

POST-INDEPENDENCE TRANSFORMATION OF RURAL LANDSCAPE OF CENTRAL HARYANA : A MODEL AND SPATIAL EXPRESSIONS

NEELKAMAL BEDI, Chandigarh

ABSTRACT : The paper examines the transformation of the rural landscape of Karnal district (Haryana) between two time levels representing pre and post independence conditions. While densification of rural settlements, ramification of road network and elaboration of the mesh of wells are the indicators, the Sikh Jat farmers and the government policies are the agents of this transformation.

The significance of the study of transformation of the rural landscape of the Third World countries derives from the fact that most of the population in these countries even now lives in the villages and on farming. Within the Third World countries there are areas which have recently experienced technological revolution in farming and where the settling of technologically progressive farmers has changed the face of the land.

Once released from their colonial shackles these countries developed rapidly by adopting modern farming technology and by modernising their agricultural infrastructure. In India, the most remarkable changes took place, for obvious reasons, during the post-Independence period. Till this period the village economy and rural society were changing but slowly. Both their preparation for accepting the urban innovations and the variety and strength of urban innovation themselves were limited. In the post-Independence period there was a sudden elaboration of change stimuli generated by culture changes, growth of population, rural electrification, link roads, consolidation of land holdings, tubewell irrigation, tractorisation, and implementation of Five-Year Plans. These stimuli generated processes

which resulted in a rapid change in the rural landscape in the post-Independence period.

There are many evidences, mainly in the form of relict features in the existing landscape but also in historical literature and in folk lore, of the changes which have occurred in the rural landscape.

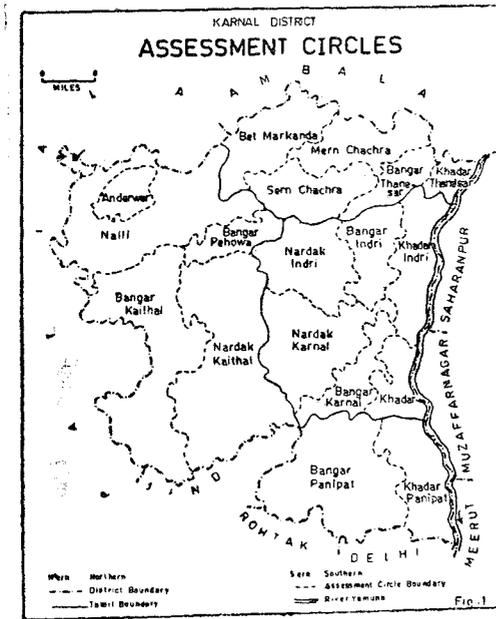
Despite the large amount of changes observable in the rural landscape of different areas of India, the rural settlement geographers continue to be obsessed with the notion of a perennially unchanging Indian village. Mukerji (1977) has very rightly stated that, the myth, *idee fixe*, of an unchanging Indian rural settlement functioning as an introvert, autonomous cultural landscape element, has been so great, 'that even in the face of massive evidence of changes operating through all the historic periods it is the permanence that is zealously sought to be portrayed as the principal characteristic of the Indian rural settlements. Any investigation, therefore, of changes and development appear as fresh breeze and force a new consideration.'

Equally important are the large areal variations in the amount and nature of changes wrought in the rural landscape.

The most dramatic changes have occurred

in those areas of India which have been settled by a new culture group possessing a superior farming technology and land and water management practices, or where a new culture group has succeeded an indigenous farming community, or, where both the processes have operated.

Changes in rural landscape became more pronounced after 1947, when the displaced persons from West Punjab (Pakistan) were resettled in the western parts of the North Indian Plain. One district where such a major re-settlement took place was Karnal, located in the central part of the state of Haryana. (Fig. 1).



The objective of this paper is to examine the densification of rural settlements, ramification of road network and elaboration of the mesh of wells as surrogate expressions of transformation and also to evaluate the role of the government and Sikh Jat farmers as the agents of transformation of the rural landscape of Karnal district (central Haryana) between two time levels representing pre and post-Independence conditions.

The basic concepts involved in the study are those of rural landscape, transformation

of rural landscape, densification of rural settlement, ramification of road network and elaboration of the mesh of wells.

The paper has been developed in two parts. Part one is comprised of the theoretical formulations and the second of an analysis and interpretation of the indicators of transformation.

