CHAPTER-VIII

SUMMARY, CONCLUSION AND RECOMMENDATION

The whole thesis reveals that, the unforgettable study of agricultural landuse in Aurangabad district. The study region is situated in upper Godavari basin and in the extreme north-west of Maharashtra. It is characterized by notable spatial variations in the ecological and socio-economic frameworks. The forms of agricultural activities and farm economy, as whole influenced in a large measure of relief, climate, drainage pattern and soils. It is very essential to examine the relationship between the physical factors and the various landuse, production and agricultural practices. The relief is an important element of the ecological setting, directly influencing land utilization and the degree of accessibility. Terrain and altitudinal different in the study region, which is set their stamp upon the agricultural land use of the study region and very well reflected in its cropping pattern.

Geographically, Aurangabad district is broadly divided into two regions -

1. Balghat of Uplands to the north.

2. The Shivana-the Godavari Basin to the south.

The Hills of Balaghat area is the continuation of the hill range of the same name in Vidarbha. There are important and noted hills namely, Daulatabad, Ajantha, Chowka and Jyptsha hills. All these have terrain like appearance with flattered summits; other hills are Satmala, Ajantha, Serpent hill, Sirmal hill. Their average height is about 2000 feet above the sea level, but some places they reach a height of about 3000 feet. The Shivana and the Godavari basins comprise the relatively low lying areas.
to the west and south of the Ajantha plateau. The shivana-the Godavari basin are exceeding fertile and almost the whole of its cultivated. The geological formation of the Aurangabad district has divided into three groups-

1. Middle Traps of the Deccan Tertiary
2. Other Alluvial Deposits of the Godavari

The lowest rocks belong to the great trppean region of the Deccan, which is roughly estimated to cover an area of 200000 sq.miles. They consist of a series of basaltic flows, all nearly presenting the appearance of having been so originally. In some part of Western Ghats, their vertical thickness is form 4000 to 5000 feet, but this is the thick end of the formation and the flows thin out towards the extremities in a series of broad edges. The rocks are believed to have been formed between the highest Mesozoic and the lowest Cainazoic period. The trap throughout the district consists mainly of agnatic lavas, comprising the various forms of basalt.

Most of the study region belongs to the Godavari drainage system. Only a small portion in the north belongs to the Tapi drainage. The Godavari is the most important rivers of the district, which runs along the southern boundary for about 203 km. separating Aurangabad district from Ahmednagar and Beed districts. Both banks of the Godavari River, the land is fertile and farmers are growing sugarcane as well as grapes in some area. Its tributaries are Kol, Narangi, Kalambi, Shivana, Dekhu, Yelganga, etc. Due to this tributaries water table at different places in the district has increased and when there is good rainfall. Farmers are benefited for improving crops. Purna is important river next to the Godavari. The Purna receives several large tributaries, the chief of the north bank being the Damna, and Kalina, and on the south bank the Ajana, the Girija and Dudna. The Purna and its tributaries are playing
significant role in the development of agriculture in the northern part of
the study area.

Climate is the most important physical factor, which affects the
agricultural activities of the region. There is no Meteorological
Observatories in the district. The climate of Aurangabad district is on the
whole dry except during the south-west monsoon period. The year may
be divided into four seasons-

1. The Cold Season from December to about the middle of
   February
2. The Summer Season lasting upto the end of May
3. The South-west Monsoon Season from June to September
4. The Post-monsoon Season in October to November.

May is the hottest month of the year. During the hot season the heat is
often intense and the day temperature in individual days rises to about
44°C to 46°C during the past decade.

Aurangabad district is one of the chronically drought-prone areas
in the country. It is located in the rain-shadow region in eastern part of
the Sahyadri in Maharahstra State. The average annual rainfall of the
district is about 571.9 mm. whereas, it ranges 682.90 mm. at Soyagaon in
north to 458 mm. at Paithan, Gangapur 533.30 mm. in south, 540.20 mm.
at Vaijapur in the south-west, 597.40 mm. at Kuldabad in the central part
of the district. It is worth mentioning that the district receives rain from
south-west monsoon. Coefficient of rainfall variability ranges from
28.19% to 39.30% in the district. It was highest in the Kannad (39.30%),
whereas, lowest variability was observed in Soyagaon tahsil (28.19%)
during the period of investigation.
The soils in the study region are essentially derived from trap rocks and can broadly be classified as:

1. Shallow Soils (0”- 9”)
2. Medium Soils (9” - 18”)
3. Medium Deep Soils (18” - 36”)
4. Deep Soils (above - 36”)

Shallow soils are found in the northern and north-western portion of the district. This soil is mostly poor, however, groundnut is abundant on account of spring along the foot of the scarp. Medium deep soils vary from dark gray brown to vary dark brown colour and are found scattered in the northern part of district. Deep soils are generally seen in the south and in the Godavari, the Purna, Dudhna basin. It is deep and fairly rich. In the Godavari valley especially along the river bank, it is very deep and fertile.

