CHAPTER –VIII
SUMMARY AND CONCLUSION

It is the summary of the analytical study of the impact of irrigation on land use especially on agricultural land uses and other related aspects of socio-economic studied in the previous chapters. While summarizing, the chapter provides a brief on the major conclusions of the study. The conclusions are however presented under various relevant headings

8.1 Summary:-The study has been on the impact of irrigation on the land use of Bellary district. The period of analysis is three decades, with respect irrigation but land use studies for the period of 2001 to 2011. The focus of the study is the impact of irrigation on agricultural land uses, crops and cropping patterns and socio-economic welfare of farmers in the district.

Irrigation development and expansion, in the Indian context, has been conceived as a developmental strategy for the incidence of poverty is inversely related to the rate of growth of crop output and irrigation. Investment in irrigation has therefore been a means of eradicating rural poverty.

The study has been based on both the primary and secondary data. A sample of farmers has been chosen for the primary survey. Simple techniques such as Anova, T-test, crop combination, concentration, ranking and correlation, have been applied for the analysis, irrigation impacts on land use in general and agricultural land use in particular and on the socio-economic condition of the farmers in the district.

The present study is organized in to eight chapters. The first chapter includes Introduction, significance, objectives methodology and the design of the study. The second chapter provided a descriptive account review of literature. The third chapter provided a descriptive account of the study area. The fourth chapter is on water resources, source and efficiency of irrigation in the district. The fifth chapter has examined general land uses. The sixth chapter on agricultural land use utilization types and cropping patterns, crop ranking and combination with some quantitative analysis. The seventh chapter has examined demography and settlement pattern of the district and also studied the socio-economic impact of farmers of the district. The eight chapters is the summary and conclusion of the study.
8.2 The findings are summarized as follows:

Chapter-4-Water resources and irrigation

Irrigation in the Bellary district has been studied in three decades of 1991, 2001 and 2011. Study includes Source wise Spatio temporal analysis and efficiency of irrigational source with Anova and t-test.

1. In all the three decades there is no much variation in the irrigated area of the district as well as taluks. In the total irrigated area of the district there is a short fall of 19 (-0.012%) hectares in the year 2001 but it has increased to 9.04% with an area of 13852 in the year 2011.

2. Like Bellary district the taluks of Bellary and Siraguppa there is slight decrease in the irrigated area when compared 1991 to 2001 with a negative growth of -15.47% and -6.25% respectively so as in the case percentage in change in rest of the taluks there is increase in the irrigated area compare to 2001 to 2011.

3. The taluks which recorded negative growth and change in percentage of irrigated area for the decade of 1991 were recorded highest growth and change in percentage in the decade of 2001 to 2011 likewise Kudligi which was recorded least in 1991-2001 stands third in the growth rate for the next decade.

4. Canal irrigated area was concentrated in five taluks of seven of the Bellary district, namely Bellary, Hospet Sandur Siraguppa and Hagribomanahalli. It has come down to four when the canal irrigation was disappeared in the taluk namely Hagribomanahalli in 2011.

5. High concentration of canal irrigation is located in the taluks of Tungabhadra Project command area development which includes the taluks of Bellary, Hospet and Sirguppa. Sandur also lies in the same but not having remarkably the area under canal as the rest above mentioned three taluks.

6. Kudligi ranks first in well irrigation followed by Hagribomanahalli, Hadagalli, Sandur, Hospet and Bellary in all the three decade. Kudligi’s main source is well irrigation it almost 100% (99.66%) in 2011,
7. The interesting point in the well irrigation is in its share, it is increased from decade to decade in the district as well as in all the taluk except Hospet where there is a small percentage of 0.27 is decreased in 2001 compared to 1991 but in the next decade of 2011 its share has increased.

8. Well irrigation is dominant in the area where channel irrigation is not prominent or completely absent and the taluk which have more well irrigation have less of canal irrigation.

9. In Belary and Siragupaa taluk the change in percentage of irrigation by well is highly noticeable it was 150.53% in Bellary and 281.87% in Sirgauppa. In Hospet it is 60% but in all three taluks canal is prominent.

10. The area under tank irrigation not only Bellary district but even in all the taluks has come down in all the three decades.

11. For the decade of 2001 to 2011 all the taluks of the district records a negative change in percentage of irrigated area by tank. Highest of -100% is in Kudligi followed by Hospet with -74.53%, Sandur by -48.30% and Hadagalli with -29.45%.

12. Area irrigated by other source reveals that, Hadagalli, Hospet and Siraguppa taluks are having some prominence in the irrigated area by other source in all the three decades but its presence is not found in the taluk of Bellary and Kudligi. Sandur records only 0.05% in 2011-12.

13. There is a negative change in percentage of irrigated area by other source for the decade 2001-2011 -100% , -83.82% and -53.12 respectively in the taluks of Hadagalli, Hagarobomanahalli and in Hospet, whereas in Bellary and Sandur it is zero.

14. The decreasing trend or negative change in percentage of irrigated area by other source is the sign that farmers of Bellary district irrespective of taluks are not progressive to adopt the change in source of irrigation especially in the drier parts of the taluk where the change is very much needed.

15. Canal irrigation is not at all found in Hadagalli and Kudligi in all the three decade, whereas well as a source of irrigation is found in all the taluks in all the three decade. In Bellary and Kudligi irrigated area by tank is not noticed in
all the three decade same in the case of irrigated area by other source in Bellary and Kudligi. Hospet is only the taluk in Bellary district is having all the four types of source of irrigation in all the three decades.

16. The irrigation pattern of the district in turn reflects on the agricultural cropping pattern and crop production of the taluks. The taluks which are having canal irrigation as a major source Paddy and Sugarcane is dominant crops and the yield is also more with good socio-economic condition, so as in the case of well. But in rest of the area farmers cultivate dry crops for which they will not ready to take much of the risk as well as to spend huge amount which reflects on the yield of crop and their socio-economic condition.

17. Non-availability of canal irrigation in Hadagalli taluka the intensity of dryness was more. The high change in Bellary taluk is due to wide spread canal irrigation.

18. In conclusion form the above spatio temporal analysis it can be noticed that canal irrigation is a major source of irrigation in Bellary, Hospet and Siraguppa. Well in Kudligi, Sandur, Hadagalli and Hagari Bomanahalli. Tanks mainly noticed in Sandur.

**Landuse chapter five**

1. Five of the seven taluk of the district. Only Hadagalli and Kudlagi registered a positive growth in net sown area. Hadagali with 63.81% in 2001 registered highest area in 2011 with a positive growth of 68.25%, same in case of Kudlagi it has increased its share in 2011 from 51.38% (2001) to 56.10%. Bellary which registered highest area in 2001 under this category was 71.70% has come down to second with 56.21% in 2011. Siraguppa which was second in 2001with 64.89% the area decreased to 51.75% in 2011 same way in H.B. Halli area has come down from 53.85% to 49.45% in 2001 to 2011. A marginal decline is noticed in Hospet the area has come down from 37.34% to 36.70%, so as Sandur with 36.11%in 2011 decreased to 29.91% on 2011. The reasons for such decrease in net sown area of these taluka are vary

2. Bellary district is known for its drought in the state so that the cultivation of crop under rain fed conditions is most erratic and uneven from season to season and also from taluk to taluk. In Sandur taluk the mining activity is
more profitable than the tillage hence there is reduction in arable land. On the other hand, the remaining taluks like Bellary and Hospet even though canala irrigation is dominant some due to seepage and marshyness by irrigation some of the area was left out as fallow. In case of Hadagalli and Kudlagi the arable land has increased because of well irrigation.

