Chapter 6

CONCLUSION AND POLICY IMPLICATIONS

The study discovers a close casual relationship among the social structure, size of land holdings, infrastructural facilities, cropping intensity, land use variations and the development levels both at the micro block level and sub-micro village level. Social structure as an independent variable includes the percentage concentration of the schedule caste population and the percentage occurrence of the joint family. These two basic factors considerably influence the size of land holdings and other factors of production in the spatial context.

Many of the similar studies have projected a dominant role of infrastructure and the technological factors in the cropping intensity, land use changes and the resultant production levels. The present study, however, discovers a highly significant role of the social structure. It has been seen that in the blocks and the villages under study there is a high percentage of nuclear families, the land holding have been reduced to smaller size because of the division of families and the law of inheritance. As a result of it, on these smaller land holdings both the operational and economic feasibility of agriculture is lower.

The major conclusions drawn from the foregoing research study and the discussions on the landuse changes in Budaun district as well as the forces operating behind the changes in landuse pattern are as follows:

One of the most important problems faced by the people and the society in this region is the unbalanced man-land ratio to fulfill the needs of the population within the limited land resources. As a result of it, the tillers inflict the several stresses on land. For example, the use of modern technology in agricultural operation to bring maximum area under high intensity cultivation irrespective of the inherent sustainability constants of the land. Besides this, the land which is not fully suitable for cultivation has also been brought into cultivation by applying higher doses of chemical fertilizers. There has been increased use of irrigation, insecticides, pesticides and weedicides in the
agricultural fields. However, on the potentially productive lands it has been found that not only the technological forces but the infrastructural, social and institutional forces have also played a major role in changing the landuse pattern in the region. Some salient features of the landuse are listed below:

- Forest cover in the region is very low which is a meagre 1.33 per cent of the total geographical area as compared to the national average of 22.5 per cent and with Uttar Pradesh as a whole i.e. 17.29 per cent. The forest cover is far below the ecological requirement of this region.

- Area under non-agricultural operations was 9 per cent of the reported area with a growth of 9.68 per cent during the study period. It shows the development of infrastructure in the study region.

- Barren and unculturable waste lands have shown a decline of 14.84 per cent during the study period which indicates that even the area of threshold potentials have been brought under agricultural practices.

- Total fallow lands have occupied a small 4.87 per cent of the reported area with a significant decline of 30.08 per cent during the study period which indicates that the land use intensity as well as the cropping intensity have considerably increased in the region.

- Culturable waste lands have shown a very low coverage with 1.04 per cent of the total area with a decline of 25.24 per cent during the time period which restrict the further expansion of the Net Sown Area. A considerable decline in the extent of the culturable waste and the common property area indicates the degree of pressure that the land has been put to. It is important to been in mind that the culturable wastes are the potential fuel and fodder availability areas to the landless and marginal farmers. Culturable wastes are the crucial lands for the poor man's sustainability.

- Area left for permanent pasture and other grazing lands is only 0.07 per cent of the geographical area with a massive decline of 79.68 per cent in the last ten years. It is a matter of serious concern that only 0.07 per cent of the total area is spared to the village livestock and other herbivorous. More than 80 per cent area is covered by Net Sown Area to feed the
growing human population. A great injustice and competition can be seen between man and herbivorous animals. Under such a scenario one can visualize the meager wild life and the legitimate encroachment of *Nilgai* on the cropped fields.

- Net Sown Area occupied more than 80 per cent of the reporting area which shows that the study region is dominated by the agricultural activities. Such a high area under cultivation seems to have reached its saturation level in terms of further horizontal expansion. In fact, there is an ardent need of vertical expansion of agriculture rather than the horizontal expansion. Now it is imperative to increase the cropping intensity by using the same land twice and thrice by employing new agricultural techniques in the study region.

It has been further noted that 72.41 per cent of the Net Sown Area came under the plough more than once on an average. As a result, the cropping intensity has increased to 172.41 per cent. Now, emphasis should be focused on the increase in the cropping intensity instead of the area expansion of Net Sown Area.