Area under forest is not significant in the district. Out of the total geographical area, area under forest various from 1.08% to 22.95%. Out of the total geographical area of the district, 7.84% area was under forest in 1990-93 and it was increased upto 8.01% in the year 2007-10. Below district average area under forest was recorded in Kuldabad, Sillod, Paithan, Gangapur, and Vaijapur tahsils in 2009-10, whereas, above district average forest area was registered in Aurangabad, Kannad and Soyagaon tahsils in the same period.

Population of the district increased from 4.42 lakh in 1901 to 28.97 lakh persons in 2001, with net addition of 24.55 lakh mouths. Decennial growth rates of population from 1901 to 1911 is increased by 20.13%, but in the preceding decade it decreased by 18.07%. Thereafter, population increased in every decade, after 1921 with varying rates. Highest increase occurred during 1981-91 when it registered a rise of 39.62% followed by 30.90% during 1991-2001. This continuous increase was made possible
by provision of improved health and supply of sufficient food and later by various development measures.

During 1991-2001, the highest rate of population was found in Aurangabad (45.13%) tahsil, whereas, Soyagaon (16.18%) tahsil has shown the lowest growth rate of 16.88%. Population growth rate of Kuldabad (21.59%), Kannad (24.90%), Sillod (18.18%), Paithan (19.08%), Gangapur (33.49%) and Vaijapur (18.26%) tahsils are observed between 1991-2001.

Table 3.3 revealed that the proportion of rural population to total population varies from 22.59% (2001) in Aurangabad to 100% in Soyagaon tahsil. Rural population was 67.24% in 1991, as against 62.45% (2001). All tahsils are recorded above 85% rural population, except Aurangabad tahsil in 2001.

Rural density, crude density, physiological density, agricultural density, caloric density varies from tahsil to tahsil in the district during 1991-2001. Rural density per sq.km. was 56 in 1991 and it was increased upto 62 in 2001. Agricultural density per sq.km. was 82 in 1991, and it was increased upto 93 in 2001. While caloric density per sq.km. was 82 in 1991 and it was increased upto 101 in 2001. Crude and physiological density was found 219 and 224 persons per sq.km. respectively in 1991, and it was increased upto 290 and 328 persons per sq.km. respectively in 2001.

The percentage of literate population in the district has gone up from 56.98% in 1991 to 72.90% in 2001, while rural literary rate was marked 47.48% and 67% in 1991 and 2001 respectively. The literacy rate varies from 28.39% and 51.60% in literacy rate among female was increased from 28.39% in 1990-91 to 51.60% in the year 2001. While male literacy rate was increased from 66.08% to 81.81% in the same year. The literacy rate above district average (67.0%) was marked in
Aurangabad (68.90%), Kuldabad (67.70%), Kannad (67.20%), Gangapur (68.50%) and Vaijapur (69.30%) tahsils and below district average was found in Soyagaon (65.20%).

There is one major project located in the district. The district is also benefited from Nandurga Major Project, which is located in Igatpuri tahsil of Nashik district. The Jayakwadi Major Project is constructed on the river Godavari near Jayakwadi village in Paithan tahsil. Total irrigation potentials of the project is about 263860 hectares Aurangabad, Jalna and Beed etc districts in Marathwada region are benefited by this project. The irrigation potentials of Nandurga Mahadeshwar irrigation project is 43500 hectares.

There are 17 medium irrigation projects in the study area. It is found that highest number of medium irrigation projects are found in Kannad tahsil (5), and lowest in Soyagaon, Kuldabad, Gangapur and Paithan tahsils. The total irrigation area of these medium projects are about 52555 hectares.

In 1990-91, there were 63330 irrigation wells, as against 69018 irrigation wells in 2009-10. It was increased upto 5688. Out of total wells about 96.25% wells were in use, on the other hand 3.55% wells were not in use in 1990-91. Number of wells in use were decreased upto 95.6% in 2009-10 and number of wells not in use were increased by 4.94%. Out of the total irrigation wells in Aurangabad district, about 15.86% wells were registered in Vaijapur tahsil, in the year 2009-10, while Aurangabad 14.30%, Kuldabad 6.3%, Kannad 15.51%, Soyagaon 7.4%, Sillod 12.22%, Paithan 14.09% and Gangapur 13.59% in the same year.

