CHAPTER VI

SUMMARY AND FINDINGS
CHAPTER VI

SUMMARY AND FINDINGS

Uttara Kannada District being one of the 20 districts of Karnataka State is located in the north-western part of Karnataka, where to the west of this district the Arabian sea forms the coastal boundary. With 10,258.80 sq km of area the district is irregular in shape, bulging at the central part and tapering gently towards north and south. It shows 42.10 percent shape efficiency. The district being part of the Western Ghats of India has monsoonal character in rainfall and other weather conditions. It receives an average of 2,455.20 m.m. annual rainfall. The relief of the study area is rugged and uneven. The Coastal plain has below 1,000 feet height, the eastern Semi-Malnad being a rolling topography has varying height between 1,000 feet to 2,000 feet. The core of the Western Ghats are in the central part of the district where the height of the topography is above 2,000 feet. The s-w monsoons are more intensive on the coast and Western Ghats, while moderate in the eastern margins of the districts (Semi-Malnad). Therefore, the pattern of distribution of rainfall is most important controlling factor in deciding the type of forests apart from nature of relief. Consequently the central portions of Uttara Kannada are clad with evergreen thick forest. The
gradient of topography has influenced in deciding the land-use pattern, where the Semi-Malnad with rolling topography and vast plains are able to show intensive agricultural land-use, while the Coastal belt with narrow strip of land is able to show limited agriculture and continuous row of settlements. The central part of the district being highly rugged, is an area of reserved forest with limited agricultural land. The coastal alluvial soils are used for the cultivation of rice as a dominant and groundnut as an insignificant crop. However the coconut groves along the coast and in and around the settlements are the most conspicuous features of the Uttara Kannada coast. The central part covered with laterite soils have enriched the growth of natural forest with varieties of species. The red loamy soils in the Semi-Malnad have given rise to cultivation of rice as the dominant crop and millets as the secondary crops. The cultivation of cashewnuts, spices and fruit trees are noteworthy plantations throughout the district, whose productions are being supplied outside the district and even as a foreign export. The mineral resources covering an area of 14,592.51 hect (1.42 per cent of the total geographical area) consist of manganese and iron ore as the dominant minerals which are exported to Japan through Karwar/Goa ports. Due to heavy rainfall, Uttara Kannada has enough potential of surface and underground water. Number of rivers and their tributaries are perennial throughout the year. Therefore this has profound impact on maintenance of greenary in the forest.
and crops in the arable land. However plenty of water joins Arabian sea without fully used. Hence thrust of the research is to focus on further utility of surface water for generation of hydro-electric power apart from the existing power generating installations in the district. However utmost care is needed to protect the existing forest land while installing new hydro power plants in the district, so that ecological and environmental degradation is minimised and consequently sustainable land-use development can be achieved. The shores of the Arabian sea and estuaries in the study area are great source of marine products that sustain economy and ecology of coastal settlements.

The total 12,18,367 population of the district is distributed in 1,282 villages and 14 towns, organised into 11 taluks. The population of Uttara Kannada which was 4,54,490 in the year 1901 has plunged into 12,18,367 by 1991, showing an increase of more than three times. The coastal taluks: Bhatkal and Kumta show an average density of more than 200 persons per sq km, being the highest density in the district, due to plain topography, better developed means of transport and other infrastructural facilities. The moderate density of population (50 to 200 persons per sq km) is found in eight taluks of the district except Supa (Joida) where density is less than 50 per sq km, owing to rugged terrain and thick forest coverage. As per 1991 census the district shows an average literacy of 56.67
per cent. The total workers are 4,28,663, being 34.00 per cent of the total working population. Out of this 44.52 per cent are engaged in fishing and forestry, 40.02 per cent in trade, commerce, transport and services while cultivators and agricultural labourers share 15.46 per cent. As regards spatial distribution of total workers in the district the highest of 38.20 per cent is found in the Malnad region. The Semi-Malnad region contribute 38.25 per cent, whereas 37.00 per cent in the Coastal region. The occupation varies among three regions of the district and their distribution is uneven. For example the coastal region supports 39.14 per cent of cultivators and agricultural labourers of the district, while Malnad has 36.77 per cent of workers and Semi-Malnad has 24.07 per cent. The district has large potential resources like water, marine resources, forests, minerals and arable land to create large number of job opportunities where human resource development can be achieved in a sustained manner. The ongoing projects in the study area like construction of new railway line (Konkan railway), Atomic Power Project' at Kaiga, 'Naval Base' at Karwar and hydro electric projects have profound potentiality to develop man power.