3. The volume of change in net sown area for two decade of 2001 and 2011 is less significant as the area vary is very less. Bellary highest of 21.75% to the total net sown area in 2001 also stands highest in 2011 with 22.94% followed by Kudlagi with 18.11% and 21.63% in respective decades. Siraguppa which was in third position with a share of 14.93% comes down to fourth with 13.62%. Hadagali the area has increased in 2011 from 13.36% to 15.89%, the change in volume of percentage not noticed in H.B. Halli as its percentage remains same with 11.65% in both the decade. In Hospet and Sandur it varies from 9.69% to 8.27% and 7.52% to 6.81% in the respective decades.

4. Bellary and Siraguppa have lost much of its net sown area from one decade to other even though the canal is a major source of irrigation, probably due to decrease in the amount of rainfall. It is highest of -21.60% in Bellary and -20.28% in Siraguppa. H.B. Halli registered with -8.17%. Hospet also irrigated by canal, the area has not come down drastically as negative growth rate is -1.7%, the least of -0.02% in Sandur. In Hadagali and Kudlagi taluks much of its area irrigated by well registered a positive growth of 6.90% and 9.16%.

5. Land use change in Forest is not noticed. The area remains same in all the taluks of the district in both the decade. Hospet records highest with 26.74% of its area under forest. Least is noticed in the taluk of Bellary with 1.71% of the total geographical area of the taluk. It is natural because Bellary district is known for its arid and semi-arid condition. The forests, in fact, are very poor both spatially and qualitatively. Taluk wise percentage area under forest to the geographical area indicates next to Hospet, Sandur (25.55%), kudaligi (21.87%), Hadagalli (4.99%) Hagaribommanahalli (4.59%) and Sirguppa (2.08%) follow.
6. The volume of percentage in forest Kudalagi has highest share with 34.69% of the district followed by Hospet, Sandur, Hadagali, H.B.halli and Belllary. Siraguppa represents least.

7. Siraguppa had the highest area under fallow land in both 2001 and 2011 with a percentage of 19.88 and 29.42 which accounts to 20386 and 34042 hectares to its total geographical area and Bellary stands second with 16.06% and 23.75%. Kudlagi records least for both the decade with 8.14% and a drastic decrease with 0.51%. Hadagalli had the percentage of 14.18% in 2011 but decreased with a percentage of 6.83% in 2011 same in change is noticed in Hospet taluk also it was 12.30% in 2011 and 2.24% in 2011. The area under fallow land in H.B. halli was 12.61% in 2001 and has increased to 15.73% in 2011.

8. The volume of percentage identifies except in Bellary and Siraguppa in rest of the taluk the area under fallow land has decreased from 2001 to 2011. Bellary has highest share with 25.19% and 38.26% of the district followed by Siraguppa with 19.23% and 29.24% for the decade of 2001 and 2011 respectively. The least share of 8.93% was Sandur and shifted to Kudlagi with 0.78% in 2011.

9. The change in absolute percentage for the decade of 2001 to 2011 indicates that the area under fallow land has increased only in tow taluks namely Bellary and Siraguppa with a percentage of 47.83 and 34.14 respectively in rest of the taluk the area has decreased. Kudlagi has lost much of its area under fallow with a negative growth of – 93.65% followed by Hospet (-81.14%) Hadagalli (-67.79%), H.B.Hall (63.18%) and Sandur (3.26%).

10. Agricultural land use in the district is decreasing as the area of Land not available for cultivation is increasing. The taluk wise analysis shows that during 2001 and 2011 Sandur has highest area of 26.35% and 32.88% of this category of land followed by H.B. Halli with 25.75%in 2001 and Hospet with 26.73% in 2011. The lowest was found in kudlagi taluka with 12.07% in 2001 and in 2011 Siraguppa records with 12.75%.

11. Land not available for cultivation is increased in all the taluks. H. B. Halli with 20.59% in 2001 records highest area come third position with 16.06% in
2011. Sandur which stood second with 20.37% in 2001 records highest with 18.94% in 2011. Siraguppa with 7.84 % and 8.11% records least in both the decades. The area under this category in Bellary was 13.23% in 2001 and 17.92% in 2001.

12. The change in absolute percentage of land not available for cultivation for the decade of 2001 to 2011 clearly explains that the area under area not available for cultivation has increased in all the taluks. Bellary with highest of 81.63% followed by Hospet (66.95%), Siraguppa (39.55%), Sandur24.76%), Kudlagi(24.07%) and Hadagali with 22.68. The least is recorded in the taluk of H.B.Halli with 4.64

13. The taluk wise change in area under cultivable waste indicates that Bellary, Hadagalli, H.B.Halli and Hospet taluk have increased its share while in the remaining taluks of Kudlagi, Sandur and Siragupp the area remains same in both the decade. Hospet records highest in 2001 and 2011with 7.60% and 7.61% to its total geographical area under this category followed by H.B. Halli with 3.18% and 3.26% in 2001 and 2011. In Hadagali the area has increased only with one hectare but the percentage for the decade is very negligible so as in case of Bellary.

14. The volume of percentage of area under cultivable waste of each taluks to the total cultivable area of the district indicates the volume of change for two decade of 2001 and 2011 is not so significant as the area is almost same in both the decade in almost all taluks. Kudlagi with 35.00% has the highest area under this category followed by Hospet (21.27%), Siraguppa(12.5%), Hadagali(11.89%) and Sandur with (4.96%). The least is Bellary with (4.90%) in both the decade.

15. The change in absolute percentageof area under cultivable waste for the decade of 2001 to 2011 clearly shows that the area under this category, growth is not significant as the area remains same in 2001 and 2011 except in Bellary and H.B. Halli. Bellary registered highest of 4.9. % followed by H. B. Halli(2.63%), Siraguppa (0.23%), Kudlagi(0.06%) Hospset(0.04%), and Hadagali with 0.02%.In Sandur the area is not changed as the area remains same in both the decade.
16. The land use of the district reveals that a negative change of -5.58% in net sown area and decrease in fallow land of -2.67% for the decade of 2001 to 2011. But the area not available for cultivation and cultivable waste has increased in its share with 34.14% and 0.33% respectively. The areas decreased in net sown of -38911 hectares and -2889 hectares of fallow land has been compensated by the area increased in area not available for cultivation with an increase of 41688 hectares and cultivable waste of 122 hectares.

17. The results of Anova and t-test reveal that the dominant source of irrigation played a major role on the land use of the district. Taluks of Bellary, Hospet and Siraguppa where the canal irrigation is predominant has much influence of net sown area, same as on fallow land, and cultivable waste where canal irrigation can reduce the area of these two category. In case of Hadagali, H.B. Halli, Kudlagi and Sandur well is major source of irrigation has much impact on net sown area, and can reduce area of fallow land and cultivable waste by bringing them back to agriculture. The tank as a source irrigation in Hadagali, Hospet, Kudlkagi and Sandur and other source of irrigation is predominant in Hospet and Siraguppa has its impact on land use in general and net sown area in particular.

18. It is also observed that the area under Fallow land is increasing in 2011 due to the increase of saline land with canal irrigation.