Table 3.9 indicated that in the beginning of the 1990-91, total irrigated area was 63566.33 hectares, which was 14.07% of the total cropped area. In 2009-10, the total irrigated area was increased upto 124432.22 hectares, constituting 17.21% of total cropped area.
It is observed that use of traditional implements is decreased; on the contrary the use of improved agricultural implements is increased in the district. About 42874 electric pumps were used for lifting water to agriculture in the district (2009-10). Number of tractors were increased from 1007 (1990-91) upto 2616 (2009-10), means there was marked 38.49% increase in number of tractors during the period of investigation. The number of wooden plough, bullock carts and oil engines are decline during the period under study. Number of electric pumps per hundred hectares of cultivated area varies from 0.06 in Ganagapur to 0.15 in Vaijapur tahsil in 1990-91, as against 0.11 Soyagaon tahsil to 0.54 in Kannad tahsil in 2009-10.

The proportion of cattle in the total livestock was ranked first in 1990-91 as well as 2009-10 in all tahsils of the district. The percentage share of cattle to total livestock population was increased from 47.37% in 1990-91 to 48.76% in 2009-10. The highest number of cattle population was found in Paithan tahsil (52.16%) and lowest in Aurangabad (41.88%) tahsil in 1990-91. In 2009-10, the highest number of cattle population was observed in Gangapur (60.11%) tahsil and lowest in Soyagaon (39.18%) tahsil. Cattle population was largely increased in Gangapur tahsil due to green fodder crops and increasing dairy activities.

Goat rank second, whereas, sheep rank fourth in livestock of Aurangabad district. The percentage share of goats in the livestock population was increased from 31.79% (1990-91) to 35.05% in 2009-10. Out of the total livestock below 34% changes in goat population was marked in Kuldabad, Ganagapur and Vaijapur tahsil, while 34% to 38% change marked in Kannad and Sillod tahsils, above 38% goat population was marked in Aurangabad tahsil. All tahsils in the Auranagabrd district has marked positive change in goat number, except Gangapur and Vaijapur tahsils between 1990-91 to 2009-10. Sheep shared about 8.37%
in 1990-91 to 7.65% in 2009-10. There was marked 9.41% decrease in the sheep population during the period of investigation. The highest number of sheep population was registered in Kuldabad tahsil (10.33% of the district total sheep population) and lowest in Vaijapur (4.30%) tahsil in 2009-10.

Buffaloes are third important type of livestock, and the percentage of buffaloes to total livestock population was increased from 6.76% in 1990-91 to 7.76% in 2009-10. Increasing demand of milk, trends of mixed farming and changing attitudes of farmer etc. are dominant factors responsible for increasing number of buffaloes.

The density of cattle population was varies from tahsil to tahsil, ranging from 56 to 89 cattle per 100 hectares of net sown area in 1990-91, as against 39 to 86 cattle per hectare of net sown area in 2009-10. Average district density of buffaloes was recorded to buffaloes per 100 hectares of net sown area in 1990-91, as against 12 buffaloes per 100 hectares of net sown area in 2009-10. Density of sheep per 100 hectares of net sown area is decreased from 12 to 21 during the period of investigation. Whereas, density of goat per 100 hectares of net sown area was marked increase from 47 to 50 between 1990-91 to 2009-10.

Total length of the district road was increased by 3.98 times in the study period. Out of the total length highest share was recorded under village roads and it was 42.60%. Highest positive change in road length was recorded under major district road (3.98%), whereas, lowest positive change was registered under National Highways (0.58%). Highest negative change in road length was experienced under village roads (5.17%).

Use of chemical fertilizers, high yielding variety seeds and modern agricultural implements is day by day increasing to greater extent. Therefore, agricultural structure has changed from food-grains to cash
crops. During 2009-10, the highest share of consumption of chemical fertilizers was recorded in Vaijapur (18.15%) tahsil and the lowest in Soyagaon tahsil (5.46%). The use of chemical fertilizers increased from 62180 M.T. in 1990-91 to 251499 M.T. in 2009-10.