Part — I

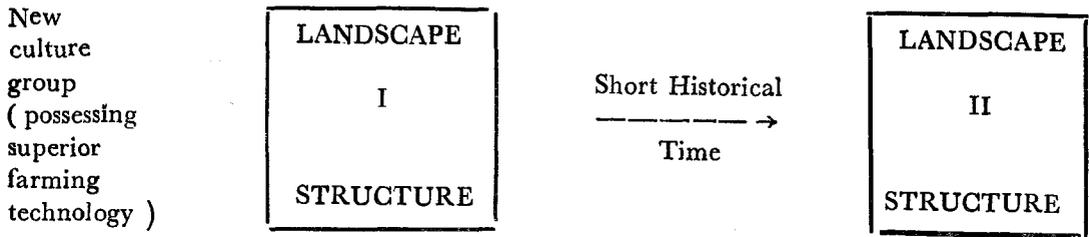
In our context the term 'rural' signifies a cultural concept. Rural landscape is both a kind and component of cultural landscape. Culture has a geographic expression and is comprised of material and non-material culture traits, the former more earthy than the latter. We agree with Kniffen's (1976) persuasive statment that, ' of all man's varied cultural activities, social, religious and economic, those most distinctly 'earthy' because of relationship to site are thereby most geographic'. It is the transformation of the landscape expression of the 'earthy' phenomena which forms the focus of this study.

Since the phenomenon of rural landscape lends itself easily to several different, but not contradictory, descriptive interpretations, it is necessary to define the concept itself as is being used in this paper. Landscape is comprised essentially of all those visible material features, which a culture group has created in an area during the process of settling and continues to create during the period of occupance and their arrangement.

The genetic conceptualisation of landscape is derived from Sauer's (1925) well-known model of the morphology of landscape. In this model Sauer proposed that the factor of culture operates through time on the natural landscape to create forms which together comprise cultural landscape. Mukerjee (1974) has further elaborated the idea in the following schema.

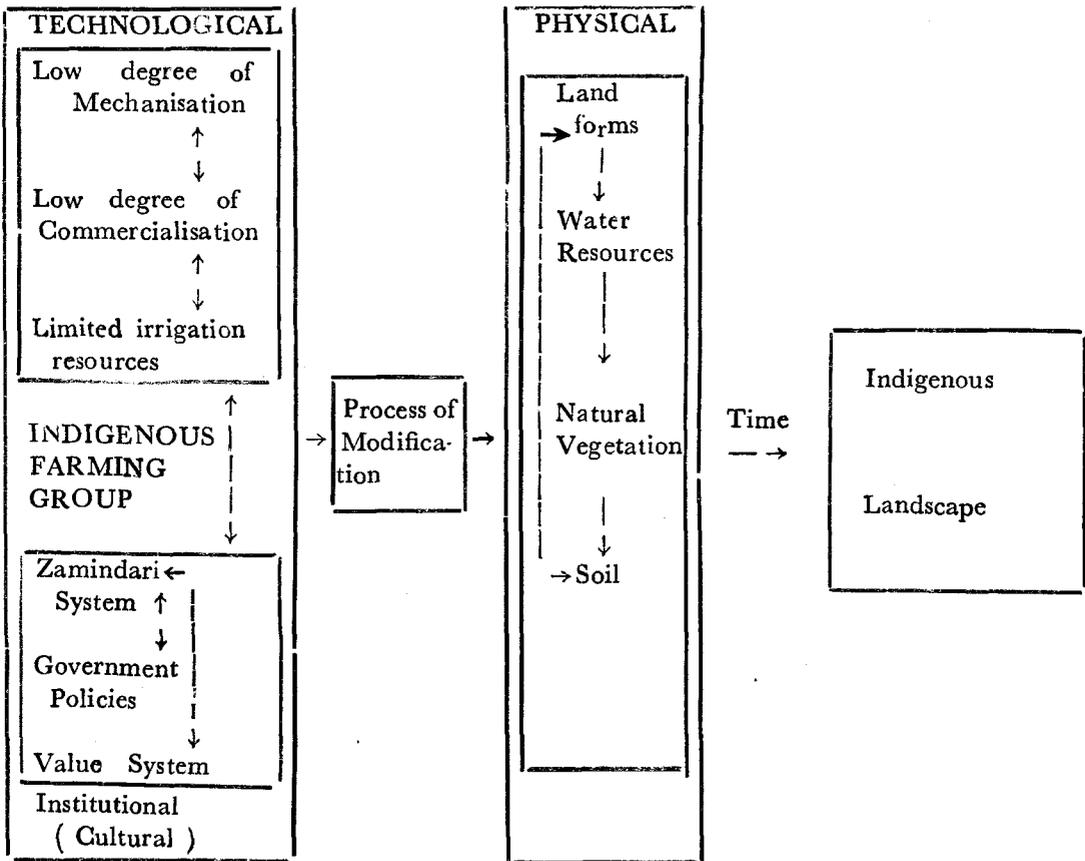
Cultural landscape = Visible → Present
 Material
 feature → Past
 (reconstructed)

DEDUCTIVE MODEL OF TRANSFORMATION OF RURAL LANDSCAPE



(Figure 3 a)