It has also been observed that out of the gross cropped area during 2007-08, 49.37 per cent area was cropped during the Rabi season whereas a much lower 43.17 per cent cropped area belonged to the Kharif season. Here, the focus should be on Zayad season which shared only 6.92 per cent of the gross cropped area. The cropping area in this season has increased. It would also increase the cropping intensity and there are bright chances of enhancement of the cultivated area in this season in the study region.

It has also been noted that wheat is the most dominating cereal crop of the region which during 2007-08 occupied more than 50 per cent area under total foodgrains followed by Bajra with 27.67 per cent. Such a high percentage of area under Bajra is a distinguished feature of this region. Water intensive crop Rice occupied about 13 per cent area whereas Maize and Barley are insignificant cereal crops in this region. Pulses occupied a meagre 5.05 per cent area of total foodgrains hectarage during 2007-08 in which Urd, Masur, Beans,
Peas and Arhar are prominent onces. Urd is most dominating pulse crop of the study region which occupied 75.21 per cent area of total pulses followed by Masur with 19.41 per cent areal spread. This very meagre hectarage of pulses is the major cause of their market-scarcity and unabated price rise.

It is also concluded that the driving forces for changing the landuse pattern do not operate suddenly and immediately but slow and silent which bring about changes in due course of time. Physical forces, Technological forces, Social forces and Institutional forces play their role individually as well as collectively in bringing about the changes in the existing land use pattern. The intensity of driving forces in the study region is discussed below.

Topography of the study region is homogenous with almost leveled plains where the degree of slope is negligible. Climatic conditions and natural variability are the prominent factors which influence the stability of a particular type of land utilization in this region, because it plays a vital role in affecting the agricultural scenario of the study region. Climatic conditions are also not adverse for agricultural practices. If adequate irrigation and other inputs are available, the climate plays a modest role in this region. Soil is almost uniformly suitable for agriculture except in some low lying areas where water table is high and water logging creates problems in the agricultural practices.

Technological forces are also prominent in breaking the physical barriers of agricultural operation by giving them suitable and appropriate inputs for a healthy agricultural scenario. Net irrigation reached above 90 per cent, fertilizer consumption per hectare was noted as above 100 kg in the study region during 2007-08. Application of wooden ploughs and Iron ploughs appears to show a declining trend with a magnitude of more than 35 per cent in the period of study which is because of adoption of the tractors in place of traditional ploughs for better efficiency in seeding and germination of seedings. A growth of 164.72 per cent was observed in the number of tractors in the study region.

To provide adequate irrigation in this region 13.03 per cent growth was observed in the number of tubewells and 32.70 per cent growth observed in the
number of pump sets per unit area of agricultural land. Intensity of pump sets and their growth is high because of a higher irrigation under the tube wells and pump sets as compared to canal irrigation.

Other inputs like harrows, modern sowing machines and sprayers have also shown improvement in their usage and in the agricultural development of the region which ultimately effects the landuse pattern of the region.

Social driving forces play crucial role in rural development and changing the existing landuse pattern in the study region. It is concluded from chapter-IV that the average size of land holding has decreased from 0.94 hectares to 0.86 hectares during the study period. In terms of institutional drives, the villages equipped with markets have shown a slight improvement whereas the villages with marketing cooperative society have seen a discouraging trend with a 54.73 per cent decline. It is also concluded that villages with stores providing quality Seeds, Fertilizers, Insecticides and Pesticides along with Government procurement centers have also seen a decline during the study period. Villages with veterinary hospitals have also observed 29.63 per cent decline during the study period. But the most encouraging scenario is that in the villages, the with Primary Agricultural Loan Cooperative Societies have increased by 30.09 per cent in the mean time of study period.

It is also concluded that the infrastructural forces are the important links between the Technological forces and Institutional drives for the meaningful results. These together play the role of bridge between industries and raw material, urban markets and rural production, Lab. researches and implementation of such results on land, factories and labour force. Infrastructural forces play important role in changing the landuse pattern of the study region.