There are 641 (Table 3.16) agricultural credit societies in the Aurangabad district. Out of the total agricultural credit societies about 18.27% societies were noticed in Gangapur tahsil, while 6.14% credit societies were registered in Soyagaon tahsil as on 31st March 2010. In loan advanced Kannad tahsil was ranking first, whereas, Soyagaon tahsil was last. Highest loan recovery was experienced in Soyagaon tahsil (98.86%). Loan recovery of Aurangabad, Kuldabad, Sillod, Paithan, Gangapur and Vaijapur tahsils were 82.94%, 81.41%, 97.82%, 95.12%, 70.91% and 96.65% respectively.

Table 3.17 reveals that in 1990-91, the lowest group occupying upto 0.5 hectare of lands consisting of 11.18% of households accounted for only 2.34% of area owned. In 2009-10 the same group consisting of 5.72% of households account for a slightly less share of land, which shows that marginal farmers share in number of holdings has decreased and their relative share in area has also declined. At the other end, the largest group owning more than 20 hectares accounting for 0.43% of house-holds in 1990-91, claimed 5.28% of land owned. In 2009-10, the same group (0.10% of house-holds) claimed 2% of owned land, which shows that over the period, this group also lost in their relative share both in number as well as in area.

In 2009-10, out of total consumption of electricity about 31.71% electricity was consumed by agricultural sector. All categories have shown negative change except agriculture and domestic. Agriculture showed 31.16% increase in its consumption between 1990-91 and 2009-10. Industrial sector showed about 22.18% negative change, on the other
hand domestic sector showed 1.82% positive change during the period under study.

The spatio-temporal investigation of the general landuse has revealed that the forest area has increased from 5.84% in 1990-93 to 8.17% in 2007-10. This shows that there is increase 2.33% in forest area during the period of investigation. Out of the total geographical area below 2% area was marked under forest in Paithan, Gangapur, Vaijapur and Sillod tahsils, whereas, 2% to 10% geographical area was registered under forest in Kuldabad and above 10% area was experienced under forest in Aurangabad, Kannad, and Soyagaon tahsils in 2007-10. Barren and uncultivable land in Aurangabad district was more (9.19%) than that of State average (8.8%) in 2007-10. There is remarkable variation in the distribution of land under this category. Below 3% positive change in area not available for cultivation was marked in Vaijapur, Kuldabad, Kannad and Sillod tahsils, whereas, above 3% positive change recorded in Soyagaon and Aurangabad tahsils during the period of investigation. Below 3% negative change was found in Gangapur tahsil and above 3% in Paithan tahsil during the same period.

Out of the total geographical area, below 4% geographical area found under cultivable land in Paithan, Gangapur, Vaijapur, Kannad and Sillod tahsils, while 4% to 8% area was observed in Aurangabad and Soyagaon tahsils and above 8% area was found in Kuldabad tahsil during 2007-10. The proportion of fallows land was marked 4.30% in 1990-93 as against 2.10% during 2007-10. It means that there was recorded 2.2% negative change in this landuse category during the period of investigation. Net are sown occupies the largest share, namely 77.44% in Aurangabad district’s general landuse pattern. It is more than as compared to Maharashtra’s average (60.4%).  

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During 1990-91, the highest per capita gross cropped area was marked in Vaijapur tahsil (0.60%), whereas, the lowest per capita gross cropped area was recorded in Aurangabad (0.13 hect.) tahsil.

In 2001, the highest per capita gross cropped area was registered in Vaijapur (0.52 hect.) tahsil and lowest in Aurangabad (0.07 hect.) tahsil.

Table 4.3 indicated that the proportion of land involves in change from one landuse type to another landuse in Aurangabad district accounted to 5.93%, which is indeed a low proportion of land involved in the process of land transformation. Aurangabad tahsil have shown dynamic (above 10%) change, whereas, semi-dynamic (5% to 10%) change in general landuse was recorded in Kuldabad and Soyagaon tahsils. Paithan, Gangapur, Vaijapur and Sillod (below-5%) have shown static change in general landuse between 1991-93 to 2007-10.

Low landuse efficiency (below-110%) was observed in Paithan, Vaijapur, Kannad, and Sillod tahsils. Both physical and non-physical determinants of agriculture are responsible for low efficiency. Medium efficiency (110% to 130%) was noticed in Gangapur and Aurangabad tahsils, whereas, moderate infrastructural facilities are available for agricultural development, whereas, high landuse efficiency (above-130%) was experienced in Soyagaon and Kuldabad tahsils during the period of investigation.