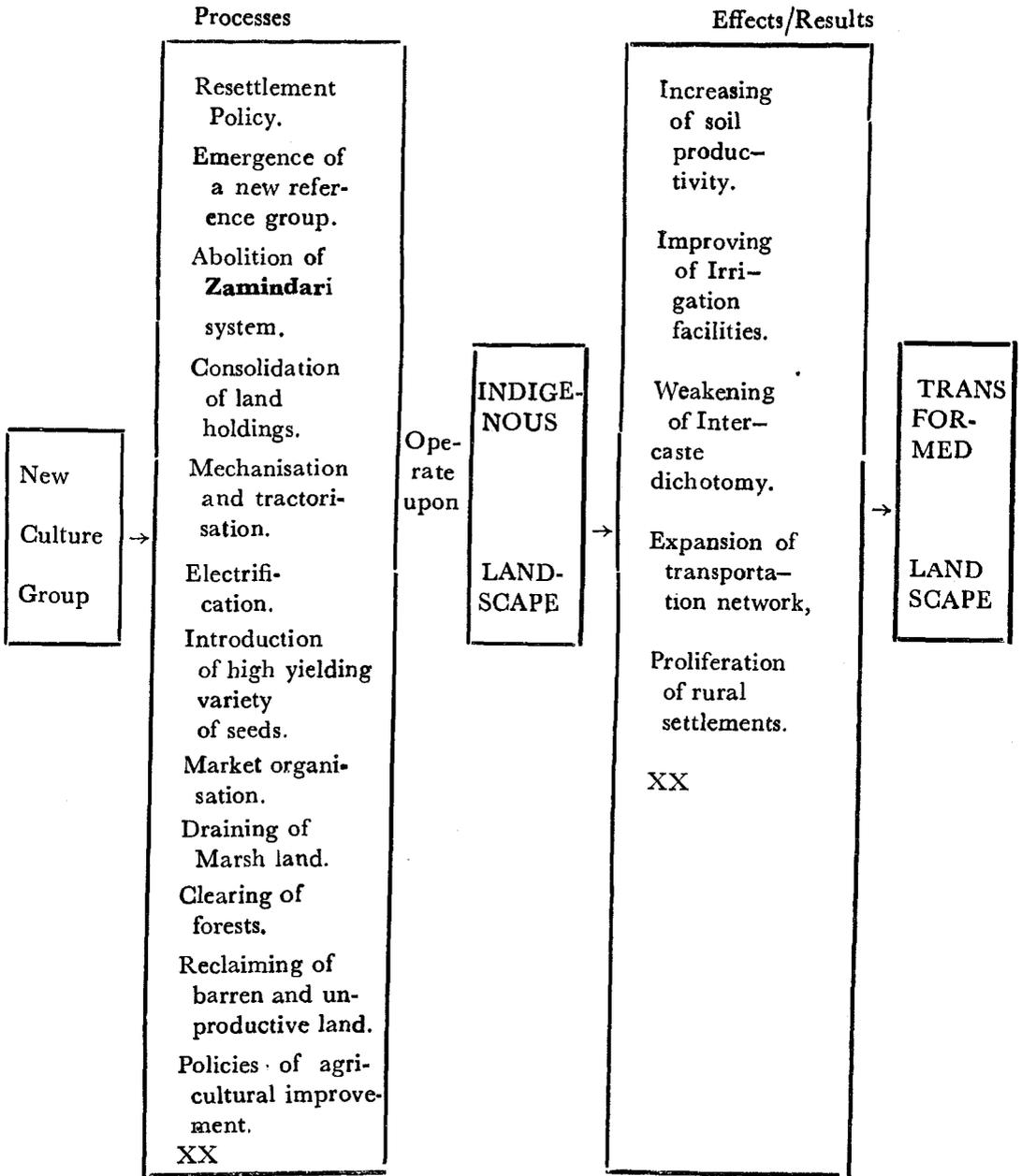
MODEL OF GENESIS OF INDIGENOUS RURAL LANDSCAPE
LANDSCAPE I STRUCTURE



1. Time = Pre-Independence time which has evolved since protohistoric period.
2. Landforms = Includes both attributes and features.
3. Value system = (cultural) of indigenous farmers.

(Figure 3 b)

TRANSFORMED LANDSCAPE
LANDSCAPE II STRUCTURE



XX : Other elements or factors

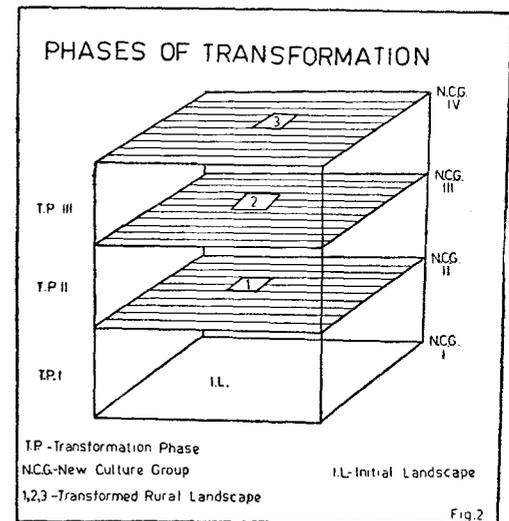
(Figure 3 c)

Cultural landscape, thus, is the man-made landscape; the visible human imprint on the land. Thus, a natural landscape is transformed into a cultural landscape by a group of people possessing homogenous value system, goals of terrestrial existence, mode of living, and technology. Such a group of people is termed a culture group. It has a history, a present and future of some sort.

