefits and not on the long-term ecological integrity of the environment. There is a need for multidisciplinarity which is essential in solving environmental problems. Mass media, as a focal point in environmental issues, could be the most effective means to redirect the thrusts of our educational system towards one that is more relevant and environmentally oriented. Its role begins at the early stage of properly informing the public and strengthening the infusion of environmental themes into the individual disciplines of the social sciences, and continues to being at the forefront in the development of environmental activism.

INTRODUCTION

A unique feature of the Philippine Constitution is embodied in Section 16 of Article II, the Declaration of Principles and State Policies, which provides: "The State shall protect and advance the right of people to a balanced and healthful ecology in accord with the rhythm and harmony of nature." No doubt this provision is the offshoot of the alarming degradation and destruction of the Philippine environment and the overexploitation of its natural resources. More specifically, in the coastal habitat, this serious problem is manifested when the artisanal fisherman, after spending a whole day at sea, goes home with a pitifully meager catch. Indeed, we have a real problem at hand. And here, the media is one important vehicle that could at least cushion the impact of this impending environmental doom.

There is at present, and for various intents, an upsurge of interest in the environment in the entire ASEAN region. This interest has elicited innumerable and varying behavioral responses on the part of certain sectors, responses which ultimately manifest themselves as activities linking individual private interests with marine environmental issues. Hence, "productivity," "conservation," "environmental manage-

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ment," "ecology," and "man-oriented" groups literally mushroomed in member countries in the last 10 years or so. Despite their felt presence and well-funded environment-oriented activities, the big question could still be asked: Why is the ASEAN marine environment a dismal scenario of innumerable failures and half-successes in marine resource management? Why is its resources being continually subjected to degradation and destruction?

One reason for this dismal scenario is the varying perceptions on the part of those whose tasks are to safeguard the environment and its resources. Non-scientists who are the "prime movers" of our society generally view the marine environment as a boundless, easily renewable resource. Hence, development by and for these people result. This development, however, is that kind which is characterized by careless disregard of the natural and of the original wondrous balance of complex yet efficient interactions among lowly plants and animals of the sea — organisms which produce food and provide shelter for other myriad life forms and by themselves undergo processes which ultimately sustain the vital functions of the environment for the welfare of the human inhabitants. Such disregard results instead to well-paved highways lined with potted trees and trimmed gardens, leading to marinas and coastal multi-story estates and resorts festooned with synthetic decors and amenities. Here we see an offshoot of the transformation from subsistence to cash economies. Before, where products traditionally gathered from the habitats were available, now there is increased reliance on imported goods.

The word "man" is in itself an enigma. In natural science, man is simply an entity with an uncomplicated role in the world of life — as an omnivore which depends upon green plants and animals for survival. To non-scientists, however, man is the center of all activities, and everything should conform to his specifications. In this modern industrialized world, he reigns supreme, and as a geological agent with the most powerful machines at his disposal, he can move and flatten mountains and divert the flow of the seas. In relation to the environment, this is that role of man which we all should watch out for.

Sound environmental management looks at profit in terms of ecological units and in the context of long-term goals. This view is incoherent with management as viewed by economists, lawyers, businessmen or engineers who generally tend to consider profit in terms of monetary units obtainable as immediate returns for their short-term investments. In general, the drive for production aims at maximum immediate benefits or economic surplus, with only direct costs taken into calculation. This process frequently results in technological choices which have considerablbe negative impacts on the environment, the resulting degradation not having been taken into account as part of

the costs. Here again, the environment as the source of raw materials is sacrificed and ravaged or at best replaced with unnatural structures.

There is the inherent difficulty a scientist faces in giving peso or dollar values to a habitat's uses and potentials. This is one reason why policymakers are not easily convinced that a seagrass bed, coral reef or mangrove forest is truly valuable. Indeed, in a country like the Philippines where environmental imperatives are often sacrificed in the name of economic development, even the most obvious sources of income and livelihood of the majority of the people need first to be given money values before these are considered priorities in research and development programs of the government. The question may then be asked: Is there a need to determine the money equivalent of resources which are directly consumed or whose biological rightness is indisputable?

THE PROBLEM IN THE CONTEXT OF PHILIPPINE EXPERIENCE

The Philippine Coastal Environment

A rapidly developing country, the Philippines is an archipelagic state with about 7,000 islands which are bounded by about 18,000 km of irregular coastlines. Its island nature partly dictates that many population centers be developed along coastal fringes — the very places colonized by seagrasses and mangroves, and in close proximity to nearby coral reefs. About four-fifths of the country's provinces border on the sea, and of the more than 1,500 municipalities, nearly two-thirds are coastal. It is thus reasonable to assume that the coastal environment has played a significant formative role in the Philippine traditional way of life, as well as in its socioeconomic development.

The country's coral reefs, seagrass beds and mangrove forests — the three major marine life-support ecosystems — are thus being subjected to increasing stresses caused by the ever-increasing population and its diversified needs. Hence, it is not surprising to see seagrass and mangrove areas being filled, dredged and diked for conversion to other coastal uses, while the reefs are literally destroyed or overfished.

Especially true for the tropical world, the marine environment depends for its stability and ecological integrity upon these three major life-support ecosystems. As one macroecosystem, they all constitute an ecological framework upon which the structure and dynamics of the seas and oceans are based. Current thinking suggests that these three ecosystems, where they occur, should not be looked at as discrete, independently functioning, and isolated from one another. Instead, they should be studied as one integrated whole, much like the land, sea and air be considered in any developmental goal which includes the natural environment as the resource.

Coral Reefs

Coral reefs are "...essentially massive deposits of calcium carbonate that have been produced by corals (Phylum *Chidaria*, Order *Scleractinia*) with major additions from calcareous algae and other organisms that secrete calcium carbonate." They are the dominant features of shallow marine waters throughout the tropics and with few exceptions, are located between latitudes 30 degrees north and south of the equator. The World Conservation Strategy identifies reefs as an essential ecological and life-support system necessary for human survival and sustainable development.

As of 1982, the status of Philippine reefs is partly shown below in Table 1.

TABLE 1. STATUS OF PHILIPPINE REEFS

Island Group	No. of Study Stations	Cover Condition(%)			
		Excellent*	Good	Fair	Poor
Luzon	229	3.5	22.7	42.8	31
Visayas	360	6.6	27.1	35.4	30.8
Mindanao	43	7	14	30.2	48.8
Mean		5.7	21.3	36.1	36.9

* Excellent=75—100%; Good=50—74%; Fair=25—49.9% Poor=0—24.9%

A greater percentage (73 percent) of the Philippine coral reefs belongs to the "fair-poor" category, directly implying the extensive influence of both natural and man-induced activities on the ecosystem. Among the three major islands, Mindanao is relatively the most disturbed. It is closely followed by Luzon and by the Visayas. As a whole, the reef areas of the country present a dismal picture and there are practically no signs of improvement over the last few years.

The stresses to coral reefs are both natural and man-induced. The natural causes of reef destruction are water movement, geological dynamics, and biological interactions. Other reports of destruction involve exposure during low tides, freshwater runoff, and burial by water-borne sediments.

The man-induced factors include siltation, blast fishing, fishing with toxic chemicals, "muro-ami," and "kayakas." Coral mining, tourism, pollution and collection of the biota undoubtedly aggravate the situation.

Seagrass Beds

Seagrasses are the only group of submerged flowering plants that are successful in shallow water coastal habitats where the sediment conditions are normally unfavorable for most macrophytes. They comprise about 50 species worldwide, but this relatively small number is

by no means proportional to their ecological and economic importance. In the Indo-West Pacific region, the Philippines has the second highest seagrass diversity in the world.

The areal coverage of seagrass beds, the least studied among the three ecosystems, is not yet known. However, mapping out the beds at six localities in the Philippines using digitizer analysis of Landsat imageries have been done successfully (Table 2). At the specific transect stations, the beds yielded a total area of 2.563 sq km, broken down into:

TABLE 2. AREAL COVERAGE OF SEAGRASS BEDS IN SIX PHILIPPINE LOCALITIES

Locality	Area (Sq Km) at Station	Total for Site
Bolinao Bay	0.768	37
Pagbilao Bay	0.075	1.89
Puerto Galera	0.205	1.14
Ulugan Bay	0.479	2.97
Banacon Island	1.016	7.81
Calancan Bay	0.020	0.07
Total	2.563	50.88

It should be noted that the actual area of seagrass beds estimated at the study sites in the Philippines represents only a very small percentage of the total area where seagrasses abound.

A number of factors have been identified to exert negative impacts on Philippine seagrass beds. Some of the more important factors include dredging and filling, eutrophication, temperature and salinity, wind and sea stress, population explosions (of grazers) and overgrazing, oil pollution, and heavy metals.

Mangrove Forests

Mangroves are the trees and bushes growing below the high-water level of spring tides. Unrelated taxonomically but with similar physiological characteristics and structural adaptations, they are the littoral plant formations of tropical and subtropical regions, fringing coastal or sheltered tidal flats, coves, bays and estuaries. An ecotone between the marine and terrestrial environments, the mangrove is a unique biotope and the interrelationships among its components are extremely complex.

In 1920, an average of 450,000 ha of mangroves have been reported to occur along the coastal zone of the Philippines. By 1985, 303,861 ha have been cleared, legally or illegally, so that only 146,139 ha remained, and much less could be accounted for now. This alarming rate of denudation of the forest at 5,064.4 ha per year is highly inimical to the

mangrove plants themselves as well as to the nearshore ecosystems which for the most part depend upon them.

The natural stresses to the mangrove ecosystem in the ASEAN region include cyclones, typhoons, tidal waves, volcanic activity, pests and diseases, and population and community interactions. On the other hand, the man-induced stressors are primarily caused by the mining of industrial materials; drilling for and production of oil; diversion of freshwater; forest exploitation for firewood, domestic fuel, and charcoal; massive deforestation; conversion to agri- and aquaculture; coastal development; and pollution.

CORAL REEF-SEAGRASS-MANGROVE ECOSYSTEMS INTERACTIONS

The UNESCO Working Group has classified the interaction among coral reefs, seagrass beds and mangroves into: physical, nutrients, animal migration and human impact. Seagrass beds act as hydrodynamic barriers which dissipate wave energy and create a low-energy zone favorable to mangroves. They also trap and stabilize sediments, preventing abrasion or burial of corals and those parts of mangroves needed for aeration. Similarly, fringe and basin 'mangrove forests act as depositional basins and effective sediment binders, reciprocating for the benefits they derive from seagrass beds. The ability of the mangroves to regulate coastal freshwater flows acts as a buffer to changes in salinity that would otherwise be adverse to both corals and seagrasses.

