CHAPTER – 5

INTEGRATED NATURE OF PHENOMENA AND SUSTAINABILITY OF ENVIRONMENT

"Trying to learn how to anticipate, radiate, emit, proliferate....."

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A wide range of scholars either explain or mention about the mutuality and interdependence between the phenomena, irrespective of space and time. The words like mutuality, interdependence, interrelationship and more specifically symbiotism, mentioned by scholars silently signify and indicate the essence of survival and existence of phenomena in their respective transforming environment experiencing varying mutuality, interdependence and interrelationship due to increase or decrease in the phenomena. Knowingly or unknowingly it is the later cause of decrease or increase of phenomena which is alarming the scholars because of aggravating threat to the human survival. And so, the scholars especially geographers and environmentalists are focusing on the environment favourable to man. It is notable that environment is simply an abstract concept for a unified set of phenomena, irrespective time and space.

The characteristic of being infinite and abstract, explains that it is not 'environment' but environment favourable to man is at stake. And so, the survival of man is at stake. Meaning thereby, perpetuity of environment cannot be denied. It will always be in existence in one or the other form. But there is suspicion about the human survival. The imaginative scholars have been sniffing about the growing crises. The course of crises is certainly indicating the dooms day.

The culminating efforts and directions of the scholars make it pertinent to study the following in detail:

1) The existing inter–causasive association between the phenomena.
2) The influence of variations among and between the phenomena and the resultant variation in the system.
3) The probable evolving or emerging alien or new phenomena.
4) The probable consequences of the variations.
5) And frame the nuclear model and composite model representing the association of phenomena with nucleic phenomenon and the composite network of association respectively.

The following analysis is based upon the correlation analyses of mean temporal decennial data of 1971, 1981 and 1991 and primary data generated through direct field observation. It is notable that the derivations, from the correlation tables

given in Annexure VI–1 and Vi–2 emphasise more on the direction and less on the magnitude of relationship between the phenomena.

5.1 GENERAL NATURE OF ASSOCIATION BETWEEN DIFFERENT PHENOMENA:

Derivations and Postulations from Annexure X–1

1. Altitude and distance have positive relationship i.e. with the increase in distance from towns the altitude increases and vice–versa.
2. Altitude and forest area have inverse or negative relation i.e. the increase in altitude is reciprocated with decrease in forest area and vice–versa. Here, it is essential to explain that such association is not a general feature and is contrary to the previous and emerging explanations. The contradictory derivations could be because of marginal or hair line difference in the values. It is noteworthy fact that the hills are prone to denudational processes and their resistant rocks are also extruding. These extruding resistant rocks and remnants of denuded rocks do not favour the growth of any vegetation. Moreover, after an excessive exploitation in the recent past further growth must not have taken place due to semi–arid climatic conditions and grazing by the animals. In the verification it is observed that with the increase in altitude, percentage of villages having forest increases but more than 50 per cent villages have only upto 10 per cent of area as forest.
3. Altitude and percentage of cultivable area are inversely related i.e. increase in altitude is reciprocated by decrease in percentage of cultivable area and vice–versa.
4. Altitude and percentage of tribal population are positively related i.e. increase in altitude is reciprocated by increase in percentage of tribal population and vice–versa.
5. Altitude and population density are inversely related i.e. increase in altitude is reciprocated by decrease in the population density and vice–versa.
6. Altitude and density of tribal population are positively related i.e. increase in altitude is reciprocated by increase in density of tribal population and vice–versa.
7. Altitude and percentage of literate population are inversely related i.e. increase in altitude is reciprocated by decrease in percentage of literate population and vice–versa.

8. Altitude and percentage of main worker population are inversely related i.e. increase in altitude is reciprocated by decrease in percentage of main worker population and vice–versa.
9. Altitude and percentage of cultivator population are positively related i.e. increase in altitude is reciprocated by increase in percentage of cultivator population and vice–versa. This could be because of greater dependence on cultivation and lack of other opportunities in the higher altitudes.
10. Altitude and mean distance between the nuclei or cores of villages are positively related i.e. increase in altitude is reciprocated by increase in mean distance between the cores of villages and vice–versa.
11. Distance from towns and percentage of forest area are inversely related i.e. increase in distance from towns is reciprocated by the decrease in percentage of forest area and vice–versa. Although, this is not a general feature, it is worthy of note that with the increase in distance from urban centres, altitude increases. This observation indicates the location of urban centres at lower altitude and flow of rain water and streams towards the lower altitude. Thus, storage of water in lower altitudinal areas, relatively even nature of terrain and nearness to the urban centres, where from the plans and programmes of afforestation and conservation diffuses, provide favourable condition for more forest near to the urban centres. Adversities like denuded hills resistant rock remnants and lack of water at higher altitude do not provide favourable condition. Moreover, diminishing effect of policies, improper implementation of programmes and lack of uniform effort could be the other causes.
12. Distance from towns and percentage of cultivable area are inversely related i.e. increase in distance from towns is reciprocated by decrease in percentage of cultivable area and vice–versa.
13. Distance from towns and percentage of tribal population are positively related i.e. increase in distance from towns is reciprocated by increase in percentage of tribal population and vice–versa.
14. Distance from towns and population density are inversely related i.e. increase in distance from towns is reciprocated by decrease in the population density and vice–versa.
15. Distance from towns and tribal population density are inversely related i.e. the increase is distance from towns in reciprocated by decrease in tribal population density and vice–versa.

16. Distance from towns and percentage of literate population are inversely related i.e. increase in distance from town is reciprocated by decrease in percentage of literate population and vice–versa.
17. Distance from towns and percentage of main worker population are positively related i.e. increase in the distance is reciprocated by increase in percentage of main worker population and vice–versa.
18. Distance from towns and percentage of cultivator population are positively related i.e. increase in the distance is reciprocated by increase in percentage of cultivator population and vice–versa.
19. Distance from towns and mean distance between the cores of villages are inversely related i.e. increase in the distance is reciprocated by decrease in the mean distance between the cores of villages and vice–versa.
20. Percentage of forest area and percentage of cultivable area are inversely related i.e. increase in percentage of forest area is reciprocated by decrease in percentage of cultivable area and vice–versa.
21. Percentage of forest area and percentage of tribal population are inversely related i.e. increase in percentage of forest area is reciprocated by decrease in the percentage of tribal population and vice–versa. Forest was so closely associated to the tribal mode of life that it seem to be ridiculous derivation but various forest policies which confiscated their ancestral forest rights and restrict them to intrude into the reserved forest ascertain the fact. Presently the trend of inverse or negative association is growing.
22. Percentage of forest area is inversely related to population density i.e. increase in percentage of forest area is reciprocated by decrease in population density and vice–versa.
23. Percentage of forest area and tribal population density are inversely related i.e. increase in percentage of forest area is reciprocated by decrease in tribal population density and vice–versa.
24. Percentage of forest area and percentage of literate population are positively related i.e. increase in percentage of forest area is reciprocated by increase in percentage of literate population and vice–versa. The increasing percentage of forest area near to the urban centres which are located at relatively lower altitude and where population has better opportunities to strengthen their socio–economic condition. Proper implementation of literacy development programmes and better socio–

economic condition of the population might be the cause for this amazing association.

25. Percentage of forest area and percentage of main worker population are inversely related i.e. increase in percentage of forest area is reciprocated by decrease in percentage of main worker population and vice–versa.
26. Percentage of forest area and percentage of cultivator population are positively related i.e. increase in percentage of forest area is reciprocated by the increase in percentage of cultivator population and vice–versa.
27. Percentage of forest area and mean distance between the cores of villages are positively related i.e. increase in percentage of forest area is reciprocated by increase in mean distance between the village cores and vice–versa.
28. Percentage of cultivable area and percentage of tribal population are inversely related i.e. increase in the percentage of cultivable area is reciprocated by decrease in the percentage of tribal population and vice versa.
29. Percentage of cultivable area and tribal population density are positively related i.e. increase in percentage of cultivable area is reciprocated by increase in tribal population density and vice–versa.
30. Percentage of cultivable area and percentage of literate population are positively related i.e. increase in percentage of cultivable area is reciprocated by increase in percentage of literates and vice–versa.
31. Percentage of cultivable area and percentage of main worker population are positively related i.e. increase in percentage of cultivable area is reciprocated by increase in percentage of main worker population and vice–versa.
32. Percentage of cultivable area and percentage of cultivator population are inversely related i.e. increase in percentage of cultivable area is reciprocated by decrease in percentage of cultivator population and vice–versa.
33. Percentage of cultivable area and mean distance between the cores of villages are inversely related i.e. increase in the percentage of cultivable area is reciprocated by decrease in mean distance between cores of villages and vice–versa.
34. Percentage of tribal population and population density are positively related i.e. increase in percentage of tribal population is reciprocated by increase in population density and vice–versa. The positive relation

between the two could be because tribals are the major inhabitants (87% of the total population) of the region. So, any variation in the tribal population must be followed by similar variation in the total population and thence population density.

35. Percentage of tribal population and tribal density are positively related i.e. increase in percentage of tribal population is reciprocated by increase in tribal density and vice–versa.
36. Percentage of tribal population and percentage of literate population are inversely related i.e. increase in percentage of tribal population is reciprocated by decrease in percentage of literate population and vice–versa.
37. Percentage of tribal population and percentage of main worker population are inversely related i.e. increase in percentage of tribal population is reciprocated by decrease in percentage of main worker population and vice–versa.
38. Percentage of tribal population and percentage of cultivator population are positively related i.e. increase in percentage of tribal population is reciprocated by increase in percentage of cultivator population and vice–versa.
39. Percentage of tribal population and mean distance between the cores of villages are positively related i.e. increase in percentage of tribal population is reciprocated by increase in the mean distance between the cores of villages and vice–versa.
40. Percentage of literate population and percentage of main worker are inversely related i.e. increase in percentage of literate population is reciprocated by decrease in percentage of main worker population and vice–versa.
41. Percentage of literate population and percentage of cultivator population are inversely related i.e. increase in the percentage of literate population is reciprocated by decrease in percentage of cultivator population and vice–versa.
42. Percentage of literate population and mean distance between the cores of villages are inversely related i.e. increase in the percentage of literate population is reciprocated by decrease in the mean distance between the cores of villages and vice–versa.
43. Percentage of main worker population and percentage of cultivator population are positively related i.e. increase in the percentage of main

worker population is reciprocated by increase in percentage of cultivator population and vice–versa.

44. Percentage of main worker population and mean distance between the village – cores are negatively related i.e. increase in the percentage of main worker population is reciprocated by decrease in the mean distance between the village cores and vice–versa.

45. Percentage of cultivator population and mean distance between the village – cores are inversely related i.e. increase in the percentage of cultivator population is reciprocated by decrease in the mean distance between the village – cores and vice versa.

5.2 CONTEMPORARY NATURE OF ASSOCIATION BETWEEN DIFFERENT PHENOMENA:

Derivations and Postulations from Annexure X–2

The complex and intricate nature of the environmental system necessitated the inclusion of some other existing essential variables to study their association and role in the system. Correlation analysis based upon primary data correlation incorporates the contemporary association between the phenomena. Here, it is also necessary to mention that the numerical associations of some significant phenomena with other phenomena are represented with the visual models.

The model representing association of one phenomenon with other phenomena is assumed as nuclear model of association. It is presumed that these nuclear models behave like sub–systems of environmental system and have inter–causasive linkage between them irrespective of any numerical dimension. These nuclear models are further represented as a unified system through a composite model of association. This composite model of association is presumed to be a simplified representation of intricate environmental system.

The visual representation of the association with the help of nuclear models, showing the direction of association to the specific nucleic phenomena, and concluding composite model shows the unified network of directional association between the phenomena in the system.

Nuclear models and composite model showing association between the nucleic phenomena and related phenomena contain nucleus and concentric arrows around them. The arrows indicate directional reciprocation of variables to their nucleic variables. The upward arrows reciprocated by upward arrow indicate positive whereas upward arrow reciprocated by downward arrow indicate negative correlation

and vice versa. Also, upward arrows show the increase whereas downward arrows show the decrease. The models are comprised of respective direction of anticipation against the radiating and inter–connecting rays to the surrounding phenomena on the basis of the correlation values given in the Annexure X–2. List of variables (phenomena) is as follows:–

1. Altitude
2. Distance from urban centres
3. Distance from growth centres
4. Percentage of forest area
5. Percentage of total cultivable land
6. Percentage of land owned by tribals
7. Percentage of tribal population
8. Tribal population (Below 18 years)
9. Tribal population (Above 18 years)
10. Percentage of literates
11. Per capita cultivable land among tribals
12. Tribal arable density (tribal population per hectare of cultivable land)
13. Soil depth
14. Crop yield (maize)
15. Domestic Vegetation Density (number of trees per hectare of private land)
16. Domestication of Animals
17. Diseased Population
18. Pellagra Cases amongst Children
19. Annual rate of crime
20. Alcohol Addiction (intoxicants)
21. House Type (Non–Cemented)
22. Electrification (percentage of electrified houses)
23. Mean areal extent of villages from the centre of the village
24. Mean distance between settlement agglomerations

5.2.1 Altitude and Different Phenomena:

1. Altitude is positively related with distance from towns, percentage of forest area, percentage of cultivable area, percentage of tribal population (below 18 years of age), per capita land holding among the tribes, yield per hectare, domestication of animals, percentage of diseased population, percentage of pellagra affected population, annual rate of crime, percentage of alcohol addiction, non–cemented houses and mean extent of villages from cores. Meaning thereby, the increase in altitude is reciprocated by the increase in above mentioned phenomena or variables and vice–versa.

2. Altitude is inversely related with distance from growth centers, percentage of tribal land, percentage of tribal population, percentage of literate population, tribal arable density, soil depth, per hectare domestic plantation of trees, percentage of electrified households and mean distance between settlement agglomerations. Meaning thereby, increase in altitude is reciprocated by decrease in the above mentioned phenomena and vice–versa.
3. Distance from towns, percentage of cultivable land, annual rate of crime and mean extent of villages from their cores have considerable positive reciprocation with altitude. Whereas, literate population has considerable negative reciprocation with altitude.

Figure 5.1 explains the association of altitude with different phenomena in the system.