**Agricultural land use sixth chapter**

1. Irrigation brings changes in cropped area under various crops. In the period 2001 to 2011 In Bellary district the total cropped area of rice was 18.63% accounts to 81613 hectares in 2001, while it has risen to 25.18% in 2011, with an additional increase in the area of about 22656 hectares. Canal irrigated taluks dominates in cultivation of paddy. Siraguppa has more than 50% of its cropped area under paddy and registered highest (50.89% and 59.10% respectively) in both 2001 and 2011 followed by Hospet with 36.13% and 52.88% and Bellary 20.94% and 41.12% respectively for the decades. The least of 3.3% in Sandur to the its cropped area in 2001 and in 2011 Kudlagi had the least of 2.98% to its total net sown area.
2. Ragi is not an important cereal of Bellary district. Its area has decreased from 5857 hectares accounts to 1.33% in 2001 to 5472 hectares in 2011. Kudlagi is the only taluk which has some prominence for Ragi cultivation but its area has also increased from 5.00% in 2001 to 5.64% 2011 with an addition of 1708 hectares. In rest of the taluks like Hadagali, H.B. Halli Hospet and Sandur the cropped area of Ragi is less than one percent to the total cropped area of respective taluks and the cultivation of Ragi is not at all excited in both the decade of 2001 and 2011 in the taluks of Bellary and Siraguppa.

3. Jowar as a staple food crop of the district its share of 20.0% amounts to 87631 hectares in 2001 and has come down to 12.45% in 2011 with a decrease of almost 50% of the area under this crop (36046 hectares). Out of seven taluks except in Kudlagi in rest of six taluks namely Hadagalli, Bellary, Sandur, H.B.Halli, Siraguppa and in Hospet area under Jowar has come down compare to 2001. In2001 Hadagali had the highest of 18670 hectares accounts to 30.84% its net sown area under Jowar in while in 2011 Kudlagi has increased its share from 15.34% in 2001 to 19.95%, in 2011.Least area in 2001 and 2011 was siraguppa.

4. Bajra had an area of 17089 hectares accounts to 3.90% of the total cropped area of the district in 2001 and has risen to 27248 hectares with 6.58% to the total cropped area of the district in 2011. Except in dry taluks of Hadagalli and Kudagi in all five taluks the area under Bajara has decreased. In 2001 Hadagali had lest of 1.24% of its net sown area under Bajra accounts to 783 hectares but it had increased its share in 2011 to 4.81%. Sandur with highest percentage had 1839 hectares accounts to 9.27% of land under Bajra in 2001 and the same has been in 2011 to 7.45%. Kudlagi had the 2.74% of its total cropped area under Bajra in 2001 and recorded highest of 15.59% amounts to 13974 hectares in 2011. There is no much difference in the taluk Bellary between two decades but records lest in2011 with 1.26% of its net sown area under this crop.

5. The total cropped area Maize of the district was 44701 hectares in 2001 with 10.2% and has increased to 28.23% in 2011 with an area of 116910 hectares. Sandur had the highest area in both decade with 16.8% of the total cropped area of the taluk amounts to 5728 hectares in 2001 and it has increased to
58.85% with 16615 hectares in 2011. In both the decade Siraguppa records least area under this crop with 2.12% and 0.51%.

6. These Minor Millets losing its importance in the district as its area has drastically decreased in all the taluks. During 2001 the district had 13609 hectares amounts to 3.1% of the total cropped area of the district and has reduced to 0.77% which accounts to 3200 hectares in 2011. In 2011 except Hospet and Sandur with 1.63% and 2.578% in rest all the taluks it has come down to less than 1% to its net sown area.

7. The area under pulses has shown an increasing trend in the district had an area of (3.49%) 15325 hectares in the year 2001, whereas it rose to 6.35% amounts to 47,506 hectares in the year 2011. The taluk wise analysis indicates that except in H.B.Halli, Hospet and in Sandur taluk all other four taluks have increased their area under pulses. In 2001 the least area of 0.54% of its net sown area reported from Siraguppa whereas it rose to 2.98% in 2011. Bellary registered highest of 11.75% of its cropped area under pulses in 2011 where it was 6.95% in 2001. Hadagalli and Kudlagi taluks have also improved its area under this crop from 2001to 2011.

8. The area under groundnut shows a drastic declining trend from 2001 to 2011 in all the taluks of the district. The district had an area of 55770 hectares in 2001 whereas it was reduced to 11532hectares 2011 that is from 12.73% to 2.78% the maximum reduction was in Kudlagi taluk which was from 48.33% in 2001 to 9.73% in 2011. Bellary registered least of its 0.43% in 2001 to 0.06% in 2011. In other taluks namely Hadagalli, H.B.Halli, Hospet Sandur and Siraguppa groundnut lost its importance.

9. The total cropped area of sugarcane in the district for the year 2001 was 7266 hectares and has increased to 8466 hectares in 2011 that is from 1.65% to 2.04%. Hospet is the only major taluk having cultivation of sugarcane and dominates in both decades with a percentage of 13.03% to 13.67% from 2001 to 2011 to its net sown area, followed by H.B. Halli with 1.9 in 2011 to 2.25% in 2011. In rest of the taluks in 2001 its area is not worth mentioning but in 2011 Hadagali,and Sandur have increased its area in cultivation of this crop from 0.093 to 3.13 in Hadagali and 0.01 to 6.0% in Sandur. Bellary registered
least of its net sown area of 0.008% in 2001 and 0.05% in 2011 for sugarcane cultivation.

10. The area under cotton has come down in all the taluks except in Bellary. Bellary district had an area of 51504 hectares (11.76%) in the year 2001 and has reduced to 44831 hectares (10.82%) in 2011. Spatio temporal analysis of cotton indicates the maximum increase of area under cotton was in Bellary taluk which rose from 4.68% in 2001 to 17.79% in 2011 of its net sown area. In 2001 the cropped area of cotton in Hadagali was 14.52% of its net sown area and reduced to 8.01% in 2011, same way in H.B. Halli it decreased from 13.67% to 5.36% and in Hospet it is from 7.73% to 3.12%. The highest area for cultivation cotton to the net sown area of the taluks is from Siraguppa in both the decades. But percentage has reduced from 25.36% to 22.07%. In Kudlagi and Sandur also the area decreased under cultivation of this crop can be noticed.

11. The district had an area of 37765 (8.62) hectares under oil seeds crops in the year 2001 whereas it drastically reduced to 2698 hectares (0.65%) in 2011. In all the taluks of the district the cropped area under oil seeds has decreased. The area under this crop was 27062 hectares which accounts to 22.32% of the net sown area of the taluk in 2001(map 6.12) where as it has drastically reduced to 0.20% in 2011. H.B.Halli had the area of 8.02% in 2001 and has reduced to 2184 hectares of its net sown area accounts to 4.5% in 2011. Kudlagi which had least of 0.87% of its net sown area under the cultivation of oil seeds in 2001 has reduced to 0.03% in 2011. In Sandur the area for oil seeds in 2001 was about 3.11% but it has reduced to 0% in 2011. The general observation for the decade of 2001 to 2011 shows that the oil seeds are losing its importance in all the taluks of Bellary district.

12. The district had an area of about 19779 hectares of land under net sown area which accounts to 4.51% and has reduced to 11291 hectares (2.72%) in 2011. Bellary registered 10.45% of its net sown area under this category in 2001 followed by Hospet, Siraguppa. Sandur. In Hadagalli and H.B.Halli it was less than 2%. Kudgali had 1.4% of its net sown area under these crops where as in 2011 it rose to 6.13%. Other important taluks in 2011 are
H.B.Halli (4.12%), Bellary (2.54%) and Hadagalli with 1.35%. In the rest of taluks it is less than 1%.