Seagrasses and mangroves tend to leak or export nutrients. The structure of the former correlates positively with lower nutrient inputs, while that of the latter, with higher inputs. This nutrient leakage ensures that each system receives the level required for optimum growth and development. Additionally, birds that rest in mangroves and feed on seagrasses carry nutrients back into the mangroves by defecating after returning from feeding on the seagrass. Dissolved and particulate organic matter, runoff from mangroves into seagrass beds and coral reefs, and vice versa, may help maintain the rich nutrient pools of these three habitats. Coral reefs, seagrass beds and mangroves are also linked by animal migrations (i.e., fish, sea turtles, dugongs) that lead to an exchange of energy between feeding and sheltering habitats.

Mangrove forest destruction allows terrigenous runoff into seagrass beds and coral reefs. This causes smothering, shading and eutrophication. These consequences would inevitably lead to a reduction in both primary and secondary productivity, primarily because of lowered photosynthetic rate on the part of the plants. Seagrass-bed removal renders the sediments unstable, with the sediments then being carried by currents or storms to mangrove areas and coral reefs where they may exert

detrimental effects, e.g., destruction of the nursery and feeding grounds or alteration of food-web patterns.

ROLE OF MASS MEDIA IN ENVIRONMENTAL PROTECTION

While it is true that biological and physical features constitute the natural framework of the human environment, its ethical, social, cultural and economic dimensions also play significant roles in determining the lines of approach and the means whereby people may understand and make better use of natural resources in meeting their basic needs. Along the same clear extent, mass communication as a social science which is closest to the people, is profoundly relevant in the study of current marine environmental problems and in searching for their applicable solutions.

In the protection of the environment, mass media could play many significant roles. Surely, many of these roles have been mentioned in as many fora and conferences, including this seminar-workshop. I will not dwell on those which obviously have been cited in the agenda of politicians or those presented to cloak the misdeeds of some journalists, or even those which concerned citizens have been clamouring mass media should play. These are mostly transitory obligations whose impacts are realized only in the short-time frame. I would like to dwell on those roles wherein mass media could create an impact founded on the continuity of the human desire for change.

I propose that the role mass media should play in marine environmental protection is as an efficient and lasting vehicle as well as an active partner in: (1) Public information advancement; (2) Environmental integration in the social sciences; and (3) The growth of environmental activism working hand in hand with formal education.

Public Information Advancement

As an effective means of informing the public, media personnel should first make an extra effort to be knowledgeable on the issues at hand in order to emphatically instill into the mind of the public the universal value of ecosystems, their interactions, and resources. In relation to the marine environment, one information that should be stressed is that the Philippines is an archipelagic state and the increase of 200 million hectares in its territorial waters by virtue of the current Law of the Sea has brought the state's jurisdiction over marine waters to about five times greater than her land area. However, the Philippine economy is still highly directed towards land-based economic development and too little attention has been given to the development of marine resources and marine-based industries. This information, to be effectively understood, should be disseminated in ways that relate to the status, interests and callings of the majority of the people. The facts and

actualities must be there in such a form that people of diverse cultures and religions can relate to them.

As important as imparting the necessary and correct information, mass media should advance that knowledge by adding newer and more relevant information. This is a difficult task but it is incumbent upon all those who have access to the basic needs of the greater majority of the people to update and broaden the latter's horizons. This learning process plus hard work is the only key to progress in a society where education is a privilege of the few.

Environmental Integration in the Social Sciences

The environment is still not significantly considered a part of the content and practice of most social sciences. Towards this endeavor, mass communication could take on an active role in the progressive integration of the environmental dimension into the teaching of these sciences. This is possible if mass media first solicits from mandated institutions the identified fundamental environmental content to be integrated into different disciplines, and then help implement the proper methodological or conceptual holistic approaches.

More often, economists fail to allow greater appreciation of the way people organize the productive process, the distribution and consumption of goods and services meeting the people's needs, and of the need for assessment of the environmental impacts of the choices made. Mass media could help towards this end. Indeed, economics should indicate that a nation's choice is not between that of economic development or environmental quality, but rather the formulation and operationalization of a body of economic and technological knowledge which will effectively harmonize the goals of development and environmental quality.

Mass communication could also be useful where sociologists take for granted possible lifestyles (as well as those currently practised) and the system of values sustaining them as well as their consequent impact upon environmental quality. For instance, questions such as community vs. individual interests come into play in the course of sociological studies relative to the preservation of the environment.

More often too, social anthropologists fail to clarify the attitudes of differing societies and civilizations towards their relationship to the environment — a challenging role for mass media. It should be noted that the concept of ecologically sound development ("ecodevelopment") is one of the most promising results of such comparative anthropological studies.

Historians have not been active in adding a special dimension to the solutions of environmental problems. In this regard, mass media could

provide a means for those concerned to realize that a historical dimension is needed as an integral part of the solutions, a dimension which traverses time, forward and backward, demonstrating that rational or irrational management of yesterday's or today's environment has consequences not only on the quality of today's life but that of future generations.

Geography contributes the notion of multidimensional space — physical, social, economic — to environmental thinking. People should be made to understand that this discipline allows for a more realistic appreciation of the relations established by human societies with their natural environment in different latitudes, pointing out different solutions for similar environmental problems, and different ways in which they use their natural resources.

Environmental Activism

With the public properly informed, updated and conscious of their environment and with the latter's themes set in place and in motion in the teachings and practices of the social sciences, complacency on the part of the populace as well as that of the teachers should never be allowed to take deep roots. Direct, vigorous but lawful actions in support of sound environmental causes or in opposition to anti-environment advocacies should be recognized as part and parcel of formal education. Mass media, as the people's voice, should be instrumental in inculcating in their minds the idea that active sacrifice in favor of the environment means directly preventing the loss of the only place we have on this planet.

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SYNCHRONIZATION OF PERIODIC MARKETS IN FAIZABAD DISTRICT, NORTHERN INDIA

Nizamuddin Khan*

ABSTRACT. Periodic markets are places where buyers and sellers meet for the exchange of goods at regular intervals. They are sequentially organized in time and space, with the optimal sequence being described by Smith as the synchronization of periodic markets. An optimal sequence is hypothesized separately for consumers and traders. The sequence for consumers is that there is an inverse relationship between the spatial and temporal distributions of markets while for traders the relationship between time and space distributions is direct. Using nearest neighbor analysis, the study shows that the optimal sequence propositions for consumers and traders are only partially confirmed. The spatio-temporal distribution of periodic markets is also observed to be uneven on account of regional physical and socio-economic variations. Seven-day periodicities are common and Saturday is the most preferred market day.

INTRODUCTION

Periodic markets are authorized places where buyers and sellers meet together for the exchange of local and urban consumer goods at regular intervals. Their frequency of occurrence varies widely from once to thrice a week of seven days. The periodic markets are organized in a sequence with reference to time and space to facilitate the activities of market users, i.e., consumers and traders who visit different markets held in a region over a week. The optional sequence in which periodic markets are arranged is described by the relationship that proximity in time implies separation in space or spatial distance among the different periodic markets in the region (Foggerland and Smith, 1970). This kind of sequence or arrangement may be called spatio-temporal synchronization of periodic markets (Smith, 1970). It minimizes the conflict between the schedule of a particular market to the schedule of nearby as well as higher-order markets. Again, it intensifies the competition between markets as well as between market users, i.e., consumers and traders who may visit different markets through the week (Dixit, 1970). For example, if two markets on the same day are located close to each other, they will be competing and clashing in the same area for the same group of people at the same time. It is obvious that, eventually, one of the two markets will emerge as dominant and the subsequent occasionally competing market will ultimately disappear (Hill and Smith, 1972).

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Hill and Smith (1972) have described different kinds of market sequence or arrangement for consumers and traders. The optimal sequence for the former is based on the notion that the periodic markets are inversely related to time and space and, for the latter, that the markets are directly related to time and space. The relationship between market location and periodicity has been criticized by different scholars (Smith, 1976; Bromley, 1976). They point out that Smith's method gives no account of the difference between the real distance and straight line distance. A modified method was introduced to measure the distance from each periodic market to all the neighboring markets of all sizes (Bromley, 1976). Hay (1971) observes that there is no necessary relationship between time and space to neighboring markets because the mobile traders can select markets in a sequence convenient to them without necessarily creating a geometrical pattern in the sequence. For the producer-sellers, any temporal sequence is equally convenient because each of them visits only one market. Thus, the sequence or synchronization of markets offers distinct advantage only to non-home-based mobile traders who visit a number of markets in a given sequence before returning to home base with the aim of minimizing travelling cost. This kind of movement pattern is called the travelling salesman or circumferential route (Bunge, 1966; Stine, 1962). In such a case, the resulting sequence would be expected to show a distinct spatio-temporal pattern, i.e., the markets which are proximal in time will be closer together in space (Smith, 1976). The mobile traders visit a number of market places in sequence until the cumulative sales from these markets reach a level that ensures normal profit to the traders (Stine, 1962).

A number of scholars have tested the hypothesis that proximity in time implies proximity in space (Good, 1972; Thorpe, 1978; Wanmali, 1977). Almost invariably, same-day markets are more areally spaced than those which are more temporally spaced. However, the consumer hypothesis for all categories of temporal spacing has not been confirmed (Ghose, 1981) because the consumers visit only one market of any given level of hierarchy (Skinner, 1965) and since each consumer is within the outer range of only one of the markets (Stine, 1962). Similarly, in a local exchange system there is a little incentive to visit more than one market place. Thus, the spatio-temporal pattern of markets in this situation would not be expected generally to be in keeping with the consumer's hypothesis because it would hold only if the consumer visits markets other than the closest one (Ghose, 1981).

THE SETTING AND RESEARCH METHODOLOGY

Faizabad District forms a part of Ganga Basin in the north Indian state of Uttar Pradesh and lies between latitudes 26°9′N and 26°50′ and longitudes 81°41′E and 83°8′E. The study area occupies an area

of 4,429 sq km and has a population of 2,382,515. The total length of the district from east to west is approximately 140 km and the breadth from north to south is about 42 km. From the administrative point of view, the district has been divided into four subdivisions and 18 development blocks (Fig. 1).