It is concluded that more than 90 per cent of the villages are equipped with metalled roads with a considerable growth of more than 110 per cent during the study period. This makes a considerable link of villages with other villages as well as with the urban areas. Post offices are important means of
communication with the distant places. It is noted that only 16.11 per cent villages of Budaun district are equipped with post offices. Biogas plants and Cold Storage centers are also important components of infrastructural forces. A growth of 29.46 per cent in the number of Biogas plants shows a strong base of Biogas plants in almost every village of the study region. Modes of transport i.e. number of Railway stations and Bus stands are other important modes for development of any region which result to the changing landuse pattern of any region. About 29.19 per cent growth in the number of Bus stands shows strong linkages with other villages as well as the urban areas.

PCOs (Public Call Offices) and telephones are the quickest means of communication. In the study region the number of PCOs are seen declining which shows that people have adopted some other means of earning for their livelihood whereas the number of private telephones have shown a growth of 35.49 per cent in the study area. This shows an improved economic condition and purchasing power of the population in the study region.

Regarding the second objective of the study it can be said that the changing pattern of landuse is not the work of a single factor but a combined effect of all the driving forces i.e. Technological, Infrastructural, Social and Institutional factors. It is also pertinent to mention here that the intensity and magnitude of the driving forces depict a spatio-temporal variation.

It is also seen that the impact of driving forces on landuse efficiency is positive and directly proportional to their gravity in every micro and sub-micro region.

On the basis of Z-score and other statistical techniques, the hypotheses of the study have been tested in the following manner.

- Adoption of new technology is not the main cause of landuse changes in the study region but it is the effect of the social and institutional factors on the cropping pattern.
- Landuse changes are the result of changing cropping pattern in the study region.
• Changes in landuse are largely determined by the social institutional and infrastructural forces which play a dominant role in changing landuse pattern.

• Infrastructural forces are mainly responsible for the increase in area under non-agricultural uses but not in the gross cropped area which is a function of technological drives.

• Physical factors play a negligible role in determining the landuse changes in the study region.

• Landuse changes are the result of infrastructural development in the study region.

• Net Sown Area has increased almost upto the brim at the cost of cultivable waste lands.

A conclusion is derived from the comparative analysis of the combined performance of all the driving forces of Blocks and the sampled villages which were randomly selected on the basis of cropping intensity. The results are as follows:

Out of a total number of 18 sampled villages, seven sampled villages showed a positive correlation with their respective blocks in terms of combined performance of all the driving forces in changing the landuse pattern. A few examples are Shekhupur village of Ujhani block and Chabutra village of Junawai block. Both belong to high cropping intensity and showed low performance of driving forces on the basis of Z-score.

Baraura village of Qadarchowk block of medium cropping intensity showed a positive correlation of medium performance of driving forces with the same method. Dakara Khaam village of Sahaswan block and Risauli village of Ambiyapur block of high cropping intensity showed a positive correlation of high performance of all the driving forces by Z-score method.

Khera Jalalpur Pukhta village of Usawan block of low cropping intensity showed medium performance of all the driving forces of changing landuse pattern. Pusgawan village and Wazirganj block belongs to medium
cropping intensity region. It showed a positive correlation with the low performance of the driving forces.

There were four villages where negative correlations existed with their respective blocks for example, village Nagla Sharki of Qadarchowk block belongs to medium cropping intensity and showed a negative correlation where Qadarchowk shows medium performance and village Nagla Sharki shows low performance of all driving forces.

Similarly, Dehgawan village of Dehgawan block of high cropping intensity showed high performance in the block whereas the village comes under medium performance of all the driving forces. Dhoondpur village of Asafpur block belonged to low cropping intensity region and block showed high performance while the village showed medium performance of all the driving forces. Village Gautra Patti Bhauni of Miaon block belonged to medium cropping intensity region where block showed medium performance while the village showed low performance of all the driving forces.