13. Volume of percentage of paddy in 2001, Sirguppa had the highest area of 42.19%, followed by Bellary 31.09% and Hospet 15.45% where as in 2011 Bellary restored the first with 37.47% followed by Siraguppa 30.58% and Hospet with 17.38%. Kudlagi which had least area of 0.99% in 2001 has increased its share to 2.56% in 2011.

14. Out of seven only the taluk Kudlagi has highest of 57.27% of area under Ragi of the whole district in 2001 and 88.14% in 2011. In 2011 in Bellary and Siraguppa the area under this crop is not at all excited where as it was 0.08% in Bellary in 2001.

15. Bellary taluk had the highest area of 38.86% under Jowar out of the total Jowar cultivated area of the district in 2001 but its position has come down to third with 16.98% in 2011. Kudlagi has increased its area from 11.73% in 2001 to a highest of 34.65% in 2011. The other taluks which are increased area under Jowar are H.B. Halli which had 8.75% in 2001 increased to 12.38% followed by Hospet from 3.02% to 4.51% in 2011 and Siraguppa from 6.96% to 9.84%. In Hadagali and Sandur the area under Jowar has decreased from 21.30% to 17.28% and 9.35% to 6.32% respectively.

16. In 2001 Hadagali had least of 4.58% to the total cropped area of Bajra in 2001 and rose to 11.43% in 2011. Kudlagi which had 10.76% of the total cropped area of Bajra in 2001 ranked first (51.28%) with more than 50.00% of the district cropped area of Bajra in 2011. H.B.Halli which had highest area of 24.35% in 2001 lost much of its Bajra cultivated area in 2011 with 13.24%. H.B. Halli and Hospet are the other taluks where the area under Bajra decreased and lest area under Bajra in 2011 is Hospet with 3.98%.

17. In 2001 Bellary with a percentage of 27.67 stood first in the total Maize cultivated area of the district followed by Hadagali with 21.98% and Kudlagi 15.92%. The least area under Maize for the total district cropped area of Miaze in both the decade of 2001 and 2011 was Siraguppa with 0.79% and 0.98%. Where as in 2001 Hadagalli which was second registered highest of the total Maize cultivated area in 2011 with 25.58%.
18. In 2001 H.B. Halli, Hospet, Kudlagi and Sandur had some noticeable percentage of area under minor millets crops accounts to 5.21%, 6.34%, 3.95% and 6.07% respectively to the total min or millets cropped area of the district but in 2011 except Hospet and Sandur with 1.63% and 2.578% in rest all the taluks it has come down to less than 1%.

19. Compare to total pulses cropped area of district of 2001 to 2011 the area under pulses has increased in Bellary, Siraguppa, H.B.Halli Kuddalgi and Siraguppa but it has decreased in Hospet, and Sandur. H.B.Halli had the highest area of 35.07% under this crop in 2001 whereas in 2011 it is Bellary with 42.47% and the least of 2.55% in Siraguppa in 2001 and 1.38% in Hospet in 2011.

20. The variation in volume of percentage for two decade under the area of groundnut Kudlagi has increased its area under this crop to the total groundnut area of the district. It is highest of 58.03% in 2001 to and 75.64% in 2011. In Hadagali it has decreased from 15.47% to 11.33 in2011 same is noticed in H.B.Halli and Sandur. The least of .94% in Bellary in2001 where as it shifted to Siraguppa in2011.

21. Even though the area under sugarcane is decreased from 62.55% in 2001 to 55.38% 2011 in Hospet it had highest area under this crop in both decades tot the total sugarcane cropped area of the district. While Hadagali is the only taluk which had increased its share form 7.76% to 24.00%. In rest of the taluks in 2001 its area is not worth mentioning but in 2011 Hadagali,and Sandur have increased its area in cultivation of this crop from 0.093 to 3.13 in Hadagali and 0.01 to 6.0% in Sandur. Bellary registered least of its net sown area of 0.008% in 2001 and 0.05% in 2011 for sugarcane cultivation.

22. Siraguppa had the highest area of 33.32% of the total cotton cultivated area of the district in 2001 it has reduced to 26.56% in 2011. Bellary increased its share from 11.02% to highest of 37.72% in2011. Hospet in both decade had the lest area under this crop to the total cropped area of the district

23. Bellary had the highest area under oil seeds in 2001 to the total oil seeds cropped area os tge district while it has gone to H.B.Halli in2011 at the same time the lest area was Siraguppa in2001 while in 2011 Sandur with 0%.
24. Bellary registered highest of 64.04% of the total cropped area of other crops of the district in 2001. While in 2011 Kudlagi has the highest of 48.64% of the total of other cropped area and least of 1.33% in Siraguppa. Only the taluks which has increased its area in 2011 under these crops are Hadagali, H.B.Halli and Kudlagi.

25. Out seven taluks except in Kudlagi and Hadagali in rest of the five taluks the net sown area has decreased the maximum can be noticed in Bellary with -21.60% followed by Siraguppa with -20.28% Sandur -17.15%, and H.B.Halli with -8.17% least of -1.71% in Hospet. Only Kudlagi with highest of 33.74% and Hadagali with 6.96% showed a positive growth in their net sown area.

26. Even through the net sown area of the district has come down the area under paddy has increased to 27.76% in the district. Kudlagi has shown highest of 227.69% followed by Hadagalli (108.64%), Sandur (81.06%) Bellary (53.95%) and Hoospet with 43.84%. H.B. Halli and canal irrigated taluk of Siraguppa registered a negative growth of -7.52% and -7.40% respectively.

27. The area under Ragi has come down to -1.91% in the district. Kudlagi is the only taluk where the area under Ragi has increased to 50.90% rest of the taluk have shown a negative growth. Bellary has -100% followed by Sandur -72.90%, Hadagalli 72.31%), Hoospet -70.38% and H.B. Halli with -70.23%. respectively.

28. Except in Kudlagi in rest of the taluks the area of Jowar has shown a negative growth. The district Bellary as a whole registered a negative growth of -41.13%. Map 6.26 indicates a least of -12.15% in Hospet followed by -33.63% in Siraguppa and in H.B.Halli it is -16.72%. In rest of the taluks namely Bellary, Hadagalli and Sandur it’s more than 52.22%.

29. Bellary district as a whole registered a growth of 59.44% under Bajra. Out of seven taluks the maximum area has increased is in Kudlagi with 659.86% followed by Hadagali with 297.95%. Rest of the taluks the area of Bajra has shown a negative. Varying from percentage of -33.31(H.B.Halli) to- 33.39% (Sandur)

30. Maize is the only crop which indicates a positive growth in all the taluka of Bellary district. District as a whole showed a positive growth highest among
all crops of 161.53%. Maximum area has increased is in H.B. Halli with 289.25% followed by Kudlagi with 252.97% Siraguppa 229.31% Hadagali 204.39% and in Sandur 190.06%. In rest of the taluks Bellary and Hospet it is 22.92% and 56.87% respectively. The results show that Maize is gaining importance in the district as major crop of dry farming.

31. Minor Millets in the district as a whole registered a growth -76.48%. In all the taluks the area under these crops decreased. Maximum of -92.81% in H.B.Halli followed by -81.94% in Siraguppa and in Kudlagi and Hospet (map6.27) it is around -75%. Bellary and Hadagali it’s more than -60%.

32. Except in H.B. Halli, Hospet and Sandur in rest of the taluk the area under pulses has increased Bellary district as a whole it increased to 71.61%. The maximum of area increased is 865.42% in Bellary taluk followed by Siraguppa with 311.47% and Kudlagi with 118.51%. H.B.Halli and Hospet with a negative change.

