Chapter- VI

SUMMARY

Land has been the scarce resource for agriculture than to secondary and tertiary sectors. The competition between agriculture and non-agricultural sectors for land is intensifying due to the increasing pressure on land for food production on one hand and, housing, industrial expansion, creation of infrastructural facilities etc. on the other hand. The per capita availability of land is continuously decreasing primarily due to relentless increase in population along with the lack of non-farm employment opportunities. This is particularly true for hill state like Himachal Pradesh. In the state the net cultivated area is decreasing over time. The irrigated area has almost remained constant over a period of time. Further the erratic climatic conditions have worsened the agricultural situation and it is becoming more and more uneconomic. Farmers have been forced to leave the agricultural profession leaving the land uncultivated. As a consequence, a significant portion of farm land gets abandoned. This has led to land degradation. In some of the niches of the state farmers have opted for cash crops like off-season vegetable crops and fruit cultivation and they are growing these crops over a period of time mainly because of its profitability. The monoculture of crops along with extensive unbalanced fertilizer use and high doses of plant protection measures for a long time have seriously threatened the land quality and have led to decrease in per unit of land productivity. Overexploitation and degradation of land has become a major threat to sustainable agricultural development in general and production in particular. The other factors for land degradation might be fragmentation, migration, non-farm income, leased-out land etc. Thus, there is need to study the temporal and spatial land use pattern of the state and quantify
the factors responsible for land degradation at the micro level so that suitable policies for land use management can be framed. Keeping this in view, this study was undertaken with following specific objectives.

- To study the dynamics of land-use pattern at state and district level.
- To study the existing land use pattern and the determinants across agro climatic Zones and farm size categories.
- To study the extent and causes of land degradation across agro-climatic Zones and farm size categories.
- To understand the economic and environmental implications of the existing land use pattern for rural livelihood and suggest suitable policy measures.

Himachal Pradesh has been subdivided into four agro-climatic zones as per National Agricultural Research Project (ICAR) conditions. These zones are Zone I Sub-Mountain Low Hills (below 650 m.); Zone II Mid-Hill High Humid (650-1800 m); Zone III High-Hills Temperate Wet (1800-2200 m) and Zone IV High-Hills Temperate (2200 m. and above). The study was carried out in all the four Zones of Himachal Pradesh. Both primary and secondary data were collected to meet out the various objectives. The secondary data on various land use categories for all the twelve districts and Himachal Pradesh as a whole were drawn from various published and unpublished sources. The primary data were collected through multistage random sampling technique from 200 randomly selected farmers drawn from one block in each of the four Zones of the state, five villages in each block and 10 farmers in each selected village. These farmers were post-stratified into small (up to 1.16 ha) and large (>1.16 ha) based on land holding by using Cumulative Cube Root Frequency Method.

To meet out the first objective compound growth rates, instability index and location coefficient were estimated.

The second objective was met through tabular analysis using averages and percentages.
To meet out the third objective, component as well as LOGIT analysis was used. Total owned land (TOL), Number of fragments (NF), Family labour (FL), Non-farm income (NFI), Farm income (FI), Migration (MI), Leased-out land (LOL) and Highest education in family (HED) were considered as the factors affecting land degradation.

**MAIN FINDINGS**

- During 2003-04, forest land, land for non-agricultural uses, barren land and other fallow land observed an increase of 2.34, 9.51, 4.22 and 0.25 percentage points from 1972-73 whereas in case of other categories of land a decrease in percentage points was observed.

- The barren and other fallow land showed a growth rate of more than 5 per cent per annum during 1972-2004 whereas in culturable waste land and net area sown a decrease was observed. In case of other land use categories a positive growth was observed. The other fallow land which had a high positive growth in period I (1972-80) showed a decrease in period II (1981-90) but showed a decreasing trend in period III (1991-2003). Culturable waste land, land under non-agricultural uses and current fallow observed an increase in various periods except culturable waste in period II.

- The instability was highest in barren land followed by non-agricultural uses, other fallow and culturable waste in the entire state.

- During 2001-03, the concentration of land for non-agricultural uses and culturable waste was highest in Una, current fallow in Hamirpur & Kullu and other fallow in Hamirpur, Una & Shimla.

- About fifty per cent of households were in the age group of more than 60 years in Zone I and Zone II against 30-45 years in Zone III and Zone IV with a literacy rate of 72 per cent in Zone II to 94 per cent in Zone III. Family size varied between 5.38 in Zone IV to 7.50 in Zone I. The sex ratio (females/1000males) was highest in Zone II.
(1080) followed by Zone III (1014). The literacy rate of population varied between 82.40 per cent in Zone I to 87.93 per cent in Zone III.

- The total investment/ha was highest in Zone II followed by Zone IV. The investment was highest on real assets in all the Zones followed by investment on livestock except in Zone II.

- In Zone II, 60 per cent farmers had knowledge about Agricultural Information centres, 40 per cent in Zone I and Zone III and only 20 per cent in Zone IV. The awareness about these centres was highest in Zone II whereas the beneficiaries were highest in Zone III.

- Fuel wood was the main source of energy during 1995 in all the zones except Zone I against fuel wood plus LPG in 2004-05.