Two villages showed highly negative correlation namely Bangarh village of Salarpur block with high cropping intensity showed high performance in the block, while low performance of all driving forces in the village. Manakpur village of Bisauli block belonged to very low cropping intensity but block showed high performance whereas the village appeared under low performance of all the driving forces.

Three villages showed a comparatively high performance. For example, Sithauli village of Islamnagar block belonged to medium cropping intensity where block showed medium performance while the village showed a high performance of all the driving forces. Gardha village of Samrer block and Rajpura village of Rajpura block belonged to very high cropping intensity. Whereas Samrer showed a low performance while Gardha showed medium performance and Rajpura block showed medium performance while Rajpura village emerged under high performance of all the driving forces.

Two villages showed a strong positive correlation. These are, village Sarai Piprai of Dataganj block and Kail village of Gunnaur block. These belong
to high cropping intensity region whose blocks showed low performance while villages belonged to high performance of all the driving forces.

**Policy Implications**

There is an urgent need for some suitable and constructive policy implications for the sustainable forest development programmes in this area because forest cover is merely 1.34 per cent of the total geographical area. Strict laws and their implementation is imperative against any the forest cutting or even any floral clearance in the study region which is almost devoid of forest cover. Besides this afforestation driven should be seriously launched from macro level to micro level to cover every bit of vacant land with the greenery. Afforestation programmes should not be ritualistic annuals, but there is a need for monthly and even weekly awareness drives to overcome the forest crises in the study region.

Like the population census and the livestock census, a tree population census should also be conducted for every five year gap on the same line as human population census of India. Data regarding the number of various species of plants, their numbers, plant species removal, number of planting tree species, their natural growth and density. Such database will help us obtain a clear picture of the tree population not only at macro level but at micro level. Such a data would give us a picture for wider policy implications for the target regions of India.

Policies should be made to allow only barren and unculturable wastelands for non-agricultural uses like infrastructural development. This will make available the agriculturally uneconomic land for some useful infrastructural purposes.

Fallow lands are also required to provide rest to the cultivated land and recoup and maintain there natural fertility. Policies should also be made to decide the percentage of land allotted for the fallow, for a sustainable landuse pattern.

Permanent pastures and other grazing lands with a meagre 0.07 per cent area are on the verge of extinction from the landuse statistics of Budaun.
districts. These lands are actually the feeding grounds for village livestock of the poor man as well as other herbivorous animals. These lands help to maintain the fragile equilibrium between the flora and fauna of the region. These lands support the population of wild herbivorous. The herbivores in turn sustain the populations of the carnivorous. They help in maintaining the ecological balance of the study region. Policies should encourage to maintain the pasture lands and grazing grounds at least to 10 per cent of the total land cover.

Net Sown Area which has reached to 80 per cent of the total land cover needs to share some lands left for fallow lands, and pastures and grazing lands. Policies should also be formulated to enhance the cropping intensity of the available agricultural lands and to increase the yield per hectare to maintain the agricultural production for the existing population of the study region.

Policies for the Zayad season agricultural development are needed to enhance the cropping intensity of the study region.

Policies for land utilization should be adopted according to its capacity and ensure that per unit arable land produces optimum and deteriorates the productive capabilities at its minimum.

Regarding the size of landholdings, the study revealed that less than 2 hectares size of landholding is scarcely viable for the implementation of modern farm technology. Some laws should be enacted to fix the minimum size of land holdings below which the sub division of holding be not allowed. Such a policy may appear socially utopian but an end to further shrinking of the farm size is an unavoidable necessity.

It is suggested that the Cooperative Farm Development Boards may be established on the basis of collective ownership, so that the size of operational holdings is increased or maintained to be economically viable for modern agricultural technology. In this way the land use efficiency may also be enhanced.

Intensity of irrigation should be judiciously and sufficiently made available for all the cropping seasons i.e. Rabi, Kharif and Zayad. It should
keep in consideration that Zayad season should not be neglected. Special irrigation enhancement programme should be formulated to increase the cropping intensity in the study region.

Centres should be strengthened for the essential services in the rural areas such as education, medical, credit, veterinary, postal and telecommunication, mandis, electricity, roads and railways power and water etc. to restrict rural urban push migration and the development of rural areas.