33. Groundnut is the other crop which indicates a negative growth in all the taluka of Bellary district. District as a whole showed a growth of -79.32%. The maximum area has decreased is in Sandur with -94.28% and lest of 73.04% in Kudlagi. In rest of the taluks it is around 80% to 90% it shows that the groundnut as crop losing its importance.

34. Sugarcane registered a growth of 16.51% in this crop. Sugarcane as an important irrigated crop has shown highest of 259.01% increase in Hadagali followed by Hadagali followed by 190.00% in Bellary 6.5%in H.B.Halli and 3.00% in Hospet. Kudlagi,Sandur and Siraguppa registered a negative growth of -71.09% , -100.00% and -37.37% respectively. It is interesting to note that even through Siraguppa a canal irrigated taluk the area under sugarcane has come down but it has increased in Kudagli as well as a source of irrigation.

35. Cotton experienced a negative growth of -12.95% probably due to lack of rainfall in the district. Except in Bellary and Kudlagi in rest of the taluks the area under this crop has shown a negative growth. The positive change is highest of 197.74% in Bellary taluk followed by 10.00% in Kudlagi. Negative growth is reflected in the taluks of H.B.Halli with -63.94% followed
by Sandur-62.05%, Hospet with 60.34% Hadagali -4099% and Siraguppa with -30.61%.

36. Oil seeds showed a negative growth of -92.89%. H.B. Halli and Siraguppa the change in this crop is more than 50% where as in rest of the taluks like Bellary Hadagali Hospet Kudlagi and Sandur it around 100%. This reveals that the oil seeds have no importance in the Bellary district.

37. Other Crops has shown a negative growth of -42.91%. Except in canal irrigated taluks of Bellary Hospet Sandur and Siraguppa in rest of the taluks where well as a source of irrigation or rained areas this crop has increased its area. Kudlagi has shown an increase of 482.50% followed by H.B.Halli with 104.41% and in Hadagali it is 32.72%. Highest of negative change-99.33% in Siraguppa Bellary and Hospet it is around 80% and in Sandur it is 75.14.

38. In the district Cereals increased by 23.43% because the cereals are drought resistant and as such they are cultivated both in dry and wet tracts so that the area under these crops can be more. The area under pulse has drastically increased to 71.61%. The decreased in the cropped area oil seeds with -84.78%, Cash crops by -10.82% and other crops by -42.91%. The decrease in the area under oil seeds cash crops and area under other crops are compensated by the increase in the area of cereals.

39. In the cropped area of Cereals Minor Millets of the district records a negative growth highest of -76.48%, followed by Jowar-41.13% and Ragi with least records least among the cropped area with -1.91%. A huge decrease is shown in the cropped area of oil seeds by -92.85% followed by Ground nut with -79.32% and in cash crops Cotton has lost its area with -12.75% and other crops with -42.91%.

40. The positive variation is noticed among the area of cereals of the district especially in the cropped area of Maize which highest of 161.53% followed by an increase in cropped area of Bajra with 59.44% and paddy with 27.76%. An increase in the area of other pulses can be noticed with an increase 71.61% and in cash crops Sugarcane has improved its area with 16.51.

41. District as a whole the area of irrigated crops has been increased in the cropped area of paddy as well as in sugarcane. The area in oil seeds and
groundnut area has been decreased with an increase in the area of other pulses. Among the dry crops of cereals the area of Ragi, Jowar and Minor Millets area has been compensated with an increase in the cropped area of Maize and jowar.

42. The hypothesis is accepted in Anova test for both the decade as difference is considered to be not quite statistically significant with value of $P=0.0689$ for 2001 and $P=0.4905$ in 2011 means there is no much difference in the irrigated area and cropped area of paddy.

43. The hypothesis is rejected in Anova test for both the decade as difference is considered to be very statistically significant with value of $P=0.0060$ for 2001 and $P=0.0298$ means ragi is not an important irrigated crop in the taluks of Bellry district.

44. The hypothesis is accepted in 2001 but rejected in 2011. Difference is considered to be not statistically significant with value of $P=0.2542$ for 2001 and as difference is considered to be statistically significant with value of $P=0.0419$ in 2011. Anova results which shows Jowar is not an important irrigated crop in the taluks of Bellry district.

45. The hypothesis in Anova test is rejected in 2001 and 2011. Difference is considered to be statistically very significant with value of $P=0.096$ and $P=0.0172$ which shows that Bajra is not an important irrigated crop in the taluks of Bellry district.

46. The hypothesis is rejected in 2001 but accepted in 2011. Difference is considered to be statistically significant with value of $P=0.0336$ for 2001 and as difference is considered to be statistically not significant with value of $P=0.2980$. Anova test results which shows Maize is gaining importance in the taluks of Bellary district.

47. The hypothesis is rejected for both the decade. Difference is considered to be statistically very significant with value of $P=0.078$ and $P=0.0108$. Irrigated area is more but area under Minor Millets is less which shows that Minor Millets is not an important irrigated crop in Bellary district.

48. The hypothesis is rejected in 2001 and for 2011. Difference is considered to be statistically very significant with value of $P=0.078$ for 2001. The Anova
results show that Minor Millets is not an important crop in general and as an irrigated crop in Bellary district.

49. The hypothesis is rejected for both the decade. Difference is considered to be statistically significant with value of $P=0.0117$ for 2001 and $P=0.0147$ in 2011 means irrigated area is more but area under groundnut is less which shows that groundnut is not an important irrigated crop in Bellary district.

50. The hypothesis is rejected in Anova for both the decade. Difference is considered to be statistically significant with value of $P=0.0065$ for 2001 and $P=0.0139$ in 2011. Irrigated area is more but area under sugarcane is less which shows that sugarcane is not an important irrigated crop in Bellary district.

51. The hypothesis is rejected in Anova for both the decade. Difference is considered to be statistically significant with value of $P=0.0462$ for 2001 and $P=0.0467$ in 2011 which shows that cotton is not an important irrigated crop in the district of Bellary.

52. The hypothesis is rejected in Anova for 2011. Difference in Anova test considered to be statistically very significant with value of $P=0.0001$ for 2011 which shows that oilseeds are not important irrigated crops in Bellary district.

53. The hypothesis is rejected for both the decade in Anova. Difference is considered to be statistically significant with value of $P=0.042$ for 2001 and $P=0.0265$ in 2011. Irrigated area is not obsolete to total net sown in Bellary district.

54. In Bellary district irrigation is having more impact on irrigated crops paddy only where the hypothesis is accepted in Anova test in both the decade even though sugarcane a very good commercial and irrigated crop can be cultivated with the help of the irrigation it is not an important irrigated crops in the district so as in the case of ragi. As per the Anova results the other crops are rain fed crops.

55. The results of t-test reveals that canal irrigation in Bellary taluk has tremendous impact on paddy, Ragi, Jowar and Sugarcane as the hypothesis is accepted with a value more than $P=0.0969$ there is no much significant impact
of canal irrigation on other crops and hypothesis is rejected as difference is statistically significant.

56. Canal irrigation in H.B. Halli taluk has no much impact on crops except few crops like Minor Millets, Other Pulses and Cotton the hypothesis is accepted. Irrigated crops like Paddy, Ragi, and Sugarcane with other crops like Bajra, Maize, Groundnut and Oil seeds do not have any impact and t-test is rejected as the difference is statistically significant. Canal is not a major source of irrigation in this taluk.

57. The t-test results reveals that canal irrigation in Hopset taluk has its impact on crops like paddy, Ragi, Maize Sugarcane and Cotton as canal is a major source of irrigation and the hypothesis is accepted with a value more than P=0.0742 difference is statistically not significant. For other crops hypothesis is rejected as difference is statistically significant.