The present study is based on primary as well as secondary data. The information regarding location and periodicity and frequency of periodic markets were collected from the district census handbook *Town and Village Directory 1981*. For determining the spatial pattern and spatial distance between the markets of different days, the actual mean distance from a particular market to its neighboring markets was measured. In addition, different sets of average distance for consumers and traders were also calculated. For the consumer, average distance was calculated to the nearest same day, whether pre- or post-adjacent day, as the markets. But only post-adjacent markets are considered for computing average distance from the traders' point of view because they look forward in time to design their optimal route (Smith, 1972).

The present paper aims to study the spatial and temporal distribution of periodic markets. An attempt is also made to test the consumer's hypothesis with reference to periodic markets in the region that "proximity in time implies separation in space" and the trader's hypothesis that "proximal time denotes closeness to space."

SPATIAL DISTRIBUTION OF PERIODIC MARKETS

Faizabad District has 227 periodic markets which are very unevenly distributed over an area of 4,523.59 sq km. At block level, their numbers vary between 6 in Purabazar and 24 in Akbarpur (Table 1). Nearest neighbor analysis (Clark and Evans, 1954) indicates that the markets are very randomly located in almost all development blocks of the study area. On the basis of Rn value (Table 2), it becomes obvious that the majority of blocks have a random pattern of market location. Akbarpur enjoys a low random pattern while in Morodha, Bhiti and Jalalpur the markets show a moderate random pattern. Sohawal, Bikapur, Haringtonganj, Tarun, Bhiyaon, Tanda and Baskhari indicate a high random pattern of periodic markets. Moreover, Mayabazar, Milkipur, Katehri and Ram Nagar claim to have the least uniform pattern. There is only one block in which markets are uniformly distributed. Since in nowhere does Rn value exceed 2.00, the area does not have any hexagonal formation (Fig. 2).

The nature of population distribution, the settlement pattern, the level of economic development, and the nature of infrastructural facilities are important attributes influencing the spatial distribution of periodic markets. The high concentration of markets occurs in the western part

FIG. 1

TABLE 1. DISTRIBUTION OF MARKETS BASED ON PERIODICITY AT BLOCK LEVEL IN FAIZABAD DISTRICT (1981)

S. No.	Development Block	Number of Markets					
		Number of Periodic Markets					
		Weekly	Bi-Weekly	Tri-Weekly	Total	Daily	Total
1.	Masodha	1	10	—	11	—	11
2.	Sohawal	3	8	—	11	3	14
3.	Purabazar	—	6	—	6	2	8
4.	Mayabazar	—	6	—	6	—	6
5.	Amaniganj	1	5	—	6	1	7
6.	Haringtonganj	1	9	—	10	—	10
7.	Bikapur	—	8	—	8	3	11
8.	Milkipur	3	10	—	13	—	13
9.	Tarun	2	11	—	13	3	16
10.	Bhiti	4	4	—	8	1	9
11.	Bhiyaon	8	9	—	17	2	19
12.	Jalalpur	—	16	—	16	1	16
13.	Akbarpur	—	24	—	24	1	25
14.	Katehri	—	8	—	8	—	8
15.	Jahangirganj	—	19	—	19	3	17
16.	Baskhari	3	17	—	20	2	22
17.	Ram Nagar	—	17	—	17	2	19
	District	28	199	—	227	24	251

Source: *District Census Handbook: Town and Village Directory*, Faizabad District, Uttar Pradesh, 1981.

of the study area (which includes Baskhari, Ram Nagar, Jahangirganj, Jalalpur and Akbarpur) because of the high density of population and the increasing length of metalled road (Khan, 1988). A similar situation is also seen in the eastern part (leaving Amaniganj as exception) where a greater concentration of markets is found. But in the central part of the district, i.e., in Purabazar, Mayabazar, Bhiti and Katehri blocks, there is a rather low concentration of markets. This low concentration is attributed mainly to the bad topography created by the *Ghaghra* and *Tons* river system (Khan, 1988).

TEMPORAL DISTRIBUTION OF PERIODIC MARKETS

Periodic markets are held on different days in a week at a particular place. Their periodicity is not equal everywhere but change from region to region. Different scholars have found four-day (Eighmy, 1972), seven-day (Hill, 1966) and other periodicities in different parts of the world. In the study area, all periodic markets are distributed among seven days of the market week (Fig. 3). The distribution of market days on which a particular market is held cannot be a random process if the market is linked to other markets in the region (Mckim, 1972).

The temporal distribution of all kinds of periodic markets is given in Table 1. Out of 251 market centers, 227 have been recognized as

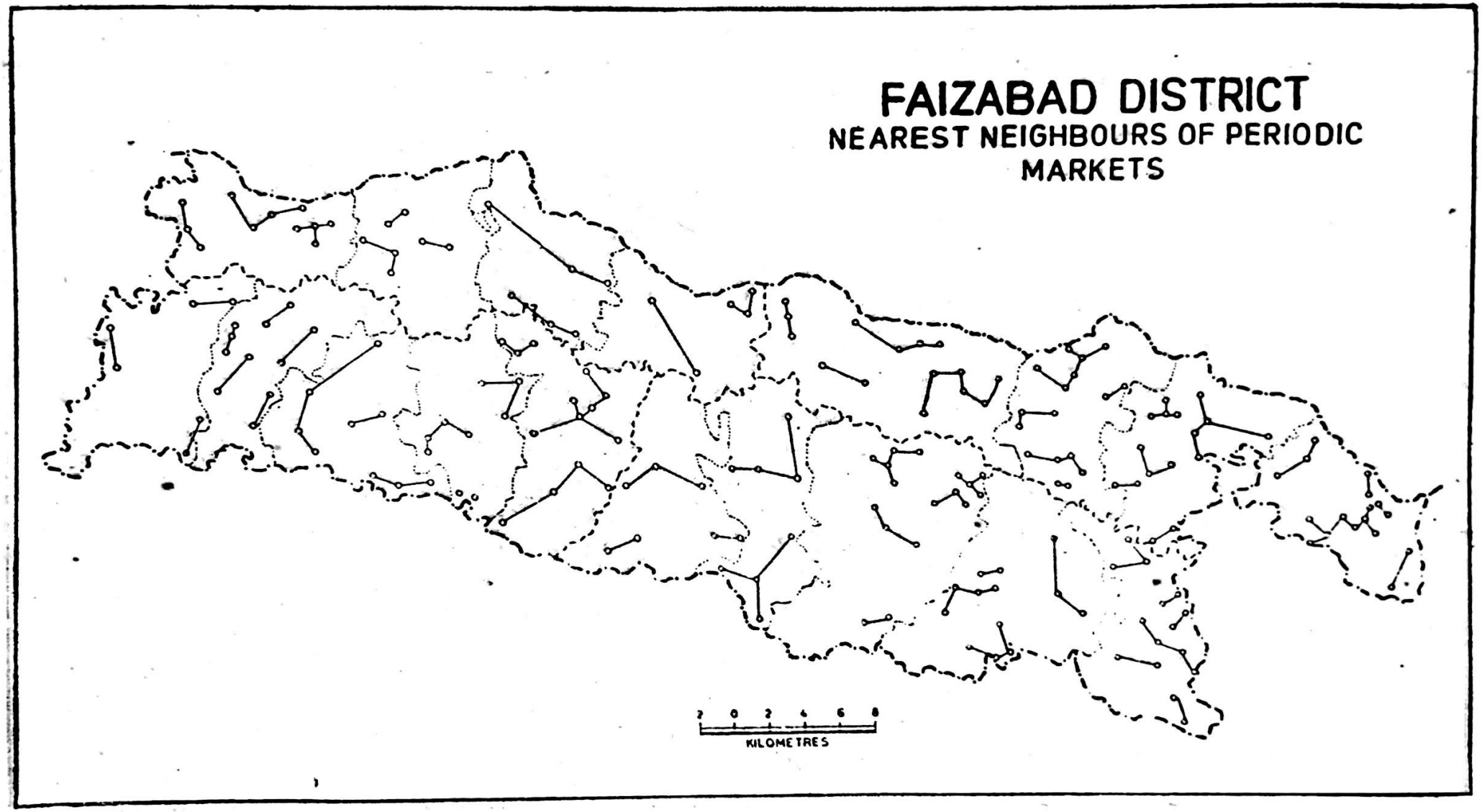
TABLE 2. SPATIAL DISTRIBUTION OF PERIODIC MARKETS IN FAIZABAD DISTRICT*

S. No.	Development Block	No. of Markets	Da	De	Rn
1.	Sohawal	11	1.80	2.16	0.83
2.	Masodha	10	1.50	2.51	0.60
3.	Purabazar	6	5.97	3.32	1.80
4.	Mayabazar	6	4.08	3.35	1.22
5.	Amaniganj	6	2.13	3.25	0.65
6.	Milkipur	13	2.10	1.99	1.05
7.	Bikapur	8	2.43	2.62	0.93
8.	Haringtonganj	10	2.11	2.41	0.88
9.	Tarun	13	2.25	2.28	0.99
10.	Bhiti	8	1.67	2.80	0.60
11.	Katehri	8	3.60	2.86	1.25
12.	Akbarpur	24	1.07	2.18	0.49
13.	Jalalpur	16	1.38	2.22	0.62
14.	Bhiyaon	18	1.66	1.79	0.93
15.	Tanda	14	2.41	2.46	0.98
16.	Baskhari	20	1.51	1.55	0.97
17.	Ramnagar	17	1.95	1.91	1.02
18.	Jahangirganj	19	1.34	1.76	0.76