The integrated comprehensive action plan should be adopted for optimum output from every unit of land and proper and sustainable landuse planning for agricultural practices and rural development. Integrated farming techniques are also ecofriendly which include integrated nutrient management. An assessment of nutrient removal by the crops and quantities of chemical fertilizers added in the soil would suggest the pattern of management in terms of what is the removal from the soil by a particular crop and what is required to be added in it to check a further exhaustion of nutrients from the soil.

The development of an integrated plant nutrient supply system with an appropriate combination of organic, biological, nitrogen fixation, phosphate solubilizing microbes and need based chemical fertilizer would be crucial for the sustainability of nutrients in the soil as a resource base. Green manuring is an important component of integrated nutrient management system for improving the soil fertility and supply of nutrients requirement for crops.

The study has identified the need for certain policy implications. These policy implication have been enumerated below.

1. Suitable institutional mechanism for scientific management, conservation and development of land resources is recommended
2. Negligible forest cover needs to be expanded for the restoration of sustainable landuse pattern.
3. Greater awareness needed for the conservation of forest resources, culturable waste lands and fallow lands to maintain the ecological balance on the one hand and to provide shelter to wildlife and livelihood for marginal farmers and landless laboures on the other.
4. Preparation of Landuse Atlas for planning purpose.
5. Computerized data base of updated land records.
6. Reclamation of degraded land.
7. Diversification of landuse.
9. Achievement of sustainable landuse pattern through planning.
10. Need to generate systematic data base on land utilization and land management practices at village level.
11. Measures to check further land degradation.
12. Policies to cover all farmers within the Institutional credit fold including small and marginal farmers for the over all development of the region.
13. Policies for high value crops to enhance the economy of the region. e.g., Horticulture, Floriculture, Vegetables and Mushroom cultivation.
14. Identify the backward villages on the basis of cropping intensity and other parameters to facilitate an inclusive growth and village development programs in the backward villages.
15. Policies for removing inequalities in the agricultural development of the villages.
16. Social forestry on culturable waste lands.
17. Policies to increase the area under forest, management of cultivable land, conservation of uncultivable land to maintain the sustainable land utilization while cropping intensity be enhanced.

The overall evaluation of suitable policy adoption and the prospective implications play a crucial role in enhancing the production potentials by improved land use practices and increased cropping intensity. A further elaboration of the major policy adoption and implications is imperative and was considered worth a mention in the following description.

Land use depends on three types of factors: the inherent qualities of land itself; the effect of neighboring land use activities; and the aggregate demand of land for particular activity. Land use activity is a major issue and challenge the
planners to design the Eco friendly and sustainable economic growth. The human activity for development generally exceeds the environment at sustainability. Which results in consequences such as soil erosion, global warming and pollution etc. the cause for change in land use activity may be due to socio-economic development or due to the changes in the environment or may be due to socio-economic pressures. For example, an increase in total export demand for a particular agricultural product will be translated into increase in demand for this particular product whereas increase in tourist influx will result in increased demand of land for constructions. Land for these can be gained by conversion of agricultural fields or by clearing the forest. In both cases the consequences will be different.

There is a need to increase awareness of land degradation and improvement issues among political leaders and the broader society. These issues of land husbandry need to be integrated broadly into educational programmes as well as rural extension services.

Technical information about land improvement options needs to flow more quickly and widely among land users. Greater integration between rural land use sectors (such as forestry, agriculture, and agribusiness) and disciplines, such as economics and geography, is needed in extension programmes. Methods developed by local farmers as well as developed through scientific research should receive greater recognition and dissemination. A high priority is to develop geographically referenced, computerized information systems that can collect, store and analyse data on natural and socio-economic resources and that can disseminate, in “user friendly” format, information about the range of available options and techniques for different types of soils, climate and farming system. Such information can be drawn from formal research, development project experience or local farmer knowledge at micro and sub-micro levels in the study area of Budaun district of Western Uttar Pradesh.