The cropping pattern in the study area is dominated by the food-grains. As much as 79.66% total gross cropped area was under these crops in 1990-93, as against 76.80% in 2007-10. The percentage share in gross cropped area of food crops are recorded 3.18% decrease during the period of investigation. In food-grains, major share is of cereals, occupying 57.69% (2007-10) and remaining 13.97% is under different pulses, while 28.34% total gross cropped was under non-food crops. Area under rice was decreased from 0.28% to 0.06% during the period of
investigation. Percentage growth during the investigation period recorded 74.10% decrease, where difference in percentage share declined upto -0.22% in the district. Cereals are marked 1.43% increase, while growth rate of pulses are declined 0.62% during the same period. Among the cereals highest increase occurred in area under maize. Difference in percent share is recorded 7.56% between 1990-93 and 2007-10. Considerable decrease has been marked in area under gram and other pulses. While increase in area under tur and mung are recorded during the period of investigation. It is observed that the area under sugarcane has increased, but its proportion in total cropped area decreases (0.02%). Area of oilseeds decreased by 35196 hectares or 35.52% growth over 1990-2010. The cotton has recorded increase share about 8.07% during 1990-2010. Same portion is of fodder crops, which is registered 63.01% growth and 0.09% share in area between 1990-2010. The average percentage growth rate of crops area, to total gross cropped area is marked 7.21% increase, but difference in percentage share of crop area has declined by 12.55% during the period of investigation.

According to Weaver’s Method, three crop combinations was recorded in Soyagaon tahsil, whereas, four crop combination was registered in Kuldabad tahsil, five crop combination was experienced in Aurangabad, Kannad, Sillod, Paithan and Vaijapur tahsils, six crop combination was found in Gangapur tahsil during 1990-93. During 2007-10 certain changes has been noted, four crop combination was recorded in Soyagaon and Sillod tahsils, while five crop combination took place in Kannad tahsil, six and seven crop combination were marked in Kuldabad, Paithan, Vaijapur and Aurangabad, Gangapur tahsils respectively. According to Rafiullah’s Method six crop combinations was found in study region in 1990-93, whereas, 2007-10 five crop combination recorded in the area under study.
Table 5.8 showed that the lowest crop concentration (0.04%) was registered in area under cotton in Vaijapur tahsil and the highest crop concentration (5.25%) was marked in area under maize in Sillod tahsil in 1990-91. The lowest crop concentration (0.02%) was observed in area under mung in Kuldabad tahsil and the highest crop concentration (4.53%) was observed in area under rice in Soyagaon tahsil during 2009-10. Spatial variation in degree of concentration in crop production are noticed to be the result of differential interaction between various factors, for instance physiographic, climatic, hydrological, socio-economic, technological in the Aurangabad district.

During 1990-91, the index of high diversification (below-15%) was recorded in Paithan, Aurangabad, Kuldabad and Sillod tahsils, whereas, moderate (15% to 18%) diversification was found in Gangapur and Kannad tahsils, and low diversification (above 18%) was registered in Vaijapur and Soyagaon tahsils. The crop diversification in the district was changed during 2009-10. No change in diversification was observed in Soyagaon, Kannad, Kuldabad and Aurangabad tahsils.

Table 6.1 indicates the present position of Aurangabad district in respect of yield rate of important crops. This is more revealing from the comparison of yield rates of important crops, such as, the yield rates of wheat, jowar, bajra, and maize in the district as ratios of their respective yield rates in the Maharashtra State are 1.68, 1.04, 1.11 and 1.40. It was found that, area under all cereals in the district is about 9.75% of the State, where the district produces 6.20% of the total cereals. Similarly, area and production of all pulses in the district constituted 2.93% and 3.01% of that of the State respectively. Cotton was occupied about 4.16% area and produces 9.83% of cotton, as compared to Maharashtra State in the year 2009-10. The share of district in area and production of
sugarcane are marked 2.37% and 3.06% respectively of that of Maharashtra.

The production of food grain increased from 577300 M.T. in 1990-91 to 864500 M.T. in 2009-10, recording 49.74% increase in twenty years. The growth of cereals has recorded much faster than pulses in production (2.75% against 0.79% per annum). In cereals, wheat and maize have recorded very high increase in production (103.01% and 265.78% respectively) during 1990-91 and 2009-10, whereas, jowar (34.27%), rice (100%), Bajra (20.16%) have shown negative growth. Gram occupying 4.97% of cropped area and producing 5.28% of food-grains, records an increase of 34.13% in area and about 109.62% in production during 1990-91 and 2009-10. The production of tur was marked 3.49% of food-grains, registered decrease of 27.08% in area but recorded increase of 224.73% in production during the same period. Production of mung, uddid and other pulses are recorded negative growth of production since 1990-91 to 2009-10, production of oilseeds except groundnut, which was declined during the period of investigation.