In the study area man's economic activities have greatly transformed the physical landscape. The general land-use pattern in the district is to be seen in the light of its overall natural and changing socio-economic conditions. The
pattern of land-use is mainly controlled by relief, soil and amount of rainfall. The rapid growth of population from 1971 to 1991 has been responsible for intricate and unanticipated shift in the general pattern of land utilization in Uttara Kannada district. As a result forests and scrub lands have been cleared to some extent. The forest land which was 81.45 per cent to the total geographical area of the district, in the year 1971, has been reduced to 80.44 per cent by the year 1991. Whereas arable land has been increased from 11.39 per cent to 12.22 per cent. However cultivable waste land has been reduced from 1.38 per cent to 0.77 per cent. The taluka-wise land-use pattern shows 91.54 per cent of forest land in Supa taluk, as the highest and 67.81 per cent as the lowest in Haliyal taluk, in the year 1991. The rest of the taluks have forest land ranging between 67.99 per cent to 90.36 per cent, during 1991. However the density of forest plants and their quality is gradually declining due to heavy impact of man’s economic activity. The distribution of arable land in Uttara Kannada is influenced by terrain conditions and forest cover. The arable land is very limited to the extent of 12.23 per cent (1,25,407 hect) of geographical land. In coastal area this arable land occupies 4.57 per cent, 3.28 per cent in Semi-Malnad region and 4.38 per cent in Malnad region. In the last 20-years (1971 to 1991) the district has shown an increase of 8,967 hect (7.70 per cent) under arable land. Out of it 6,930 hect is in the Semi-Malnad, 3,047 hect in the Mainad region, while 1,010 hect
declined in the Coastal region. The decline of arable land in the Coastal area is mainly due to diversion of arable land for developmental activities. Similarly the fallow land is increased in the Coastal area from 4,562 hect (1971) to 6,179 hect by the year 1991, showing a net increase of 1,617 hect. This situation is also attributed to the developmental activity. In the Malnad region it has been reduced from 5,146 hect (1971) to 4,771 (1991) hect, showing a net reduction of 375 hect. Similarly in the Semi-Malnad the fallow land is reduced from 3,132 (1971) to 744 hect (1991), showing a net decline of 2,388 hect. The declining trend of fallow land explains the importance of land for other usable purpose, consequently it is a current fallow land. Therefore the land-use development is more concerned in the Central Malnad and the eastern Semi-Malnad. The net area sown in the year 1971 was 1,03,600 hect, which has been increased to 1,13,713 hect in 1991. Thus there is an increase 10,113 hect over a period of 20-years. Out of net sown area, cereals (rice and minor millets) share 79.08 per cent, pulses share 3.71 per cent and other crops (oil seeds, cotton etc) share 17.23 per cent. The increasing land under net sown area shows the importance of converting of land for agricultural activities, which in turn provides not only job for agricultural workers but also food for growing population in the study area. The intensity of cropping in the Uttara Kannada district is of a negative approach where we find that in two sub-regions (Malnad and
 Semi-Malnad) the intensity is reduced from 114.01 (1971) to
111.88 (1991). However in case of Coastal region it is
increased from 110.53 to 115.18. Thus the impact of modern
innovations of agriculture like farm techniques, H.Y.V. seeds,
application of chemical fertilizers etc are not uniformly
received in the study area. In case of Coastal area due to high
literacy rate of the farmers and accessibility to the modern
inputs of agriculture it has been possible to bring increased
intensity of crop. The land under horticultural crops which was
0.35 per cent (3,572 hect) in the year 1971 has been increased
to 2.17 per cent (22,280 hect) in the year 1991. We can notice
that the land under horticultural crops is considerably
increased in the Malnad and the Coastal area while it is least
increased in the Semi-Malnad.