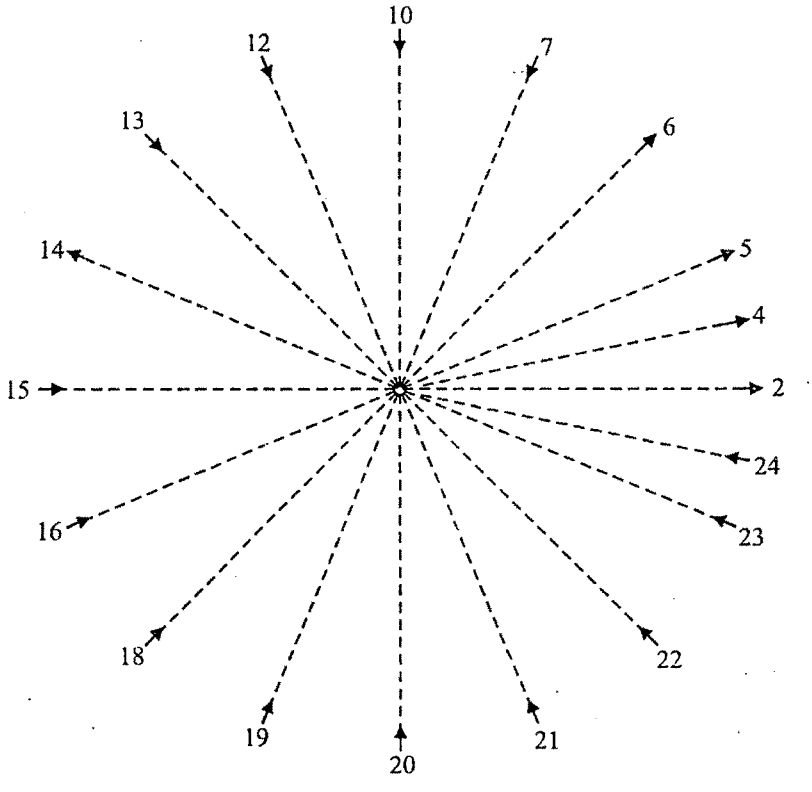

Figure 5.1: Association between Altitude and Different Phenomena

5.2.2 Distance from Towns and Different Phenomena:

1. Distance from towns is positively related with percentage of forest area, percentage of cultivable area, percentage of tribal land, percentage of tribal population below 18 years of age, per capita land holding among the

tribes, per hectare domestic plantation of trees, percentage of non–cemented house type and mean distance between settlement agglomerations. Meaning thereby, the increase in distance from towns is reciprocated by the increase in the above listed phenomena and vice–versa.

2. Distance from towns is inversely related with the distance between the growth centers, percentage of literate population, tribal arable density, soil depth, yield per hectare, domestication of animals, percentage of diseased population, percentage of pellagra patients, annual crime rate, percentage of alcohol addiction, percentage of electrified houses and mean extent of villages from cores. Meaning thereby, the increase in distance from towns is reciprocated by the decrease in the above listed phenomena and vice–versa
3. House–type has considerable positive whereas electrification has considerable inverse or negative relationship with distance from the towns. Figure 5.2 shows association of distance from towns with different phenomena in the system.

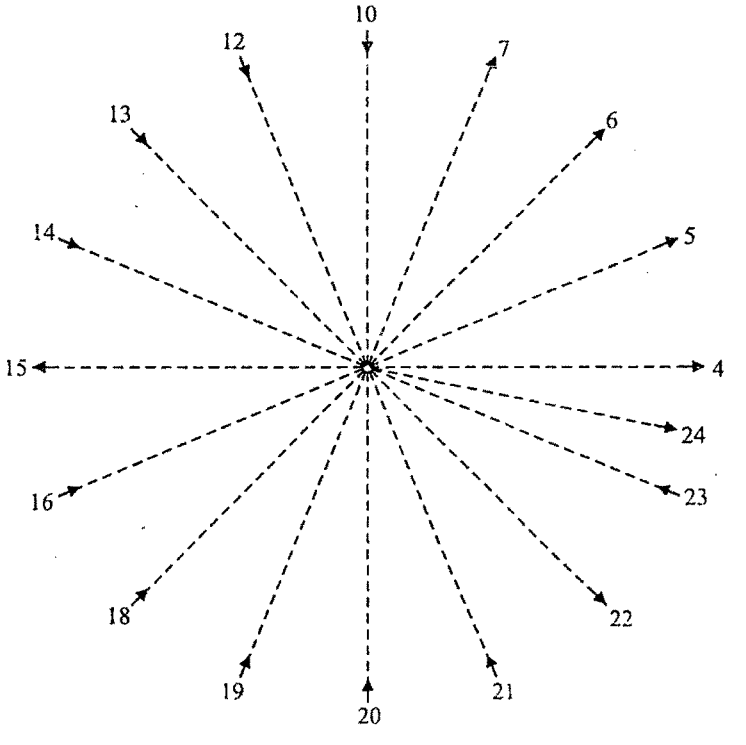

Figure 5.2: Association between Distance from Towns and Different Phenomena

5.2.3 Distance from Growth Centres and Different Phenomena:

1. Distance from growth centers is directly or positively related with percentage of tribal land, percentage of tribal population, percentage of tribal population of above 18 years of age, percentage of literate population, tribal arable density, yield per hectare, per hectare domestic plantation of trees and percentage of alcohol addiction. It means, the increase in distance from growth centers is reciprocated by the increase in above listed variables and vice–versa.
2. Distance from growth centers is inversely related with percentage of forest area, percentage of cultivable area, per capita land holding among tribes, soil depth, domestication of animals, percentage of diseased population, percentage of pellagra patients, annual rate of crime, percentage of non–cemented house type, percentage of electrified households, mean extent of villages from cores and mean distance between settlement agglomerations. This explicates' the increase in distance from growth centers is reciprocated by the decrease in above listed variables and vice–versa.

5.2.4 Forest Area and Different Phenomena:

1. Forest area is positively related with tribal arable density, soil depth, domestication of animals, percentage of diseased population, percentage of pellagra patients, annual rate of crime and percentage of electrified households. It explicates that the increase in forest area is reciprocated by the increase in above listed variables and vice–versa.
2. Forest area is negatively related with percentage of cultivable land, percentage of tribal land, percentage of tribal population, percentage of tribal literate population, per capita land holding among tribes, yield per hectare, per hectare domestic plantation of trees, percentage of alcohol addiction, percentage of non–cemented house type, mean extent of villages from cores and mean distance between settlement agglomerations. It explicates that increase in the forest area is reciprocated by the decrease in above mentioned variables and vice–versa.
3. Percentage of Tribal Land and percentage of tribal population have considerably negative reciprocation with forest area. Figure 5.3 explains the association of forest with different phenomena in the system.

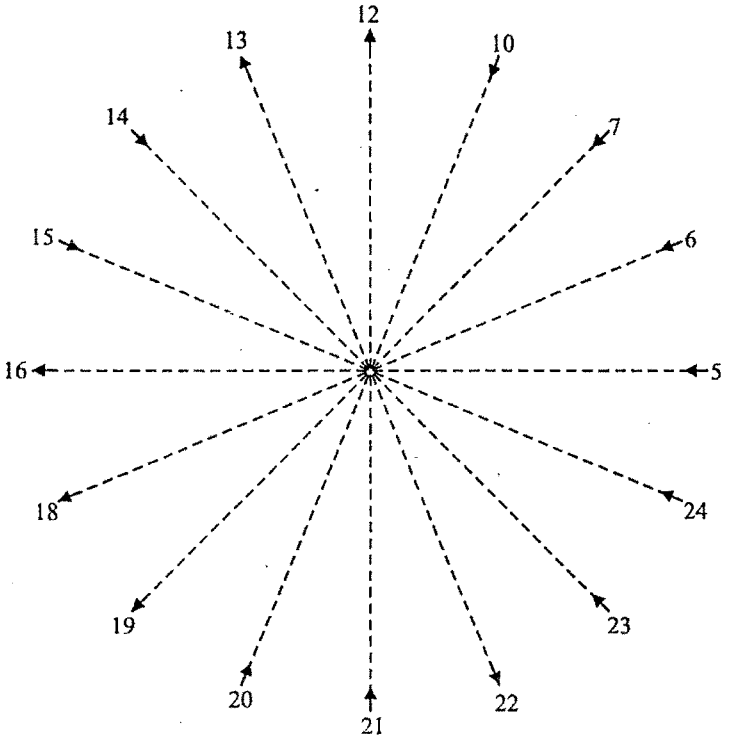

Figure 5.3: Association between Forest and Different Phenomena

5.2.5 Cultivable Area and Related Phenomena:

1. Cultivable area is positively related with percentage of tribal land, percentage of tribal population, percentage of tribal literate population, per capita land holding among tribes, yield per hectare, domestication of animals, percentage of pellagra patients, percentage of alcohol addiction, percentage of electrified households and mean extent of villages from cores. It explicates, the increase in cultivable area is reciprocated by increase in the above mentioned phenomena and vice–versa.
2. Cultivable area is inversely related with tribal arable density, soil depth, per hectare domestic plantation of trees, percentage of diseased population, annual rate of crime, percentage of non–cemented house type and mean distance between settlement agglomerations. It explicates that the increase in cultivable area is reciprocated by decrease in above listed variables and vice–versa.
3. Percentage of tribal land, percentage of tribal population, percentage of alcohol addiction, and mean extent of villages from cores have considerable whereas land per tribal has very significant positive reciprocation with cultivable area.

4. Tribal arable density has significant inverse reciprocation with cultivable area. Figure 5.4 represents association of cultivable area with different phenomena in the system.

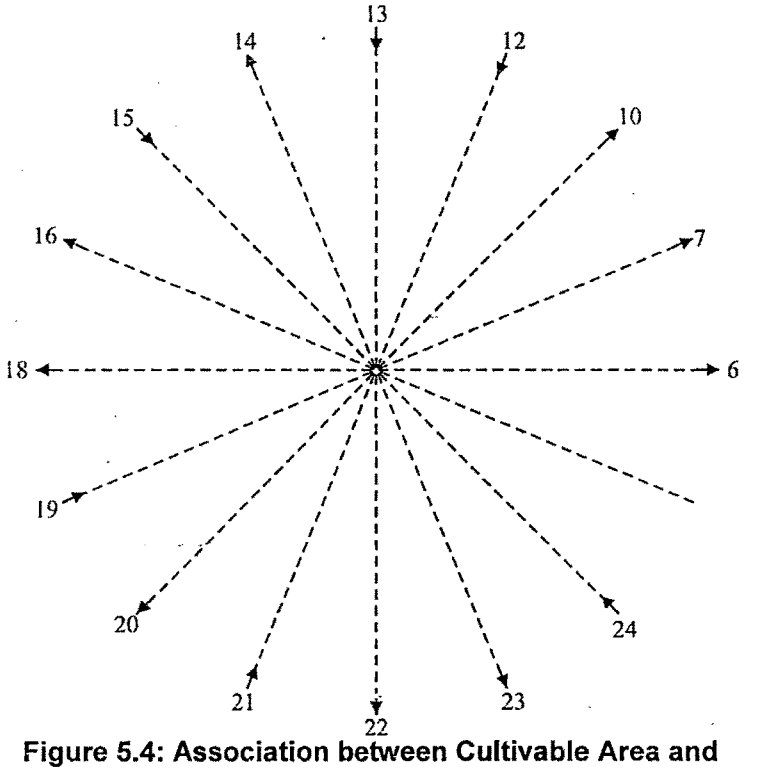

Figure 5.4: Association between Cultivable Area and Different Phenomena

5.2.6 Tribal Land Percentage and Different Phenomena:

1. Percentage of tribal land is positively related with percentage of tribal population, percentage of tribal literate population, per capita land holdings among tribes, per hectare plantation of trees, percentage of pellagra patient, annual rate of crime, percentage of alcohol addiction, percentage of non–cemented house type, mean extent of villages from cores and mean distance between settlement agglomerations. It explicates, the increase in tribal land percentage is reciprocated with the increase in the above listed variables and vice–versa.
2. Percentage of tribal land is inversely related with tribal arable density, soil depth, yield per hectare, domestication of animals, percentage of diseased population and percentage of electrified households. It explicates that increase in tribal land percentage is reciprocated with decrease in the above motioned variables and vice–versa.

3. Percentage of tribal population has very significant whereas alcohol addiction has significantly positive reciprocation with percentage of tribal land.
4. Domestication of animals has considerable whereas percentage of diseased population has very significant negative reciprocation with percentage of tribal land.

5.2.7 Tribal Population and Different Phenomena:

1. Percentage of tribal population has positive relation with percentage of tribal population of above 18 years of age i.e. percentage of adult tribal population, percentage of tribal literate population, per capita land holding among tribes, tribal arable density, per hectare domestic plantation of trees, percentage of pellagra patient, annual rate of crime, percentage of alcohol addiction, percentage of non–cemented house type, mean extent of villages from cores and mean distance between settlement agglomerations. It explicates, the increase in scheduled tribe percentage is reciprocated with the increase in above listed variables and vice–versa.
2. Percentage of tribal population is inversely related with percentage of tribal population having less than 18 years of age, soil depth, yield per hectare, domestication of animals, percentage of diseased population and percentage of electrified households. It explicates that the increase in scheduled tribes' percentage is reciprocated with the decrease in above listed variables and vice–versa.
3. Percentage of alcohol addiction has significant whereas percentage of non–cemented house type has considerable positive relationship with percentage of tribal population.
4. Percentage of diseased population has significant negative reciprocation with percentage of tribal population. Figure 5.5 represents association of tribal population with different phenomena in the system.