In explaining the localisation and characteristics of landscape one has to use the trinity of ecology, culture, and history. Culture is the great variable factor that may reflect earth qualities and effect the patterns of earth occupation (Kniffen 1954). Whatever the context of ecology, differences in culture, always and everywhere, result in distinct landscapes.

The rural landscape is simultaneously both static and dynamic; the notions being analogous to the philosophic notions of being and becoming. That all rural landscapes are constantly changing is axiomatic. The rural landscape evolves through stages which can be identified by their characteristic features and their arrangement. Change can be either slow, producing imperceptible results, or rapid, producing dramatic alterations. It is the latter which we propose to term as transformation.

Change and transformation constitute the processes of evolution of the rural landscape and are strikingly analogous to those of uniformitarianism and cataclysmic development in geomorphology. While change is difficult to be periodised, is generally unspetacular in manifestation, and is not easily perceived; transformation is characterised by definite periodisation and is, therefore, historically bound within non-repetitive segments of time. Periodisation of transformation may be attempted with reference to that point in time when a new culture group possessing a superior farming technology enters into an area. The sudden perceptible change does not remove all the features of the existing landscape. Some of them are transformed completely, whereas, others are



transformed partly, and still others remain unchanged and become relict. Once initiated, transformation continues through the period during which a new culture group settles in the area. The phases of transformation correspond to the succession in which different culture groups have settled in the same area (Fig. 2).

Transformation of rural landscape occurs through phases which can be reconstructed by identifying some of their relict features in the present-day landscape. The relict features are the material expressions of a culture on the landscape and provide the fundamental basis of the culture-historical approach that is characteristically employed by cultural geographers. They point to the patterns and functions of the preceding rural landscape whose evolution, conceptually, merges with sequent occupation. Transformation becomes related to the succession of cultural landscape. Transformation in itself is an abstract concept concretised by its indicators. These indicators, inter alia, are densification of rural settlements, ramification of the road network and an elaboration of the mesh of wells. The indicators are inter-related and have a cause and effect relationship. They are integral parts of rural settlement which is considered as a system.

In order to evaluate the role of the indicators in concretising transformation as a landscape expression, it is imperative to understand the variables of transformation itself.

A deductive model of transformation of

rural landscape is presented below. It is operative in areas which, in terms of institutional, technological, and physical conditions, are generically similar to the study area (Fig. 3 a, b, c).