Kharif and rabi are two distinct agricultural seasons
practiced in Uttara Kannada district. The Kharif season is
associated with s-w- monsoon (June to September) while rabi
season is practised during winter to early summer (October to
March). The Kharif season shares 98,648 hect (78.66 per cent)
of the total arable land in 1991. In the last 20-years 4,595
hect of land (4.89 per cent) is added to Kharif crops. Kharif
crops include paddy, groundnut, ragi, jowar, millets pulses
cotton etc. During 1990-91, about 15,065 hect of land (13.25
per cent) was under rabi crops. All the sub-regions have shown
an increasing trend in rabi crops since 1971. The important
Rabi crops grown in the study area are rice, groundnut, vegetables etc. The study of ranking of crops based on area under each crop shows rice as the first ranking crop in the entire district, arecanut as second, coconut as third, pulses as fourth, banana as fifth and groundnut as sixth crop. However, their ranking position except paddy varies in all the taluks, which is due to varying rainfall conditions, degree of slope of terrain and soil conditions. The study of crop combination shows rice as a monoculture in 1971, whereas in 1991 excluding Bhatkal, Honavar, Haliyal and Mundgod taluks rice was cultivated as a monoculture in the rest of the taluks. The coastal taluks of Honavar and Bhatkal had two crops combination (rice and oil seeds) while Semi-Malnad taluks: Haliyal and Mundgod had also two crops combinations, where cotton and rice were grown. The study area has 1,21,434 land holdings consisting of total of 1,47,687 hect of land as per 1991. This shows an average size of 1.22 hect of land, per each holding. However, the average size of the land holding varies from 0.76 hect in the coastal region, 2.76 hect in the Semi-Malnad region, 2.76 hect in the Semi-Malnad region and 1.83 hect in the Malnad region. There is wide variation in size of land holdings in the study area. The marginal holdings (upto 1 hect) have occupied highest number of 74,285 (61.71 per cent) holdings in the district. Out of them Coastal region alone consist of 61,834 (50.92 per cent) Marginal holdings with 18,429 hect, while Malnad region consist of 10,484 (8.63 per cent) of marginal
farm holdings with 4,907 hect (3.32 per cent) of area. The remaining 1,967 (1.62 per cent) of marginal farms are distributed in 1,299 hect (0.88 per cent) of total cropped land. The number of marginal farm holdings are showing an increasing trend in the recent years. The family partition is the main cause for such fragmentation of land in the district. It is more so in Coastal region mainly due to high density of population. At many places, in the coastal area the size of the land holding is as small as 1,500 sq feet.

