CHAPTER – 6

PLANNING AND DEVELOPMENT OF TRIBAL HILLY ENVIRONMENT

"Self explorations expose our consumer–behaviour."

CHAPTER – 6
PLANNING AND DEVELOPMENT OF TRIBAL HILLY ENVIRONMENT

6.1 THE CONCEPT OF PLANNING:

The growing crises and demand impels the need of planning to combat and neutralize the negative effects on the one hand and adopt measures to accelerate the potentials to satisfy the needs on the other. The realization of this essence of planning has been the impetus to incorporate it in the life of the tribes for eradication of problems, meeting projected or un–projected challenges and attaining objectives for the betterment of their, society and population. It is noteworthy that the nature of planning has been changing with the transformation of the environment. Though the future projection is the main impetus for planning, in recent decades the whole mankind including institutions and administrative bodies have become more concerned with the survival and sustenance of the environment for the future. Such attitude has led, specially the advocates of environment, to think seriously about sustainable development. The progressive attitude, realization of breaking or diminishing natural systems and inculcation of functional abilities enabled them to think in this direction. Earlier, man as a gatherer hunter extractor and cultivator, kept on exploiting nature and deforesting land for sustenance unscrupulously. The pre– and post–industrial revolution world could not make any concerted effort to implement traditional and acquired knowledge to conserve the natural cycle of the environment. They mainly concentrated on planning to solve instant problems and did not care for the conservation and resilience of the deteriorating environment.

6.2 PHASES OF CHANGING ATTITUDE TOWARDS PLANNING:

The phases of planning can broadly be classified as the following:

1. Hunter–gatherer phase characterized by seasonal mobility: seasonal mobility reflect the strategy of the hunter–gatherers to allow the revival or regeneration of exhausted resources. The tools and implements reflect their abilities to plan for hunting and gathering and the seasonal mobility on their plan to adjust with the varying environmental conditions specially climate.
2. The second phase could be designated as transitory phase, during which man was learning the process of cultivation and exploring other means to be self–reliant and secure their future.

3. The third phase could be designated as settled phase. The varying functional ability and environmental perception guided man to plan and live a settled life. Growth of large scale agricultural civilizations along the river courses or water bodies, and their settlements, implements and tools of cultivation reflect on their changing attitude towards planning.
4. The fourth phase could be called as mixed phase. The industrial revolution paved the way for dominance of secondary sector though due importance was given to planning of the primary activities. Along with these two, the emphasis on human well being was over emphasized. This overemphasis misled the policy makers and resulted in the unscrupulous exploitation of natural environment. The unscrupulous exploitation of natural environment for the betterment of life created a series of environmental crises and gave rise to the very question of survival of life on earth.
5. The contemporary phase could be called a "realization and anticipation phase". The growing awareness about the environment and its future transforming trends enabled man to realize the growing crises. It was realized that the deteriorating environment would lead to the extinction of man and other living beings. So, contemporarily the geographical environment is being given constant and rational attention for revivification and conservation for sustainable development.

The changing attitude towards planning reflects varying perceptions, interactions and adjustment of man with the environment. The variation in their mutual relation must have been directed by the growing demand, knowledge, technology and skill. The first two phases indicate the rule of determinism as their mode of life was completely regulated by environment. The third phase seem to be a transitory phase. During this phase man took initiatives to modify environment according to his needs but could not completely deny the dominating role of environments. The fourth phase indicates the dominance of possibilism. Man found himself capable of modifying environment according to his needs. Undoubtedly, upto great extent man succeeded in satisfying his ever growing immediate demands but failed in projecting the future consequences. Excessive exploitation of environment resulted in breaking of resilience and sustainability. This clearly indicates that since the very beginning the whole process of planning, irrespective of its form and process, merely concentrated on satisfying immediate demands. Contemporarily man is realizing the crux of environment and emphasizing on its sustainability.

6.3 PLANNING OF TRIBAL HILLY ENVIRONMENT:

The growing population and thence demands of the tribes, shrinking opportunities, and adverse geographical conditions in an economy dominated or stimulated by primary activities necessitate to perceive differently and anticipate accordingly. A deep surveillance of the sample area and contributions of scholars, policy makers and related institutions enables to evolve a model of planning for the sustainable development. However, at the outset it is essential to elaborate some of the finer nuances of the model.

6.3.1 The Basic Problem:

The basic problem envisaged is related to lack of harmony between the growing demand of the contemporary human society and the capabilities of the environment to fulfill those. As a consequence, environments of different areas are emerging as crises zones threatening the sustenance of life–system.

6.3.2 Strategy of Planning:

The planning conceived with the realization of growing crises and intentions of the betterment of population necessitates a strategic move. So, while planning for the sustainable development of environment dominated by hills and tribes, the following strategies may be followed:

1. Realization and detection of the various problems and their causes.
2. Detection of relationship between various problems.
3. Projection of desirable objectives and targets within a set time frame.
4. Adoption of approach or approaches.
5. Formulation and implementation of policies for the solution.
6. Estimation of financial and physical assets in activating the policies and other measures.
7. Coordination and organisation of problem areas and assets for implementation.
8. Periodic evaluation of the efficacy of policies and other measures.

6.3.3 Association and Intricacy of Problems:

Symbiotic inter–causasive relationships and synergies generated between or within the synchronizing constituents of environment indicate that any disturbance in the equilibrium of a system would generate transitive chain of problems or crises. It means, even a minor variation in one constituent causes proportionate variation in the interrelated or interdependent elements. The negative variations or crises in any

system could be caused or brought either by deterioration in any constituting element or infusion of unwanted component into the system.

The growing crises in the tribal systems of similar locations and possessing similar characteristics are the result of both deterioration or activation of physical elements and processes and the infusion of human or artificial unwanted elements into the system. An excessive exploitation of resources by irrational man has activated geographical processes like weathering and erosion, extinction of animal and plant species, disturbance of hydrological cycles and other life supporting cycles. Similarly, excessive application or infusion of chemical fertilizers, pesticides or insecticides has led to the depletion of soil and water resources and activated eutrophication. The above processes are leading to the loss of productivity, disrupted flow of energy in the system and consequently a series of socio–economic, cultural and anthropological problems. So, due to such disruptions in the system, any effort by institutions in the form of material or financial infusion turn out to be inadequate to eradicate the problems and to achieve the set objectives. The intricate linkage between the multitudes of inter–causasive elementary problems is illustrated in Figure – 6.1.

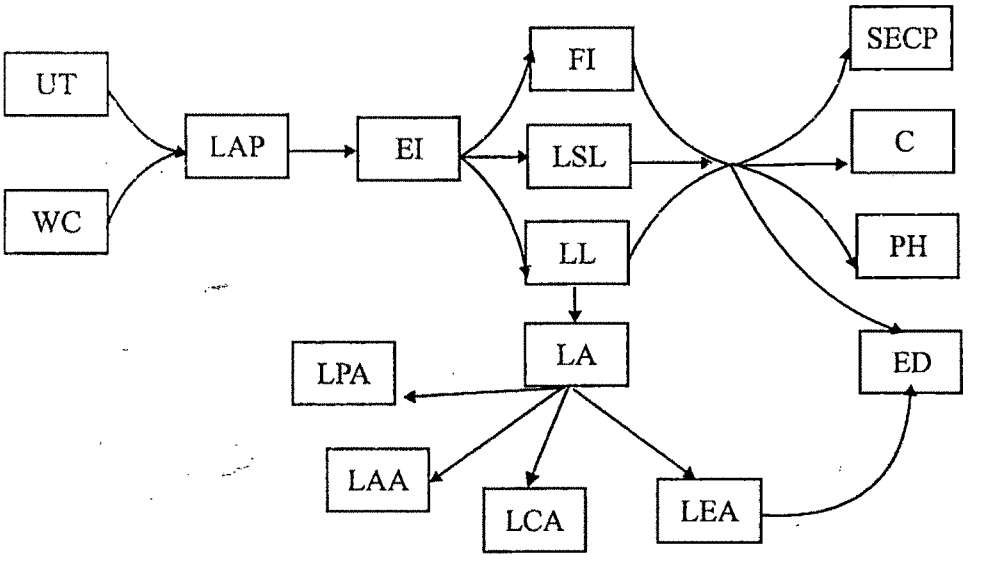


Figure 6.1: Intricacy of Problems

In the figure the acronyms for the abbreviations are:

UT	Undulating Terrain
WC	Water Crisis
LAP	Low Agricultural Production
EI	Economic Instability
FI	Food Insecurity
LSL	Low Standard of Living
LL	Low Literacy

SCEP Socio–Economic and Cultural Problem
C Crime
PH Psychological and Health Problems
ED Environmental Degradation
LA Lack of Awareness
LPA Lack of Political Awareness
LAA Lack of Administrative Awareness
LCA Lack of Constitutional Awareness
LEA Lack of Environmental Awareness

6.4 DETECTION OF THRUST AREA FOR PLANNING AND DEVELOPMENT:

Viewing the intricacy between synchronizing symbiotic elements and probable causes of problems, the detection of thrust area for proper planning and development becomes essential. And so, the need to frame an appropriate method of detection impelled to focus on it. After a long constant cogitation a method is evolved, which is described below.

Explanation: The method of thrust area detection is based upon the correlation values calculated for the various variables (correlation matrix is represented in Annexure X–2). Correlation values showing the direction and magnitude of association between the variables are represented graphically. Figures 6.2 to 6.9 represent the slope of association. These slopes explain the direction and magnitude of variation in the variables with the increase or decrease in altitude distance from urban centres, percentage of forest area, percentage of total cultivable land, percentage of tribal land, percentage of tribal population, percentage of literate population and soil depth. The list of variables along with their codes is given in the following index.

INDEX –

1. Altitude
2. Distance from urban centre
3. Distance from growth centre
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

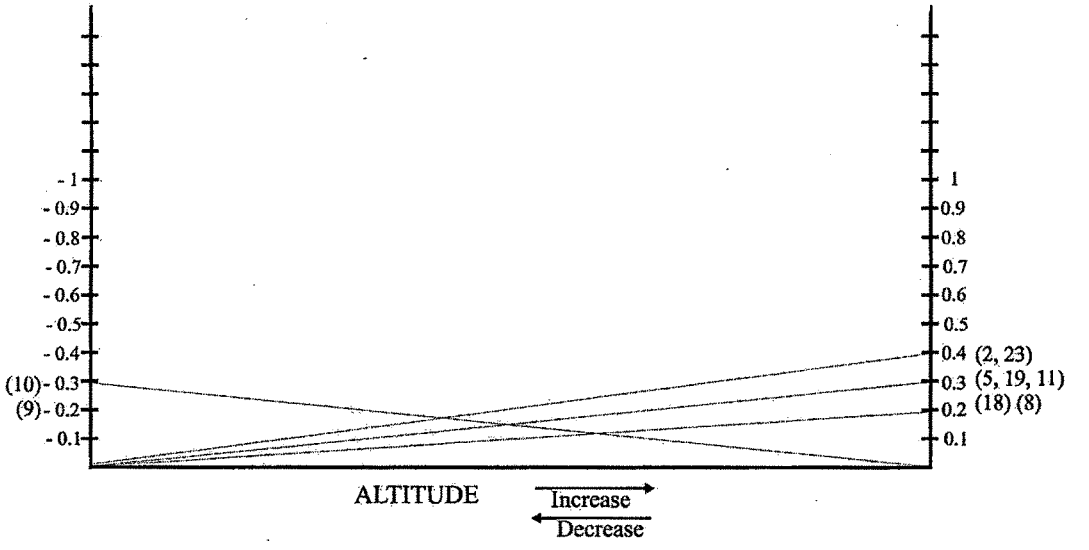


Figure 6.2: Association between Variables and Altitude

Figure 6.2 displays that percentage of pellagra cases amongst children below 18 years and annual rate of crime increases whereas percentage of literate population decreases with the increase in altitude. It also indicates vice–versa.

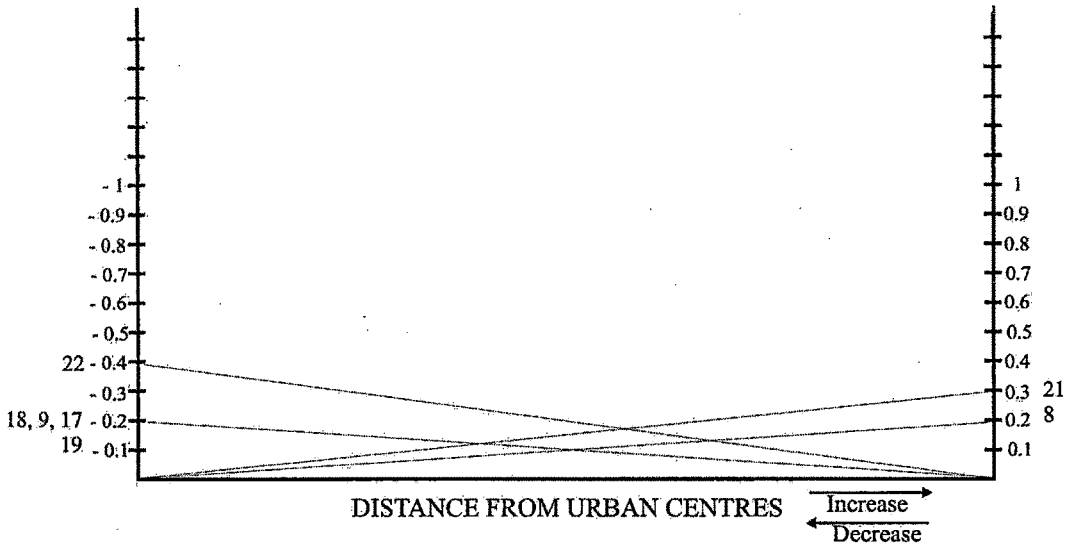


Figure 6.3: Association between Variables and Distance from Urban Centre

Figure 6.3 displays increase in tribal population of below 18 years of age and non cemented houses whereas decrease in electrification with the increase in distance from the urban centres and vice – versa.

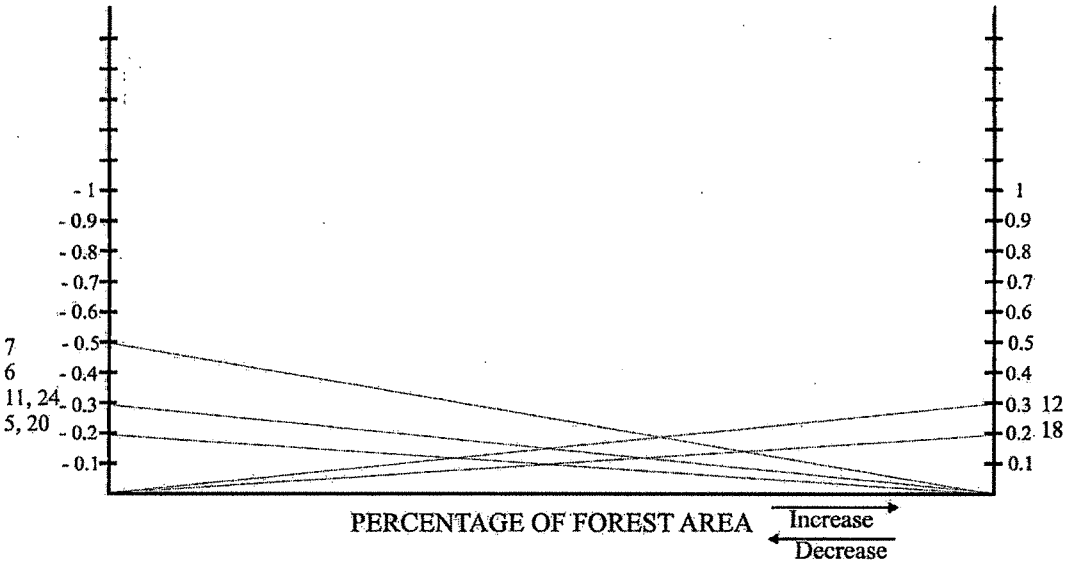


Figure 6.4: Association between Variables and Percentage of Forested Area

Figure 6.4 displays that tribal arable density and percentage of pellagra cases amongst children increases whereas percentage of cultivable land, percentage of tribal cultivable land, percentage of tribal population, percentage of addiction and mean distance between settlement agglomerations decreases with the increase in the percentage of forest area and vice–versa.