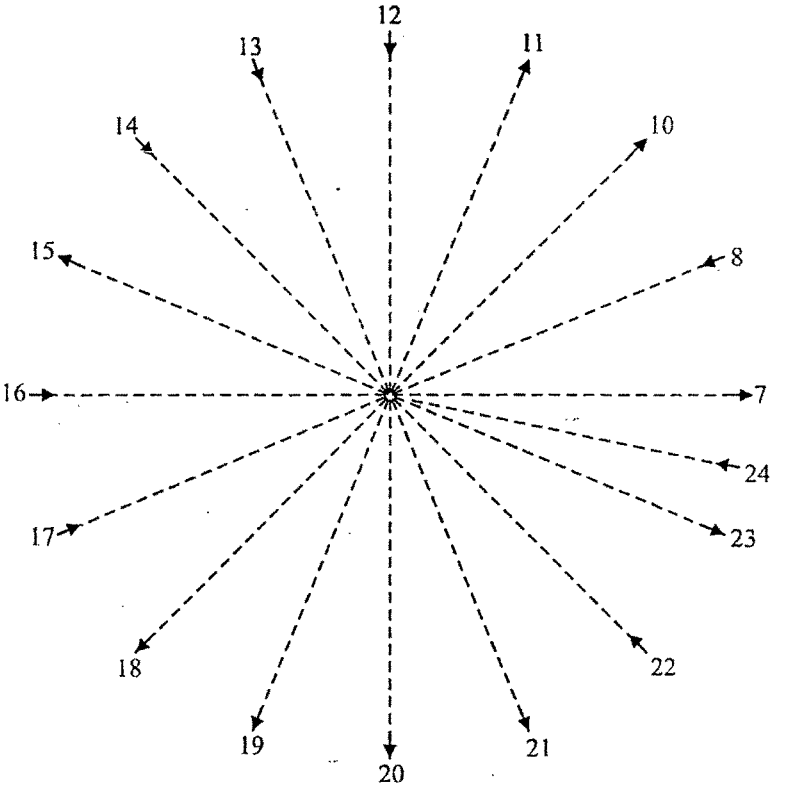

Figure 5.5: Association between Tribal Population and Different Phenomena

5.2.8 Tribal Literate Population and Different Phenomena:

1. Percentage of tribal literate population has positive relation with per capita land holding among tribes, soil depth, yield per hectare, percentage of electrified households and mean extent of villages from cores. It explicates, the increase in percentage of tribal literate population is reciprocated with increase in the above mentioned variables and vice–versa.
2. Percentage of tribal literate population has inverse relation with tribal arable density, per hectare domestic plantation of trees, domestication of animals, percentage of diseased population, percentage of pellagra patient, annual rate of crime, percentage of alcohol addiction, percentage of non–cemented, house type and mean distance between settlement agglomerations. It explicates, the increase in percentage of tribal literate population is reciprocated with the increase in above listed variables and vice–versa.
3. Percentage of electrified households has considerable positive correlation with percentage of tribal literate population.

4. Percentage of pellagra patients and percentage of non–cemented house types have considerable–whereas annual rate of crime has significant negative reciprocation or correlation with percentage of tribal literate population. Figure 5.6 represents association of tribal literate population with different phenomena in the system.

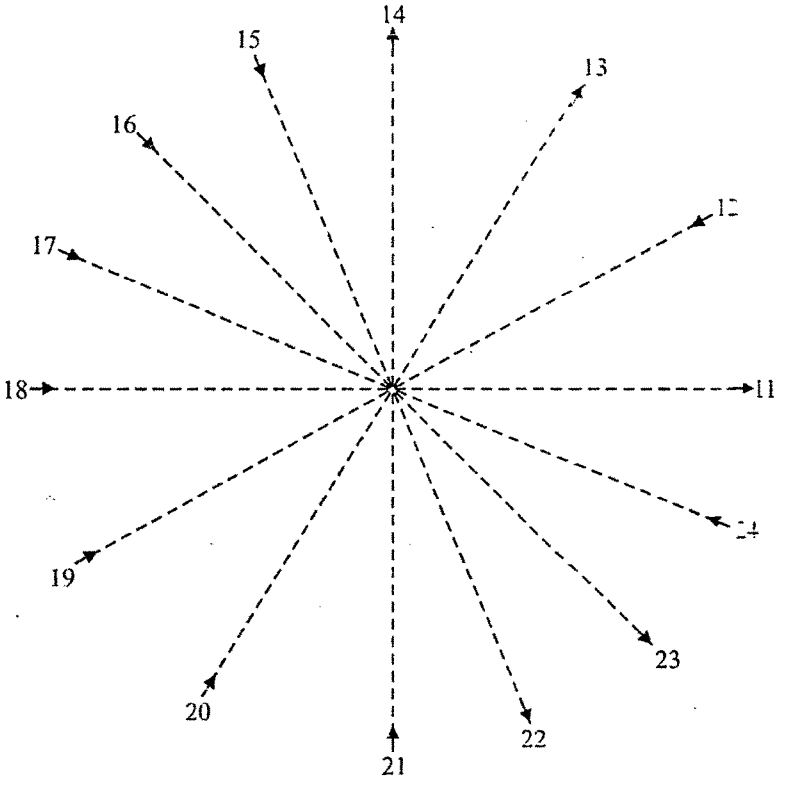

Figure 5.6: Association between Tribal Literate Population and Different Phenomena

5.2.9 Land per Tribe and Different Phenomena:

1. Per capita land holding among tribes has positive relationship with yield per hectare, domestication of animals, percentage of diseased population, percentage of electrified households and mean extent of villages from cores. It explains that the increase in per capita land holding among tribes is reciprocated with the increase in above listed variables and vice–versa.
2. Per capita land holding among tribes has inverse relationship with tribal arable density, soil depth, per hectare domestic plantation of trees, percentage of pellagra patients, annual rate of crime, percentage of alcohol addiction, percentage of non–cemented house type and mean distance between settlement agglomerations. It explicates that increase

in the land per tribe is reciprocated with the decrease in above mentioned variables.

3. Mean extent of villages from cores has considerable positive relation with the per capita land holding among tribes.
4. Per hectare domestic plantation of trees and percentage of non–cemented house type have considerable negative relation whereas tribal arable density has very significant relationship with per capita land holding among the tribes.

5.2.10 Tribal Arable Density and Different Phenomena:

1. Tribal arable density has positive relationship with soil depth, per hectare domestic plantation of trees, percentage of pellagra patients, domestication of animals, and mean distance between settlement agglomerations. Meaning thereby, the increase in tribal arable density is reciprocated with the increase in above listed variables and vice–versa.
2. Tribal arable density has negative relationship with yield per hectare, percentage of diseased population, percentage of electrified households and mean extent of villages from cores. It explicates' increase in the arable density is reciprocated with the decrease in above listed variables and vice–versa.
3. Per hectare domestic plantation of trees, percentage of pellagra patients, annual rate of crime, percentage of non–cemented house type and mean distance between settlement agglomerations have considerable positive relation with tribal arable density.

5.2.11 Soil Depth and Different Phenomena:

1. Soil depth has significant positive relationship with yield per hectare. It explicates, the increase in soil depth is a reciprocated with increase in yield per hectare.
2. Soil depth has positive relationship with per hectare domestic plantation of trees i.e. the increase in the soil depth is reciprocated with the increase in per hectare domestic plantation of trees.

5.2.12 Miscellaneous:

1. Yield per hectare has positive relationship with per hectare domestic plantation of trees i.e. wherever the yield per hectare is high per hectare domestic plantation of trees is also high.

2. Yield per hectare has positive relationship with mean extent of villages from corers and mean distance between settlement agglomerations. Meaning thereby, wherever the yield per hectare is high, it is reciprocated with increasing extent of villages and distance between settlement agglomerations.
3. Percentage of pellagra patients, percentage of alcohol addiction and annual rate of crime are significantly related. Meaning thereby, wherever the percentage of pellagra patients are more the percentage of alcohol addiction and annual rate of crime are also more. On the other side the electrification is less.
4. Percentage of non–cemented house is negatively related with percentage of electrified households i.e. the increase in the number of or percentage of non–cemented houses is reciprocated with less percentage of electrified households. It explicates, the more non–cemented house is reciprocated with less percentage of electrified households.
5. Percentage of non–cemented house type has negative relationship with mean extent of villages from cores and positive relationship with mean distance between settlement agglomerations. It explicates' the increase in percentage of non–cemented house type is reciprocated with decrease in or less extent of villages and increase in the distance between settlement agglomerations.

5.3 PRESENTATION OF ASSOCIATION BETWEEN PHENOMENA AND NUCLEAR CORRELATION SYSTEMS:

The composite network of association between the phenomena and nuclear systems of association is represented here to explain more emphatically with the help of visual model. The numerical magic of correlation analyses of phenomena while explaining the direct mutual relationship, also explains the intricate indirect but logical linkage or reciprocation. The correlation matrix given in Annexure X – 1 and 2 explains the true nature of environmental system and establishes the fact that all the phenomena are directly or indirectly and related to each other. The models evolved, using correlation, represent the mutuality between the phenomena. The first six models represent the directional reciprocation of phenomena against nucleic phenomena placed at the center. The nucleic phenomena are – altitude, distance from towns, forest area, cultivable area, scheduled tribe population and literate

population. Besides these models, the assembled model represents the intricate relationship evolving in the system as a sub–system (Figure 5.7).

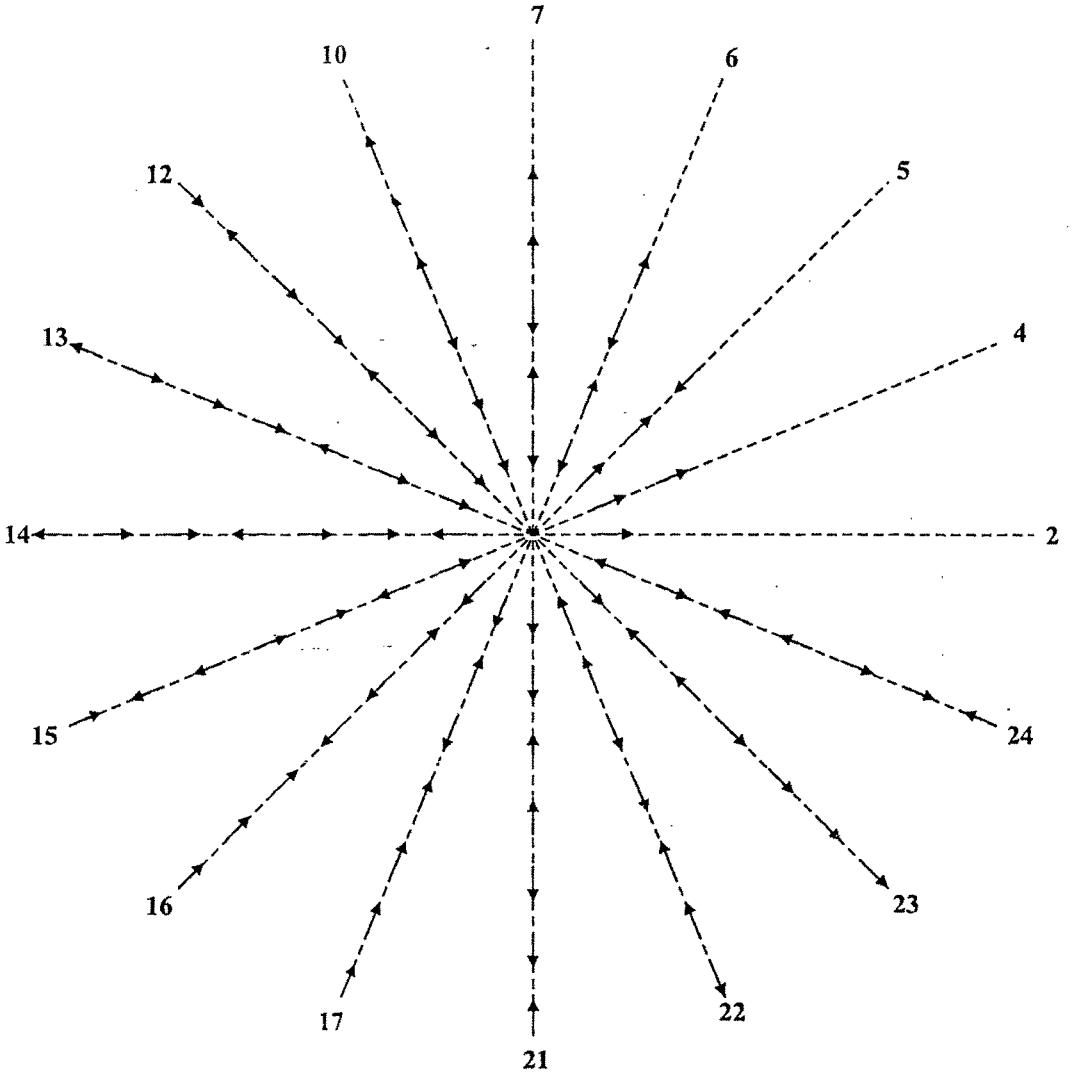

Figure 5.7: Representation of Anticipation & Interlinkage between Phenomena and Nuclear Correlation Systems

Source: Drawn on the basis of Correlation table represented in Annexure X–2.

Index:

1) Altitude
2) Distance from Urban Centres
4) Percentage of Forest Area
5) Percentage of Cultivable Land
6) Percentage of Tribal Land
7) Percentage of Tribal Population
10) Percentage of Literate Population
12) Tribal Arable Density
13) Soil Depth
14) Yield Per Hectare
15) Per Hectare Domestic Plantation of Trees
16) Domestication of Animals
17) Percentage of Diseased Population
21) Percentage of Non–Cemented Houses
22) Percentage of Electrified Households
23) Mean Extent of Villages
24) Mean Distance between Settlement Agglomerations

Note:

1) The innermost i.e. first concentric arrows show anticipation with the increase in altitude.
2) The second concentric arrows show anticipation with increase in distance from urban centres.
3) The third concentric arrows show anticipation with increase in forest area per cent.
4) The fourth concentric arrows show anticipation with increase in cultivable land per cent.
5) The fifth concentric arrows show anticipation with increase in tribes' land per cent.
6) The sixth concentric arrows show anticipation with increase in tribes' population per cent.
7) The seventh concentric arrows show anticipation with increase in literate population per cent.
8) Inward or centripetal arrows represent decrease or negative relationship with the increase in nucleic phenomenon.
9) Outward or centrifugating arrows represent increase or positive relationship against increase in nucleic phenomena.

The following derivations can be made from the Model:

A. All the phenomena are directly or indirectly related and reciprocated to each other.
B. Each phenomenon seems to be the nucleus, performing a regulating role in its environment.
C. The environment with one prime nucleus contains many subordinate nuclei, having their own environment, as a sub–system, tending to propagate or transform the parent environment.

Findings:

The derivation from the correlation analysis leads to the following findings:

Relatively higher population density at lower attitudes and less distance from the urban centres (towns) characterized by (1) greater proportion of forest area and cultivable area (2) higher literate population (3) low tribal population density indicates the probability of over population. This may lead to the –

1. Increase in the density of settlements and in arable density.
2. encroachment of than tribals including literate population and cultivators into the interior areas.
3. encroachment into lowland may lead to the struggle for opportunities between non–tribes and tribes in the interior areas.
4. The struggle may aggravate the problems of tribes living in the interior areas having low literacy, less cultivable area but high dependence on agriculture.