The chemical components of soil in the study area show high content of organic carbon in all the taluks, while phosphate as low in Mundgod, Yellapur, Sirsi, Karwar, Ankola, Honavar, Bhatkal and Siddapur, while as medium in Haliyal, Supa and Kumta taluks. The potash content in the soil is low in Supa (Joida) and Kumta taluks, medium in Karwar Ankola, Sirsi, Siddapur and Honavar, while it is high in Haliyal, Yellapur, Mundgod and Bhatkal taluks. On the basis of the classification of the landforms of Uttara Kannada district the following four categories of land types are identified, viz, (i) First Grade Land: River vallies, Coastal and estuarine plains (Fluvial and Marine landforms) consisting of 78,116 (7.61 per cent) hect, (ii) Second Grade Land: Dissected hills with 6,43,650 hect (62.73 per cent) (iii) Third Grade Land: Foot Hill plains with 97,130 hect (9.48 per cent) and (iv) Fourth grade rolling plains with 2,06,984 hect (20.18 per cent). In the First Grade Land and Second Grade Land first priority is given to crop
land-uses, second priority is given to horticultural crops and third priority to forestry. In case of Third Grade Land first priority is to horticulture, then agriculture and forestry as last. In case of Fourth Grade Land it is purely meant for forest land-use. On the basis of degree of slope the land classified in the study area also shows four types where first grade land is having less than 3° slope, second grade land between between 11° to 20° slope and fourth grade land as more than 20° slope. Forest and plantation crops are predominant in the areas where degree of slope is more than 20°. In the First Grade and Second Grade Land agriculture is dominant while in Third Grade Lands horticulture and forest are dominant. Based on the yield of the crop four classes of lands are identified in the study area. i) The very good quality land share 1.53 per cent (15,655 hect) of total land. ii) Good quality land: share 5.06 per cent land (51,933 hect). (iii) Medium quality land: 6.84 per cent land (70,151 hect). iv) Poor quality land share 0.97 per cent (9,948 hect). Thus all these types of land together contribute 14.40 per cent of arable land of the district. A notable study (in chapter-IV “Land Capability Classification”) on formation of wastage of land due to unscientific practice of terraced cultivation, is carried out extensively, where the researcher has quantified 1,482.51 hect of land as wastage in the entire district. He has suggested a practicable model to re-use such wasted land by way of redrawing of bunds on such terraced fields.
The real beginning of settlement evolution in Uttara Kannada district was started during proto-historical period. The Satavahanas (from Ashok time to 3rd century A.D.) were the first rulers of the district. In the medieval period Muslims entered the district (Jalaluddin sultan of Delhi in 17th century) and conquered the region. During the period of Haidar Ali and his son Tipu Sultan (1761-1799) the whole of Uttara Kannada District witnessed growth of trade, agriculture, road transport and diffusion of settlements in the interior regions. Further the Portugues (1502-1768) introduced new varieties of crops like cashew, pineapple, papaya, sweet potato etc., as a result the crop land-use was diffused in remote parts of the district and consequently it gave rise to settlement colonies in the vallies of Western Ghats. During the British rule in 17th century the region witnessed numerous changes in the development of settlements where inaccessible settlements were linked by roads for administration. Rapid development of settlements occurred after independance (1947). As a result many plans and projects were proposed. Consequently extension of roads, electricity, banking system, drinking water facilities, rural health care facilities, and educational facilities came into existence. The increase in agricultural production, improvement in sanitary conditions led to the rapid increase in population, as a result of it the river vallies, forest tracts and vacant lands were occupied for habilitation and expansion of agriculture. The existing government programmes of providing
houses, sites and subsidy facilities to economically weaker sections of population have made significant impact in changing the pattern of settlements in the rural and urban areas, where settlements and urban sprawls have come into existence along the transport lines. On the basis of topographical maps of the study area and field observation, different types of settlement pattern are identified. The "Nearest Neighbour" results show dispersion pattern (2.29 as 'RN' value) of settlements in all the three sug-regions of the district. However along the coastal roads and river banks in the vallies of Western Ghats we notice linear pattern of settlements. About 100 years ago there were 1102 habilitated villages consisting of 3,64,401 population. At present there are 1,296 settlements showing 16.33 per cent increase over a period of 100 years. In 1971 these were 1,311 settlements consisting of 8,49,105 population. During 1991 census the district had 1,296 settlements consisting of 12,18,367 population. Out of this 1,282 were rural settlements consisting of 9,23,913 (75.84 per cent) rural population, while 14 were urban centres with 2,94,454 urban population (24.16 per cent). The population size wise distribution of settlements is interesting to note as it is very much associated with landscape pattern and rainfall distribution in the study area. About 31.10 per cent of the total rural settlements fall under very small size category (less than 200 population), another 31.10 per cent under small size (200 to 499 population), 19.52 per cent under medium size
(500 to 999 population), 10.26 per cent under large size category (1,000 to 1,999 population), 5.40 per cent under very large size (2,000 to 4,999 population) and about 1.54 per cent settlements belong to exceptionally large size (above 5,000 population).