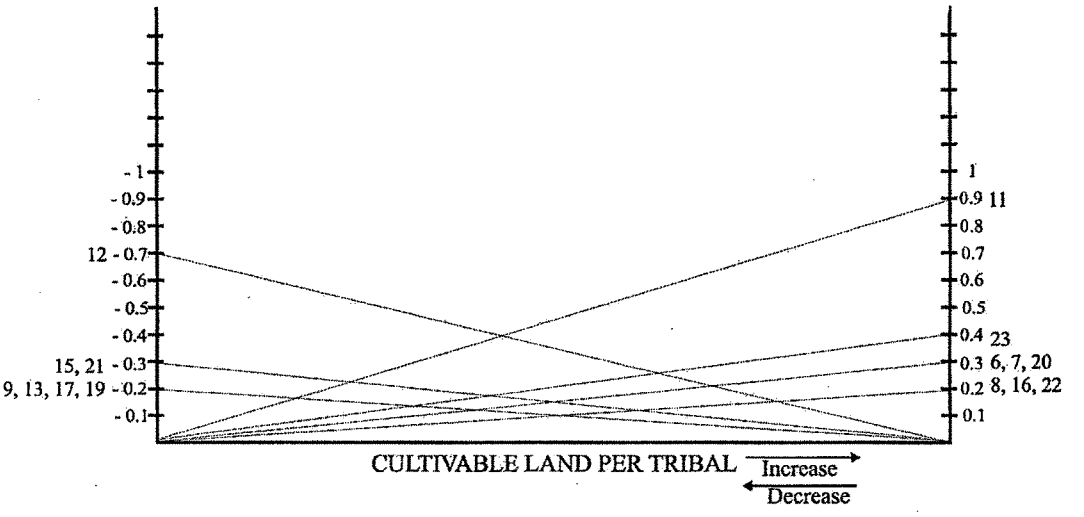


Figure 6.5: Association between Variables and Cultivable Land

Figure 6.5 displays that percentage of tribal cultivable land, percentage of tribal population, percentage of tribes below 18 years of age per capita land among tribals, domestication of animals, percentage of addiction, percentage of electrified houses and mean extent of villages increases whereas tribal arable density soiled up depth, domestic vegetation density, percentage of diseased population, annual rate of crime and percentage of non–cemented houses decreases with the increase in cultivable land. It also indicates vice–versa.

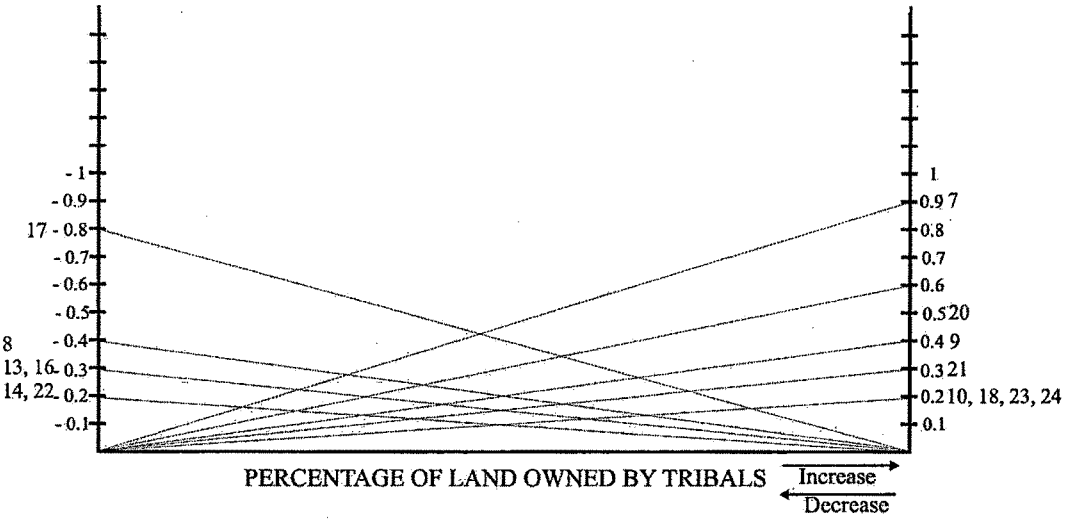


Figure 6.6: Association between Variables and Tribal Land Percentage

Figure 6.6 displays that percentage of tribal population, percentage of literate population, percentage of pellagra cases amongst children, percentage of addiction for intoxicants, percentage of non–cemented houses, mean extent of villages, and mean distance between settlement agglomerations, increases whereas percentage

of tribal population below 18 years of age, soil depth, yield per hectare, percentage of domestication of animals, percentage of diseased population and percentage of electrified houses decreases with the increase in percentage of tribal land. It also indicates vice–versa.

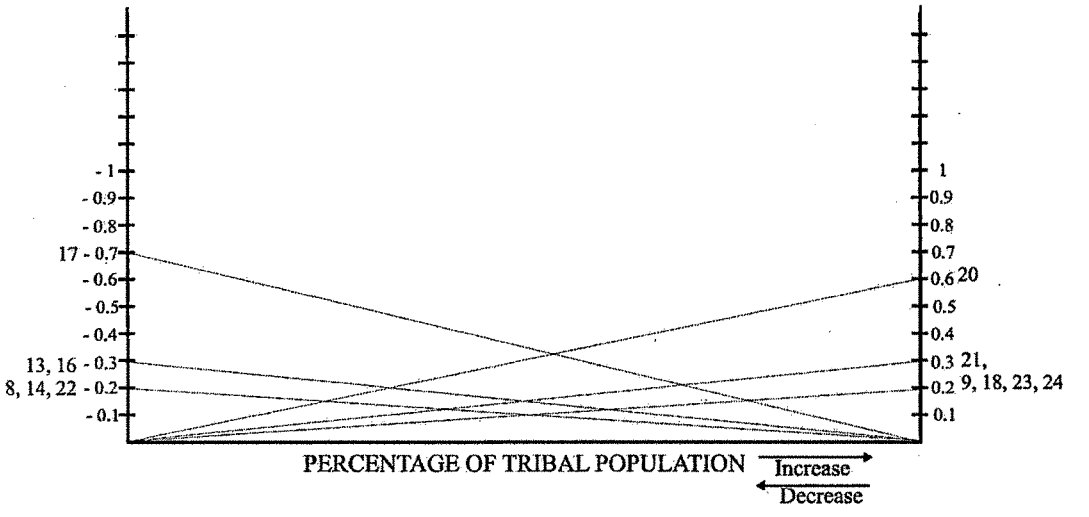


Figure 6.7: Association between Variables and Tribes Percentage

Figure 6.7 displays that percentage of tribal population above 18 years of age, percentage of pellagra cases, percentage of addiction for intoxicants, percentage of non–cemented houses, mean extent villages from the centre and mean distance between settlement agglomerations increases whereas soil depth, yield per hectare, percentage of domestication of animals, percentage of diseased population and percentage of electrified houses decreases with the increase in percentage of tribal population. It also indicates vice–versa.