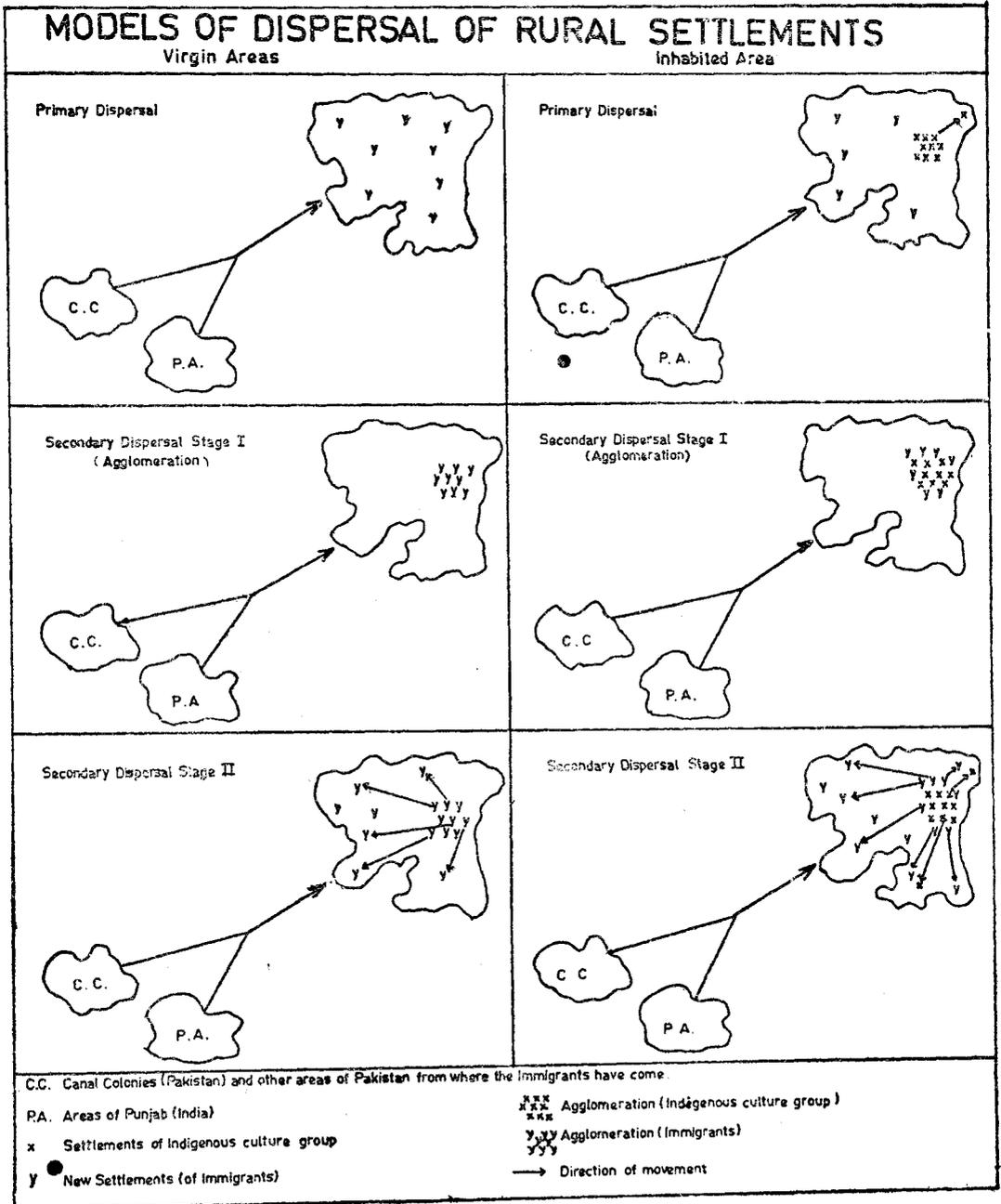


Fig. 4

Model of Transformation

The schema indicates the structure of an earlier landscape which is drastically changed into a new one by a new culture group operating on it through a short historical time. The new culture group possesses a superior farming technology not only in terms of implements and the inputs but also in the techniques of land and water management. In the schema structure refers to the visible material features and their specific arrangement. In the second landscape, therefore, there can be either a change in the arrangement of the features without a corresponding change in their number, or, there can be an increase in the number of the features accompanied by a change in their arrangement. The change occurs through well-defined but short historical periods which are essentially identified in terms of the presence and activities of particular culture group.

Even though the model is self-explanatory, it might be added that the indigenous rural landscape is the product of the combined operation, on the pre-Independence physical landscape of the area, of the two interacting sets of factors, technological and institutional (cultural), which characterised the indigenous farming communities. The indigenous rural landscape was characterised by an absence of link roads, consolidated land holdings, canal network, hospitals, schools, and dispersed rural settlements. This landscape was by no means a primeval landscape. It had been under human occupancy of different cultures almost since the protohistoric period. The available evidence, archaeological, epigraphical and scriptural, suggests that most of these occupants belonged to the farming groups. Even though the time involved in the change has been enormously long, the technology involved in the process was a simpler one and, therefore, the amount of change was very limited and the change itself very slow.

The indigenous farming group had a characteristic cultural baggage of techno-

logical and institutional components. Their technology reflected low degree of mechanisation and commercialisation, and little developed irrigation resources. Cultivation was done with a small light wooden plow having a short iron sheath and other simple implements. The main source of energy was biological; human and draft animal. The output was low and the scope for commercialisation was also limited. *Zamindari* system played a very important role. The decision-making powers were in the hands of the *Zamindars* who were manouvered by the British Government. The developments which could have taken place did not due to the self-centred motives of the *Zamindars* and *Jagirdars*. Additionally, the value system of the indigenous farmers were such as to cause hindrance in the path of transformation. They were governed by superstitious beliefs and castesegregation which fenced their sluggish agricultural system.

With the help of these technological and institutional components, the indigenous farmers operated the processes of modification on the physical setting and evolved the indigenous landscape. This landscape, in this paper, is considered as the pre-Independence landscape.

The new culture group that entered the indigenous landscape also possessed its own technological and institutional (cultural) baggage which was superior in terms of farming technology and water management. This baggage plus the government inputs and the initiative of the new culture group operated on the evolved indigenous landscape, and produced the transformed landscape.

The resettlement policy, mainly the allotting of land, helped the Sikh Jat farmers (the new culture group) to settle in the district. The Sikh Jat farmers brought with them a very progressive, superior farming technology from the canal colonies (Pakistan) and their current perceptions were based on the same. As harbingers of progressive

technology they became the new reference group. The indigenous farmers adopted the new technology. By joining with the new culture group, the indigenous farmers also became the agents of transformation of rural landscape.