The above findings are further certified by the correlation analysis of primary data. It is observed that –

1. The lowlands nearer to the towns possess better opportunities such as:
    a. soil depth is more,

b. literate population percentage is more,
c. electrification is more,
d. number of non–cemented house is comparatively less,
e. high domestic vegetation density,

2. Some of the emerging problems in the settlements nearer to the towns are:
   a. increase in tribal arable density
   b. increase in annual rate of crime, alcohol addiction, diseased population indicating malnutrition,
3. Some of the emerging problems in the higher lands are:
   a. increase in population percentage of tribals below 18 years of age
   b. increase in diseased population, alcohol addiction, pellagra cases showing malnutrition and annual rate of crime,
   c. more number of non–cemented houses.
4. Similar problems emerging contemporarily in the interior highlands and settlements nearer to towns indicate that the threat speculated about the system is already showing its effect and is a signal of the alarming future crises.
5. It is notable that the increasing forest area and domestication of animals in the interior highlands and increasing forest area and domestic vegetation in the interior lowlands would probably be exhausted with the increasing population of the tribes on the one hand and encroachment of the non–tribes on the other.
6. In the higher lands mean extent of villages is more but mean distance between settlement agglomerations is less.

Such association between the two explains that settlement agglomerations are sparsely settled might because of more spatial irregularities danger of wild animals, security reasons and interspersed reserved forests. Contrary to this, in the low lands, close to the towns, mean extent of villages is more and settlement agglomerations are denser than the interiors. This signifies the probability of emergence of dense settlements nearer to towns.

The distance between growth centres being comparatively less at higher lands and in the interiors i.e. at greater distance from the towns reflects right approach for the development of the area. The positive effects of growth centres are visible with the higher percentage of forest area, domestication of animal and electrification in the nearer settlements. But some of the negative aspects such as higher percentage of diseased population, pellagra cases reflecting malnutrition,

annual rate of crime and non–cemented houses in spite of more cultivable area, more soil depth, more per capita land (land per tribal), more percentage of forest area, electrification and animal domestication indicate either ineffectiveness of the government efforts or lack of proper approach. The high percentage of literacy, domestic vegetation, and productivity (yield per hectare) inspite of less soil depth in the settlements at greater distance from growth centres seem to be either due to the efforts of the mass or effect of growth centres. Contrary conditions in either spaces could be because of more concentration and implementation of policies to the far off spaces from the growth centres. The electrification and forest development are two positive indicators of probable future development but ineffectiveness of growth centres direct the need to apply multi–directional and multi–nodal fission and fusion processes simultaneously.

Per capita land amongst tribals, yield per hectare, domestication of animals, domestic plantation, literacy, health, crime, addiction and nature of settlements indicate that the socio–cultural and economic condition of the tribes is miserable even in the area where the percentage of tribal land, tribal arable density and percentage of tribes is more.

The higher annual rate of crime, pellagra patients showing malnutrition and alcohol addiction and lower per hectare yield and electrification indicate the gravity of the existing and probable situation in the settlements characterized by the above mentioned phenomena. Moreover, such settlement agglomerations indicate the irregular terrain and other adversities such as water crises in the region.

Higher electrification and productivity alongwith lower diseased population, pellagra patients, annual rate of crime, alcohol addiction, non–cemented house type and tribal arable density and dense settlements in the areas of higher literate population indicate the probability of socio–cultural and economic development. Meaning thereby, increase in the levels of literacy could develop the tribal areas. The similar association and effectivity is possible if the land per tribal is more. But it seems impossible to increase and distribute the arable area even if the irregular terrains are optimally distributed to the tribal.

5.4 VERIFICATION OF FINDINGS:

The characteristics of environment, theme, and objectives impelled to know the role and efficacy of geographical phenomena in the evolution and transformation of environment. To evaluate the efficacy various geographical elements are considered independent and there after their efficacy on dependent elements or variables is found out with the application of statistical techniques. Here, in this

chapter, the preceding characteristic explanations and generalizations based upon syllogistic explanations and derivations from statistical computations are further verified for making the study more precise and perfect. More specifically, the objective is to verify the efficacy of time, distance, physiography (especially altitude), location and their association with other variables. The existing realities are explained explicitly alongwith data and their respective graphical representation.

Figures 5.8 and 5.10 explicate the variations in the areal characteristics and figures 5.9 and 5.11 explicate the variations in population structure in space–time continuum. Both the set of figures also indicate the inter–association between them. It is suggested that data close to thousand are indicative of either dense or over population.

Table 5.1 (A): Temporal Variation in Areal Characteristics in the Distance Range of upto 15 km From Urban Centres

Areal Characteristics	1971	1981	1991	2001*	2011*
Forest Area	104	75	255	525	1082
Irrigated Area	8	27	58	160	442
Unirrigated Area	571	522	504	474	445
Culturable Waste Land	140	142	73	56	43
Uncultivable Area	184	182	117	95	78

Table 5.1 (B): Temporal Variation in Areal Characteristics in the Distance Range of 16 - 30 km From Urban Centres

Areal Characteristics	1971	1981	1991	2001*	2011*
Forest Area	77	102	159	229	331
Irrigated Area	33	33	32	31	31
Unirrigated Area	591	606	572	563	555
Culturable Waste Land	82	116	67	67	66
Uncultivable Area	217	88	170	199	232

Table 5.1 (C): Temporal Variation in Areal Characteristics in the Distance Range of More Than 30 km From Urban Centres

Areal Characteristics	1971	1981	1991	2001*	2011*
Forest Area	63	75	200	386	744
Irrigated Area	11	22	32	55	95
Unirrigated Area	458	548	471	484	498
Culturable Waste Land	75	86	78	80	82
Uncultivable Area	393	280	219	164	122

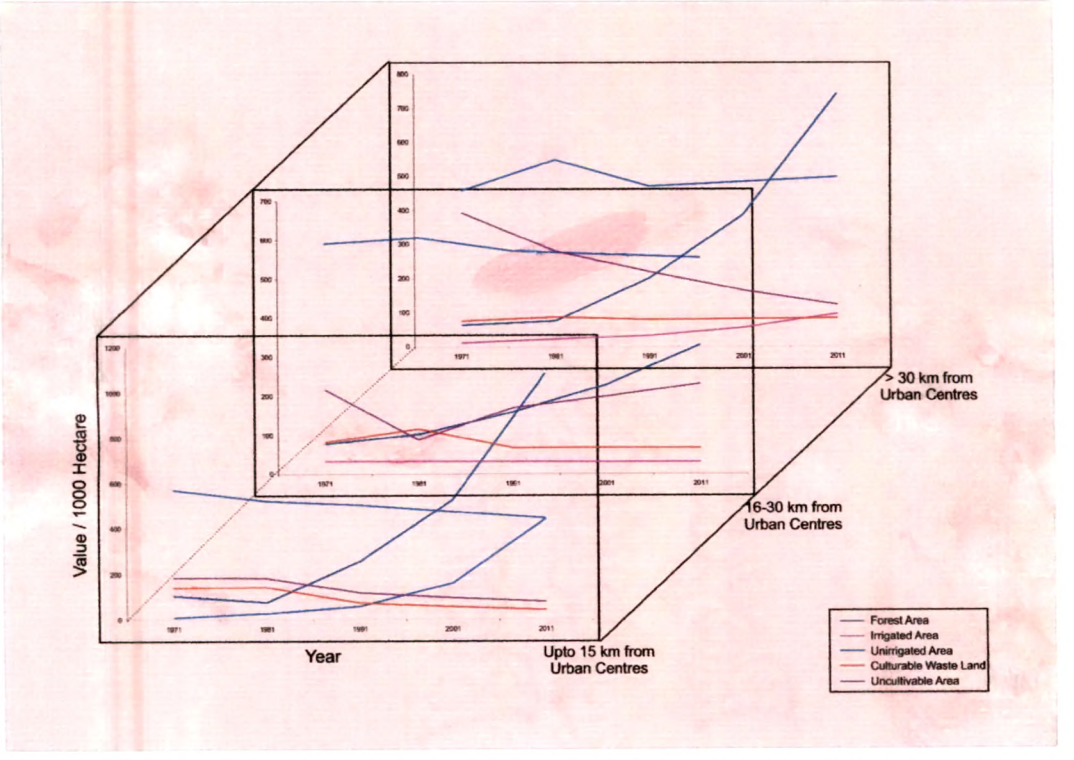

Figure 5.8: The Impact of Distance and Time: Temporal Areal Variation in the Varying Distance Ranges.

Figure 5.8 explains, increase in the forest area and irrigated area whereas decrease in the unirrigated, culturable wastes and uncultivable area in all the distance ranges. The constancy in the irrigated area between 16 to 30 km distance ranges might be due to the topographic characteristic. Also comparatively less increase in the forest area in the same distance range could also be due to same reason. The decrease in culturable waste and uncultivable area might be because of increasing demand land with increasing population (Table 5.1 (A), (B) and (C)).

Table 5.2 (A): Temporal Variation in Population Structure in the Distance Range of upto 15 km From Urban Centres

Demography Characteristics	1971	1981	1991	2001*	2011*
Tribal Population	753	885	808	844	881
Literate Population	160	207	266	343	442
Main Worker Population	389	299	271	227	190
Cultivator Population	351	244	204	156	120

Table 5.2 (B): Temporal Variation in Population Structure in the Distance Range of 16 – 30 km From Urban Centres

Demography Characteristics	1971	1981	1991	2001*	2011*
Tribal Population	838	918	859	872	886
Literate Population	106	152	237	355	531
Main Worker Population	426	367	341	305	273
Cultivator Population	394	312	265	217	178

Table 5.2 (C): Temporal Variation in Population Structure in the Distance Range of more than 30 km From Urban Centres

Demography Characteristics	1971	1981	1991	2001*	2011*
Tribal Population	837	937	942	1000	1000
Literate Population	73	115	176	273	424
Main Worker Population	448	356	354	317	283
Cultivator Population	425	301	278	227	185

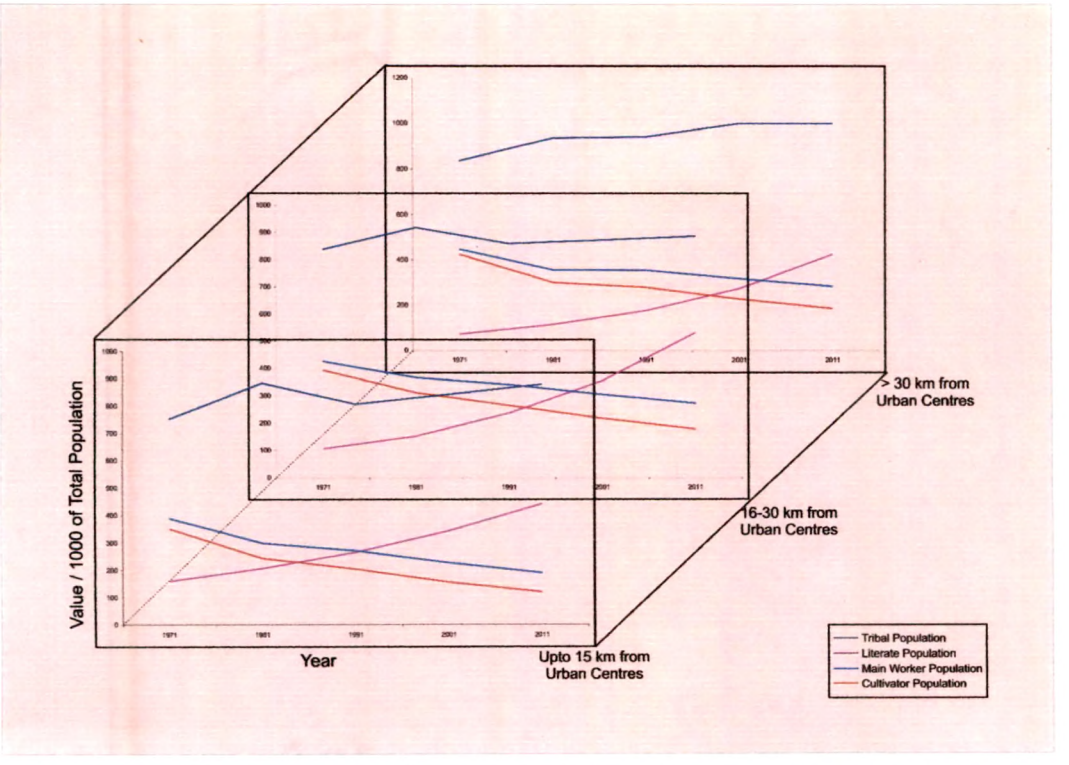

Figure 5.9: The Impact of Distance and Time: Temporal Variation in the Population Structure of Varying Distance Ranges.

Figure 5.9 explains temporal increase in the tribal population and literate population in all the distance ranges and decrease in the main worker and cultivator population. The decrease could be because of increasing population and shrinking opportunities. This is certainly an alarming situation indicating imbalance and unsustainability of the system. The increasing proportion of tribals could be either due to out migration of non–tribals to areas of favourable conditions or excessive increase in the tribal population (Table 5.2 (A), (B) and (C)).