The total urban population in 1971 was 17.72 per cent (1,50,497 population). It is increased to 24.17 per cent over a period of 20 years i.e., 1991 (2,94,454 urban population), showing an increase of 95.65 per cent. The number of towns during 1971 were 8 while in 1991 they increased to 14. There is no class-I city in the study area. In 1971 there were no class-II towns, while in 1991 three towns emerged as class II, which were Dandeli, Karwar and Sirsi. During 1971 class-III towns were three while in 1991 they were two (Bhatkal and Kumta). The class-IV town in 1971 as well as in 1991 were four. The class-V towns in 1971 was only one (Yellapur) while in 1991 they were two (Haliyal and Binga). In class-VI there were no town in 1971 whereas in 1991 three towns were noticed viz., Magod, Ganeshgudi and Kadra. As shown in Figure-28, the Rank-size relationship of towns does not exist in full context, in the district. Some what akin relationship is noticed from class-II town (Karwar) to class-V town (Yellapur). There is wide gap of Rank-size relationship from Ambikanagar (class-V town) to Magod (class-VI town) when compared with hypothetical line. The functional classification of towns reveals Dandeli and Bhatkal.
as towns of Basic Functions like manufacturing and trade respectively. Karwar town being the district headquarter has specialization in other services (37.49), trade and commerce (20.62), fishing (18.53) manufacturing and repairs (8.49). In Sirsi trade and commerce (35.20) are dominant functions while other services, transport, manufacturing, construction and forestry are minor functions. Similar is the case with Kumta and Honavar towns. Haliyal town is predominated by agricultural labourer (122.90) while Yellapur town by cultivators (207.92). In Ankola town agricultural labourers (40.79), other services (28.90), and transport and trade are important functions. In case of fifth order town Binga, manufacturing (68.65), mining (53.22), cultivators (45.60), construction (33.49) and livestock (26.01) are important functions. The four towns viz., Ambikanagar, Ganeshgudi, Kadra and Magod are specialized in other services. Thus, only Dandeli and Bhatkal towns distinctly appear as towns of basic functions and rest of the 12 towns are non-basic towns. The urban sphere of influence is varying according to population size of each town, around each urban centre. The aspects of physical setting like relief, forest cover and rainfall conditions have distinct bearing in deciding the urban sphere of influence of each town. Dandeli and Sirsi towns due to highest population size are able to influence in a radius of 24 kms around them. The coastal towns are able to influence only in the coastal belt as Western Ghats act as barriers towards the east. The hierarchy of settlements of
Uttara Kannada District is worked out on the basis of functions performed. However the settlements of 2,000 population and above are considered for hierarchic analysis. The settlements having less than 2,000 population do not perform even the minimum functions, hence they exert very meagre influence around them. The urban centres have maximum number of service functions, hence they are separately studied as urban hierarchic orders. The hierarchy of service is determined by giving weightages to 52 functions grouped into 7 types viz., education, health, administration, finance/trade, industries, transport/communication and recreation/culture.

Through the composit weightages of services 92 rural service centres and 13 urban service centres are identified. The coastal region alone possess 55 centres, whereas the Semi-Malinad possess 18 and the Malnad possess 9 service centres. The distribution pattern of service centres shows dispersed pattern in all the three sub-regions of the district, being in association with the general pattern of settlements (dispersed).

It is necessary to know the regional disparities, whereby one can understand the strength of responsible factors in deciding the disparities. To measure the regional disparities in Uttara Kannada District 43 indicators belonging to infrastructural development (16 indicators), agricultural development (9 indicators), industrial development (10 indicators),
indicators) and demographic development (8-indicators) are considered. Based on the "Kendals' Rank Order Score" Method the levels of development are drawn, taluka-wise. The infrastructural facilities are very high developed in Karwar taluk, high in Kumta, Sirsi and Siddapur taluks, medium in Honavar and Yellapur taluks, low in Bhatkal and very low in Supa (Joída) Ankola, Haliyal and Mundgod taluks. The industrial development is very highly developed in Karwar, Honavar and Bhatkal, high in Kumta, medium in Ankola and Haliyal, very low in five taluks viz., Supa (Joída), Yellapur, Mundgod, Sirsi and Siddapur. The agricultural development is very high in Kumta, high in Sirsi, medium in Honavar, Siddapur and Mundgod, low in Bhatkal, Haliyal and Yellapur, very low in Supa (Joída) Karwar and Ankola taluks. The demographic development is very high in Kumta and Sirsi, high in Karwar and Siddapur, medium in Bhatkal and Haliyal, low in Honavar and Ankola and very low in Supa (Joída) Yellapur and Mundgod. The combined levels of regional disparities based on four groups of developments consisting of 43 indicators reveal Karwar and Kumta as very high developed taluks, Honavar and Bhatkal as high developed taluks, Siddapur as medium developed taluk, Sirsi low developed and Ankola, Supa (Joída) Haliyal, Yellapur and Mundgod as very low developed taluks.

THE MAJOR THRUST OF THIS RESEARCH is to suggest the improvement in the existing land-use patterns and situations
and to bring out spatial organisations and linkages for the entire systems of settlements in the district.