58. The t-test results of Sandur taluk reveals that no much impact of canal irrigation on major crops except few crops like Ragi, Jowar and Cotton the hypothesis is accepted with a value more than P=0.1742 t-test is rejected as the difference is statistically significant for other crops.

59. The t-test reveals that canal irrigation in Siraguppa taluk has its impact on crops like paddy, Sugarcane and Cotton as the hypothesis is accepted with a value more than P=0.2933 difference is statistically not significant. For other crops hypothesis is rejected as difference is statistically significant.

60. Well irrigation in Bellary taluk has no much impact on crops as area irrigated by well is very less. Except irrigated crops like paddy and sugarcane for rest of the crops like Ragi, Jowar, Bajra, Maize Minor Millets, Other Pulse, groundnut, Cotton and oil seeds the hypothesis is accepted with value more than P=0.1675 as difference is statistically not significant. A hypothesis is rejected for other crops as difference is statistically quite significant.

61. Well irrigation in Hadagali taluk has its impact on crops like paddy, Ragi, Maize, groundnut and cotton as well as a major source of irrigation the hypothesis is accepted with a value more than P=0.0567 difference is statistically not significant. For other the hypothesis is rejected as difference is statistically significant.
62. Well irrigation has its impact on crops like Ragi, Maize, Groundnut and Cotton in H.B. Halli and the hypothesis is accepted with a value more than P-0.0566 difference is statistically not significant. The hypothesis is rejected as difference is statistically significant for other crops.

63. Well irrigation is not a major source of irrigation in Hopset but has its impact on crops like Ragi, Jowar, Bajra, Maize, Minor Millets, Other Pulses Cotton and Oil Seeds and hypothesis is accepted with a value more than P-0.0729 difference is statistically not significant. And hypothesis is rejected as difference is statistically significant for other crops.

64. Well irrigation has its impact on crops like Paddy, Ragi, Jowar, Bajra, Maize, Minor Millers, Groundnut and Cotton in Kudlagi taluk and the hypothesis is accepted with a value more than P-0.0563 difference is statistically not significant. The hypothesis is rejected as difference is statistically significant for other crops.

65. Well irrigation in Sandur taluk has its impact on crops like paddy, Ragi, Jowar, Bajra, Maize, groundnut and cotton as well is a major source of irrigation the hypothesis is accepted with a value more than P-0.0528 difference is statistically not significant. The hypothesis is rejected as difference is statistically significant for other crops.

66. Well irrigation in Siraguppa taluk has no much impact on crops as area irrigated by well is less. The crops like Jowar, Bajra, Maize are important crops of well irrigation in this taluks and the hypothesis is accepted with value more than P=0.1750 as difference is statistically not significant. Hypotheses are rejected for other crops as difference is statistically quite significant.

67. Tank and other sources of irrigation is not a major source of irrigation in Bellary district so its impact on crops is not so significant in t-test.

68. Three crops such as Jowar, Groundnut and Paddy as first ranked crops in 2001 whereas Paddy retained its first rank with Maize in 2011. Jowar is identified as first rank in Bellary, Hadagali and in Sandur followed by Paddy in canal irrigated taluks of Hospet and Siraguppa. Groundnut identified in H.B. Halli and Kudlagi. Paddy is only crop which retained its position in 2011 with an increase in the area of 49095 hectares and a significant improvement in the
cultivated area adding additional area from the taluk of Bellary. Maize in 2011 ranks first in Hadagali, H.B.Halli, Kudlagi and Sandur.

69. Oilseeds is identified as second rank in Bellary in 2001. Jowar ranks second in both decade in H.B.Hali and in Kudlagi even though two more taluks Hadagali and Sandur added to earlier taluks the area under this crops comes down in 2011. Cotton even though cultivated in only one taluk Siraguppa in 2001 where as in 2011 it is in Bellary and Siraguppa. Maize an important crops of the dry irrigation gaining its importance in Bellary district. In 2001 it was cultivated as a second rank crop only in two taluks namely Hadagali and Sandur in 2011 and found only in Hospet as second rank crop. Sugarcane as a second rank crop which was cultivated in canal irrigated taluk of Hospet in 2011.

70. Paddy is identified as third rank in canal irrigated taluk of Bellary in 2001 and in 2011 it is found in Hadagalli and H.B..Halli. Jowar ranked as third crop only in Siraguppa in 2011. Sugarcane which was not 2001 but identified as a third rank crop in canal irrigated taluk of Hospet in 2011.

71. Other crops as fourth ranked found in Bellary in 2001 where as it is substituted to Other Pulses as fourth ranked crop in 2011 in Bellary and Hadagali. Groundnut was identified as fourth rank crop in Hadagali and Sandur in 2001 and existed in Kudlagi taluk in 2011. Cotton retained its position in both decade as fourth ranked crop. In 2001 in Hadagali and Sandur and in 2011 even though it retain its rank area has come down and identified in Kudlagi. Maize ranked as fourth in H.B.Halli in 2001 only. Jowar which was not represented in 2001 is identified as fourth rank crop in 2011 in Hospet.

72. Maize as fifth ranked crop identified in Bellary in 2001 where as it disappeared in 2011. Other Pulses as fifth ranked crop was identified H.B. Halli and Hadagali in2001 but its spatial distribution and area was restricted to Siraguppa in 2011. Ragi was identified as fifth ranked crop only in Kudlagi only for the decade of 2001. Bajra identified as fifth rank crop in Sandur in 2001 and in Hospet in 2011. Jowar in 2001 was identified as fifth rank crop in Hospet and in 2011 in Bellary. Other crops were identified as fifth ranked
crop in Siraguppa in 2001 and in Kudlagi in 2011. Cotton and Paddy are fifth ranked crop which was not represented in 2001 is identified in 2011.

73. The sixth ranked crops recognized for two decade in the Bellary district were Oilseeds, Minor Millets, Cotton and Bajra in 2001, and six crops are recognized as sixth ranking crops like Cotton, Bajra, Other crops, Maize and Other Pulses in 2011. The crops which were in 2001 Minor Millets were replaced by other three new crops such as Other crops, Maize and Other Pulses in 2011.

74. The seventh ranking crops for 2001 were Bajra, Other Pulses, Paddy, Minor Millets, and Sugarcane and the five crops for 2011 as seventh ranking crops are like Ragi, Sugarcane Other crops, Minor Millets and Bajra. The crops which were in 2001 Other Pulses and Paddy were replaced by other two new crops such as Ragi and Other crops in 2011.

75. Five crops such as Paddy, Other crops, Ragi, Other Pulses and Groundnut has been recognized as eighth ranking crops for 2001 and four crops such as Other Pulses, Groundnut, Minor Millets, and Other crops for. Paddy and Ragi which were ranked as eight in 2001 were disappeared in 2011 and Minor Millets has been recognized.

76. Five crops have been recognized as ninth ranked crops for the year 2001 such as Minor Millets, Bajra, Other Pulses and Oilseeds. Whereas Paddy, Groundnut, Other crops, Oilseeds and Ragi for the year 2011. Oilseeds are the only one crop which was identified in 2001 also represented in 2011 but spatially in different taluks.

77. Six crops has been identified as tenth ranked crops for 2001 were Minor Millets, Bajra, Oilseeds, Other crops, Sugarcane and Groundnut. Whereas in 2011 crops restricted three as tenth rank crops are Sugarcane, Groundnut and Minor Millets. Sugarcane and Groundnut are identified in both the decades in same taluk as well as from other taluks.