With their initiative and progressive attitude this new culture group cleared the forests of Nardak, drained the marshes of Thanesar, and reclaimed barren and unproductive land of Chachra and Naili. Their initiative coupled with the government inputs and policies, such as improved seeds, fertilizers, consolidation of land holdings, abolition of Zamindari system, agricultural improvement schemes, electrification mechanisation brought about such effects as increase in soil productivity, weakening of inter-caste dichotomy, expansion of transport and canal network, and proliferation of rural settlements. These changes manifested themselves through a new landscape which is being termed the transformed landscape.

The study area, has had a long history of occupation beginning with the Proto-historic period. Within the periods of recorded history, the Maurya, Kushana, Harsha and Gurjara Pratihara rules followed by those of the Muslim, Mughal, Sikh, Maratha influenced the rural landscapes of these periods but the specific details relevant to the theme of the study are not available. The essential features of the pre-Independence landscape were created by the British rule. The most revolutionary period of its history is of course the post-Independence era when a large number of Sikh Jat farmers were resettled through a government scheme of rehabilitation of displaced persons.

Very little information is available either in published or unpublished literature on the transformation of rural landscape in the study area. A good deal of information, however, can be extracted from 1" : 1 mile survey of India topographical sheets of different periods.

The identification and interpretation of

the indicators is based on a comparison of the two sets of topographical sheets for the pre and post-Independence periods. Maps representing the two time levels have been used as documentary evidence of the changes in the rural landscape. However, it has not been possible to identify the various time phases because the comparable evidence for the intervening periods are not available.

Part II

Transformation has been studied by analysing the attributes of the following indicators :

1. Densification of the rural settlements.
2. Ramification of the road network.
3. Elaboration of the mesh of wells.

(1) Densification of the rural settlements

Densification refers to an increase in the number of rural settlements in the same area over a short span of time.

An index of densification has been calculated by using the following formula :

$$ID = 100X \frac{S_1 - S_2}{A} \quad ID = \text{Index of Densification}$$

S_1 S_2 = no. of settlements in period 1 and 2
 A = Area

Theoretically, in the areas generically similar to the study region, densification can result from the combined operation of the following factors :

- a. Construction of additional roads.
- b. Tube-well construction.
- c. Consolidation of landholdings.
- d. Lease grants.
- e. Increase in population either by natural causes or resettlement schemes.
- f. Change in the cultural composition of the area.

The process of densification operates through primary and secondary dispersal. Primary dispersal refers to the establishment of new settlements outside the already existing ones; and secondary dispersal occurs when the new settlements are initially accommodated in the existing settlements and then replanted outside as new settlements (Fig. 4). The type of dispersal in any area, among other factors, will depend on

whether the area is a virgin land or an already settled one.

It is difficult to isolate a single factor, from among a large number of factors, which generates a particular type of dispersal.

Densification provides us with a qualitative measure of the intensity of occupancy of land, increase in the spread of settling of population, and in the extent of exploitation of ecological resources. The vegetation cover, field systems and patterns, transportation and canal network, and the pattern of rural settlements comprising the landscape experience changes. In fact, there, is a chain reaction in the whole system in which a change in one element is transmitted through all the other elements, generating multiple, mutual responses thus, transforming the entire landscape.

Distinct densification in the study area has been identified for the pre and post-Independence periods. It experienced striking acceleration in the latter period. The amount of densification reveals spatial variations (Index of Densification value from 25 to 891) which are related to those of ecology and culture groups. The processes of dispersal, primary and secondary, have operated and are still operating. Densification is greater in those areas where more of virgin land has been brought under cultivation in the post-Independence period.

Various factors such as the establishment of tubewells, ramification of road network, consolidation of land-holdings, and mechanisation prompted dispersal, primary and secondary, in the study area. For example, in the area of the highest densification 131 out of 338 settlements (39 per cent) are located along the link roads. This dispersal has occurred most strikingly in those areas where large tracts of barren and culturable waste-lands have been settled by the Sikh Jat farmers. These tracts were acquired by the removal of the forest cover by burning and falling of trees (*butashigafi* and *butamar*) (Baden-Powell, 1974), draining of marshy areas, and reclamation of former

barren and unproductive lands. These extreme measures were prompted by the inherent progressive attitude of this community. They possess a superior farming technology, the successful operation of which is contingent upon the operation of a set of factors, important among them being the value system buttressed by the normative standards prescribed by Sikh religion and practised by its followers. Unlike the indigenous farmers, their behaviour was not determined by myths and superstitions, nor did it flourish on metaphysical abstractions and subtleties. This stands in sharp contrast to the general attitude of the indigenous farming communities, settled in this area for a long time, who either did not perceive the opportunities or were indifferent to them. These indigenous farmers have had an ancient tradition of living in completely agglomerate settlements in which the characteristic mode of living has been very largely regulated by a community calendar. The new migrants share the continuing tradition of living in agglomerate settlements but, the tradition has undergone considerable changes in Karnal in that a large number of their families have established widely proliferated single unit settlements in the fields, at varying distances from the original agglomerate settlements. Living in these farmstead settlements helps them to implement their individual decisions, protect the tubewells, utilise fully the inputs available, stay within the consolidated holdings and remain independent of the indigenous community. These objectives could be achieved through an area neutral proliferation in which the area remained constant while the number of settlement units increased. Of the several agents of densification, tubewells, link roads, consolidation of land holdings, green revolution, technology and the Sikh Jat farmers, the last emerges as the most important.