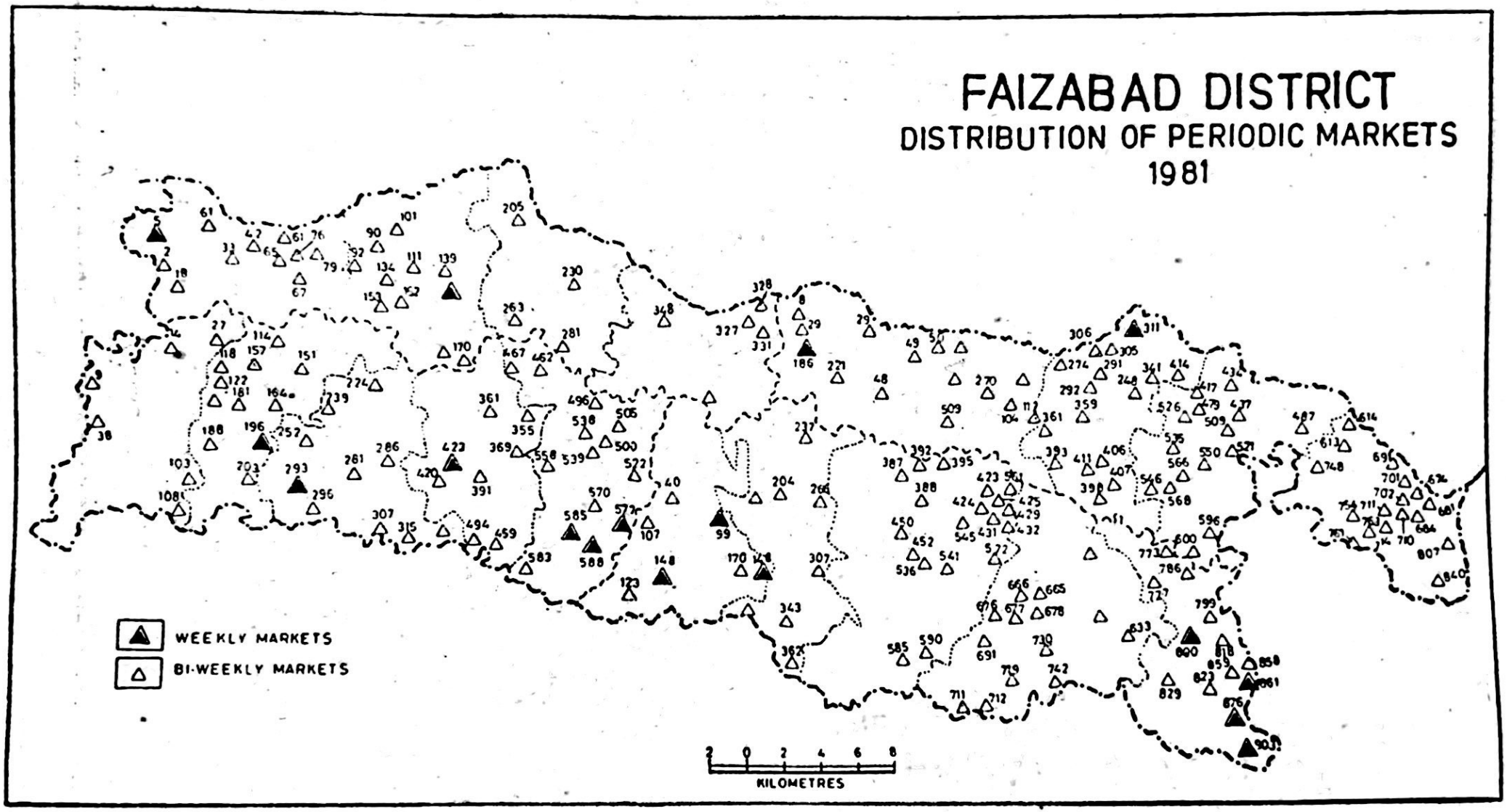
* Based on nearest neighbor analysis.

periodic markets based on the non-permanent character of their occurrence. Among the periodic markets, 28 markets are held once a week while the remaining are bi-weekly in their temporal character. A perusal of Fig. 3 shows that weekly markets are mainly concentrated in the southern part of the study area and about seven blocks in the district are devoid of weekly markets. The bi-weekly nature of periodic markets has been attributed to the economic condition of the area, the nature and size of demand, as well as the social and religious traditions prevailing in the region. During the field survey it was observed that many new bi-weekly markets have emerged because of increasing demand for vegetables which are perishable and cannot be stored longer than two or three days.

Similarly, the totality of market frequencies also varies with the region as well as with the days of the market. The total number of market frequencies in the district as a whole is 422, which is spread all over the region on the seven days of the market week (Table 3). Among the seven days, Saturday (74 frequencies) is the most preferred day as it is known to be an important day for temple visit. The successive important market days, in order of preference, are Wednesday (65 frequencies), Friday (64 frequencies), and Monday (64 frequencies). The rather high frequencies on Friday and Saturday clearly indicate the influence of religious and cultural factors on the meeting schedule of periodic markets in the region (Hill, 1972). Friday is favored as a market day in the larger centers where consumers can attend both *Juma Masque* and markets on the same day (Miller, 1937).



FIG·2



FIG·3

TABLE 3. DAY-WISE FREQUENCIES OF PERIODIC MARKETS AT BLOCK LEVEL IN FAIZABAD DISTRICT (1981)

S. No.	Development Block	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Total	Share to District Total (%)
1.	Masodha	2	5	4	2	3	3	1	20	4.73
2.	Sohawal	1	4	1	3	2	5	1	17	4.02
3.	Purabazar	1	2	1	4	1	—	3	12	2.84
4.	Mayabazar	1	—	3	2	1	3	2	12	2.84
5.	Amaniganj	3	1	1	2	3	—	2	12	2.84
6.	Haringtonganj	6	2	2	2	3	2	2	19	4.50
7.	Bikapur	2	1	4	2	1	2	4	16	3.79
8.	Milkipur	1	2	6	4	2	5	2	22	5.21
9.	Tarun	4	3	4	6	2	5	2	24	5.68
10.	Bhiti	—	4	1	1	2	4	2	14	3.31
11.	Bhiyaon	4	4	1	4	4	3	7	27	6.39
12.	Jalalpur	4	6	4	1	5	4	6	30	7.10
13.	Akbarpur	8	7	4	5	7	11	8	50	11.84
14.	Katehri	1	3	1	2	3	3	3	16	3.79
15.	Tanda	2	4	3	4	5	3	6	27	6.39
16.	Jahangirganj	4	4	6	8	3	5	7	37	8.76
17.	Baskhari	3	6	5	5	6	2	7	34	8.05
18.	Ramnagar	1	4	3	8	4	4	9	33	7.81
	District Total	48	62	54	65	57	64	74	422	100.00

Source: *District Census Handbook: Village and Town Directory*, Faizabad District, Uttar Pradesh, 1981.

However, variations in the totality of market frequencies are also observed among the 18 blocks of the district. Akbarpur (50 frequencies) ranks first with 11.84 percent of total frequencies in the district. The share of other blocks is given in Table 3.

SPATIO-TEMPORAL RELATIONSHIPS

The present study makes an attempt to investigate the relationship between spatial and temporal spacing of periodic markets in one area. The consumer's and trader's hypotheses as developed by R.H.T. Smith (1971) were tested to identify whether or not the current systems of periodic markets are attuned to either of them.

The spacing values calculated from the consumer's point of view indicate that same-day markets have the maximum geographical distance and that markets occurring two days apart have the smallest average distance of 4.07 km (Table 4). But the ratio between temporal and spatial separation is not consistent with reference to pre- and post-adjacent and to pre- and post-adjacent plus one day markets. Thus, the notion of the consumer's hypothesis, i.e., that proximity in time implies larger separation in space, is only partially confirmed in the study area. This non-conformity to the consumer's hypothesis is attributed to the fact that the consumers do not necessarily visit the nearest market centers but make visits to higher-order centers (even if they

TABLE 4. CONSUMER AND TRADER HYPOTHESES

Temporal Spacing Day	Geographical Distance (Km)	
	Trader	Consumer
Same day	7.28	7.28
+/ day	5.22	—
+/—1 day	—	4.65
+/ 2 days	3.60	—
+/—2 days	—	4.91
+/ 3 days	3.66	—
+/—3 days	—	4.07
+/ 4 days	3.35	—
+/ 5 days	3.90	—
+/ 6 days	3.78	—

are located farther) and simply bypass the nearest low-order centers with the aim of making a multipurpose journey. They seldom visit more than one market in a week because almost all markets are held twice a week, a frequency that is usually sufficient to cater to the demands of consumers.

With reference to traders, the calculated spacing values indicate that the average separating space among different temporal groups of periodic markets is relatively lower than those for consumers. The geographical distance of separation between markets decreases with

TABLE 5. CONSUMER'S HYPOTHESIS AS TESTED BY TEMPORAL AND LOCATIONAL SPACING OF PERIODIC MARKETS IN FAIZABAD DISTRICT (BY DAYS OF WEEK) (1981)

Temporal Distance	Locational Distance	Temporal Distance	Locational Space
SUNDAY		**THURSDAY**	
Same day	7.28	Same day	4.98
+/-1 day	4.50	+/-1 day	4.43
+/-2 days	3.75	+/-2 days	4.52
+/-3 days	3.50	+/-3 days	3.88
MONDAY		**FRIDAY**	
Same day	5.17	Same day	4.02
+/-1 day	4.65	+/-1 day	5.32
+/-2 days	4.91	+/-2 days	4.12
+/-3 days	4.07	+/-3 days	3.90
TUESDAY		**SATURDAY**	
Same day	3.04	Same day	4.79
+/-1 day	4.42	+/-1 day	4.77
+/-2 days	4.72	+/-2 days	4.61
+/-3 days	4.61	+/-3 days	4.27
WEDNESDAY			
Same day	4.73		
+/-1 day	4.58		
+/-2 days	4.66		
+/-3 days	3.53		

increasing temporal separation (Table 4). This trend does not conform to the hypothesis which assumes a direct relationship between spatial and temporal spacing of periodic markets. This is because the mobile traders in the study area follow the radial pattern and not the circumferential route, they being home-based and want to return every night to their homes after visiting the markets in the region over the week. In this radial pattern of movement, the average distance travelled by each group of traders is the same irrespective of the order in which markets are held.

Moreover, all the studies on space-time relationships have tended to limit themselves to the analysis of an aggregated market week (Wanmali, 1981). The study of market places from this point of view does not show from which day of week the calculations are made. Thus, such analysis is likely to conceal more interesting patterns of space-time integration based on individual days of the week.