Table 5.3 (A): Temporal Variation in Areal Characteristics in the Altitude Range of upto 500 feet from Urban Centres

Areal Characteristics	1971	1981	1991	2001*	2011*
Forest Area	129	149	335	570	970
Irrigated Area	3	29	26	48	69
Unirrigated Area	560	539	513	491	470
Culturable Waste Land	136	54	40	30	83
Uncultivable Area	173	142	71	47	31

Table 5.3 (B): Temporal Variation in Areal Characteristics in the Altitude Range of 501 - 750 feet From Urban Centres

Areal Characteristics	1971	1981	1991	2001*	2011*
Forest Area	57	72	158	273	472
Irrigated Area	9	26	33	69	143
Unirrigated Area	590	611	603	595	587
Culturable Waste Land	124	105	53	36	24
Uncultivable Area	186	183	137	119	103

Table 5.3 (C): Temporal Variation in Areal Characteristics in the Altitude Range of more than 750 feet From Urban Centres

Areal Characteristics	1971	1981	1991	2001*	2011*
Forest Area	92	98	196	300	460
Irrigated Area	33	32	45	53	63
Unirrigated Area	531	555	501	488	475
Culturable Waste Land	34	123	80	52	34
Uncultivable Area	266	192	188	160	136

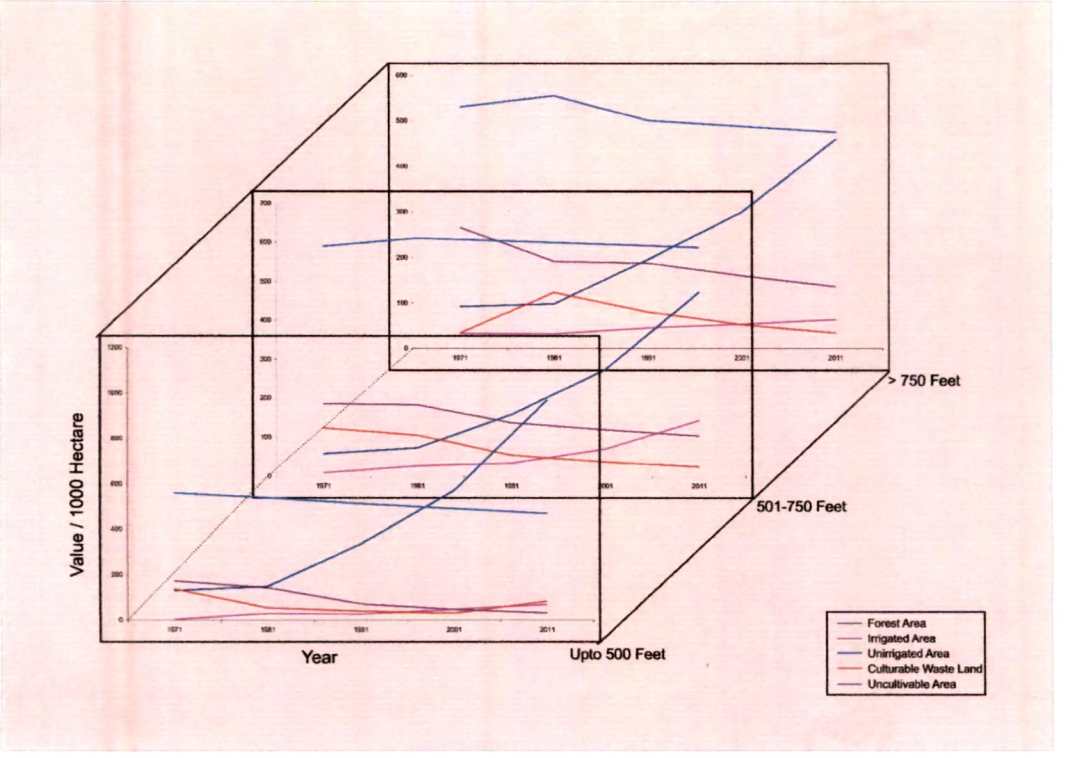

Figure 5.10: The Impact of Altitude and Time: Temporal Variation in the Areal Characteristic in Varying Altitudinal Ranges.

Figure 5.10 explains temporal increase in the forest and irrigated area and decrease in unirrigated, culturable waste and uncultivable area in all the altitudinal ranges. The decrease in above characteristics might be due to growing demand from the growing population (Table 5.3 (A), (B) and (C)).

Table 5.4 (A): Temporal Variation in Demographic Characteristics in the Altitude Range of upto 500 feet from Urban Centres

Demographic Characteristics	1971	1981	1991	2001*	2011*
Tribal Population	814	882	883	920	959
Literate Population	75	357	189	500	1000
Main Worker Population	491	407	428	402	378
Cultivator Population	449	329	331	288	250

Table 5.4 (B): Temporal Variation in Demographic Characteristics in the Altitude Range of 501 – 750 feet from Urban Centres

Demographic Characteristics	1971	1981	1991	2001*	2011*
Tribal Population	717	855	797	847	899
Literate Population	141	198	287	410	584
Main Worker Population	403	337	322	288	258
Cultivator Population	366	273	243	199	163

Table 5.4 (C): Temporal Variation in Demographic Characteristics in the Altitude Range of more than 750 feet from Urban Centres

Demographic Characteristics	1971	1981	1991	2001*	2011*
Tribal Population	907	926	901	898	896
Literate Population	106	141	214	305	434
Main Worker Population	413	334	321	284	251
Cultivator Population	270	166	252	269	287

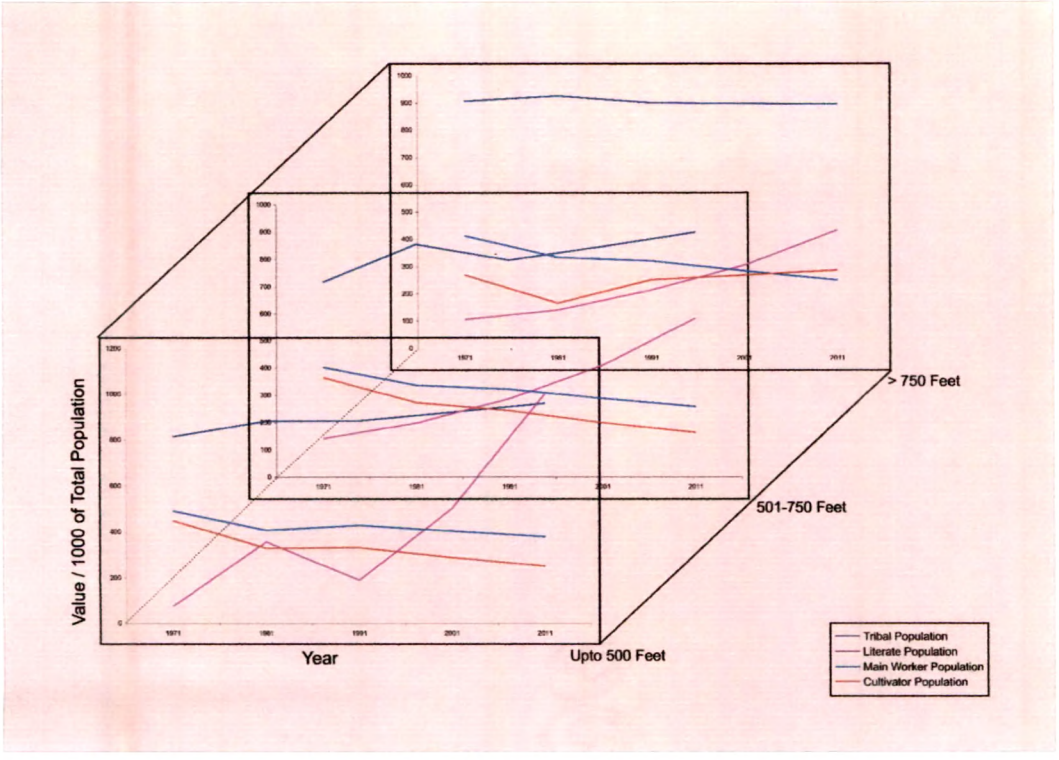

Figure 5.11: The Impact of Altitude and Time: Temporal Variation in the Demographic Characteristics in Varying Altitudinal Ranges.

Figure 5.11 explains temporal increase in the tribal population and literate population and decrease in main worker and cultivator population in all the altitudinal ranges. Increase in the proportion of tribal population could be because of natural increase in their population or out migration of non–tribals. A nominal increase in the cultivator population could be because of division in the families (Table 5.4 (A), (B) and (C)).

Table 5.5: Mean Decennial Variation in Areal Characteristics (Area / 1000 Hectare)

Distance	Forest	Irrigated	Unirrigated	Culturable Waste	Uncultivable
Upto 15 km	408	139	503	91	131
16 – 30 km	180	32	577	80	181
Above 30 km	294	43	492	80	236

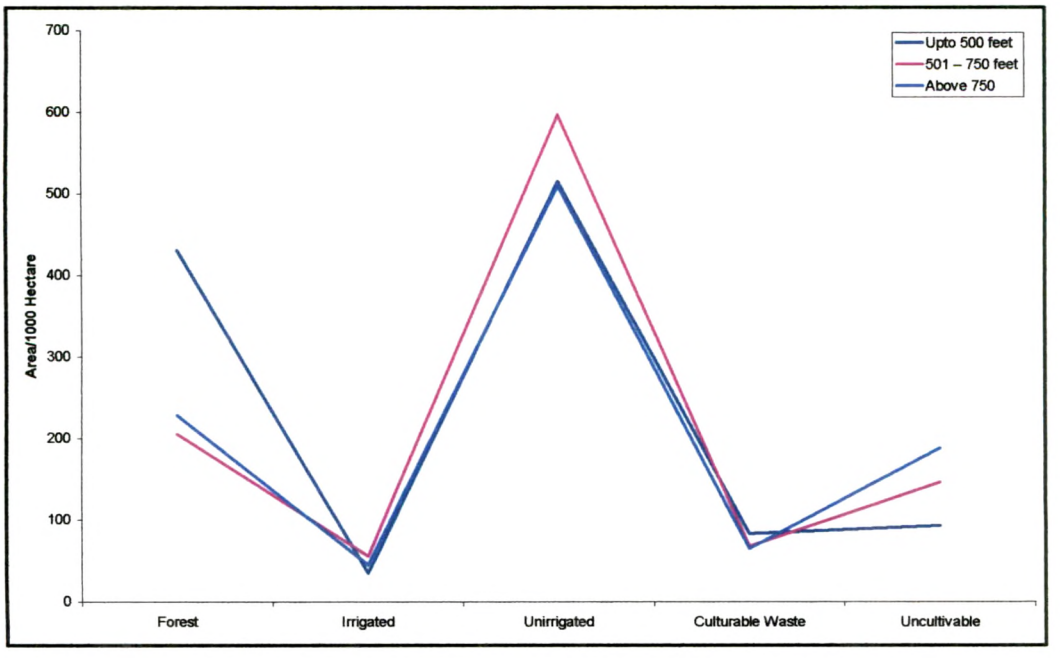

Figure 5.12: The General Impact of Distance over Three Decades: Mean Temporal Variation in Areal Characteristics

Figure 5.12 (Table 5.5) explains the proportionate distribution of forest and unirrigated land are comparatively far more than the irrigated, culturable waste and uncultivable land in all the distance ranges from urban centres. These clearly depict proportionate uniformity in the distribution of areal phenomena and mean temporal variation between the different phenomena. This indicates general trend of distribution over a span of three decades.

Maximum proportion of forest in the distance range of upto 15 km from urban centres could be because of vicinity to the urban centres, where from the regulatory bodies operate their functions such as afforestation programme, conservation programmes, etc. Simultaneously, less proportion of forest in the intermediary location i.e. in the distance range of 16 to 30 km could be because of diminishing effect of plans and programmes. Again altitude increase in the forest area in the location beyond 30 km from urban centres could be because of decreasing encroachment, and inaccessibility caused due to increasing altitude. Decreasing trend in the irrigated area could also be because of diminishing impact of plans and programmes with the increase in distance from urban centres. And an increasing trend of uncultivable land with the increase in distance from urban centre dictates increasing altitude and erraticism in the nature of terrain.

Table 5.6: Mean Temporal Variation in Demographic Structure
(Population / 1000 of Total Population)

Distance	Tribal Population	Literate Population	Main Worker Population	Cultivator Population
Upto 15 km	834	284	275	215
16 – 30 km	875	276	342	273
Above 30 km	943	212	352	283

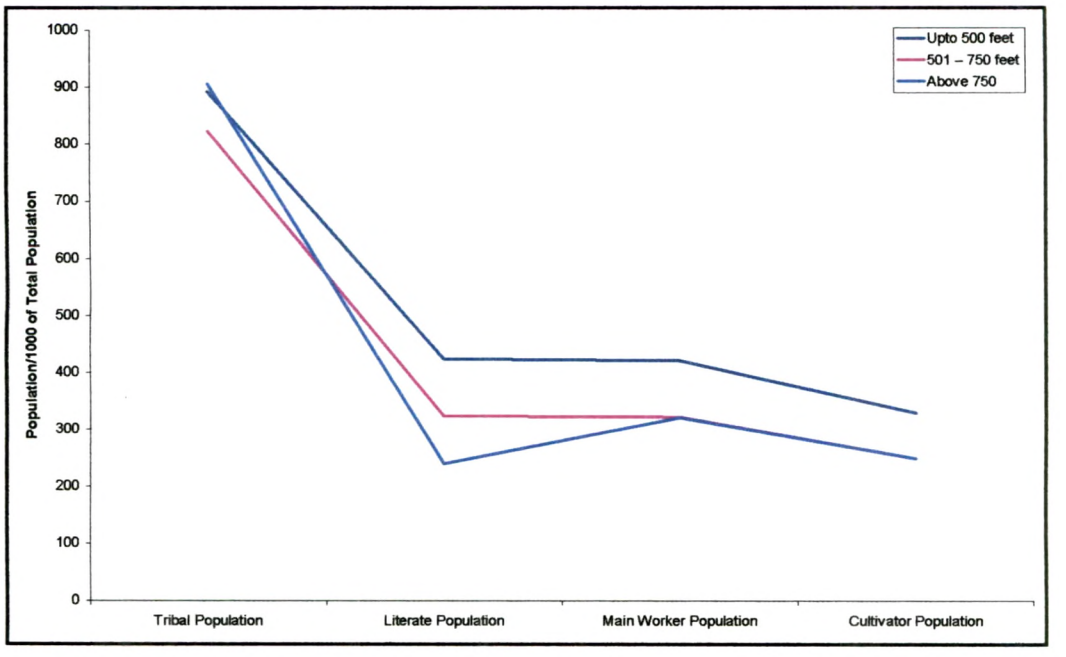

Figure 5.13: The General Impact of Distance over Three Decades:
Mean Temporal Variation in Demographic Structure

Figure 5.13 (Table 5.6) depicts similarity in the proportionate distribution of demographic phenomena between distance ranges from urban centres and a marginal variation within the phenomena of different distance ranges from urban centres. The distribution pattern indicates uniformity in spatial distribution of demographic phenomena. This represents a general trend of distribution over a span of three decades.

The cause for increasing proportion of tribal population with the increase in distance from urban centre could be because of decreasing population of non–tribals with the increase in distance from urban centres. Similarly increase in the population of main workers and cultivators could be because of higher population with the increase in distance from urban centres in an agrarian system. Contrary to the above, decrease in the population of literates with the increase in distance from

urban centres could be because of diminishing impact of urban centres, awareness, plans and opportunities.