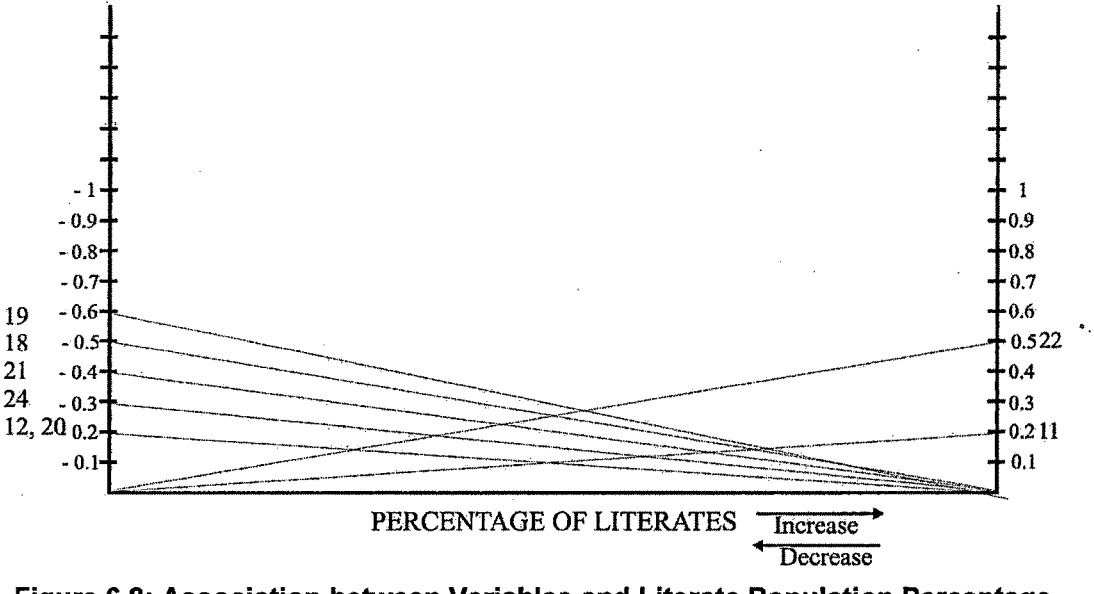


Figure 6.8: Association between Variables and Literate Population Percentage

Figure 6.8 displays that per capita cultivable land among tribals, and percentage of electrified houses increases whereas tribal arable density, percentage of pellagra cases amongst children of below 18 years, annual rate of crime, percentage of addiction for intoxicants, percentage of non–cemented houses and mean distance between settlement agglomerations decreases with the increase in literate population. It also indicates vice–versa.

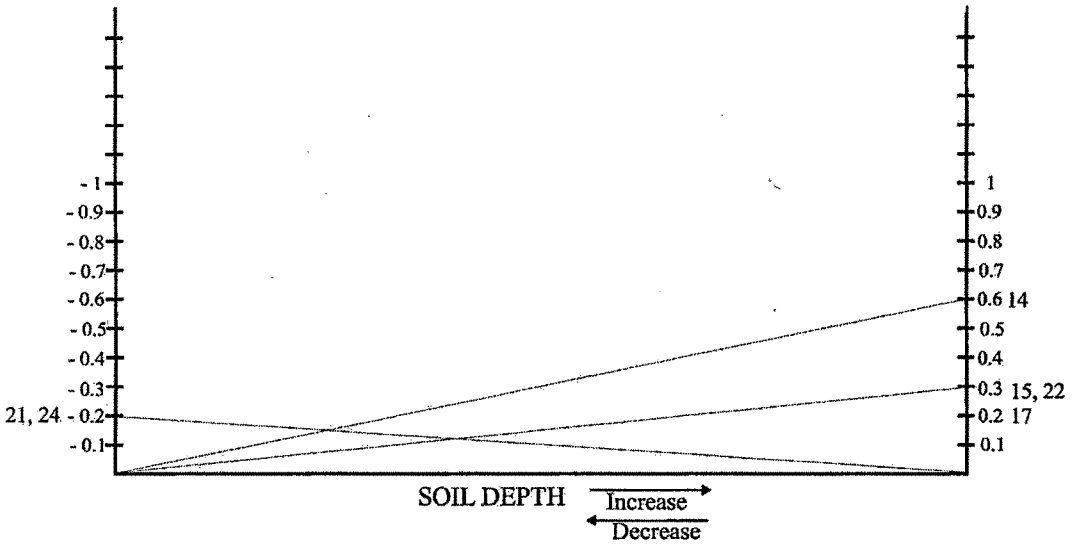


Figure 6.9: Association between Variables and Soil Depth

Figure 6.9 displays that yield per hectare, domestic vegetation density and percentage of electrified houses increases whereas percentage of non–cemented houses and mean distance between settlement agglomerations decreases with the increase in soil depth. It also indicates vice–versa.

So from the analysis of above explained figures the following thrust areas are detected –

1. Figures 6.2, 6.3 and 6.4 suggest that high altitudinal parts, interior lands located at greater distance from the urban centres and villages with dense forest cover are to be considered as chronic spaces for intensive care and development.
2. Figures 6.6 and 6.7 sprout the fact that areas having high concentration of tribes are facing multifarious problems. And if such spaces are characterised as high altitudinal forested lands located at a greater distance from urban centres then the crises is more intensified. So, such spaces must be

classified as most 'Intense Chronic Spaces' for impulsive but conscient multitudinal action.

Figures 6.8 and 6.9 suggest the development of human resources and emphasise on due consideration geographical constituents for propitious anticipation and sustainable development of environment.

6.5 CAUSES OF THE GROWING PROBLEMS:

1. The transitory location of the study area i.e. at the margin of tropical and subtropical zone; proximity to sea on the south–west and desert on the north–west creates erratic climatic conditions, especially rainfall which in turn affects its water potentiality, agriculture and vegetation.
2. The undulating rocky terrain having hills, uplands mounds, remnants and rugged topography creates difficulty in appropriate exploitation of land for water conservation, water harnessing and cultivation.
3. Irresponsible lucrative attitude of a few disturbs the ecological balance through–
   a. Mining activities in the hilly and undulating terrain accelerates erosion and disturbs the ecological balance.
   b. Extensive exploitation of vegetation is accelerating erosion and causing threat to hydrological and biological cycles and the eco–system.
   c. Grazing of cattle especially goats and sheep takes off the grasses along with the roots. This exposes the terrain to erosion increases atmospheric temperature during the day by decreased albedo, and degenerate the cyclic eco–system.
4. Increased pressure of population due to unprecedented growth rates is emerging as a threat to the fragile ecology of the area characterized by hilly terrain unsuitable for intensive cultivation.
5. Lack of opportunities, advanced techniques and skills and economic ignition for the inhabitants within the area have also compelled them to exploit the environment unscrupulously.
6. Lack of the required area under forest cover (only around 12%) is a threat to many operative cycles like food chain, hydrological, energy and elementary cycles of the system and maintenance of sustainable equilibrium of the system.

7. The centrepetality of tribes to their area restrict and disdain them to march out for opportunities to excel their living conditions. The lack of skill, both educational and professional, has made them misfit to the organized urban–industrial sector.
8. Weak or no provision of a performance–surveillance system encourages the implementing bodies to perform only on papers and not in reality. The fabricated reports about the performance of plan projects mislead policy makers and consequentially these problem areas gradually transform into grave problem areas.
9. The overlooking of geographical or environmental aspects restricts them from making or formulating sustainable planning models or policies.