On the other hand, the spatio-temporal locational study of periodic markets by days of the week exhibits full integration in terms of the consumer's hypothesis, i.e., closeness in market location on geographical space means larger separation of time in the case of three days (Sunday, Wednesday, Saturday) from which the market week is supposed to be commenced (Table 5). As a whole, the hypothesis relating to space-time organization of periodic markets is partially confirmed by the

TABLE 6. TRADER'S HYPOTHESIS AS TESTED BY TEMPORAL AND LOCATIONAL SPACING OF PERIODIC MARKETS IN FAIZABAD DISTRICT (BY DAYS OF WEEK) (1981)

Temporal Spacing	Geographical Distance	Temporal Spacing	Geographical Distance
SUNDAY		**THURSDAY**	
Same day	7.28	Same day	4.98
+1 day	5.22	+1 day	4.92
+2 days	3.60	+2 days	4.38
+3 days	3.66	+3 days	3.35
+4 days	3.35	+4 days	4.42
+5 days	3.90	+5 days	3.73
+6 days	3.78	+6 days	4.39
MONDAY		**FRIDAY**	
Same day	5.17	Same day	4.02
+1 day	4.07	+1 day	5.77
+2 days	4.99	+2 days	3.90
+3 days	4.42	+3 days	3.73
+4 days	3.75	+4 days	4.07
+5 days	4.84	+5 days	4.34
+6 days	5.22	+6 days	4.92
TUESDAY		**SATURDAY**	
Same day	3.04	Same day	4.79
+1 day	4.77	+1 day	3.78
+2 days	4.67	+2 days	4.84
+3 days	4.07	+3 days	5.15
+4 days	5.14	+4 days	5.15
+5 days	3.60	+5 days	4.38
+6 days	4.07	+6 days	5.77
WEDNESDAY			
Same day	4.73		
+1 day	4.39		
+2 days	4.34		
+3 days	3.40		
+4 days	3.66		
+5 days	4.99		
+6 days	4.77		

marketing system prevalent in the study area. But the trader's hypothesis which indicates a direct relationship between spatial and temporal separation of markets is observed not to conform to any day of the market week which might be thought of as the beginning of the week (Table 6).

CONCLUSION

This study is basically a contribution to the empirical verification of certain spatial and temporal organizations and related propositions regarding the periodic markets as developed by R.H.I. Smith in developing countries like India. However, the analysis of spatial organization indicates that the optimal sequence for both market participants, i.e.,

consumers and traders, does not realistically reflect such propositions but only partially confirms them.

It is found that all markets follow the seven-day periodicity or seven-day market week. Saturday appears to be the most preferred market day on account of its being also a temple-visit day. Friday stands as the next favored day, especially in Muslim-dominated areas. The influence of religious traditions is demonstrated here since on Friday Muslims prefer to visit markets with the aim of attending *Juma Namz* (prayer), in addition to purchasing basic commodities.

Lately, interest in the analysis of the different spatial organizations of periodic markets has been getting sufficient momentum. Such studies promise to be helpful in designing and projecting plans for rural development in terms of providing rural areas with marketing and other service facilities. It is also expected that soon generalizations can be made from comparative empirical studies of periodic markets in other areas of the country.

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WOMEN IN HOME RECYCLING CENTERS FOR DEVELOPMENT OF RECYCLING COOPERATIVES*

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ABSTRACT. The paper aims to point out primarily the role of women in turning household trash into a resource. It suggests ways to adapt one's home into cost-efficient collection, sorting and storage of waste materials which can be recycled. Resource recovery as a strategy in household sanitation is discussed in its historical and global perspective along with composting, biogas and liquid organic fertilizer production, recycling of solid wastes including agricultural wastes, and women's participation in the formation of recycling cooperatives. The recycling cooperatives proposed draw upon the strength of women's collective awareness of the problem of pollution brought about by improper waste disposal practices, and upon women's understanding and appreciation of the hidden value in household garbage.

BACKGROUND

Resource recovery is not a new idea. It has its origins in ancient urban societies that recognized the intrinsic value of human wastes. It is known that in China, nightsoil collection systems have operated for centuries, with the nightsoil providing the principal source of fertilizer for supporting intensive agricultural activities in the rural areas surrounding the cities.

Recycling is not a new concept either. It was promoted during the early 1970s by environmentalists concerned about the ecological implications of solid waste. Some of the early programs succeeded, but many quietly failed. Today, the hard reality of the landfilling dilemma all over the world, especially in the industrialized countries, has given resource recovery and recycling a new impetus. It is economics forcing man to face up to recycling in a way idealism could not.

This means that along with an increased amount of garbage, man faces a limited amount of landfill space. As more landfills reach capacity, and public resistance toward siting new ones grows, other methods of managing wastes should be found. Once seen only as methods for conserving natural resources, resource recovery and recycling should now be recognized as integral components of an advanced waste management system.

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WHY RECYCLE?

Is there money in garbage? There is cash in trash because it is a resource. As people at IRRREN Foundation say, "There is no such thing as rubbish, only a resource that has not found a good use for it (yet)". It does not seem right to throw away something that can be salvaged and reused. That is the idea behind recycling. Before valuable materials reach the landfill, these can be intercepted and used for manufacturing new, useful products.

Some examples of this are: (1) Aluminum cans are widely recycled because it is much cheaper to reclaim them than to make new aluminum from bauxite ore; (2) Paper, the most plentiful discard, is reused to make insulation, building materials or other paper products; (3) Glass bottles and jars are also in high demand; they are collected and remelted to produce new containers. By using "cullet" (crushed glass) instead of virgin raw materials, manufacturers also reduce the air and water emissions that often occur when new glass is made; (4) Plastic containers are increasingly finding a second life as fiberfill stuffing for pillows, sleeping bags, automobile seats, planks, post and traffic markers, among a host of other applications.

Contrary to common knowledge, waste offers unique opportunities for creating jobs (Vogler, 1981). As a matter of fact, hundreds of thousands of people are already earning a living or amassing great profits in the waste business. Why not, indeed, when waste is plentiful; waste is free; waste is flexible; waste is labor-intensive; waste needs little capital; waste sells for cash; waste is familiar; and resource recovery and recycling are acceptable? In short, waste is suitable for processing in informal or subcontract industries, using appropriate technology and capital, and providing a cash income plus other environmental and community benefits.

Waste management is now considered the newest growth industry, particularly in Asia's most dynamic societies. The lure of this new business is attracting big companies with the modern scientific and management expertise to handle solid and toxic wastes. Big companies like chemical maker Dupont, engineering giant Bechtel, and diversified electrical equipment maker Westinghouse are all into the waste business.

RESOURCE RECOVERY AND RECYCLING OPTIONS

1. *Composting.* In the international scene, Egypt provides an example of waste recycling through composting in appropriate conditions. With World Bank assistance, two pilot composting plants of intermediate technology design were constructed by the Cairo and Alexandria Governorates in order to produce compost which will be utilized in building up the poor sandy soils of the desert and to substitute for costly imported

fertilizer. The income derived from the operations would defray about 16 percent of the total cost for solid waste management in the two cities, apart from the economic benefits generated through increased agricultural production, savings in disposal costs that would otherwise be incurred, and savings to the economy through the use of recycled material instead of imports. Although the cost of producing compost will not be totally recovered through sales revenue, the additional benefits would justify the project.

In the local scene, one that can be cited, among other small-scale composting operations, is a company named TECHTREND, which has been commissioned by the government of Saudi Arabia to produce for them organic fertilizer from waste materials. It is worth mentioning at this forum that this organization is headed by a dynamic Filipino woman.

The formal educational sector is not to be left out in this undertaking. In 1983, the University of the Philippines Institute for Science and Mathematics Education Development came up with a module entitled, "Goodbye, Waste!" Many find it to be very instructive especially on how to come up with one's own "fertilizer basket" in his own backyard. It says that fertilizer for plants will be ready after about six months of composting.

2. *Biogas and Liquid Organic Fertilizer Production.* The rural household biogas programs in China and India have been highlighted in many discussions. The focus is gradually shifting to large-scale biogas projects based on the methanization of urban wastes or concentrated agricultural wastes through the anaerobic digestion process. The methane content of biogas is high, varying from 50 to 75 percent, so that it can be burned directly to generate steam or electricity, or be used as a supplement for diesel duel. As an alternative, the methane fraction can be purified and sold to power companies, or bottled for use in vehicle engines, as a cooking fuel, or other applications. The remaining digested slurry can be used as biofertilizer.

The methanization processes for large-scale biogas production from wastes are very promising. Recent research in Belgium, France and the United States shows that gas with 70 to 75 percent methane content can be produced from the anaerobic digestion of domestic garbage mixed with sewage sludge (Bartone, 1986). Sufficient gas is generated to meet 20 percent of the energy demand of the community. Another approach is based on the codigestion of sewage sludge with water hyacinths raised on sewage treatment ponds.

The recovery of biogas from sanitary landfills is another technology which is commercially attractive. In many countries such as Finland, Denmark and the United States, the gas from the landfills is collected

by a low-cost system of wells and drains installed when the landfill is formed.

In the Philippines, there is now a much-improved biogas system which has the ability to generate methane gas without any hydrogen sulfide gas or rotten-egg odor. It also produces non-toxic, ready-to-use liquid organic fertilizer and solids good for animal feed supplement. Due to the absence of hydrogen sulfide gas in the system, detoxification, aeration and aging lagoons are eliminated. This biogas system is known as the IRRREN Waste Recycling System (IWRS). It can achieve complete anaerobic fermentation process on animal manure and other organic/biodegradable wastes.

3. *Recycling of Solid Wastes.* In the more advanced countries, scavenging in open dumpsites is unthinkable. They may have their respective disposal crisis but they are into systematic and efficient resource recovery and recycling operations. A few examples may be cited below.

In New York City, they have the so-called Environmental Action Coalition (EAC), a non-profit environmental group that collects a variety of recyclables from more than 150 buildings with almost 30,000 apartments. These buildings range in size from 28 units to 600 units. Each month, it collects about 110 tons of newspaper, five tons of glass, and 100 pounds of plastics.

In San Bruno, California, hundreds of schoolchildren act as door-to-door canvassers, collecting pledges from residents to participate in the curbside recycling program which provides each residential household with three free-of-charge stacking containers for separating and storing recyclables. Media coverage and container distribution are two high-impact tools in the public awareness effort.

In Missisauga, Canada, voluntary curbside collection program has an 80-percent participation rate, and has reduced by 15 percent the waste stream going to the landfill. Posters and brochures play an important role in educating Missisauga residents about recycling. Laidlaw Company which handles the efficient operation uses special collection trucks. These trucks have a right-hand drive so the driver can easily step down and load recyclables. The back of this special truck is divided into sections for newspaper, glass and metals that can be loaded from the side, and dumped separately and in different areas at the processing plant.

In Stockholm, Sweden, they have an operation called SKAFAB, created as a joint private-public enterprise which recycles glass and paper after it has been separated in the home. SKAFAB uses 300 private collectors to pick up waste at 76,000 collection points throughout the city.