(2) Ramification of Road Network

Since the dawn of civilisation man has been traversing over particular paths which,

through a long span of time, have become roads. Roads, which form an integral part of the rural landscape, interconnect all its elements, settlements, fields, wells and tubewells, stores and barns, and all other landscape features.

Ramification is one of the indicators of transformation. It refers to straightening of the paths, shortening of distances, creating of branches of roads, extension over areas lacking in them, and increase in the total number of roads in the same area over a short span of time.

Ramification is not only related to a new culture group but also to the government schemes. In Karnal, the scheme of developing the roads network was implemented under the Five-Year-Plans, but the effects were generated much-faster than in other areas because of the co-operation of the new culture group.

Ramification of roads indicates intensity of occupation of land, permanence of settling of population, extent of exploitation of ecological resources, extension of agricultural land, and reclamation of marshy, barren and uncultivable waste-lands. It has been facilitated by the removal of physical obstacles, such as forests, thick vegetation cover, draining of marshes, and increase in interaction among the various elements of landscape.

Theoretically, in the areas generically similar to the study region, ramification can result from the combined operation of the following factors :

- a. Reclamation of barren and unculturable wastelands;
- b. Consolidation of land-holdings;
- c. Increase in the number of settlement units;
- d. Increase in population either by natural causes or resettlement schemes;
- e. Construction of Tubewells and wells;
- e. Culture change, that is, settling of the new culture group, and
- f. Government schemes :
 - i. Introduction of mechanisation,

- ii. Agricultural improvement plans under the Five-Year plans.

- iii. Incentive to farmers, in the form of lease grants, to settle the the area.

In the study area, ramification was accelerated through the removal of forest cover by burning and felling of trees, draining of marshy areas and reclamation of the barren and unproductive lands. These extreme measures were prompted by the inherent, progressive attitude of this community.

The topological transformation of the road network reveals that the number of edges (paths) has gone up by 13 between the two time periods. Since the number of rural settlements remains the same (70), the β index has increased from 2.1 to 2.3, γ from 74 to 80, d from 60 to 70, μ from 81 to 94. If we consider the dispersed settlements and the linking paths with the existing roads, then the number of edges has increased from 150 to 387, and the number of rural settlements has increased from 70 to 178, and the beta index is then reduced from 2.32 to 2.17. The correct meaning is revealed when we consider that there is a large increase in the number of links and settlement units. Since, both have increased, the connectivity falls down, thereby revealing the inherent weakness of the formula for representing connectivity in the context of transformation of rural landscape.

The changes in the amount of tortuosity (Mukerji, 1973) are different in different parts of the area. These are related to several factors, prominent among these being : location of physical obstacles in the area, such as, forests, marshes, and swamps; inability to acquire land for the construction of roads; and location of religious features and land attached to them.

The density of roads has decreased from 1.6 in pre-Independence period to 0.9 in post-Independence period. This is so despite the fact that there are 237 new roads. The explanation here is provided by the decrease in the tortuosity (3.8 times) of roads and

ramification. The impact of the reduction in tortuosity on the density of roads becomes more striking when we consider that the road frequency in the study area has increased by 1.519 from 0.961 in pre-Independence period to 2.480 in post-Independence period (Mukerji, 1963).

As a result of ramification, the landscape appears quilted with a rectangular meshing of roads. Secondly, even the single dwelling units are now linked by roads. Thirdly, the roads which were earlier detouring around the forests and marshes are now shorter in distance and straighter in form due to the removal of forests and draining of marshes.

The roads have been straightened so the distance between the existing settlements has been reduced. There is now a rectangularity of the landscape. This rectangularity refers to roads, canals, and the fields, and on a large scale observation even of the settlements. The morphological changes have been dramatic, but they have been accompanied by a significant increase in the functional efficiency, as well, of the landscape.

The present analysis invalidates some of the naive notions about the results in transformation as reflected by the ramification. This is especially true in the case of density of roads and the consequences of a reduction in the tortuosity of roads.

(3) Elaboration of the mesh of wells

The wells became an integral part of the Indian rural landscape, after there had come a permanence in agriculture (Mukerji 1963). Being the principal source of water for irrigation and domestic needs, wells are dug both in the settlement and in the cultivated lands. Any marked change in the settlement and in agriculture is bound to be reflected in the number of wells, the methods of drawing out water and distributing it, and the pattern of its utilisation. The most obvious change in the wells, reflecting transformation, is an increase of their number, structure and form.