Table 5.7: Mean Temporal Variation in Areal Characteristics (Area / 1000 Hectare)

Altitude	Forest	Irrigated	Unirrigated	Culturable Waste	Uncultivable
Upto 500 Feet	431	35	515	83	93
501 – 750 Feet	206	56	597	68	146
Above 750 Feet	229	45	510	65	188

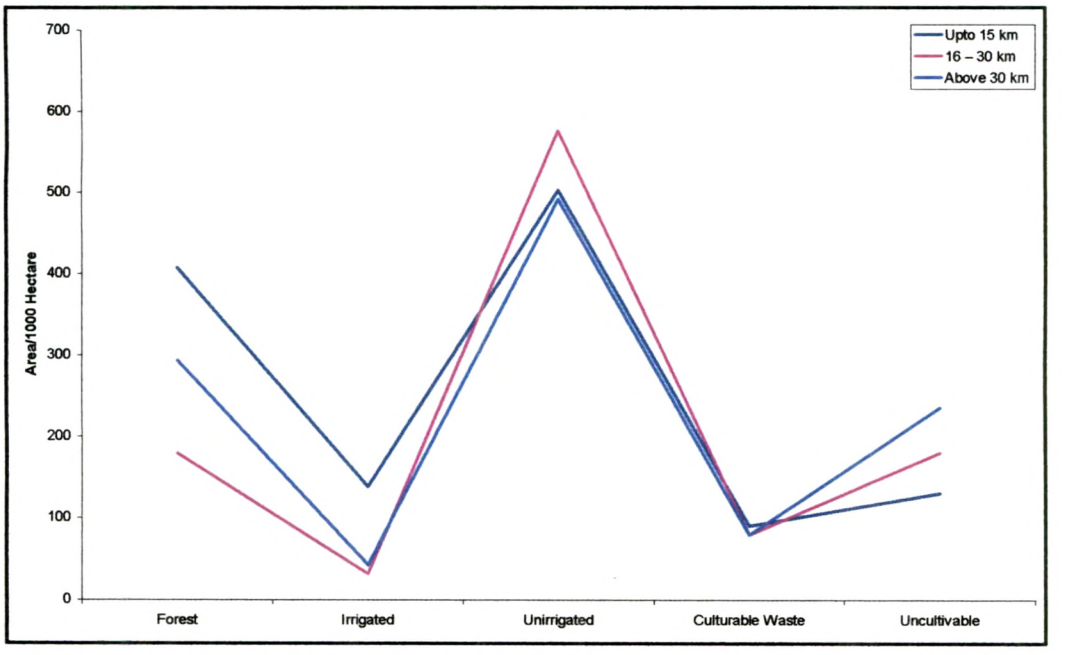

Figure 5.14: The General Impact of Altitude over Three Decades: Mean Temporal Variation in Areal Characteristics

Figure 5.14 (Table 5.7) explains similar trend in the distribution different areal phenomena in the different ranges of altitude and a marginal variation within the phenomena in different ranges of altitude. This indicates uniformity in the distribution of areal phenomena and represents a general pattern and trend of distribution over a span of three decades. This shows more forest in lower altitudinal zone and more uncultivable land in higher altitudinal zone. The irrigated area does not show much variation altitudinally. This could be concluded that variation in forest and uncultivable land reflect geographical correspondence. The proportion of more forest in the lower altitudinal range could also be because of initiation of afforestation, and

conservation programmes from the lower attitudes having more accessibility and diminishing impact of programmes with increasing altitude and in accessibility.

Uniformity in the distribution of irrigated, unirrigated and culturable waste area between the different altitudinal ranges and a marginal variation within the phenomena dictate the deterministic role of physiography. Increase in the uncultivable land with the increase in altitude also dictates the deterministic role of phenomena.

Table 5.8: Mean Temporal Variation in Demographic Structure (Population / 1000 of Total Population)

Altitude	Tribal Population	Literate Population	Main Worker Population	Cultivator Population
Upto 500 Feet	892	424	421	329
501 – 750 Feet	823	324	322	249
Above 750 Feet	906	240	321	249

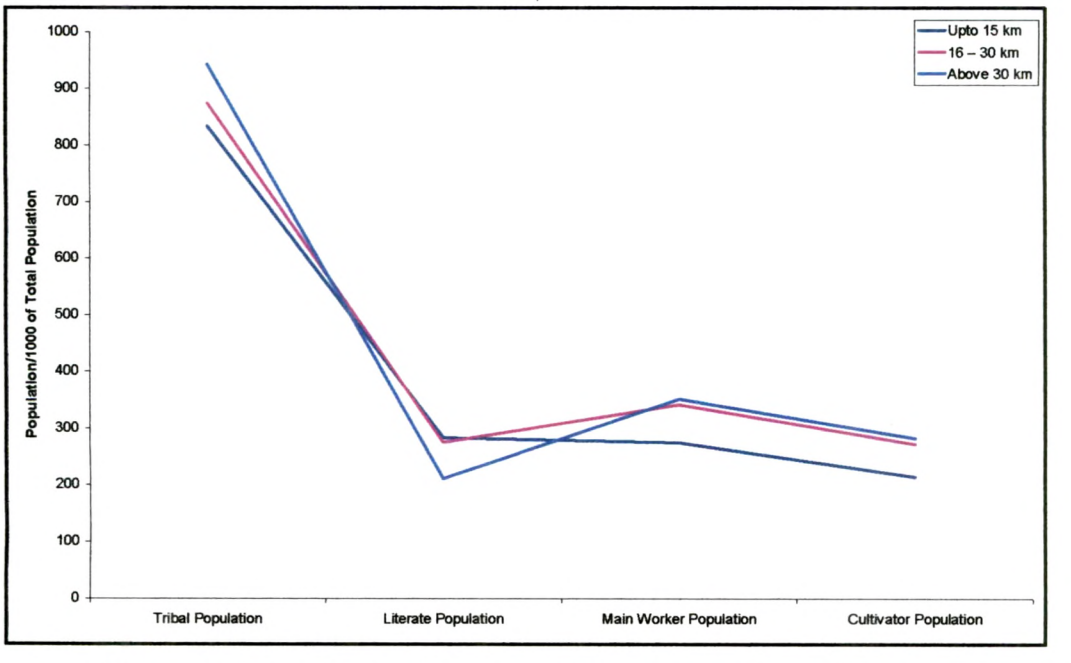

Figure 5.15: The General Impact of Altitude over Three Decades: Mean Temporal Variation in Demographic Structure

Figure 5.15 (Table 5.8) represents uniform trend and pattern in the distribution of demographic phenomena between the different altitudinal ranges. Simultaneously, it represents a marginal variation within the phenomena of different altitudinal ranges. Interestingly show reverse trends as the proportion of tribal

population increases whereas literate, main worker and cultivator population decreases with the increase in altitudinal ranges. Less tribal population at lower altitudinal ranges reflect that non tribals are relatively more at advantageous locations. And decreasing proportion in the population of literate, main worker and cultivator with propagating increase in altitudinal ranges could be because of relatively more focus in lower areas by the government institutions and shrinking opportunities in the region of higher altitudes.

Figures 5.12 and 5.14 representing trend and pattern of distribution of areal phenomena according to the distance ranges from urban centres and altitudinal ranges have remarkable similarity. Simultaneously, the figures 5.13 and 5.15 represent a remarkable similarity in distribution trend and pattern of demographic phenomena of different altitudinal ranges. Similarities between the graphical representations explain close association between the ranges of distance from urban centres and altitude. This certifies that altitude increases with the increase in distance from urban centres. The close association also indicates inter–causasive association between the phenomena and unity and integrity of the system.

Table 5.9: Concentration of Tribal Population in various Locations

Tribal Percentage	Riverine Village Per cent	Non – Riverine Village Per cent	Forest Village Per cent	Non – Forest Village Per cent	Village Per cent upto 15 km from Urban Centres	Village Per cent between 15 to 30 kms from Urban Centres	Village Per cent more than 30 kms from Urban Centres	Village Per cent upto 500 feet Altitude	Village Per cent of 500 to 750 feet Altitude	Village Per cent of more than 750 feet Altitude
10	0	0	0	0	0	0	0	0	0	0
20	0	0	0	0	0	0	0	0	0	0
30	0.9	0	0	0.9	0	0.9	0	0	0.9	0
40	0.9	1.81	0	2.72	0.9	1.8	0	0	2.7	0
50	0	0.9	0.9	0	0.9	0	0	0	0.9	0
60	3.6	2.72	3.6	2.72	1.8	4.5	0	0	3.6	2.7
70	5.45	6.36	7.2	4.54	4.5	6.36	0.9	1.8	7.2	2.7
80	1.81	5.45	3.6	3.6	2.7	3.6	0.9	0.9	3.6	2.7
90	6.36	6.36	5.45	7.2	3.6	7.2	1.8	0.9	5.4	6.3
100	40.9	16.36	23.6	33.6	16.3	32.7	8.18	4.5	17.2	35.4

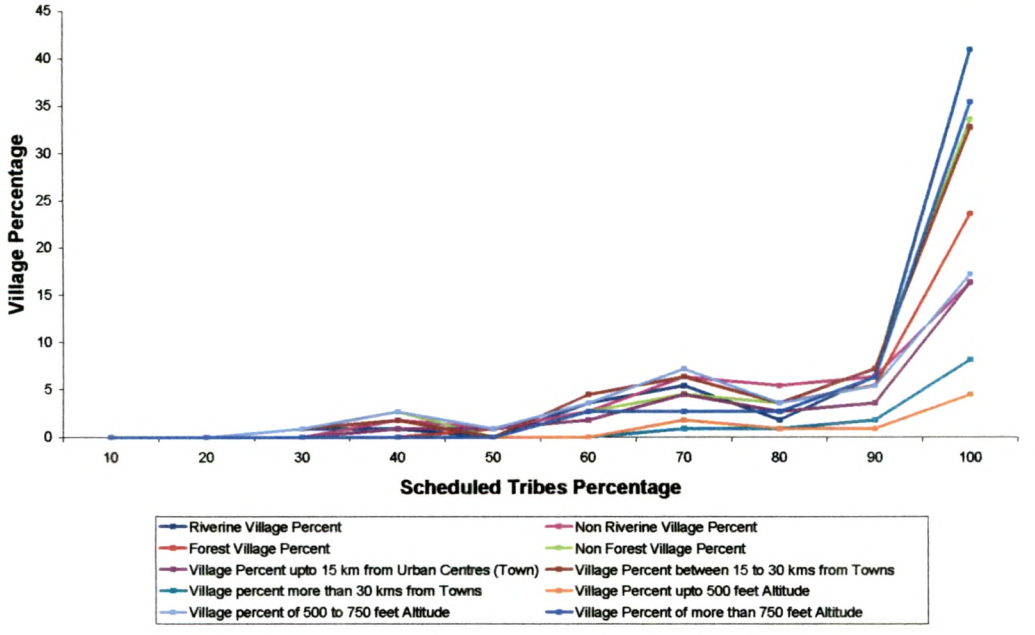

Figure 5.16: Representation of impact of geographical (locational) factors on Distribution of Tribes

Figure 5.16 clearly depicts that the settlements characterized by high altitude, riverine, forest or non–forest locations have high percentage of tribes. It also explains that the percentage of settlements located at high altitudes, rivers, non–forest, and forest between the ranges of 15 to 30 kms from urban centres is directly proportionate to the high percentage concentration of tribes. The non–forest villages might also have been dense forests in the past (Table 4.21).

Table 5.10: Proportion of village characterized by varying functions i.e. forest village percentage and cultivable village percentage

Cultivable Area % and Forest Area %	Cultivable Area Village Percentage	Forest Village Percentage
10	0	30.9
20	1.81	25.45
30	5.45	12.72
40	2.72	2.72
50	13.63	1.81
60	22.72	0
70	17.27	0
80	18.18	1.81
90	18.18	0
100	0	0

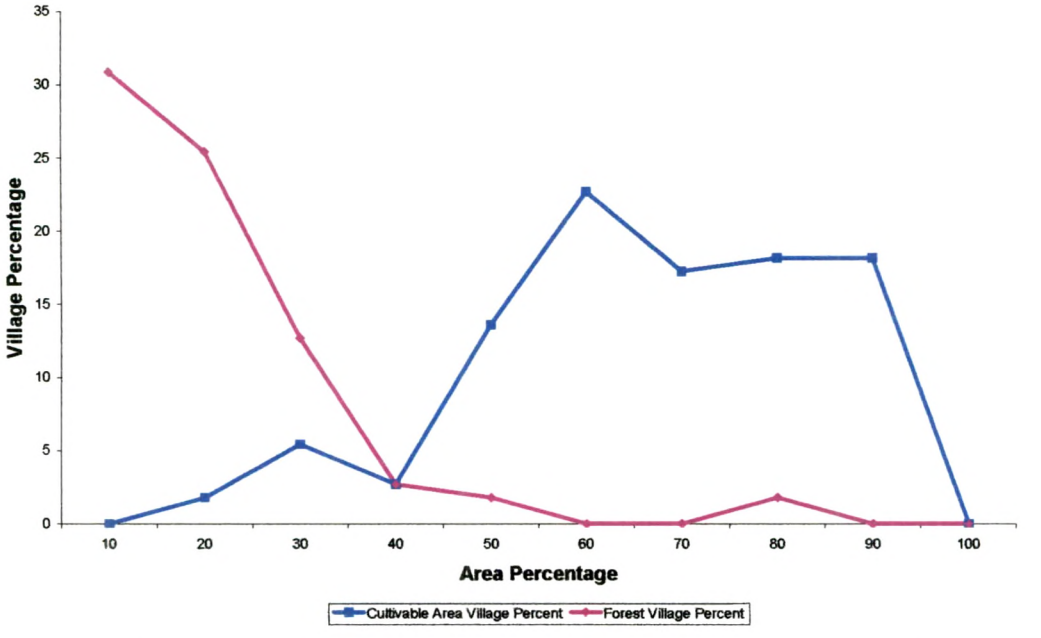

Figure 5.17: Comparative representation of village percentage against forest area and cultivable area percentage

Figure 5.17 explains that percentage of villages with high per cent forest area is very low and vice–versa whereas percentage of villages is directly proportionate to percentage of cultivable area (Table 5.10).