In West Germany, their first recycling projects were based on the premise that food waste comprises 40 percent of household refuse. As a result, the entire waste stream was composted. However, the compost contained high levels of heavy metals, too high for land application. They learned that if organic matter was kept separate from the rest of the waste stream from the beginning, a compost could be created with less than half the allowable heavy metal levels. Thus began the multi-bin source separation concept in West Germany. Today, more than 15 projects are successfully composting the "clean fraction" of household refuse. Most of their separation systems also allow residents to comingle dry recyclables such as paper, metals, plastics and glass in sixty-four-gallon green carts, while materials to be composted are stored in black bins. The remaining refuse is stored in grey bins of various sizes.

In Machida City, Tokyo Prefecture, Japan, public officials and solid waste management workers go door-to-door at least once a year explaining the purpose of waste separation to residents. Brochures about the benefits of recycling are distributed to third- and fourth-grade children. As a result, residents in Machida separate their waste into seven classifications: (1) newspapers and magazines, (2) glass bottles, (3) aluminum and steel cans, (4) combustibles including kitchen waste, (5) light plastics and soiled papers, (6) non-combustibles such as broken glass, scrap metal and hard plastics, and (7) poisonous and hazardous materials such as batteries, etc.

In Machida, 103 officially registered civic groups, including organizations run by handicapped citizens, carry out the collection of newspapers, glass bottles and metal cans. Resource recovery dealers also collect recyclables. Using a widespread program known as "chirigami kokan" (tissue paper exchange), residents are given weekly allotments of tissue paper, napkins and toilet paper in exchange for a week's worth of newspapers.

Many more lessons from cases in the developed world may be cited for the purpose of coming up with a Philippine system of waste management where public acceptance of source separation is the key. On the other hand, in many cities of the developing world, the common practice is to pick up recyclables out of the solid waste stream at many points — in the house, curbside, from central storage containers, off collection vehicles, at transfer stations, and at dumpsites. Scavenging is so widespread.

In the open dump disposal sites in Metro Manila, for example, about 75 percent of the residents inside the dumping area and the surrounding areas are dependent on material recycling as a major livelihood. The dumpsite owners do not collect any form of garbage fee but usually get some income from the share obtained from their authorized middlemen who purchase recyclable materials from the dumpsite scavengers.

Scavenging is an activity of great concern due to the fact that a great majority of the scavengers are children who hardly receive any type of inoculation against communicable diseases. In addition to those at tne dumpsites, itinerant scavengers with pushcarts roam the streets retrieving discarded materials with resale value from households' refuse bins, communal containers and illegal dumps. The items retrieved may be bottles, cans, plastic, etc. The Environmental Sanitation Center (ESC) collection crew and unofficial helpers also scavenge recyclable materials from the household refuse bins and bring along the recovered items in the collection vehicle as it goes through its route to the dump. The items recovered are sold at the dumpsite, or at the junkshops.

Can we bear witness to such a predicament of our children at the dumpsite? Most of these scavenger children are afflicted 70 percent of the time with parasitism, tetanus, tuberculosis, bronchitis, gastro-enteritis, diarrhea, colitis, skin dermatoses, malaria, pest-vermin-insect-transmitted diseases, zoonotic diseases like rabies. and sanitary-linked diseases due to neglected sanitary aspects and pollution.

HOME RECYCLING CENTERS AND RECYCLING COOPERATIVES

What can women do? Where do we start? How do we start? Why the formation of recycling cooperatives? Women can do a lot in household consumerism and sanitation. Women would easily recognize that there is cash in trash.

There is a need for women to affirm their commitment to the cause of helping clean up the environment through resource recovery and recycling of wastes. There should be a resolve to give all-out support to community-based solid waste management and recovery initiatives. There should be a resolve to utilize appropriate technologies in processing wastes into more productive uses.

Women should start by making their kitchens mini-recycling centers. The home recycling facility should consist of two or more trash bins lined with degradable plastic for easy handling and sorting of recyclables. A convenient spot for sorting and storage of household refuse should be provided.

Women should do advocacy work for the public to accept and actualize the idea of separating wastes at the source. Lobby groups should be formed in order that mandatory recycling laws be passed and that incentives be given to those who recycle products.

Women should see to the increase in efficiency of recycling programs by having their legislators expand tax laws to include incentives for investing in recycling equipment and facilities. They should demand for the implementation of procurement laws which set specific requirements

for purchasing recycled goods. More industry participation in people's waste management initiatives should be encouraged.

Women should form *recycling cooperatives* so that not only the duties and responsibilities will be shared but the benefits and profits as well.

CONCLUSION

Women should be as productive and creative contributors to the well-being of society as the men. The fact that in Philippine culture women are the ones who handle the money has much to make their propositions succeed. They know how to generate extra money from engaging in buying and selling activities. They are able to identify opportunities for added income. They are used to budgeting; they are used to handle finances and to account for them. This is one reason why Philippine society has many women bankers and CPAs in the field of finance.

But this now has to be brought into the field of entrepreneurship, into the field of business, into the field of *cooperatives* — particularly into the formation of *recycling cooperatives,* which is more difficult and more challenging (and exciting).

It is important to note that in the fundamental law of the land, there is a recognition of the talent of women or a basis for equality with men. Women should be able to show this in their activities, like adapting their homes to cost-efficient collection, sorting and storage of waste materials which can be recycled, and in all of their other undertakings. They should be able to show that their work is *no less* than what the men are doing.

Women should be proud and grateful of the fact that they are women. This is not to say that they should declare war on the men. Of course not, men are the natural allies of women and they should always be partners with them.

Maybe, what women can let the men decide on would be: international trade tariffs; what to put on the newspaper headlines; how governments will be run and who will run them; or what crop will be grown where, etc. But women should not be overwhelmed by the fact that it is time that they, the *Filipino women* of today, must rise to the occasion of making *decisions* on matters directly affecting the welfare of their children and the future generations, which are anchored heavily on keeping and maintaining a clean, wholesome environment.

President Corazon Aquino herself said that,

> **Women are nurturers of life and can be expected to want to preserve and enhance life. They have the innate abilities and capabilities to help work for the improvement of our people in their respective places and communities through socio-economic and cooperative projects.**

The *challenge* for women is to be able to produce and market products from recovered or recycled wastes, made possible by women capitalists, entrepreneurs and inventors — supported by recycling cooperatives which are run and managed mostly by *women*.

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TECHNOLOGY AS A FACTOR IN RURAL DEVELOPMENT: THE PROBLEM OF CONCEPT, CHOICE AND TRANSFER

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ABSTRACT. The paper attempts to highlight the role of technology in the development of rural areas which have been suffering from poor economic growth and subsequent chronic poverty for decades. Third World governments have stressed that technological innovations and their applications are crucial factors in the improvement of rural living conditions. However, the authors observe that there is a lack of appropriateness in the technologies available as well barriers in their access to the masses. People, too, have failed to choose the technologies appropriate to their needs, culture and local resources. The criteria used for deciding the appropriateness and conditions for the effective transfer of technology are discussed with particular reference to the rural environment of developing countries. An emphasis is laid on the generation of size-neutral technologies that the majority of rural people could afford and their agricultural activities and industrial base could absorb.

INTRODUCTION

The objective of the present paper is to focus on the role of technology in rural development using illustrations from India. The major problems that have emerged in this context focus on the crisis of right perception as to the choices and hindrances in the effective transfer of technology. The multiple problems of rural areas in India have over time generated faith in science and technology as a powerful weapon to tackle such problems towards the acceleration of material and economic progress. It has been realized, of course, that rural society has always been ridden with problems of hunger and poverty, of poor sanitation and illiteracy, of superstitions and obstructive customs and traditions, of vast resources going to waste, etc.; but now these have acquired dimensions that cannot be tackled without the proper application of appropriate technology. The dire need for technological innovations and development may be discerned from a disproportionate growth of population in relation to index of chief crops, the former having reached staggering dimensions (40 percent during the 1970-71 to 1985-86 period) and the latter having registered only a nominal growth (102.5 to 105.6 during the same period).

Obviously, the basic aim of technology is to provide people with

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those means and tools which are essential to them in their daily activities. As such, technology includes a large number of tangible and intangible factors. Of late, its application has been extended to societal missions in such fields as literacy, drinking water, immunization, oil seeds, telecommunication, and dairy development. With the realization of these missions, related problems like rural-urban migration and its varied implications will also be largely arrested. To exemplify, under the literacy mission it has been proposed to mitigate the prevailing high illiteracy rate by imparting functional literacy to 80 million illiterate persons in the 15-35 age group by 1995. Similarly, to solve the problem of inadequate water supply, it was projected that 40 liters per capita per day would be needed by 1990. Needless to say the list of items to be solved with the aid of technological innovations has been increasing.

Many empirical studies have shown that the employment of modern technology has led to increases in employment and wage rates of agricultural labor. Tractorization in Punjab, for example, has resulted in the increase in demand for human labor instead of a decrease in its demand. Thus, employment and technology need to be viewed in complimentary terms and in a wider perspective with the full knowledge that there is a host of low-productivity dead-end jobs from which individuals can extricate themselves for better-paying jobs elsewhere (Zuvekas, 1979:314). Thus, technological improvement must have a wide range covering several aspects such as techniques of production, organization, marketing and sales propaganda so as to provide more employment opportunities. Also, it must be borne in mind that low-cost technology appropriate to "production by the masses" will have to be specified and an industry based on them given protection through fiscal measures, import restrictions, and subsidies so that they can compete with mass-produced goods that are now invading the rural markets (Juyal, 1972:477).

The demand of technology is linked to the status of society and the place and the time with which it is considered. In rural India, the majority of the people have low living standards and poor purchasing power but recently there has been a noticeable change in their economic condition, social values and norms following more exposure to modern trends and ideas. Thus, it bebcomes rather imperative to evaluate the relevance of a particular technology especially in terms of the preparedness of the masses to use technology and of the political will of the government to provide it to the rural poor. It is heartening to note that in India science and technology has received sufficient attention through different plans, as is evident from the allocation of only Rs. 20 crores for it in the First Five-Year Plan and of as much as Rs. 4,530 crores in the Eighth Five-Year Plan. The pattern of technology is shaped by, and in turn shapes, the society in which the technology is generated

and sustained. More specifically, technology responds to social wants which are in turn modified and transformed by technology through a causal chain or spiral. Thus, correspondence between the type and level of technology and the social structure is to be desired, at least from the point of absorption which implies greater emphasis on indigenous technology. Much of the scientific work done in India has been derivative and even repetitive, and there is also much uncritical acceptance of capital-intensive methods as well as unwillingness to explore the possibility of using labor-intensive technologies. As such, there is a strong case for the propagation of intermediate technology in terms of improving traditional technologies in various fields without necessarily creating conflict with high level technology in certain areas.