The structure and form of the the wells,

in the pre-Independence period was associated with *dhekli*, (with a lever like device to pump out water) persian wheel (*rahat*) and other such technologically simple forms of drawing water from the wells. The wells were generally *kachcha* and the number was limited. This small number can be attributed to the fact that a large part of the northern half of Karnal was covered with forests and was also susceptible to floods due to the numerous streams braiding through the area. Therefore, this area was sparsely populated and a lot of it was yet to be brought under the plough. In the post-Independence period, when the Sikh Jat farmers developed the land, the necessity for a more reliable source of water for irrigation was acutely felt. The summer rains were not adequate for *kharif* crops; and for *rabi* crops irrigation was indispensable. Therefore, well irrigation was promoted. The marshlands of pre-Independence period were converted into cultivable area by sinking mere wells, which lowered the water-table and drained the marshes. In addition, consolidation of land holdings facilitated construction of new wells, and rural electrification gave it a further impetus by introducing mechanisation in the methods of drawing water. The financial aid provided by the government also helped the farmers to construct tubewells in large number.

Thus, the development of land went hand-in-hand with the development of wells for irrigation. Wells, thus, became an indicator of transformation of rural landscape.

The following attributes of the wells as an indicator of transformation have been analysed :

- a. Absolute increase in the number of wells.
- b. Density of wells and tubewells.
- c. Ratio between settlements and wells and the tubewells.
- d. Pattern of distribution of wells.

Between the two time periods of pre and post-Independence, the number of wells has

increased from 168 to 490. There were no tubewells in the former period but in the latter period the topographical sheets show a sudden mushrooming of tubewells (numbering 206) on the landscape. So, the total number of wells (wells and tubewells) has increased from 168 to 696. There has been a tremendous increase in the traditional source of water (wells) accompanied by a remarkable increase in the number of tubewells. The small number of wells in the pre-Independence period is related to the limited extent of exploitation of land for cultivation; farming technique requiring a smaller quantity of water for irrigation, and the dependence on rain. Most of the cropping was rain fed (*barani*). In contrast the development of land for agriculture and the new farming practices, which were introduced to this area by the Sikh Jat farmers necessitated the sinking of new wells, and an improvement in the already existing ones. The introduction of tubewells succeeded greatly in meeting the increased demand for irrigation. The former *kachcha* wells are now made *pucca*. The *dhekli* has been replaced by a technologically superior method of drawing out water, that is, tubewells and mechanised wells.

The density per square kilometer of wells has increased from 1.079 to 3.141; tubewells from 0 to 1.320; and tubewells and wells considered together from 1.076 to 4.461 between the two time periods.

The ratio of wells to hundred settlements has increased between the pre and post Independence periods, from 240 to 700; tubewells from 0 to 300; and tubewells and wells together from 240 to 1,000. If the dispersed settlements are also considered then the increase in the wells is from 0 to 120; tubewells and wells combined from 240 to 390. The number of named settlements between pre and post Independence periods has remained static (70) but the dispersal of settlements has occurred only in the latter period (70 to 178).

The distribution pattern of wells is ran-

dom, because their location is controlled by the irregular occurrence of aquifers. Secondly, in the pre-Independence period there was a concentration of well in a few pockets located in the south-eastern and south-western parts of the selected area. This is associated with the extension of cultivated fields and the absence of wells in the northern half to the forests. Even in the post-Independence period there is a concentration of wells in the south-western and south-eastern parts of the selected area from where the concentration parts of wells decreases northwards. However, the areas of concentration of wells have been enlarged and pockets devoid of wells, so characteristic of the pre-Independence period, are no longer found in the post-Independence period.

The elaboration of wells has been accompanied by the creation and elaboration of water channels. The installation of tubewells has promoted a sprouting of electric poles and the adjacent construction of room for a mechanic or the farmer. These rooms at places have developed into nuclei of single dwelling units.

It is clear, therefore, that transformation is better understood through a study that combines the types of wells, the method of drawing out water and the distribution, number and density of the wells. The full significance of this indicator is brought out when we consider the wells as entities in themselves and as elements of the landscape.

The locational relationship of the settlements and agricultural fields with wells remains strong even where there is an increase in the usage of mechanised power.

Conclusion

1. Between the pre and post-Independence periods there has been a remarkable transformation of the rural landscape of Karnal District.

2. The Sikh Jat farmers have been the principal agents of this transformation. Their endeavours, derived mostly from their religious and social traditions, were further

strengthened by the government policies.

3. The government policies were subsumed mainly by Green Revolution, Intensive Agriculture District Programme, and the Five-Year Plans.

4. There are several indicators concreting transformation, namely :

- a) Densification of rural settlements
- b) Ramification of road network, and
- c) Elaboration of the mesh of wells.

5. These indicators have operated in conjunction with each other through mutual reinforcement.

6. It is not easy to quantify the role of one indicator and assess its relative importance.

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Address of the author

Miss Neelkamal Bedi, Research scholar, Dept. of Geography, Panjab University, Chandigarh.