78. Two, five, seven, and eight crop combination has been identified in table for 2001 and in 2011 two, five and eight combination has been noticed.

79. Only in one canal irrigated taluk Siraguppa in both the decade two crops combination of irrigated crop paddy and dry irrigated crop Cotton
80. Only in one canal irrigated taluk Bellary five crops combination is existed with the highest of cropped area for both the decade. Jowar+Oilseeds+Paddy+Othercrops+Maize combination is found for 2001 which reveals that irrigated crop paddy had the combination with rain fed crops. Where as in 2011 irrigated crop paddy has the combination with rain fed crops Paddy+Cotton+Maize+Other Pulses+Jowar. The total cultivated area of these five crops has been reduced compare to 2001.

81. Seven crop combination is identified only in two out of seven taluks of the district for 2001 and they are Hadagali and Sandur. The seven crops combination in Hadagali are Jowar+Maize+Cotton+Groundnut+Otherpulses+ Oilseed+Paddy it revealse that combination of all the seven crops in Hadagali taluk except paddy as lost in combination are rain fed crops. Where are as in Sandur all seven crops are rainfed crops Jowar+Maize+Cotton+Groundnut+Bajra+Minor Millets+Other pulses.

82. Eighth crop combination is identified in two out of seven taluks of the district for both the decade in two taluks of H.B. Halli and Kudlagi. The Eight crops combination in H.B.Halli for 2001 are Groundnut + Jowar + Cotton + Maize + Otherpulses + Oilseed + Bajra + Paddy it revealse that combination of all the eight crops in H.B. Halli taluk are rain fed crops except Paddy. Where as in 2011 spatially differed in Kudlagi all eight crops are rainfed crops Maize + Jowar + Bajra + Groundnut + Others + Cotton + Ragi + Otherpulses are grown.

83. The net sown area shows positive correlation with canal (0.354) and well (0.43) irrigation and all the crops have positive correlation especially with Sugarcane (0.758*) Ragi (0.836**) and Jowar (0.759*). The net sown area in the district shows strong negative correlation with tank and other source of irrigation (-0.501 and -0.541) and in the crops cotton has negatively correlated with net sown area with a value of -0.354. This fact explains that the increasing in net sown area does not proportionally increase the area under tank and other sources of irrigation and in the crops with cotton.
84. Irrigated area shows a strong positive correlation with canal (0.935*) tank and other sources of irrigation whereas with well negatively correlated (-0.288). Irrigated area and all the crops except Sugarcane (0.528) groundnut and oilseeds have negatively correlated (table 6.22). Strong negative correlation with paddy (-0.738) Ragi(0.761*) and Jowar (0.708*).

85. Canal irrigated area shows a strong positive correlation with Tank (0.012)and other sources (0.648) of irrigation and negatively correlated with well (-0.548) whereas in the crops positively correlated with Paddy (0.817) Minor Millets (0.215) groundnut (0.384) and Cotton (0.118) Negatively correlated with Sugarcane (-0.425) Rag i(-.714*) Jowar (-0.699) Bajra (-0.722*) Maize, Pulses, and Oilseeds.

86. Well irrigated area negatively correlated with tank (-0.05) and other sources of irrigation (-0.357). Where as in the crops strong positive correlation excited with Bajra (0.708*) followed by Jowar (0.266) other pulses (0.179) groundnut and oil seeds. The crops like Paddy (-0.637) Sugarcane (-0.047) Ragi (-0.366) Maize (-0.095) Minor Millets (-0.206) and Cotton (-.618) have negative correlation with well irrigation.

87. Tank irrigated areais positively correlated with other sources of irrigation (0.37) and in crops strong positive correlation with Maize (0.954*)followed by Bajra (0.362) other pulses (0.179) groundnut and oil seeds. Rest of the crops are negatively correlated such as Paddy (-0.013) Sugarcane (-0.212) Ragi (-0.317) Jowar (0.315) Minor Millets (-0.449) Cotton (-.472) and oilseeds.

88. Irrigated area by other sourceshas strong positive correlation with crops such as Paddy (0.757*)followed by groundnut (0.863*) and Maize (0.239).With respect to other crops (table 6.22) it is negatively correlated.

89. Area under Paddy shows a positive relation with Groundnut (0.445) and Cotton (0.579) with respect to other crops it is negatively correlated. A strong negative correlation is found with Ragi (-0.845) and Bajra (-0.860*) and least correlation with Oilseeds (-0.258).

90. Area under Sugarcane has strong positive correlation with Ragi (0.848**), Jowar (0.912**), and with Pulses (0.962**) and least positive correlation with
Bajra (0.06) and Maize (0.022). With respect to other crops it is negatively least correlated.

91. Area under Ragi has strong positive correlation with Jowar (0.882**), and Pulses (0.890**) and moderate positive correlation with Bajra (0.461) and least positive correlation with Minor Millets (0.192) and Oilseeds (0.082). It is negatively moderately correlated with Groundnut (-0.468) and Cotton (-0.42) and least negative correlation with Maize (-0.187) and Minor Millets (0.192).

92. Area under Jowar has Strong positive correlation existed with Pulses (0.937**), moderate positive correlation with Bajra (0.328) and least positive correlation with Maize (0.059) and Oilseeds (0.0064). It is negatively moderately correlated with Cotton (-0.452), Groundnut (-0.335) and least negative correlation with Minor Millets (-0.224).

93. Area under Bajra has moderate positive correlation with Oilseeds (0.329) and least positive correlation with Maize (0.38) and Pulses (0.111) and negatively moderately correlated with Cotton (-0.669) and least negative correlation with Minor Millets (-0.03) and Groundnut (-0.238).

94. Area under Maize has negatively correlated with other crops such as Minor Millets (-0.509), Pulses (0.186), Cotton (-0.398) and Oilseeds (0.316) except with Groundnut (0.249).

95. Area under Minor Millets has negatively correlated with other crops such as Pulses (0.038), Groundnut (-0.491), and Oilseeds (0.295) except with Cotton (0.363).

96. Area under Pulses has negatively correlated with Groundnut (-0.252), and Cotton (0.394) except with Oilseeds (0.0.24).

97. Area under Groundnut has negatively correlated with Cotton Except with Oilseeds (0.006).

98. Area under Cotton: has negatively correlated with Oilseeds (0.27).

99. As per multiple regression percentage of Canal, Percent Groundnut, percent of Oilseeds, percent of tank, and percent of Ragi associated with total irrigated area. For example \(y/x) = 0.915\) for every one unit of X (canal) 0.915 unit of total irrigated area will be affected positively.
Demographic Character and Socio-Economic Impact chapter seven

1. In Bellary district the highest population is in Bellary taluk with 31.31% followed by Hospet and Kudligi with 18.37% and 12.65% Nearly 62.00% of the district population concentrated in three taluks the rest of the 40% of the population distributed in other four taluks namely Siraguppa (10.95%), Sandur (10.86%), Hadagalli (8.15%) and Hagari bomanahalli (7.75%) This is mainly due to employment opportunity in mining and manufacturing in Bellary and Hospet.

2. Mining towns of Hospet Bellary had the highest density of 509 and 457 persons per square kms. Rests of five taluks have less than the district average. Least of 193 persons are found in H.B. Halli with no urban concentration.

3. The composition of male and female shows not much variation it is either high or low with less than around 0.1%. Female concentration is slightly high with less than 0.17% in Bellary and 0.11% in Hospet in rest of the taluks male population is more than the female.