It is pertinent to mention here that the acceptance of the dominance of alien and exotic technological systems and the consequent neglect of indigenous skills would not be good for development, to say the least. Thus, C.V. Raman's suggestion that if we do not have the wherewithal to make good motor cars, we should have at least the capacity to build good bullock carts holds true to a large extent. As observed by Bhagavantam (1977:3), it is not logical to plant borrowed technology without considering the nature of the soil, as the seed may not sprout, grow and flourish.

THE PROBLEM OF CONCEPT

In the context of developing countries like India, it has become a fashion among writers to use the term "intermediate technology" or "appropriate technology." These terms have been confused with low level technologies. This is due to the notion of advanced technology based on the criterion of scale of production instead of level of scientific and engineering thinking that goes into research and development. The result has been a widespread belief that appropriate technology is "second class" and not modern. Intermediate technology, which is also referred to sometimes as "adaptative technology," is nothing but an efficient self-help technique. It is supposed to be cheap and labor-intensive and suited most to the transformation of local raw materials. The term "intermediate" refers to the technology being more efficient and productive than what the poor are using now but less expensive and complicated than the high technology currently used in highly industrialized countries. Now, the question of proper understanding of the term "appropriate" has acquired greater importance particularly after the realization that much of the failures on the development front can be explained by poor perception and wrong choice of technology. The perceptual aspect gained currency only after Schumacher (1964) initiated and inspired technology-related activities on a global scale as when various groups under the common rubric "Intermediate Technology Development Association" at different levels studied different aspects of

technology. Usually, the term is taken as referring to technology requiring much less sophistication in comparison to that in the Western world. Perceptually, some analysts relate it to an intermediate level (between updated and backward) and so associate it primarily with rural areas, emphasizing local components which have been improved through proper inputs of science and technology and local labor. Others having a wider view ignore the narrow issue of the type and scale of technology and, as such, treat both the spinning wheel and the satellite as appropriate provided they deliver the goods and services without producing cultural and environmental disruptions in the country. Here the crux remains on the propriety of situations. Thus, consideration is made of an array of technologies which could be utilized if circumstances are found appropriate.

The value of technology is assessed according to its impact on work and workers such that it requires careful handling. Ordinarily, technology is credited with many startling gains like reduction or elimination of hazardous, arduous and tedious work, provision of a safer and cleaner working environment, offering of more varied and interesting jobs, fuller use of skill potential, greater workers' participation, and job satisfaction. These blessings, however, are not universal and, in some cases, they have been blighted by a number of adverse side effects such as loss of interest and alienation of workers in solely mechanical, monotonous and dead-end work, reduction in income due to shifts in jobs with downgraded positions, and less scope for advancement that causes frustration, to name a few. It may, however, be mentioned that many of the negative side effects are man-made and may partly be mitigated through proper management and concerted effort. Something can also be done with regard to safety and health aspects if the technology to be introduced is discussed in advance.

Technology in the sphere of rural industrialization is an elusive concept, for it is supposed to maximize output per worker, on one hand, but also displaces many, on the other. Moreover, it also improves the farmer's financial position. With all this in mind, it is advisable that the technology adopted is appropriate in relation to the endowment of labor and other resources available in the area as well as in relation to the specifics of the demand for certain products. On the whole, it is by no means in the interest of rural producers or the national economy to maintain their "aversion" to newer technology (Behari and Bipin, 1976) as it is now rather an established fact that innovations resulting from the application of science and technology do play an important role in improving the productivity of rural industries (Arora, 1978:84).

For technology to satisfy prerequisites that will make it appropriate or relevant to the proper development of backward/developing areas,

it must forge strong linkages with the educational, scientific and technological institutions of these areas as well as the needs of the rural poor and the traditional technologies they use. At the same time, the linkage of these institutions with the elitist demands of institutions in the developed world should be weakened. Thus, technology has to develop through commitment to the poor and their problems, in the process veering away from a type of development that is oriented to Western technology.

As a composite approach, the role of technology may be better perceived in relation to agriculture, more specifically in relation to the Green Revolution. It may be noted that the Green Revolution as a technological package incorporating elements of sufficient irrigation, inorganic fertilizers and high-yielding seed varieties was initially perceived as short of a miracle particularly in terms of increased productivity. But it also revealed the negative aspects of such a technological approach unless it is cushioned by a pragmatic social approach. To elaborate, the Green Revolution contributed to increases in disparity in farmers' income and level of living on account of its being confined to a few segments of people or areas (Singh, 1985:195). In addition, there are other restrictive factors that act as a bane to technological application and these include non-viable farm-size, poor purchasing power of solely land-based marginal farmers (who constitute the majority), superstitions, and some customs and traditions. All these necessitate an attack on the strong structural barriers to the application of science and technology in rural communities.

In a broader sense and for theoretical as well as practical purposes, technology may be defined as a comprehensive measure encompassing particular forms of organization, consumption patterns, techniques of production, compositions of wage structure, marketing arrangements, advertisements, and sales propaganda. Thus, technology does not only refer to manufacturing processes and agricultural production techniques. The bias, in the context of rural areas, for the welfare of the poor is a prerequisite in the adoption of technology. An appropriate technology is required that is usable by all categories of farmers with a minimum use of expensive and not easily available diesel- or electric-powered gadgets. More useful would be those using solar and wind energy, biogas, and bicycle mechanisms such as pulleys, levers, bearings, etc.

It follows from the above that appropriate technology does not only refer to machines, tools and processes, i.e., to hardware mechanisms, but it also incorporates within its ambit various operations ranging from the provision of infrastructure to the delivery or marketing of end-products. Keeping in mind the poor peoples' negligible capital and zero risk-taking capacity, the equipment needed under a chosen technology have to be low-cost, small, simple, manageable and repairable by the

common man whose efficiency and productivity are to be increased. Contextually, to quote Lipton (1982),

> Apart from (appropriate structured) labor intensity, what makes a technology pro-poor is that it should involve low risk, should slant incentives towards production of a relatively 'inferior' out-mix; should not require high skill or complex complementary (especially administered) inputs and — an overlooked point — should require labor reform not too demanding of caloric effort or peak physical health characteristics that are relatively costly for the poor to acquire. It also helps technology to be pro-poor if they are divisible, economic on small scale or else efficiently managed cooperatively, and fungible especially between producer and consumer uses.

It is a bad commentry on the present fondness for ill-conceived technical solutions which help large farmers multiply their incomes by as much as six times in some instances but leave the situation of small farmers essentially unchanged (Frankel, 1969:706). Here it may be underscored that the viability (in terms of access to the majority) of technology is a key factor and in the Indian environment it is a fact that the role of the bullock economy in many areas has not yet faded into insignificance and the appropriateness of the technology to be adopted has to reckon with this reality. Thus, it may be observed again that the propriety of the technology varies with reference to diverse physical and socioeconomic conditions prevailing in different areas.

THE CHOICE OF TECHNOLOGY

The choice of technology in a spatial and social context requires a prudent judgment using a set of criteria which, if satisfied, enhances the appropriateness and the relevance of the technology finally selected for adoption. The most significant of those criteria are: contribution to employment generation; utilization of local raw materials and human resources; fulfillment of local needs and market requirements; increase in production; import substitution capability; resource conservation and minimum damage to environment; and promotion of indigenous techniques. Above all, there should be a maximum possible conformity with the attitudes, aptitudes and skills of the people for whom it is chosen. In simple terms, the choice of technology must be guided by such overall considerations as capacity to: (1) satisfy basic needs; (2) develop resources through optimum use of local (manpower and capital) factors; (3) realize societal development through reduction of debilitating dependence and promotion of self-reliance based on mass participation; (4) help human development by way of accessible, comprehensible and flexible mass involvement; (5) develop cultural elements making use of, and building on, indigenous technical traditions; and (6) reduce the environment's vulnerability through minimization of depletion and pollution and through built-in waste minimization, recycling and blending with existing economic systems. Which and how many of these criteria can be taken into consideration will depend on varying circumstances and the needs

of the country. To illustrate, even vital issues like employment generation and energy conservation in different countries do not have the same magnitude and order of priorities and hence require different sets of criteria for technology selection. Thus, from a dynamic perspective, what is required is a regular review of criteria in accordance with changes in goals and priorities.

In choosing technology, a long-term view should be taken into account. For example, the initial displacement of workers due to the introduction of a certain technology should be negotiated in the light of the fact that the increase in productivity following its application will ultimately result in the creation of more investments and job opportunities along with other gains to the economy. The recent trend of emphasizing the development of technology that would be labor-intensive, based on local resources, and usable by rural personnel with limited financial resources augurs well for the Indian economy. It will facilitate the utilization of local skills and improve the quality of human capital — one of the major objectives of rural development. The investment potential of the country[1] and the thrust of government policy exercise an enormous influence on the general choice of technology While making a choice, the performance and constraints experienced so far in technology generation and its application should be noted by the government. What needs to be entertained here is the suggestion of many international agencies that in the selection of technology suitable for a particular country the economics of it or rather the waste-benefit ratio of the technology to the country should be carefully assessed. However, some allowance has to be given to the fact that small farmers are slower than large farmers to adopt new and more productive technologies because of inadequate extension work, risk aversion and low level of awareness. There should be a built-in provision for linking the process of technology planning with the process of technology selection so that better technological options than those available can be identified, and research and development work towards the development of these technologies can be initiated.

TRANSFER OF TECHNOLOGY

Without doubt, technology generation for its own sake is a sterile exercise. In order to have meaning and purpose, it must be diffused and transferred to the area and people it is designed and generated for. It can materialize only if the generation and diffusion processes are dialectically linked, a condition that is rarely available in India. In fact,

[1] When funds are scarce, money must be spent first on technologies that are economically viable, then on those which yield high social benefits even when they do not yield money returns and only after that on projects where the viability of technology is in question. In other words, the tighter the resource position, the more imperative it is to carry out rigorous economic and social appraisals in the choice of technology.

the generation of technology is a responsibility of R & D (research and development) institutions, where the process of diffusion is very often the sole concern of a development agency acting in coordination with the people, local self-government organizations, financial and credit institutions, and marketing and other extension agencies. Thus, the diffusion becomes a more complex problem involving multi-institutional effort. Here, difference as to funding mechanisms and autonomy between the two above institutions is a reality to be reckoned with.