Table 5.11: Village Percentage with Varying Population Density

Density	Village Percentage
1	7.27
2	33.63
3	33.63
4	18.18
5	3.63
6	0.9
7	0.9
8	0.9
9	0
10	0
11	0
12	0.9

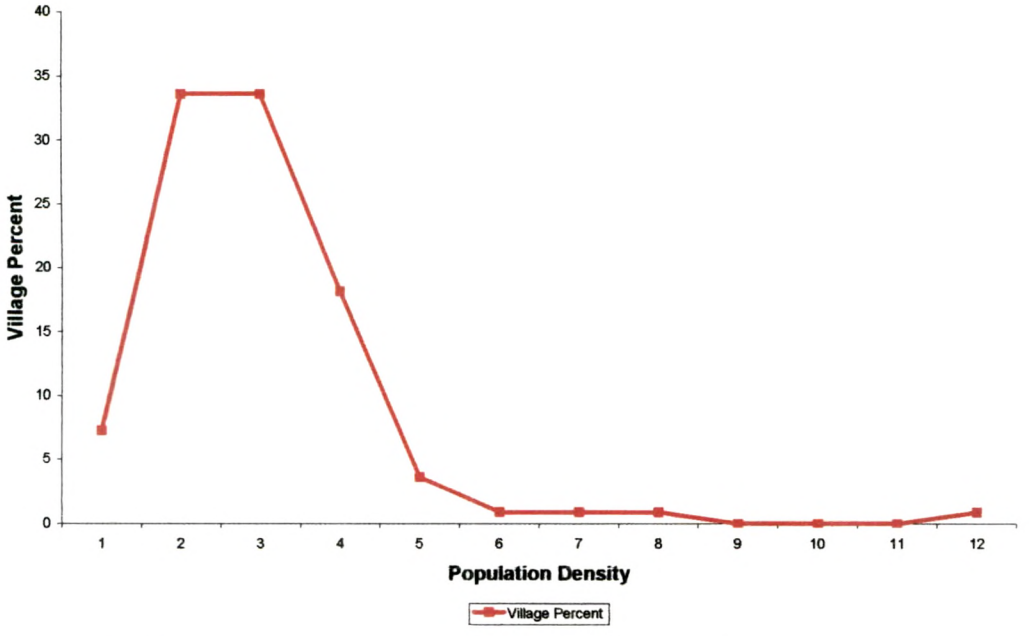

Figure 5.18: Representation of village percentage with varying population density

Figure 5.18 represents that about more than 60% villages have population density between 2 to 3 (Table 5.11).

Table 5.12: Village percentage with varying population density and tribal density

Tribal Density & Population Density	Tribal Density Village Percentage	Population Density Village Percentage
1	18.18	7.27
2	39.09	33.63
3	28.18	33.63
4	10	18.18
5	2.72	3.63
6	0.9	0.9
7	0	0.9
8	0	0.9
9	0	0
10	0	0
11	0	0
12	0.9	0.9

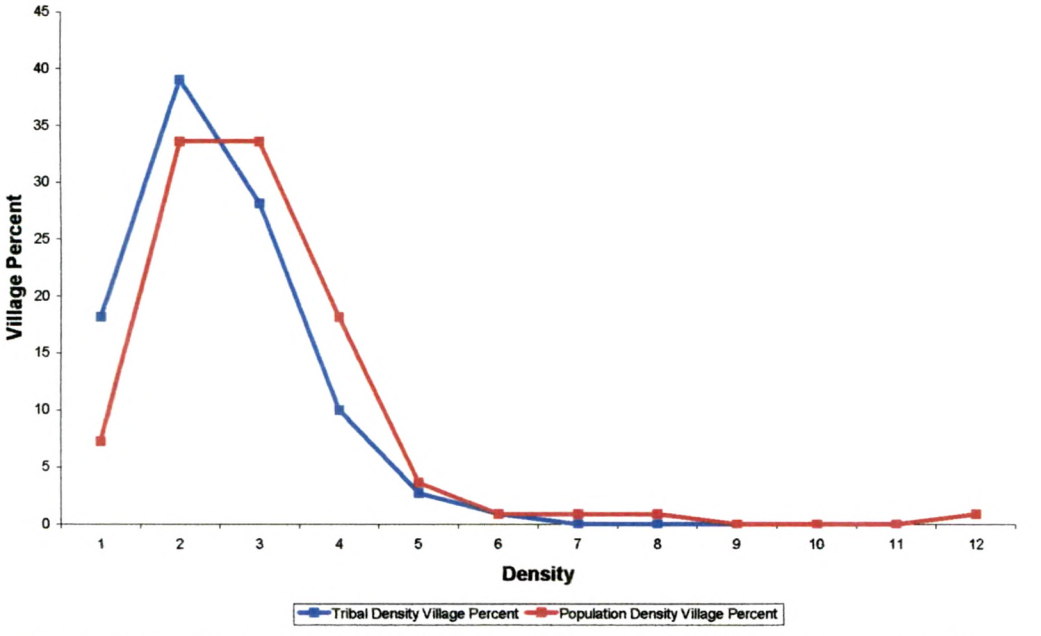

Figure 5.19: Representation of village percentage with varying population density and tribal density

Figure 5.19 represents a close resemblance between the percentage of villages having similar population and tribal densities. This could be due to the high proportion of (about 80%) tribes' population. It also explains the decrease in the percentage of villages with increasing density but this does not reflect the sparse distribution as density is calculated per hectare area (Table 5.12).

Table 5.13: Village Percentage with varying Scheduled Tribes Percentage and Literate Percentage

Scheduled Tribes % and Literacy %	Village Percentage (Scheduled Tribes)	Village Percentage (Literacy)
10	0	13.63
20	0	53.63
30	0.9	24.54
40	2.72	7.27
50	0.9	0.9
60	6.36	0
70	11.81	0
80	7.27	0
90	12.72	0
100	57.27	0

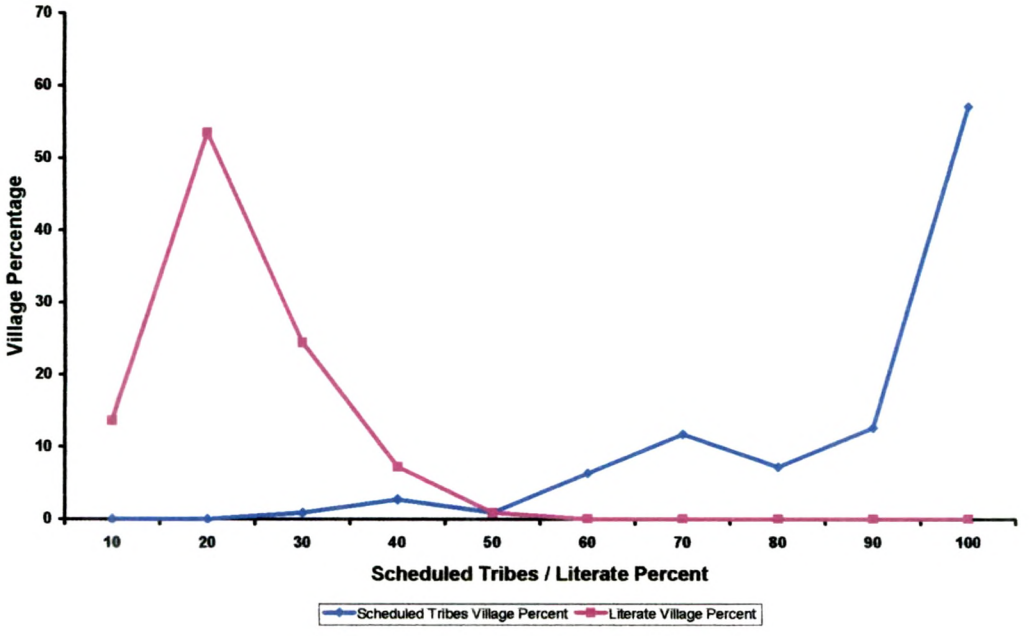

Figure 5.20: Comparative representation of village with varying tribal percentage and literate percentage

Figure 5.20 represents contrasting relation between the percentage of villages and literate population i.e. the increasing literate population per cent is commensurated by decreasing village per cent. It also represents positive trend between the tribal population and village per cent. This indicates the extensive distribution of tribes through out the sample area (Table 5.13).

Table 5.14: Distribution of Cultivable Area in varying locations

Cultivable Area %	Riverine Village %	Non-Riverine Village %	Forest Village %	Non Forest Village %	Village % upto 15 kms	Village % 16-30 kms	Village % > 30 kms	Village % upto 500 feet altitude	Village % 501-750 feet altitude	Village % > 750 feet altitude
Upto 20	0.9	0.9	0.9	0.9	0	0.9	0.9	0.9	0	0.9
20–40	8.15	0	7.29	0.9	2.7	4.5	0.9	0.9	1.8	5.4
40 – 60	22.7	14.5	26.35	10.8	14.5	17.2	5.4	1.8	13.5	21.78
60 – 80	19.99	16.36	10.8	25.4	11.7	20.89	3.6	1.8	19.08	15.38
80 – 100	9.09	7.2	2.7	13.6	1.8	13.6	0.9	2.7	7.2	6.3

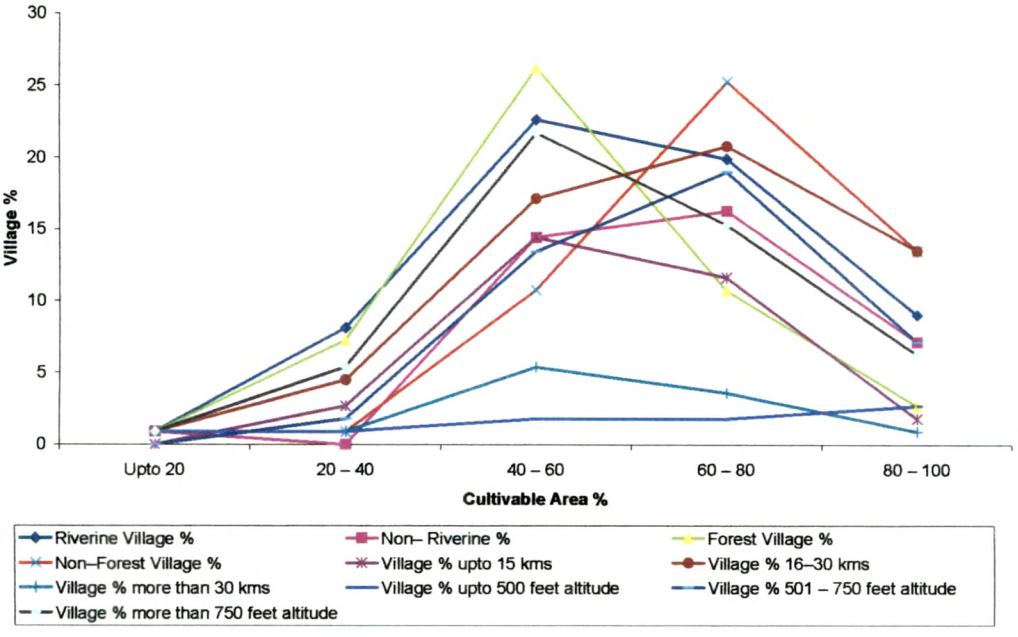

Figure 5.21: Distribution of Cultivable Area in varying locations

Figure 5.21 represents a parabolic course of relationship between the cultivable area distribution and village percentage of riverine, non–riverine, forest, non–forest, and distance and altitudinal ranges. Similarly in the pattern of magnitude of values of village and cultivable area explain close association between the distribution of villages of various locations and cultivable area. Similarly the pattern also indicates homogeneity in the distribution of cultivable area and different locations. It is notable that percentage of villages having 40 to 80% of cultivable area is higher.

Table 5.15: Distribution of Literate Population in varying locations

Literate Population %	Riverine Village %	Non – Riverine Village %	Forest Village %	Non – Forest Village %	Village % upto 15 kms	Village % 16-30 kms	Village % > 30 kms	Village % upto 500 feet altitude	Village % 501-750 feet altitude	Village % > 750 feet altitude
0 – 10	9.09	4.5	4.5	9.09	1.8	7.2	4.5	1.8	0	11.8
10 – 20	31.8	21.8	25.4	28.18	11.8	36.3	5.4	6.3	32.7	24.5
20 – 30	13.6	10.9	10.9	13.6	11.8	10.9	1.8	0	14.5	10
30 – 40	2.7	4.5	3.6	3.6	4.5	2.7	0	0	4.5	2.7
Above 40	0	0.9	0	0.9	0.9	0	0	0	0	0.9

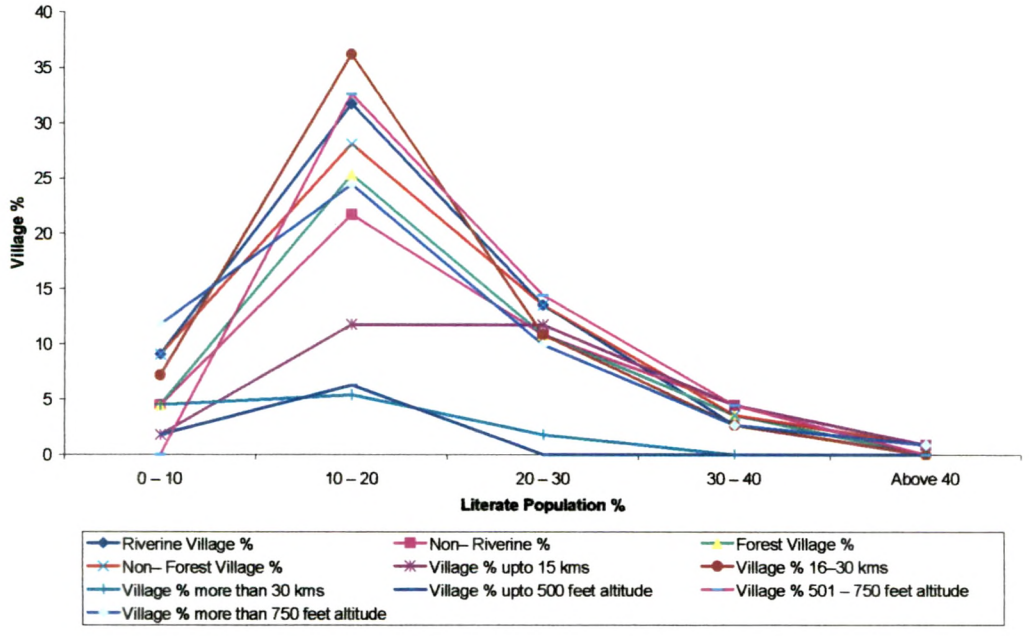

Figure 5.22: Distribution of Literate Population in varying locations

Figure 5.22 shows the settlements of different locations have similar association with literate population distribution. This clearly indicates uniform pattern in the distribution of population of literates and diffusion of literacy between the villages of various locations. It is remarkable that percentage of villages having literacy between 10 to 30 per cent is higher.