6.6 APPROACHES OF PLANNING:

The planning for the problem area is based upon the tripods of geographical and environmental considerations, integration of various phenomena, and sustainable performance of planning measures adopted. The tripod signifies three different components but one comprehensively unified chain–reactive effective approach. Though the approaches are described separately they are supposed to have an unified effect in evolving a comprehensive model for sustainable development.

1. Geographical and Environmental Approach:

The physical and human phenomena of the study area have been given due consideration while detecting the problems and interrelations between them and their causes for policy formulation and model preparation. Considering the prime role of geographical phenomena in the evolution of the sample area, which is a tribal hilly environment dependent upon primary activities, these have been included for the attainment of substantial and sustainable results.

2. Integrated Approach:

The environment operates as a system for which, an integrated approach is adopted for the comprehensive multitudinal performance of the models or policies. Simultaneously, while creating the model inter–linkages between problems and their causes, and environment and man are scrutinized for the achievement of sustainable development.

3. Approach for Sustainable Performance of Planning Measures:

The examination of interrelationships set forth the symbiotic, synchronizing and synergic behaviour of environmental phenomena. This replicates:

(a) Close interdependence in the well being and survival of various phenomena including man,

(b) Infusion of merely financial assistance or infrastructure could only satisfy instantaneous needs but may not solve the problem in perpetuity. And, such approach would always require financial influx intermittently.

Analytical retrospection of environmental phenomena for projecting the probabilities necessitates–

1. Detection and thence mobilization of scientific interlinkage between the environmental phenomena.
2. Multi–level simultaneous implementation of scientific methods to activate inter–causasive processes may have chain–reactive or cyclic impact in space–time continuum to activate proliferating environment.
3. The management of resources and activation of cycles of the environment or the eco–system is necessary for their revivification, conservation and thence sustainability.
4. Rational exploitation of environment, for maintaining the proliferating environment, and thence life regulating cycles, becomes obligatory for man at the receiving end and natural environment at the supply end.

6.7 OBJECTIVES:

The objectives of the plan are derived from the prime problems and their causes to minimize or neutralize the negative effects and regenerate the potential sources of environment. The objectives are:

1. The prime objective is to plan for the evolution of a favourable and sustainable environment which could ascertain the mutual survival and growth by combating the causes at one end and regenerating the potentials at the other with associative efforts of inhabitants and related institutions.
2. Educating the inhabilitants about environmental phenomena, issues, significance and management for the conservation, revivification or resilience of deteriorating resources and cycles and creating conscientious attitude towards it.
3. Implementing scientific ways of cultivation to combat soil erosion.

4. Implementing the scientific ways of water harnessing and its conservation, afforestation, energy generation, utilization of waste products, preparation of insecticides and fertilizers out of bio–products, and curing diseases or healing of wounds by using herbs.
5. Providing advanced techniques and training to inhabitants to create skills and perform income generating activities.
6. Educating the inhabitants about their rights, administrative system and institutions like banks, judiciary, government and non–government organisations that could render services for the benefits of the tribes.
7. Educating the inhabitants about self and time management.
8. Employing a team of educated inhabitants to continuously monitor the practical implementation of policies and programmes, and investigate into the performance of the planning measures.

6.8 TRIPODAL CHAIN REACTION DEVELOPMENT MODEL:

The study of environmental behaviour, efficacy and association of environmental phenomena and interlinkage of problems of the study area enabled to find out basic elements and prepare a process–model for sustainable development. In the model, land, water and man are selected as three basic elements because of their capability to stimulate other elements and activate chain reactive process. The whole process is presented in figure 6.10. The simulation model is based on the assumption that sustainable development in space–time continuum is the resultant of positive and inter–causasive synergic relation between the activation of basic resources, growth of primary and secondary production and growth of tertiary services. This presumption of sustainable development is conceptualized in the following derivation –

$$ABR = A(BR_1 BR_2 BR_3 \ldots\ldots\ldots\ldots BR_n)$$

↓

$$GP_p = G(P_{p_1} P_{p_2} P_{p_3} \ldots\ldots\ldots\ldots P_{p_n})$$

↓

$$GS_p = G(S_{p_1} S_{p_2} S_{p_3} \ldots\ldots\ldots\ldots S_{p_n})$$

↓

$$GT_S = G(T_{S_1} T_{S_2} T_{S_3} \ldots\ldots\ldots\ldots T_{S_n})$$

↓

Sustainable Development

Where,

ABR = Activation of basic resources

$A(BR_1 BR_2 BR_3 \ldots\ldots BR_n)$ = Activation of 'n' number of basic resources

GP_p = Growth of primary products

$G(P_{P_1} P_{P_2} P_{P_3} \ldots\ldots P_{P_n})$ = Growth of 'n' number of primary products

GS_p = Growth of secondary products

$G(S_{P_1} S_{P_2} S_{P_3} \ldots\ldots S_{P_n})$ = Growth of 'n' number of secondary products

GT_S = Growth of tertiary services

$G(T_{S_1} T_{S_2} T_{S_3} \ldots\ldots T_{S_n})$ = Growth of 'n' number of tertiary services