Table 6.4 gives us an idea about variability in area, yield and production of selected crops. The highest variability 63.96% was found in area of maize and the lowest variability (3.10%) were observed in area of sugarcane during the period of investigation. The highest variability of yield was found in tur (50.43%) and lowest in sugarcane (3.14%) during 1990-2010. Above 50% variability of production was recorded in uddid, mung, cotton, and sesame crops during the period of investigation.

The highest index number of rice was marked 82.53% in 1990-91, whereas, lowest index number of rice was noticed 31.37% in 2009-10. The index number of yield revealed decreased 68.63% in 2009-10 compared to the 1990-91. The highest index number of wheat was marked 152.29% in 2009-10, while lowest index number of wheat
recorded 92.29% during the period of investigation. The highest index number of yield of jowar was recorded 256.25% in 2004-05, whereas, the lowest index number was observed 99.53% in 2000-2001. Jowar yield was increased by 27.08% during the period of investigation. The highest index number of bajra was registered 135.96% in 2009-10 and lowest was marked 98.12% in 1995-96. The highest index number of gram was marked 177.01% (2009-10) and lowest index number was 103.83% in 2000-01. In the year 1990-91, yield of groundnut was 778 kg. and it was increased upto 989 kg. The lowest yield was found in 2000-01(584 kg.) and the highest yield was marked in 2009-10 (989 kg.). The highest index number of sugarcane yield was recorded in 1995-96 and it was 94.39%. The index number of sugarcane was increased by 27.41% during the period of investigation. Index number of cotton yield was above 100% in all considered years except in 1995-96. The highest index number of cotton was recorded in 2009-10 and the lowest index number (87.05%) of cotton was found in 1995-96.

Table 6.6 indicates that Gangapur tahsil ranking first in output of wheat in 1990-93, while in 2007-10, Paithan tahsil marked highest wheat production. The highest production of jowar was registered in Paithan (21.09%) and lowest output was found in Soyagaon (0.19%) tahsil in 1990-93. In 2007-10 highest output of jowar was observed in Gangapur (20.39%) and lowest in Aurangabad (10.26%) tahsils. In output of bajra, Vaijapur (16.67%) rank first and Kuldabad ranking last in during 1990-93, while in 2007-10, Vaijapur(20.46%) tahsil was ranking first and Gangapur tahsil remaining last in output of bajra. Below 3% positive change in maize output was marked in Vaijapur tahsil and above 3% change was recorded in Kuldabad and Sillod tahsils during the period of investigation. Aurangabad was ranking first in production of gram, uddid, mung during 2007-10. Gangapur was ranking first in production of
sugarcane, while Sillod tahsil stood first in cotton production during the same period.

Aurangabad, Paithan, Gangapur and Vaijapur tahsils have shown negative change in wheat production and it was varies from 2.84% to 13.44% during the period of investigation. Positive change has been observed in wheat production in Kuldabad, Kannad, Soyagaon and Sillod tahsils. Positive change in jowar output was marked in Kuldabad, Kannad, Soyagaon, Sillod, tahsils, whereas, negative change was recorded in Aurangabad, Paithan, Gangapur and Vaijapur tahsils. Aurangabad, Kannad, Soyagaon, Sillod and Paithan tahsils shown positive change in production of gram and Kuldabad, Gangapur and Vaijapur tahsils recorded negative production of same crops. Positive change of sugarcane output was registered in Aurangabad, Kuldabad, Kannad, Soyagaon, and Sillod tahsils, whereas, negative change in sugarcane production was found in Paithan, Gangapur, and Vaijapur tahsils during the same period. Cotton production showed positive change in Kuldabad, Soyagaon, Paithan and Gangapur, while negative change in output of cotton took place in Vaijapur, Sillod and Kannad tahsils since 1990-93 to 2007-10.

The high productivity of crop is largely affected by good irrigation, consumption of fertilizers, mechanization etc. in the district. It is observed that Paithan, Gangapur, Vaijapur tahsils etc. which are located in the Godavari and Shivana valleys. Away from the river course the productivity reduces correspondingly with the decrease of soil quality and intensity of irrigation. Tahsils of northern part namely, Kannad and Sillod have recorded low level of productivity and Soyagaon and Kuldabad tahsils were recorded very low level of agricultural productivity. These tahsils have rugged topography, limited irrigation development. As compared to southern part of the district northern part of the district has
remained as a weaker and agriculturally backward. During 1990-93, Kannad, Kuldabad, Soyagaon and Sillod etc. recorded low overall productivity. But during 2007-10, Sillod, Kannad, tahsils have moderate and low overall productivity respectively.