The question of transferring appropriate technology to far-flung farms and factories is of inordinate importance and a major challenging task. The know-how developed in the laboratories is passed on to a limited section of the society. The result is, naturally, an emergence of a dual system in which the affluent section of society utilizes the technological innovations, while the other remains ignorant of these innovations and continues to employ age-old techniques of agricultural and non-agricultural production (Sharma, 1977:28). So, where the situation demands a constant flow of new field-tested technical knowledge relevant to small production units as a precondition for the success of most rural development programs, we see instead inappropriate research programs and inadequate adaptive research and extension work limit the benefits to the poor. The technology can be transferred more effectively when it is evolved to solve specifically the local problems and constraints that cause low productivity among the small farmers and rural artisans.

The transfer of technology in rural areas needs proper and judicious efforts. The transfer of technology does not mean transplantation or imposition of impressive giant mechanization schemes in rural areas. It rather means provision of upgraded (intermediate) technology or better (modified) and entensive use of traditional agricultural techniques. The technological approach in a wider perspective demands a set of operations/ measures to deal especially with particular types of areas. For example, in semi-arid regions the conservation of water through the creation of dams and *bundis* or the channeling of rain water to the fields and making tanks is a priority component of technology. It is accompanied by the use of such devices as windmills and solar cooker, the use of crops that require less moisture, and proper management at all levels to ensure minimum waste of water.

For effective transfer of technology, the creation of suitable institutional structures, financial resources and trained personnel are a must. These will help in monitoring and implementing government policies with regard to technology. There may be needed special incentives in some cases where technological innovation does not give immediate financial returns. The extension aspect — the key to technology transfer — can be carried out successfully only if there is adequate local participation and assimilative capacity through proper community development

approaches and if there is a demonstration of the benefits of the selected technology. Also, transfer of technology and associated modernization do not mean the abrogation of all traditional practices at one stroke and their substitution by exotic practices. Rather, it means gradual adoption of innovation so that it can be properly assimilated with high returns at minimum investments.

As a policy, any scheme of distribution and extension of technology should inherently provide for such components as: (1) demonstration of design, (2) testing, (3) experimentation, (4) evaluation labs, (5) standard institutions, (6) information system, (7) repair and service facility, and (8) technical extension, training and education (Ganguli, 1988). However, the transfer should not take place abruptly but in a phased manner. The phases may be: (a) publication, (b) testing in field, (c) demonstration, (d) reduction in cost, and (e) induction of political will. The first phase, i.e., the diffusion of information, may materialize through the involvement of workers, cooperatives, voluntary agencies, rural educated persons, and schoolchildren. It will help prepare the people mentally to the introduction of technologies quite foreign to them (Tripathi, 1990).

CONCLUDING REMARKS

In order to realize the real goal of rural development, the technology, particularly in the case of the agricultural sector, should be accompanied by land reform and the provision of loaning facilities. It is also necessary for villages to have technology institutions along with national institutes for technology development in urban areas. Here, the aspects in science and technology will be designing the appropriate technologies. The management of rural technology is another significant aspect. But for this there is a likelihood of its failure on the economic front. A regional approach may be helpful, especially the identification of rural resources, the planning of rural industrialization and the selection of appropriate technology in a spatio-functional context. The voluntary agencies have a vital role to play in the diffusion and application of technologies in far-flung rural areas. They will be complementing the demonstration and extension unit of the National Research and Development Corporation. What is most important is the cooperation and support of villagers and social workers in rural areas.

It has been assessed that the country's educational, scientific and technological institutions possess the multidisciplinary competence to tackle the task of developing appropriate technologies for meeting the basic requirements of the needy in rural areas. But their effectivity lies more in redeploying efforts through the existing infrastructure

following a deliberate and formal commitment to the backward rural areas rather than in creating new institutions for developing appropriate technology. What is actually required immediately is not new science or new technology but the application of existing appropriate innovations to urgent rural problems through a speedy and extensive extension and delivery system.

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SOCIETY NEWS

PHILIPPINE GEOGRAPHICAL SOCIETY HOLDS ANNUAL MEETING AND PURSUES NEW PROJECTS

The Philippine Geographical Society (PGS) held its annual meeting in the afternoon of February 26, 1991 at the Philippine Social Science Center, Don Mariano Marcos Ave., Diliman, Quezon City. Aside from providing Society members a chance to renew acquaintances and create new ones, the meeting served as an occasion for revitalizing the Society under a new set of officers and for sounding out the members on the direction of the Society's activities in the coming months. The meeting was well-attended by both old and new members, most of whom come from the government and the academe.

The more important aspects taken up in the meeting agenda were the proposed PGS projects and the election of the nine members of the Board of Directors. Four projects were proposed, namely: (1) teacher training program in geography for social studies teachers; (2) *Philippine Place Names*; (3) *Philippine Economic Atlas*; and (4) *Philippine Almanac*. The Society decided to concentrate first on the first two proposals before pursuing the other two later, considering the difficulty of conducting all four projects simultaneously and especially at a time when the Society is still revitalizing itself. Prof. Lydia N. Agno proposed the teacher training program while Prof. Meliton B. Juanico originated the idea of publishing a book on Philippine place names. The title of the book on place names as decided upon by the body was *Origin, Meaning and Evolution of Names of Towns, Cities and Provinces in the Philippines.*

In the selection of the nine members of the PGS Board of Directors, which was conducted by secret ballot and based on the first nine highest votes, the following came out as topnotchers: Domingo C. Salita, Lydia N. Agno, Manuel J. Navarro, Emma A. Pujalte, Alex R. Baloloy, Paterno R. Santos, Telesforo W. Luna, Jr., Felix T. Antonio, and Candido A. Cabrido. As provided for in the PGS Constitution, the executive officers will be selected from and by the Board of Directors in a subsequent Board meeting following the annual one.

In the meeting of the PGS Board of Directors held last March 7, 1991 following the annual meeting, Prof. Agno elucidated on her proposed project on the training of elementary and secondary school teachers in geography/social studies. The program is aimed not only at propagating the geographic discipline but also at raising funds for the Society's future activities and for improving the *Philippine Geographical Journal*, the

PGS' on-going flagship project. Prof. Agno pointed out, however, that before the teacher training seminar-workshops could be conducted, teaching-learning packages/modules have to be produced first. The module topics listed by Prof. Agno for development by PGS members included: The Earth in Space and Time; The Atmosphere and Hydrosphere; Landforms of the Earth; Global Climate; Soils and Vegetation; Global Environmental Regions; and The Midlatitude and High-latitude Environments. Society members have been assigned to produce suitable-length and readable write-ups on these topics. The completed modules to be used in the teacher training program will be sold to the participants to provide additional income for the Society.

As proposed by Dr. Luna and agreed upon by the PGS Board, a separate and complementary popular journal for teachers will be published by the Society. Unlike the *Philippine Geographical Journal*, the proposed publication — tentatively titled *The Geographic Educator: A Journal for Teachers* — will contain less technical articles on geography. The aim is to provide easily used teaching materials for teachers of geography, social studies and allied subjects. With regard to the place name project, Prof. Juanico has already sent out letters to the leaders of Philippine local government units requesting for write-ups on the history of their respective areas which should contain the evolution and meaning of the areas' names.

In the election of the PGS executive officers from the PGS Board of Directors, secret balloting was used, with all positions filled up one after another. The new set of officers elected for the year 1991 were: Paterno R. Santos — President; Telesforo W. Luna, Jr. — Vice-President; Lydia N. Agno — Treasurer; Manuel J. Navarro — Secretary; and Emma A. Pujalte — Auditor. Appointed Asst. Secretary and Asst. Treasurer from outside the Board were Suzette B. Antonio and Darlene J. Occeña, respectively.

After the election of the Society's executive officers, the body proposed and approved a resolution awarding the title of "President Emeritus" to Dr. Domingo C. Salita — as president of the PGS for many years and for steering the Society towards stability and productivity.

Information for Contributors

The *Philippine Geographical Journal* was instituted in 1953 to serve: as an outlet for scholarly articles ranging from geographical/spatial to socioeconomic topics particularly on the Philippines and other Third World countries; as a medium for the expression of professional opinions; and as a journal for reports on activities of the Philippine Geographical Society and other items of relevance to the geographic discipline. Its volumes usually contain academic articles and, occasionally, editorials, addresses, book reviews, reports, Society and geographical news, advertisements of interest to the geographic profession and certain special items. All manuscripts submitted for publication should conform to the following requirements:

Format and length. Manuscripts should be typewritten, double-spaced and use only one side of an 8½ x 11-inch bond paper. Computer printouts are accepted, provided they are legible. Because of rising mailing costs, rejected manuscripts will not be returned. Scholarly articles should range in length from 2,000 to 5,000 words while reviews, reports, news and special items should be less than 2,000 words. The editors reserve the right to stylistically edit articles and to reduce the length of reports, news and special items that they consider to be unnecessarily long or of little interest to readers.

Authors' affiliations and interests. Authors should supply, through a footnote on the first page of the article manuscript, information on their current employment (position/rank, institution/organization, address), educational attainment (degree, discipline, institution), and research interests and experience. If a manuscript has been presented as a paper in a conference, workshop or symposium, the particulars of the occasion should be footnoted, too.

Abstract. On the first page of the article manuscript between the author's name and the text, an abstract with a length ranging from 100 to 200 words should be included. It should summarize salient points and include key words.

References and footnotes. All works cited in the text in parenthesis (author, year, page) should be listed at the end of the article in alphabetical order, last name first, following the bibliographic format used in recent issues of the Journal. Comments and explanations on textual content should be placed as footnotes, indicated consecutively throughout the manuscript by numerical superscripts, and may include literature citations.

Illustrations and tables. Illustrations, which should be kept to a minimum, should be of professional quality and drawn in black ink on white paper or on thick tracing paper. They should not be more than two times nor smaller than the size of the manuscript paper. The style of the lettering should be either in Leroy or Century type. Figure numbers and captions should be indicated in pencil at the bottom of the paper way below the drawing or its borderline. As with other aspects of style, the format of the tables should follow that indicated in recent issues of the Journal.

Other guidelines and information. An article manuscript will be accepted on the understanding that it has not been submitted elsewhere and will not be until a decision has been rendered by the Journal. The Journal's decision will be made known within one month after receipt of the manuscript. Each author will receive five copies of the Journal. All materials submitted for publication should be addressed to:

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