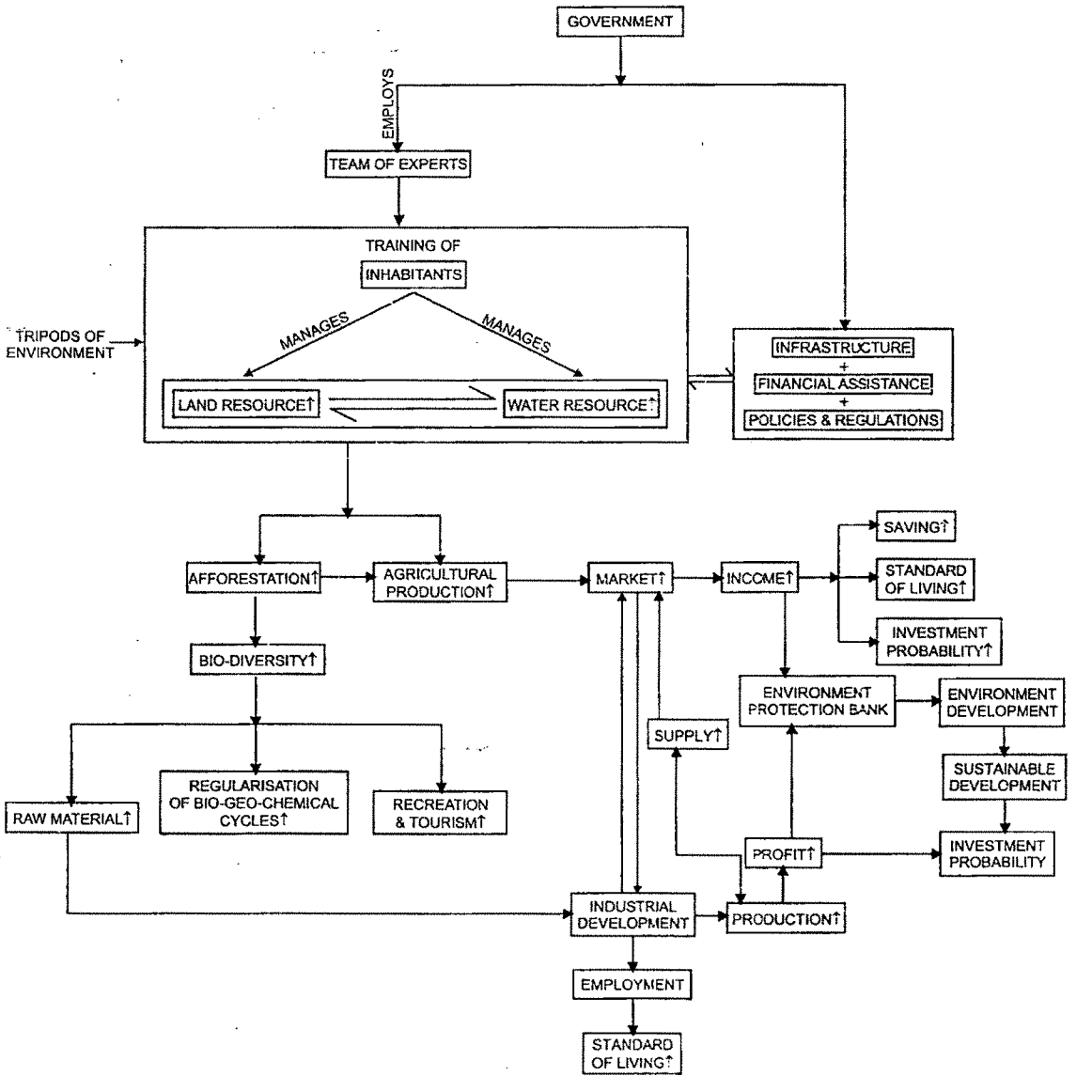


Figure 6.10: Tripodal Chain Reaction

6.8.1 The Bases of the Model:

1. Hypotheses: The management of basic synchronous elements of the environment could stimulate multitudinally dependent elements of lower order in the hierarchy and they in turn could stimulate the elements dependent upon them. Meaning there by, the stimulation of highest order basic elements could stimulate all other dependent elements of lower order and propagate the waves of sustainable development. More lucidly, it can be stated that the stimulation of one element, stimulates other elements in its immediate contact and vice versa.
2. Perception: All the elements, their problems and solutions are closely interrelated. So, the inclusion of geographical phenomena and infusion of integrated and sustainable approaches are considered the bases and regulating stimulators in preparing the development model.
3. The tripods or regulatory phenomena of model are :
   (a) Human resource management
   (b) Spatial or land management
   (c) Water resource management
4. Man having nucleic placement in the system possesses capabilities to modify. So, man is to be stimulated first for regulating all the processes simultaneously.

The process of development initiates with the stimulation of inhabitants. They being the most active element and possessing the capabilities to modify the environment in either direction are to be made aware of its processes and made participants in the process of development to solve the growing crises.

5. Illustration:

The model comprehensively emphasizes on the management of environment to,

   (a) re-establish the equilibrium and revive the cardinal cycles of the system for the survival of man and other beings;
   (b) revive the symbiotic, synchronizing and synergic behaviour of the system.
   (c) secure the sustenance of mankind in perpetuity by exploiting its potentialities.

6. Implementation:
   (a) Initiation of geographical and environmental approach with the conception of attaining sustainability.
   (b) Simultaneous activation or stimulation of regulatory phenomena.
   (c) Illustrating supporting statements having scientific essence to describe the management processes including measures to solve specific problems.

(d) Instead of capital more emphasis is to be given on the infusion or involvement of human potentialities such as intellect and labour.

6.8.2 The Process of Development:

The development process, proceeds with the trio of economic ignition, team of experts and inhabitants. The whole process is classified into various steps:

1. First Step – Asset Collection:

The economic ignition assists in collecting the required physical assets to train the inhabitants with practical explanations and propagation of the development process.

2. Second Step Preparation of the Mass:

The team of experts renders their knowledge and expertise to make inhabitants aware about:

(a) environmental processes and their significance,

(b) environmental problems and their causes,

(c) synchronizing, symbiotic and synergic behaviour of the environment,

(d) management processes to tackle the diverse problems,

(e) perspectives of various actions, programmes and policies and their implementation.

3. Third Step – Organisation:

Before implementation all the resources need to be assimilated, associated and organized to stimulate or activate targeted phenomena simultaneously. But the infusion of resources must be according to the need and significance of respective phenomena or crises. Organisation includes assets, trained masses, team of experts and the space i.e. the platform for implementation. The resources of development would act as stimuli.

4. Fourth Step – Activation:

The organisation of resources or stimuli is followed by implementation and activation. The various physical and human stimuli start functioning according to their objectives to revive and conserve degenerating potentials simultaneously within a specified functional space.

6.8.3 Management Process of the Tripods or Cardinal Elements:

Before describing the management process of various cardinal phenomena it is worth to reiterate that;

1. Concluding on the nature of the environment, it is conceived that the cardinal elements or phenomena have propagating or cyclic effects i.e. the growth of one element causes growth in many other dependent elements in immediate contact and vice versa.
2. The two guiding principles are:
   (a) A voluntary stimulation or action generates and propagates many non–voluntary stimulation or action in the related elements.
   (b) Synchronizing elements do also generate synchronizing synergy multitudinally.
3. It is speculated that the management of elements based upon scientific and syllogistic measures would have harmonic protean effect upon the related elements.

Human Resource Management:

A major proportion of the tribes are illiterate and unaware of advanced techniques of monitoring the environment. It is observed that the major chunk of functioning class i.e. tribes of more than 18 years of age are like crude ores, therefore, they are to be trained with practical approach to create skill. Simultaneously, efforts are to be made to educate the child population i.e. the prospective functioning class. The following measures are to be adopted and implemented to develop human resources.

1. A group of specialized experts to be employed for specified areas and population, to train and create skill amongst the tribes in varied field of activities.
2. Representatives of the population are to be enabled to tour to various institutions and environmentally rich areas to learn environmental planning and management.
3. The admixture of new and traditional ways of monitoring environment is to be evolved and taught for quick propitious results.
4. They are to be taught self–management, house management and time management. This would certainly improve their standard of living, appropriate use of time and skill. Such lessons can help them in exploring themselves and opportunities for utilizing surplus time.

5. They should be taught about their rights, propitious institutions like banks, judiciary, social organizations and administrative system so that they can exploit such opportunities at the time of need.
6. Instead of economic quantitative assistance (implements, machines, finance, etc.) and qualitative assistance (knowledge of science, technology, management. etc.) are to be given to generate their self productive and profit making skill.
7. The team must train them the ways to manage environmental resources, such as land. water, biotic and other resources for proper functioning of the energy cycle and other elementary cycles.

Space or Land Management:

Earth's space or land is the platform for all the abiotic and biotic life sustaining phenomena including man's activities and hence, needs proper planning or management for appropriate, optimum and propitious exploitation. For sustenance of life based upon primary activities in the undulating and hilly terrain characterized by growing population and deteriorating biotic elements, planning or management of tribal economy becomes essential. The growing human population and deteriorating biotic elements reflect the growing imbalance in the system and shrinking opportunities and possibilities for the sustenance of human population. Undoubtedly it is to be accepted that the extinction or diminution in human life might prove propitious to other biotic elements especially flora but the deterioration or extinction of other biotic elements especially flora and some micro organisms would not be propitious for human life. So, the land must be exploited scrupulously. The following steps might prove helpful in the proper exploitation of land.

1. First and foremost, land must be evaluated and classified for the various purposes or functions. This has been an essential element of planning in most of the developed countries. Even in India it has been practiced but not sincerely. So a sincere effort and more practical approach is necessary. The evaluation and classification must consider nature of terrain (slope, altitude and structure) and soil, availability of water and other resources such as mineral and vegetation. Thereafter, land must be assigned for different purposes, such as, agricultural, industrial, residential, commercial, water conservation, biodiversity conservation and revivification and recreation.
2. The preceding step must be assisted by strict laws for proper implementation and future follow ups.
3. the team of experts can assist inhabitants by training them for:

a) scientific and rational utilization of land.
b) combating the erosion of soil to maintain its productivity.
c) maintaining the isostatic balance while exploiting the weak zones of past so that they might not become active due to release of pressure or compression.

4. The exploitation of land must be managed by employed experts by the government as a part of social liability to its citizens.
5. The functional classification of land may also help the farmers to operate on corporative bases. The mass should be encouraged and trained to function on cooperative basis.