According table 7.1 shows that the decennial growth rates of population in selected villages as a whole is 17.88%. Rawala (36.34%) has the highest decadal growth rate, whereas, 12.18% is the lowest decadal rate in Naigaon village, followed by Tisgaon(15.19%), Belgaon(22%) and Mandgaon(12.33%) population growth rate. The highest crude density was marked in Tisgaon (28.8%) village and lowest in Belgaon (100%).

Table 7.2 indicate that below 10% of net sown area under irrigation was marked in Belgaon (5.10%), Rawale (6.20%) and Mandgaon (9.80%) villages, whereas, 10% to 20% area under irrigation to net area sown was found in Tisgaon (18.60%), Khandi Pimpalgaon (13.20%) during 2009-10. Above 20% net sown area under irrigation was recorded only in Naigaon (38.10%) village. The positive change has found in each of the selected villages in percentage of net irrigated area to net sown area.

The percentage share of cattle to total livestock population has decreased from 32.60% in 1990-91 to 30.66% in 2009-10. Number of cattle population was decreased in Tisgaon, Belgaon, Rawala, and Khandi-pimpalgaon villages, whereas, it numbers are increased in Naigaon and Mandgaon villages during the period of investigation. Khandi-pimpalgaon rank first in 1990-91, while Rawala rank first in 2009-10, in buffaloes population. There was considerably decrease in number of sheep during the period of investigation. Naigaon, Belgaon and Khandi-pimpalgaon villages showed positive change in the percentage of sheep, while negative change was recorded in Tisgaon,
Rawala, and Mandgaon villages. Rawala was ranking first in the goat population in the total livestock, whereas, of remaining five villages were ranking second in the goat population as compared to total livestock.

The highest percentage share of wooden ploughs was registered in Tisgaon village and lowest percentage share was noticed in Belgaon village during 2009-10. Tisgaon, Naigaon and Mandgaon showed positive change in the percentage of iron ploughs, while Belgaon, Rawala and Khardi-pimpalgaon villages registered negative change in the percentage of number of iron ploughs.

The highest share of bullock carts was noticed in Rawala village and lowest share was recorded in Tisgaon village during 2009-10. The percentage share of electric pumps was below 40% in Khandi-pimpalgaon and Mandgaon villages during 2009-10, while 40% to 45% share was found in Naigaon village, whereas, above 45% share was recorded in Tisgaon, Belgaon and Rawala villages during the same period.

Out of the six selected villages, three villages namely, Tisgaon, Belgaon and Mandgaon villages had marked increase in forest area during the period of investigation. Whereas, Naigaon, Rawala and Khandi-pimpalgaon had recorded slight decrease in area under forest. The area not-available for cultivation ranges from 3.47% (2009-10) in Belgaon village to 17.70% in Mandgaon. Tisgaon, Belgaon, Naigaon, Mandgaon, and Khardi-pimpalgaon have marked negative change in the landuse of this category during the period of investigation. Other uncultivable land varies from 1.26% in Naigaon village to 21.75% in Khardi-pimpalgaon village during 2009-01. Out of six selected villages four villages namely, Tisgaon, Belgaon, Rawala and Mandgaon indicates that the area under this landuse category has been declined during the period of investigation. All selected villages shown negative change in
fallow land since 1990-91 and 2009-10. All villages considered under study indicated that an increase in the net sown area during the period of investigation except Belgaon village. It ranges from 1.08% to 4.07% during the period of investigation.

Table 7.5 indicated that out of selected six villages, jowar, occupies the first rank in the cropping pattern of the five villages. The lowest area under bajra was observed in Belgaon (10.79%) village, while highest area was recorded in Rawala (24.88%) village. Below 3% positive changes was found in Tisgaon, Naigaon, and Mandgaon villages. Below 3% negative change was noticed in Rawala and Khandi-pimpalgaon villages. Above 3% negative change experienced in Belgaon village between 1990-91 and 2009-10. The highest percentage of net sown area was found under wheat in Naigaon village and lowest in Rawala village during 2009-10.