It is very much pertinent to note that the District of Uttara Kannada is part of Western Ghats as an ecological zone where land-use under forest should continue in its intensity although it is not possible to extend it. In this perspective the forest covered in different taluks should be fostered in its growth so that the density of forest will sustain biotic ecology and soil ecology. Degradation of forest resources on unscientific base has to be stopped so as to restore the lost ecology and environment in the central portions of Uttara Kannada District. In Semi-Malnad taluks the density of forest plants is to be increased and utmost care is needed to protect them continuously so as to foresee a dense forest in the near future. In this regard the people in the region have to be provided alternate fuel resources like L.P.G. Bio-Gas, solar energy etc., so that pressure on cutting of forest wood may be minimized. In the ongoing hydroelectric projects and other developmental projects the areas which have been cleared by forest are to be covered by new species of plants in some possible areas, where modern techniques of bio-technology are to be applied to ensure quick growth of plants. In the practice of horticultural crops like arecanut, coconut, pepper and cardamum use of green leaves as a manure is extensively done. Therefore in the vicinity of such plantations forest plants
which could yield more leaves are to be grown on intensive scale. The crop land use on the hill slope is of the type of terraced cultivation where bunds are the boundaries of each fragmented farm. In this system of bunded fields lot of land is wasted. This kind of wasted land can be regained by redrawing of field boundaries as suggested in chapter V. Thus land under agriculture can be increased. Similarly large quantity of wooden poles are abundantly used as a part of the fencing programme to protect the crops from cattle and other wild animals. This kind of fencing is done every year causing lot of damage to the forest wood and loss of labour and cost to the owners of the land. This type of practice is also not efficient in growing number of crops in the same field as the fencing may be lost in only one season crop. Therefore it is high time to bring permanent fencing by way of lateratic stone walls in the fields of the coastal areas, iron wire fencing in the remaining two regions, so that loss of forest could be reduced/eliminated in the district. The abandoned mining areas, ravine and gullied lands, lateritic exposers, degraded forest lands and cultivable waste-lands can be re-used preferably for forest growth. In this regard motivation of the land owners is to be done constantly. The abundant water resources of the district are to be used to generate hydro-power as early as possible so that it shall ensure industrial growth in the region. Right now, Karnataka Government is facing power shortage as a result of which industrial development in Uttara Kannada District is very
sluggish. The marine resources in the coastal area need further exploitation so as to develop fish based industries and economy of the coastal settlements. The mineral exploitation of resources in the district is causing great threat to the forest and soil ecology in the mining areas of the district. Therefore it will not be wrong if mining is completely abandoned in order to restore the biotic resources, in the district. The noise making and poluting industries should not be allowed to start in the district so as to sustain the entire plant and animal ecology in the natural hub of streams and tributaries of the district. The existing forest based industries like Paper Mill and Plywood Mill of Dandeli have to continue their efforts to bring afforestation continuously, in a sustained manner so that the effect of forest loss are minimal. The loss of forest due to fire and theft are also to be controlled on war footing. The grazing grounds for animals that are existing in the district are to be sustained and maintained so as to develop agro based animal husbandary that can give employment benefit to the growing youths in the study area. The agro-based trade and commerce are to be effectively managed at market centres and at rural service centres so as to encourage the economy. The maintainance and development of network of roads is necessary to ensure trade linkages within and outside the study area. The existing rural service centres need to be strengthened in order to serve the area around them and thereby to bring better spatial organisation of settlements in the region. The urban
centres have to ensure a specialization in some kind of function so that they can serve more area around them. This may also help specialized economies in the towns, consequently they may generate more employment opportunities to the growing population. The taluka-wise disparities in terms of infrastructural facilities, industrial development, agricultural development and demographic development are to be minimised, whereby we may find an uniform development of all the taluks. In this regard more thrust is laid on the development of very low developed and low developed taluks.

It is hoped that this study of "pattern of Land-use and settlements in Uttara Kannada District" will contribute in understanding the aspects of land-use, Cropping pattern, economy, hierarchy of settlements and regional disparities in particular. The analysis done in each chapter (from chapter-II to chapter-V) explains varied dimensions of problems of land-use and settlements of Uttara Kannada District. It can be ensured as a kind of micro-level indepth study in knowing the varied regional dimensions of distributed phenomenon in the region. Thus the analysis and the findings noted in this thesis will contribute in understanding the land-use patterns in association with man and his settlements in Uttara Kannada District. This topic of research continues to be dynamic in the study area as land-use and settlements are not static in their nature. Therefore the suggestions and findings are of present situations.