Water Resource Management

The availability of water in sufficient quantity is a prerequisite for any inhabited space especially in an agrarian economy. The tribal hilly environment under study is facing acute water crisis. And without overcoming this problem it would not be feasible to imagine development of tribal environment. Water is the fuel for mobilizing the development process of any environment, especially the agricultural eco-system. In the absence of this the preceding two stimuli would perform sluggishly and retard development. So, for creating chain reactive effect it becomes essential to explore water potentialities. The following ways could help to conserve, recharge and explore new sources of water.

1. Free or uninterrupted flow of rain–water is to be regulated by making mazes of stones or growth of vegetation alongwith check–dams and restricted human and animal interference (Figure 6.11 (a) & (b)).
2. The mazes of stones or growth of vegetation alongwith check–dams of varying height can restrict radial or multidirectional unrestricted flow of rain water and assist in storage and conservation of surface and ground water. This may also lead to a simultaneous increase in evapotranspiration and evaporation of surface water reservoirs may increase rainfall and develop the biome. Besides maintaining the water cycle such plantation could also be helpful in controlling weathering and erosion (Figure 6.11 (a) & (b)).
3. The mazes, if made scientifically following the contours could be more assisting in harnessing and conserving greater quantity of water in reservoirs built in low lying areas. These mazes must be assisted by deep canals to store and stream the collected water into the reservoir (Figure 6.11 (a) & (b)).

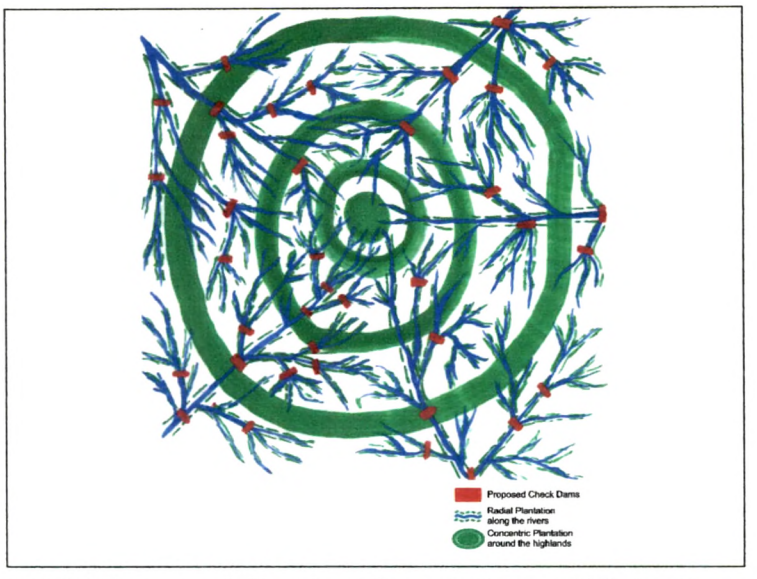


Figure 6.11 (a) Proposed Plan for Afforestation and Water Management

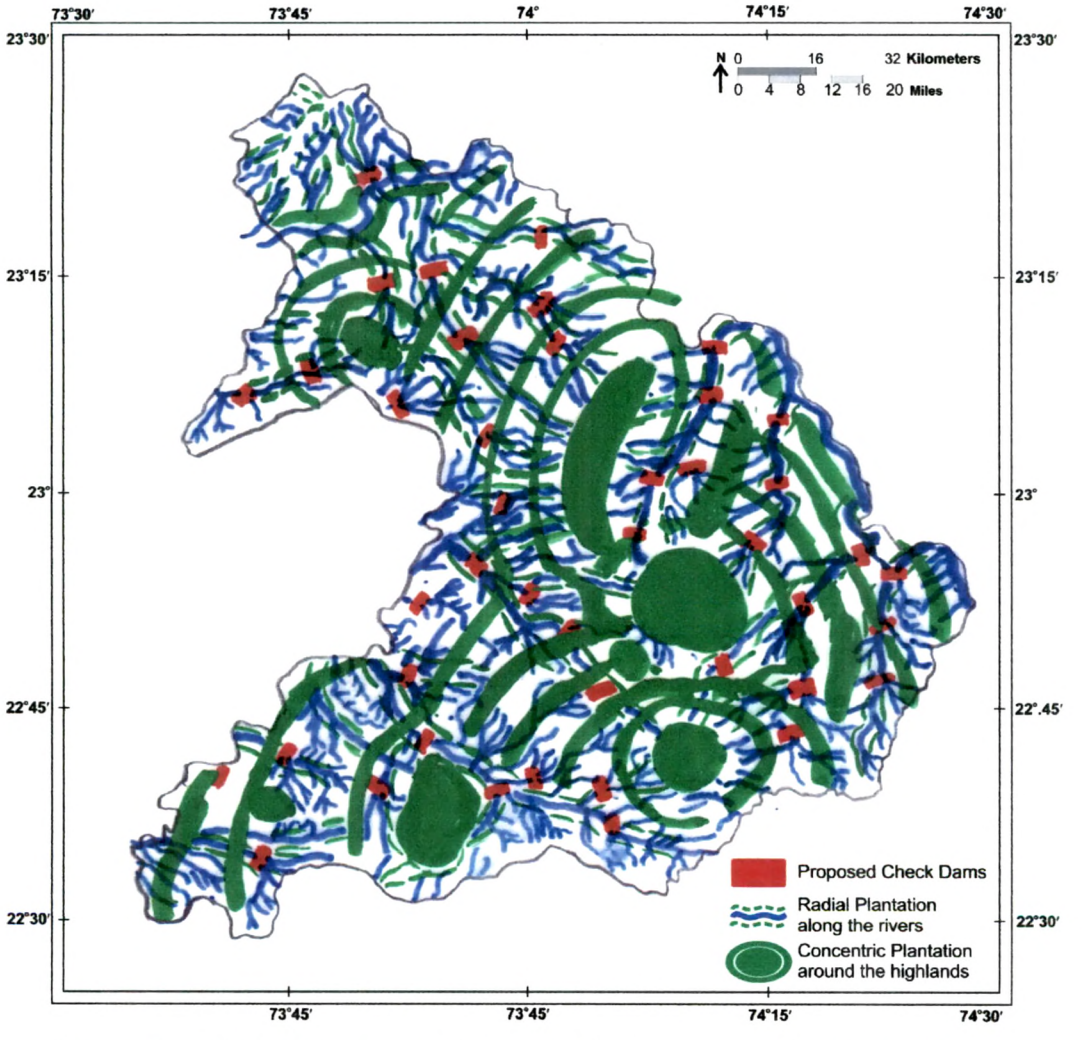
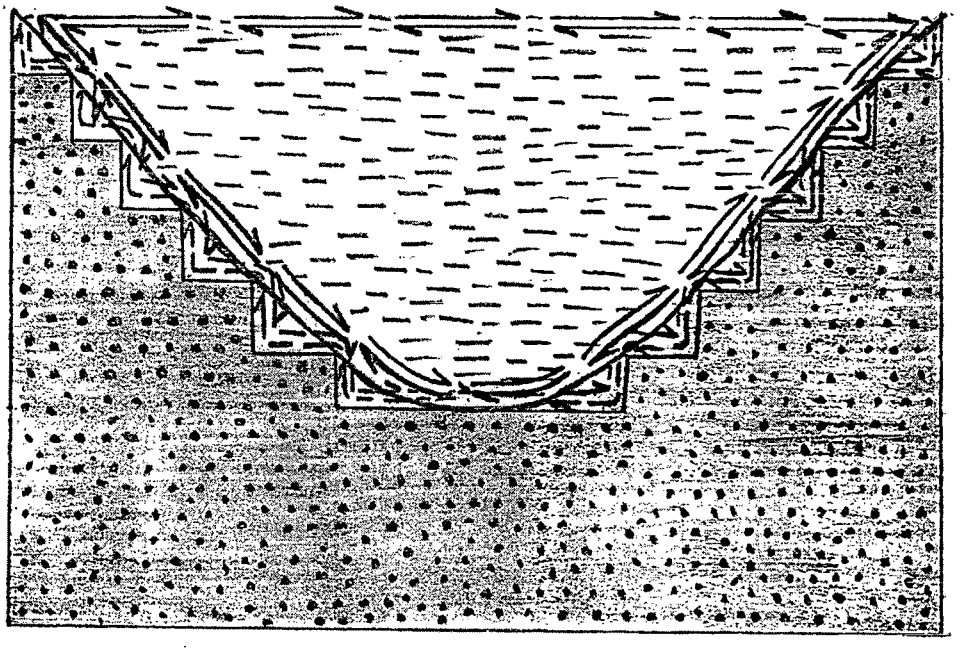