- The total household income was highest in Zone IV (Rs. 1.78 lakh / annum) followed by Zone III (Rs. 1.43 lakhs). The per capita savings were estimated to be maximum (Rs.25, 206) in Zone IV and minimum (Rs.8, 306) in Zone I. The average propensity to save (APS) was also higher in Zone IV (0.76).

- A decrease in the operational holding was observed from 1.023 ha/farm during 1995-96 to 0.877 ha/farm in 2004-05 in Zone I, from 0.425 ha/farm in 1995-96 to 0.247 ha/farm in 2004-05 in Zone II. In Zone I and Zone II maximum size of fragment was between 3-5 bigha (1 bigha = 0.08 ha) against more than 5 bigha in Zone III and Zone IV whereas the minimum size of fragment varied between 1-3 bigha in all the Zones. The number of fragments of land per farm varied between 2 in Zone III and 4 in Zone II.

- An increase in the yield of all the crops was observed in Zone I, Zone III and Zone IV during 2004-05 over 1995-96, whereas, Zone II, a decrease was found for all the crops.
The fertilizer consumption increased over the period for cereals in Zone I and Zone II and among vegetables in Zone III and Zone IV. There was no emphasis on phosphatic and potassic fertilizer in 1995-96 but their use increased substantially during 2005-06 for both small and large farmers.

The share of waste land to total owned land was 21 per cent in Zone I, 43 per cent in Zone II but only 8% in both Zone III and Zone IV. Among the waste land the share of long term fallow was highest in all the zones except Zone IV where culturable waste land accounted for the highest share. The increase in waste land per farm was highest in Zone II followed by Zone I over a period of ten years (1995-2005). It was very less in Zone III and was nil in Zone IV. Weeds, animal menace and nearby fallow land were quoted as the main reasons for the waste land by the farmers.

About 30 per cent farmers in Zone III and 20 per cent farmers in Zone IV, among the farmers who were practicing monoculture from more than 10 years, observed that monoculture had very high negative effect on the production. The change in variety and more fertilizers use were the main measures taken for maintaining production.

Large number of farmers in Zone III and Zone IV observed that monoculture had very less effect (<20 per cent) on land degradation and change in variety, contour formation and levelling of fields were the main measures taken to minimize land degradation.

The farmers investing on soil conservation was nil in Zone I and Zone II. Positive effect of soil conservation measures was observed in both the zones where these measures were undertaken.

Leasing-out of land was higher in Zone I and Zone II (22 and 24 per cent farmers) than in Zone III (6 per cent farmers). Maximum number of farmers leased-out their land for more than five years ago in all the zones. Far away land, migration to other places, low farm income, labour scarcity etc. were found to be major reasons for leasing-out in
Zone I and Zone II whereas, in Zone III, education of children and labour problem were the main reasons. The leasing-in in Zone II was higher than Zone I. The majority of farmers leased-in the land from more than 5 years. Low production in the own fields, low remuneration for unskilled labour at the farm and no other source of income were the main reasons for leasing-in land.

- Migration without family was higher in all the zones except Zone III. Employment, low household income, wild animal menace and education of children were the main reasons for migration.

- The results of component analysis showed that in Zone I all the factors had positive effect on extent of land degradation, whereas, labour scarcity, leasing-out of land & highest education in the family in Zone II, labour scarcity, off-farm income & the highest education in Zone III and off-farm income in Zone IV had negative effect on land degradation.

- The results of LOGIT analysis showed that total owned land & highest education in the family in Zone I, labour scarcity & off-farm income in Zone II and farm income in Zone IV had probability that the households would move towards land degradation whereas farm income in Zone I and Zone II, off-farm income and highest education in the family in Zone III and off-farm income in Zone IV had showed an inverse relationship.

**POLICY IMPLICATIONS**

1. The net cultivated area is decreasing and the area is being shifted to non-agricultural uses. This might cause a serious threat to sustainable agricultural development, food security and livelihood. Thus, there is a need to restrict the transfer of agricultural land to non-agricultural uses. The barren, unculturable waste land etc. may be allotted for non-agricultural purposes.
2. Fragmentation of land holdings along with decreasing size of holding along with unirrigated conditions have been the root cause of uneconomic land holdings. There is a need to frame laws so that the size of land holding does not decrease beyond a certain limit.

3. To make agricultural sector more remunerative so that the migration to urban areas is checked, there is need to develop technology for rainfed agriculture and also the government should invest more in water harvesting so that farmers can opt for cash crops, wherever possible.

4. Study has shown that farmers have to leave the cultivation due to annual weeds, like *Ageratum* sp, *Lantana* sp, *Parthenium* sp etc. along with animal menace like monkeys, stray cattle, *neel* cows, pigs etc. There is need to check these problems with the help of village panchayats since these can not be handled at individual level.

5. Results have indicated that a few farmers were aware about the extent of land degradation and the ill-effects of monoculture & use of chemical fertilizers, plant protection measures etc. The Agricultural Information Centres (AICs) too have not been able to perform their duties, may be due to the lack of staff etc. Thus, there is need to strengthen these centres. This will help in dissemination of knowledge about falling quality of soil; water etc. so that land use management practices for sustainable development can be adopted by the farmers.