4. Rural concentration is very high of 63.69% to urban composition of 36.31% of the district average. Out of seven taluks three taluks namely Hadagali, Hoispet and Bellary are having more than the district average of urban population. It is very high in Hadagali with 86.49% followed by Hospet 57.89% and in Bellary 51.37%. The four reaming taluks namely H.B.Halli, Kudlagi, Sandur and Siraguppa are dominated by rural population which are having more than the district averag. The rural population Hagaribomanahalli is 100%, followed by Kudligi (83.54%), Siraguppa (69.55%) and Sandur (71.74%) whereas in Bellry, Hadagali and Hospet the composition of rural population is 47.51%, 49.22 and 42.10% respectively.

5. The scatter diagram shows that there is a clear association between irrigation intensity and density of rural population. The regression line (Y = 109.83+3.782x) drawn, also indicates the relationship between the two factors mentioned above.

6. The correlation coefficient between the irrigation ratio and density of population has a value of +.847 indicating a high positive association.
7. The district has an average density of 6.14 villages per 100 sq kms. Siraguppa and Hospet have shown higher density of villages than the district average. The remaining taluks such as Bellary, Hadagali, H.B.Halli, Kudlagi and Sandur have indicated a low density of villages which is less than district average.

8. As per 2011 census there are 10 urban settlements the predominance of primary activities and inadequate transport facilities have obstructed the process of urbanization in general. In Hagari Bomanahalli Halli taluk urban center is absent. Hospet taluk with three followed by Kudligi and Siraguppa with 2 urban centers whereas in rest of the taluk it is one each.

9. The process of urbanization is in the infant stage of development. Hospet and Bellary taluks represents high proportion of both populations as compared to other taluks. There is weak process of urbanization in kudalgi and Hadalgi taluks but Hagaribomanahalli does not have any urban center. The other taluks namely Siraguppa and Sandur indicate moderate urban population.

10. The entire district comprises 45 railway stations except Hadagali and Siraguppa rest of the taluks are provided by railway services. The district average of audio visual media for every100 8.5% of people are having radio and transistor. The average person’s using telephone in the district is 4.35% it is more in urban area rather than the rural areas of the district.

11. In Bellary district 34.19% of people are using bicycle as a mode of conveyance. In case of automobiles for every 100 persons 23.1 persons are having two wheelers in Bellary district. It is more in the taluks of Bellary and Hospet. In rural areas the percentage of people having two wheelers are 15.36. The least number of person having two wheeler for 100 person is in the taluk of Hadagali. The percentage of people having four wheelers are very less in the district it almost 3 persons for every 100. It is highest in Bellary, Hopset and Sandur and less than the district average in rest of the taluks.

12. The main source of lighting for the district is electricity 91.42% followed by kerosene of 7.7%. Solar energy and by other source is negligible. Only 0.48% of the people are without any source of thing.
13. Fire wood is the main source of fuel of the district which constitute 68.73% followed by LPG -23.67%, Kerosene -4.08% and rest are negligible as they constitute less than 3.5% and 0.35% of the people are not cooking at all.

14. Land less farmers are less and medium and large scale farmers are more in the canal irrigated taluks of Bellary Hospet and to some extent even in Sirgauppa.

15. 51% of the people of the district are having income less than one. In second category 33 person per hundred are having income of one to five lakh in the district. For every 100 person 16 persons are having income more than five lakh. More number of persons 23 is in Bellary taluk followed by Siraguppa 19 and in Hadagali, Hospet and Sandur for every 100 persons 18 persons income is more than five lakh. It is least of 12 in H.B. Halli.

16. In Bellary district 42% of the houses are permanent and 33.5% are of semi-permanent and rest of 24.4% comes under usable category.

8.3 The Suggestion is summarized as follows:

Chapter-4-Water resources and irrigation.

1. Well irrigation is the best source to the poor and marginal farmers to irrigate their limited amount of land though it is costlier. In the red loamy soil the underground water is very near to the surface. It can be made feasible to the poor farmers by way of loans and subsidies.

2. The farmers should be educated regarding change in source of irrigation by other source especially in the drier parts of the taluk where the change is very much needed to conserve water resources by using drip irrigation, sprinklers etc.

3. Non-availability of canal irrigation in Hadagali taluk the intensity of dryness could be reduced by lift irrigation from the river Tungabhadra.

4. The area under net sown can be increased by reducing the waste land and bringing back the cultivable waste land in to agriculture. The use of land for crops is made still useful and dynamic with a specific cropping pattern to suit physical conditions with available water resources.

5. Proper utilization of canal water, ground water and rain water can lead to increase in the net sown area of the district. Ground water can be making use
more in better way in the taluks of Bellary, Hospet and Siraguppa. They are having more opportunity for using ground water as the area irrigated by well is very less, so as the rain water in this district has not been harnessed properly. In the taluks like Bellary, H.B.Halli, Kudligi and in Siraguppa the area irrigated by tank is 0% and these taluks may store rain water in rainy season and can be utilized.

6. Farmers must be trained to utilize available water in optimized manner. Qualitatively and quantitatively general land use in general and agricultural land in particular should be improved with better use of science and technology. Remote sensing data in this regard is more useful for proper land management such as to check soil erosion and to improve the soil fertility.

8.4 Suggestions to Improve water resources and irrigation.

1. It is necessary to restrict paddy to the Kharif season and to high rainfall areas. Paddy crop need not be irrigated independently with shallow field depths of water. Irrigation may be given to early sowing of Kharif crops in June so as to use rain water more efficiently.

2. It is preferable to practice kharif and rabi crops rather than kharif and summer crops since irrigation water requirement in summer is high.

3. Crops like groundnut, sunflower, ragi, jowar and maize as light irrigated crops should grow instead of paddy in Hadagali, H.B.Halli Kudligi and in Sandur taluk.

4. A water users’ Association in every village should be formed so as to collectively and equitable manage water use and distribution. The association may also be used as an instrument in crop regulation, control of irrigation waters and judicious cropping schedules on seasonal basis.

5. In addition to the formation of the water users’ Associations, the irrigation authorities must necessarily take firm steps towards completing a comprehensive survey of soils of the area, irrigation and crop practices in the area so as to make appraisals based on practices in cropping and irrigation prevalent now.
6. The authorities must necessarily to make corresponding administrative arrangements for ensuring the water availability at the desired as well as right time and in required quantities. On the other hand, farmers or the water users’ Associations must take necessary actions towards an efficient on-farm use for irrigation waters to achieve optimum production.

8.5 Conclusion Out of the total geographical area 813926 55.70% of land under net sown area in 2001 and has come down to 50.91% in 2011 the net sown area has decreased by almost 5%. Therefore, the area under net sown can be increased by reducing the waste land and bringing back the cultivable waste land in to agriculture. The use of land for crops is made still useful and dynamic with a specific cropping pattern to suit physical conditions with available water resources. Proper utilization of canal water, ground water and rain water can lead to increase in the net sown area of the district. Ground water can be making use more in better way in the taluks of Bellary, Hospet and Siraguppa. They are having more opportunity for using ground water as the area irrigated by well is very less, so as the rain water in this district has not been harnessed properly. In the taluks like Bellary, H.B.Halli, Kudligi and in Siraguppa the area irrigated by tank is 0% and these taluks may store rain water in rainy season and can be utilized. Farmers must be trained to utilize available water in optimized manner. Qualitatively and quantitatively general land use in general and agricultural land in particular should be improved with better use of science and technology. Remote sensing data in this regard is more useful for proper land management such as to check soil erosion and to improve the soil fertility.