All selected villages were shown positive change in area under wheat. Out of six selected villages, Tisgaon, Belgaon and Khandi-pimpalgaon showed zero percentage area under rice. The lowest percentage share in Maize crop was noticed in Rawala (3.17%) village, while highest percentage share was marked in Belgaon (5.55%) village during 2009-10.

Below 4% net sown area under gram was marked in Belgaon, Khardi-pimpalgaon and Mandgaon villages, while 4% to 6% area was found under gram in Tisgaon, Naigaon villages. Above 6% area under gram was registered only in Rawala village during 2009-10. Tisgaon village was ranking first in area under tur, while Mandgaon village rank least in area under tur. Belgaon, Khardi-pimpalgaon, Tisgaon and Mandgaon villages had shown below 2% positive change in area under mung, whereas, below 2% negative change was noticed in Naigaon, Rawala villages during the period of investigation. The highest
percentage share in uddid crop was marked in Khardi-pimpalgaon (7.21%) village and lowest percentage was marked in Mandgaon (2.09%) village 2009-10.

Tisgaon and Rawala had recorded below 3% area under groundnut, while 3% to 5% area was marked in Belgaon, Khardi-pimpalgaon villages during 2009-10. Above 5% area was recorded in Naigaon village during the same period. All selected villages were recorded negative change in area under javas except Mandgaon village during the period of investigation.

Below 3% area under sugarcane was registered in Tisgaon, Rawala, Khandi-pimpalgaon and Mandgaon villages, while above 3% area was marked in Naigaon and Belgaon villages during 2009-10. Both positive and negative changes noticed in area of cotton. Below 2% positive change under cotton was marked Naigaon, Rawala, Khardi-pimpalgaon and Mandgaon villages and below 2% negative change was found in Tisgaon, Belgaon, villages between 1990-91 and 2009-10.

RECOMMENDATIONS

In the context of the finding stated above, some recommendations for improving agricultural landuse have been made under…..

Due to the high density of population, over emphasis on land utilization was observed in most part of the district. This intensive type of farming, resulted in depletion of soil quality and allied problems, therefore, the priority should be give for the development of other economic sectors in the study region.

The conversion of agricultural land into no-agricultural use is serious problem in the study area. In order to check such conversion, there should be fakes major steps to stop shrinkage of agricultural land.
It is observed that not only holdings are small in district, but also they are highly scattered, involving a lot of wastage of labour in movement from one tiny piece to another, farmers cannot concentration on improvement. This problem can be solved by the consolidation of holdings, which means the reallocation of holdings, which are fragmented. Farmers who have very small holdings should give up their land and shift to other occupations in the district.

To overcome the problem of erratic rainfall, it is very essential to percolate the each and every drop of rainwater in the soil. To stop the surface running water in the region, more percolation tanks, more Kolhapur Type bandhare and field tanks should be constructed in each and every village in the district.

It is very essential to increase the irrigational facilities in Soyagaon, Kuldabad, Kannad, tahsils. Natural situation cannot be change, but effective use of available water plays vital role to overcome the problem of less irrigation region. Government should be under take new medium and minor irrigation schemes. New irrigation techniques such or drip irrigation, sprinkle irrigation should be made available to the farmer on subsidy, so that most of the farmers can get benefit of it. Adequate agricultural inputs should be providing about proper use of water and fertilizers.

For the development of the livestock wealth the population cows of indigenous breed and cross breed cow should be developed through the number of establishment of breeding centres in district.

The electric motor pumps are important water lifting devices. Therefore, cheap and assured power supply should be made available to the farmers.
In regard to landuse, the district has recorded poor proportion (8.17%) of the forest cover and there has been a considerable deforestation in almost all the tahsils. Therefore, require special attention, it is felt that there should be made aware about deterioration of resources and their short term and long term consequences.

Landuse capability maps need to be prepared for better utilization of land and water resources of the district.

To solve the problem of drought prone area, maximum rainwater should be captured and retain. New drought tolerant varieties which grown quickly after sowing should be used preferably in the district. Farmers of the district should turn towards rearing of livestock and horticulture.

Inspite of all efforts in recent years, average agricultural production in the district per hectare is still one of the lowest as compared to Western Maharashtra. To increase agricultural productivity, farmers should be attention towards crop rotations, soil erosion should be stop by using various measures. Fertilizer, pesticides and improved seeds should be made available on reasonable prices to the farmers. Modern techniques and implements should be used for the cultivation.

Almost all farmers are unawareness about government schemes. The government should give regular information about schemes and programmes regarding agricultural development to the farmers through media. Gramsevak and talathi should give direct information about the government schemes to the farmers’.