Figure 6.11 (b) Application of Proposed Plan for Afforestation and Water Management

4. The reservoirs must be built scientifically as the hollow inverted pyramidal reservoirs of ancient or medieval periods which were too scientific as they contained many axes and downward terraces or steps of decreasing lengths with increasing depth. These terrace form reservoirs seem to be capable of disrupting convectional process and decreasing the rate of evaporation (Figure 6.12)



Index:

Convection in the natural reservoir

Convection in terraced-water reservoir

Figure 6.12: Terraced Water Reservoir

5. A deep canal along the low lying periphery of the tilted or uplifted area is to be built for water conservation i.e. from low lying peripheries towards the central highlands along the concentric lowlands and radially flowing rivers (Figure 6.11 (a) & (b))
6. The plants have variability in absorption, transportation and evapotranspiration of water content. So, the concentric and radical plantation of trees and herbs at regular intervals according to their absorption, and discharging capability of water may prove to be helpful in recharging the ground water, and modifying the climate by decreasing albedo and increasing rainfall (Figure 6.11 (a) & (b))
7. Scientific ways of water exploitation should be adopted. It is experienced that due to the resisting geology most of the dug sources are not dug optimally and so none of them seem to have reached to the water table or phreatic zone. The water contained in them comes through the seepage through the joints or rock

ducts. The source of such seepage might be the cavities or the underground streams. Even the hand pumps or motors installed through boring seem to have not reached the water table. That is why most of them become dry after a few months.

8. The folds i.e. hills signify the compression and folding of weak zones due to the lateral flow of material. The compression at one elongation must have been compensated by the release of pressure on to the adjacent land. So, syllogistically it can be derived that there might be lateral flow of water from the low lying areas to the inner uplifted part (Figure 6.13).

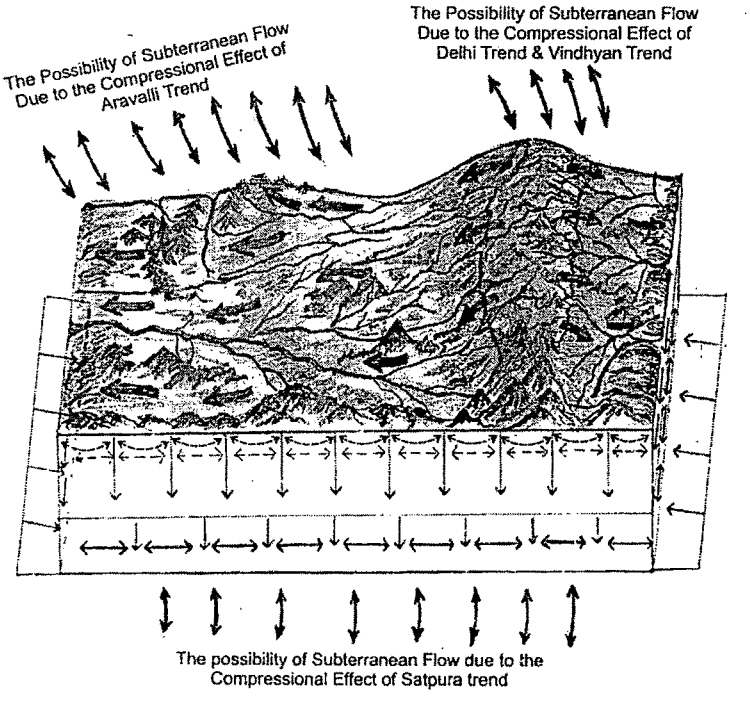


Figure 6.13 Surface Run–off and its Reverse Subterranean Flow

6.10 MULTITUDINAL SYNERGIC EFFECT OF SYNCRETIC EFFORT:

The probable multitudinal and propagating synergic effect of syncretic effort to stimulate and activate regulatory phenomena i.e. land, water and human resource, for appropriate exploitation is represented in the Figure 6.10 and described below:

1. Increase in agricultural production increases surplus stocks, income, saving, standard of living and potentiality to perform other income generating activities.
2. Increased afforestation sets the platform for the growth of other biotic phenomena like micro and macro organisms and regularization of energy flow and other potent cycles of the ecosystem such as hydrological and other bio-geo-chemical cycles.
3. Increased agricultural production and biodiversity supply the surplus to the market and industries based on agro–biological products.
4. The afforested hills accompanied by water reservoirs could be developed as recreational or tourist centres.
5. Judiciously classified land utilization under diverse categories of activities in a dominantly agrarian economy increases the scope of other activities like forestry, pisciculture, horticulture, animal husbandry, floriculture, cottage industries, agro–based industries, dairy farming, recreation and tourism and other commercial activities. These in turn reflect increase in the scope of employment opportunities and income generation.
6. A part of increased income could also be contributed by the inhabitants, towards social liabilities and environmental protection and development.

6.11 CONCLUSION:

The planning and management of any environmental unit must be based on the analytical circumspection of the human behavior, behavior of the environment, interaction between and within them and the course of transformation in space–time continuum. Such an approach is necessary to detect the problem and understand the nature of functioning of the environment because these act as stimuli for framing planning and management process for any environmental unit.

Moreover, the need of planning and management is solely to eradicate problems and regulate the functioning of the environmental system properly. Simultaneously, it is worth to reiterate here that the above mentioned steps ultimately enable to decide approaches, objectives and strategy for further actions for planning and management. By adopting this approach the tripodal chain reaction development model could be produced for the sample area.

A detailed study of temporal transformation of physical, social, cultural and economic environment exfoliated the diminishing sustainability with increasing pressure of demand and deteriorating and decreasing resources in the system dependent upon primary activities. Further, efficacy and association between the various phenomena in space-time continuum necessitated to detect nuclei elements in the system. Thus, land, water and man (inhabitants) were selected as the nuclei elements i.e. tripod, out of some explored elements. The whole process of multitudinal development is based upon the management and activation of the above mentioned elements. A scientific management and activation of the three at micro-level i.e. village level are presumed to have propagating multiplier effect in resuscitating sustainability and building integrity of the system and satisfying the demand. The impacts of efforts made at micro–level may extend upto any extent. One significant feature of the model is that its nuclei radiate their impact in the form physical (natural) social, cultural and economic development. However, the nature, degree and extent of radiating or diffusing effects may diminish with the increasing distance from the node of implementation. Meaning there by, the effect of efforts made at micro–level (village–level) may reach to any extent or scale or degree.

Success of any plan or model, explaining the process of development is dependent upon strategy of implementation, approach, detection of problem, detection of solution, and association and integration between the various elements of process. It is just like to press the right switch to switch on the light. Therefore, a process model must be activated by an organized team having the spirit of coordination and integration and tendency of transmitting, translating and diffusing resources (inputs) and outputs within the system. This implies that a coordination and integration, between the government, non–government organizations and inhabitants, their effort to activate essential elements and finally, transmission and translocation of radiating or diffusing elements may have positive impact in fulfilling the objective.

Regarding the applicability it is felt that that the slope detection model could be exploited for detecting problems and preparing problem inter–linkage model for any system whereas the tripodal model of development could be exploited for similar systems.