Table 5.16: Distribution of Cultivator in varying locations

Cultivator %	Riverine Village %	Non – Riverine Village %	Forest Village %	Non – Forest Village %	Village % upto 15 kms	Village % 16-30 kms	Village % > 30 kms	Village % upto 500 feet altitude	Village % 501-750 feet altitude	Village % > 750 feet altitude
Below 60	0.9	0.9	0.9	0.9	1.8	0	0	0	0.9	0.9
60 – 70	2.7	1.8	0.9	3.6	1.8	2.7	0	0	2.7	1.8
70 – 80	11.8	8.18	8.18	11.8	3.6	12.7	3.6	2.7	11.8	5.45
80 – 90	24.54	18.1	21.8	20.9	18.1	18.1	6.3	2.7	16.3	23.6
90 – 100	14.09	11.8	12.7	18.1	4.5	24.5	1.8	2.7	9.09	19.09

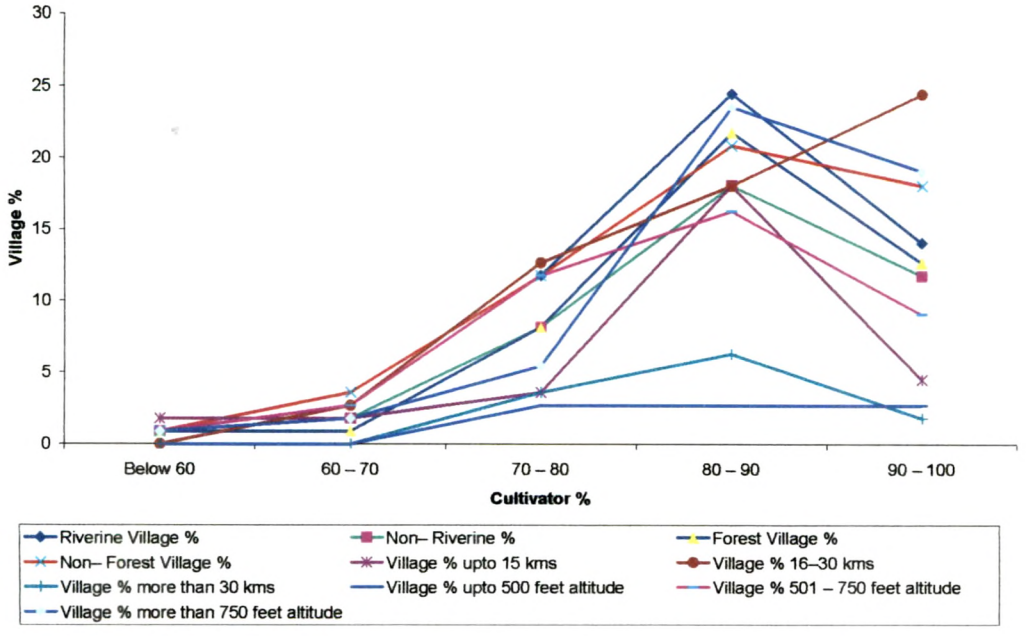

Figure 5.23: Distribution of Cultivator in varying locations

Figure 5.23, identical trend between percentage of settlements (percentage of villages) and percentage of cultivator population represent extensive prevalence of cultivation in the tribal region. Uniformity in the pattern of distribution of cultivator population in the villages of various locations indicates close association between the different locations in terms of favourability for cultivation. The percentage of villages having 70 per cent to approximately 100 per cent cultivable area is higher. It is noteworthy that percentage of forest is relatively higher in riverine area, close to the urban centres and in the higher altitudes.

Table 5.17: Distribution of Forest in varying locations

Forest Area %	Riverine Village %	Non – Riverine Village %	Village % upto 15 kms	Village % 16-30 kms	Village % > 30 kms	Village % upto 500 feet altitude	Village % 501-750 feet altitude	Village % > 750 feet altitude
Upto 10	36.3	20	15.4	36.3	4.5	5	25.3	25.3
10 – 20	13.6	11.8	8.1	13.6	3.6	1.8	10.8	12.6
20 – 30	5.4	7.2	3.6	5.4	3.6	0	4.6	9.05
Above 30	3.6	1.8	3.8	1.8	0	0.9	1.8	2.7

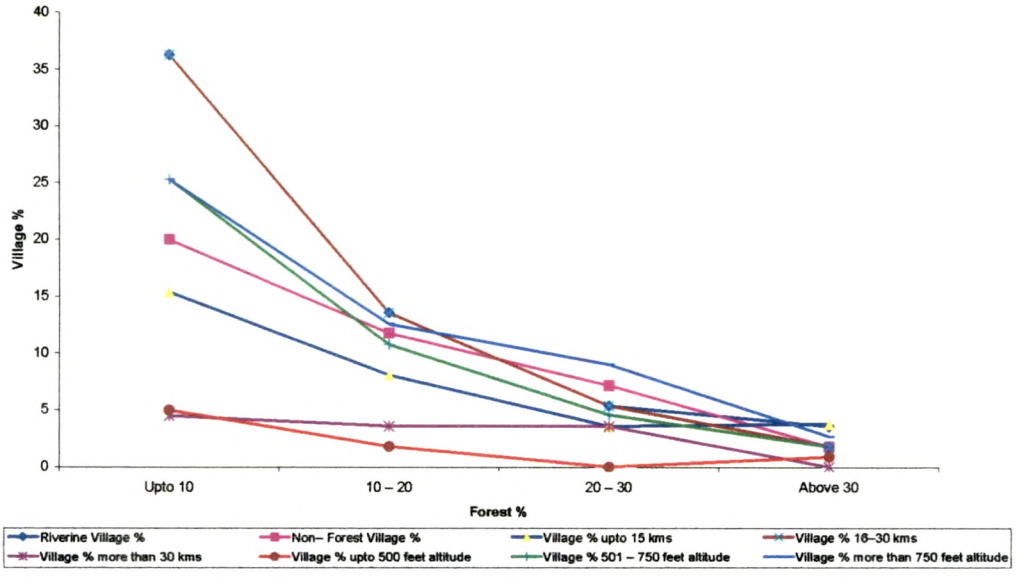

Figure 5.24: Distribution of Forest in varying locations

Figure 5.24, the negative relation between forest area per cent and village per cent of varying locations indicate deterioration of forest and diminishing of resilient. Uniformity in the pattern of association between the percentage of forest area and percentage of villages of various locations indicates uniformity in the favourability for forest expansion or dispersal. It is remarkable that percentage of villages of different locations having upto 20 per cent of forest area is higher. But percentage of villages having forest area upto 10 per cent is much higher. This is certainly an indication of diminishing sustainability and so demands a positive move.

Table 5.18: Distribution of Main Workers in varying locations

Main Worker %	Riverine Village %	Non – Riverine Village %	Forest Village %	Non – Forest Village %	Village % upto 15 kms	Village % 16-30 kms	Village % > 30 kms	Village % upto 500 feet altitude	Village % 501-750 feet altitude	Village % > 750 feet altitude
Upto 30	14.5	9	16.3	7.2	13.6	8.1	1.8	0	10.9	12.7
30 – 40	29	20	18.1	30.9	15.4	27.2	6.3	2.7	20	26.3
40 – 50	14.5	9	9	14.5	1.8	18.1	3.6	3.6	10	10
Above 50	1.8	1.8	1.8	1.8	0	3.6	0	1.8	0.9	0.9
Upto 30	14.5	9	16.3	7.2	13.6	8.1	1.8	0	10.9	12.7

5.5 CONCLUSIONS & IMPLICATIONS:

Inhabitants of the hilly–forested regions might have initially settled on the periphery and gradually kept on accessing and influxing to the interiors with the exhaustion of resources. This influxing population might have been either the laggards or opportunists of the past.

Low literacy, less electrification, low quality of houses (number of non–cemented houses), and high crime rate with the increasing altitude and distance from the urban centres might be either due to lack of uniform constant thrust in implementing programmes or policies or might be due to the lack of awareness of masses.

Distribution of land to the inhabitants (tribes) might be showing great impact on the distribution of settlement or villages, tribes, vegetation density, literate population, electrification, domestication of animals and addiction for intoxicants. Cultivable land is positively anticipated by tribes' population per cent, literate population per cent, electrification, animal domestication and mean extent of villages whereas negatively associated or anticipated by mean distance between settlement agglomeration, vegetation density, non–cemented house and addiction for intoxicants. This replicates that economic betterment is the basic cause for positive response in electrification, literacy expansion, decrease in crime and dense settlement agglomeration reflecting togetherness. The increase in addiction is the negative effect.

Literacy shows positive impact on the inhabitants. It is derived that wherever literacy is high the productivity and electrification is high, diseased population, annual crime, pellagra amongst children, addiction for intoxicants, number of non–cemented house and mean distance between settlement agglomerations is less.

it is inferred that despite of economic and educational betterment the domestic vegetational density is not increasing.

The introspection of association of tribal concentration with other phenomena reveal that vegetational density, non–cemented house distribution, mean distance between settlement agglomerations, pellagra cases amongst children, literacy, annual crime and addiction for intoxicants are positively anticipated whereas productivity, domestication, diseased population, and electrification are negatively anticipated or associated.

Tribal region being characterized as hilly or undulating, it would be worth to introspect and analyse the association and anticipation of altitude with other phenomena.

- Altitude is positively related or unidirectional to distance from urban centres and forest area.
- Cultivable land, mean extent of villages, settlement type (non–cemented house), domestication, annual crime pellagra cases amongst children, addiction intoxicants and productivity are positively anticipated whereas soil depth, mean distance between settlement agglomerations, domestic vegetation density, tribes' per cent, electrification and literate population per cent are negatively associated or anticipated to altitude.

An inter–causasive relationship between the efficacies of various environmental phenomena directed the need to analyze mutuality between them. The analysis of association between the phenomena revealed that, locational factors like physiography, distance from urban centres, rivers and forests are still operative in deciding the concentration of population and settlements. Inhabitants of the hilly, forested regions might have initially settled at the periphery and gradually moved further interior after exhaustion of resources. The influxing population might have been either the laggards or opportunists of the past. Some of the existing characteristic features like low literacy, less electrification, low quality of houses, and high annual rate of crime with increasing altitude and distance from the urban centres might be either due to lack of uniform thrust in implementing plans and programmes or due to the lack of awareness of the masses. Possession and exploitation of land by the inhabitants (tribes) for satisfying their needs is showing great impact on the distribution of settlements or villages, tribes, vegetation density, literate population, electrification, domestication of animals and addiction to intoxicants. Cultivable land is anticipated positively by percentage of tribal population, literate population, electrification, animal domestication and mean extent of villages and, negatively by mean distance between settlement agglomerations, vegetation density, non–cemented houses and tribals' addiction to intoxicants. This replicates that economic betterment has triggered the positive response towards electrification, expansion of literacy, decrease in crime and increase in dense settlement agglomerations. The increase in addiction is surprisingly a negative effect. Literacy shows positive impact on the inhabitants. It is observed that wherever literacy is high, yield per hectare and electrification is high whereas diseased population, annual rate of crime, pellagra cases amongst children, addiction to intoxicants, number of non–cemented house and mean distance between settlement agglomerations is less. It is inferred that despite economic and educational betterment the density of domestic vegetation is not increasing. The introspection of association of tribal concentration with other phenomena reveal that density of domestic vegetation, number of non–cemented

houses, mean distance between settlement agglomerations, pellagra cases amongst children, literacy, annual rate of crime and tribals' addiction to intoxicants are positively associated whereas, yield, domestication, diseased population, and electrification are negatively associated. The above relationship dictates their state of penury and underdevelopment.

The tribal region being characterized by hilly and undulating terrain, it was considered worth to introspect and analyze the association and anticipation of altitude with other phenomena. A positive relationship of forest area and distance from urban centres with the altitude explains that urban centres are located at relatively lower altitudes and at greater distance. This also explains that the forests are denser in the region of higher altitudes. Cultivable land, mean extent of villages, settlement type (non–cemented houses), domestication, annual rate of crime, pellagra cases amongst children, addiction to intoxicants and yield are positively associated whereas, soil depth, mean distance between settlement agglomerations, domestic vegetation density, percentage of tribal population, electrification and percentage of literate population are negatively associated with altitude. It is concluded from the above that with the increase in the altitude the concentration of tribal population increases. The socio–economic condition of tribes at higher altitudes is miserable. The topography might be a major cause for greater distance between settlement agglomerations and thence less concentration of tribals at higher altitudes.

The villages located near to the urban centres also signify nearness to the administrative bodies because most of such regulatory bodies operate their function from urban centres. Their general tendency of initiating implementation from the nearby villages must be the sole cause. But plans and policies seem to have the tendency of diminishing in space–time continuum. It is also observed that the approach of implementation of programmes from the growth centres is reverse to the urban centres i.e. growth centres have initiated their concentration and implementation of their programmes from the distant settlements.

The geographical phenomena affect the nature of the environment irrespective of time and degree of effectiveness i.e. the degree of effectiveness varies over time. It is so because, variations in some phenomena have instant or immediate effect but many more show their impact in the long run. Similarly, the magnitudes of effect do vary with time, space and phenomena. For example, mining, tilling and deforestation on hills might have immediate economic effects but their impact on the bio–geo–chemical cycle (life–supporting systems) would be of high magnitude and run over a period of time.

The topography and distance from urban centres are the two regulatory phenomena which influence the environmental system in space–time continuum. In the system both are acting as stages and stimulant in one or the other way. But it is noteworthy, that a favorable topography is more desirable in rural and tribal environmental system because of its major dependence on primary activity. The favourable topography may provide better conditions for appropriate water resource, forest resource, cultivable land and thence stimulate pisciculture, silviculture, agriculture, horticulture, etc. which in turn could provide better and sustainable system for the inhabitants. And if such a system is supported by the infusion of desired innovative methods, techniques, ideas, and resources, it may prove to be a sustainable life supporting system. That is why, the efficacy of topography i.e. altitude and distance from urban centres is verified to explore the impact on areal characteristics and population and interrelationship between each and further evolving probabilities.

The efficacy of geographical catalysts on settlements socio–cultural and economic structure of tribes dictates a regulatory role of geographical phenomena in the evolution and transformation of environment including man. Here, some of the crude realities are verified with graphical representation.

Syllogistically, it is inferred that some phenomena which were active in the past, are presently inactive and vice–versa. For example, rich bio–diversity of the past was favourable for the resilience or conservation of water resource, combating the erosion, fostering the inhabitants and regulating the bio–geochemical cycles. But the present rarified biodiversity is intensifying the erosion, water crises, extinction of eco–systems and extinction of resources to foster the population. It is inferred that all the elements or phenomena of environment are inter–related and there is inter–causasive cyclic relationship between them.