The important findings that emerged out of the primary data analysis and from secondary data analysis are presented below.

5.1 FINDINGS BASED ON SECONDARY DATA

- Forest land has increased to 21% from 14%, overall 7% raised from 1951 to 2013. Not available for cultivation has increased 1% respectively. On the other hand other uncultivable land excl fallow reduced by 7% in 2013. Also fallow lands have reduced by 2% respectively. Net area sown has raised only 1% during 1950 to 2013.

- The reporting area increased from 284 Mha in 1950-51 to 305 Mha in 2010-11. The percentage of area under forests has shown an increase over a period of five decades. Due to various measures to protect the forests, the share of forests in the available area has increased from 14.24% in 1950-51 to 22.89% by 2010-11. However the disturbing trend is that the share of area under non-agricultural use has been increasing over the same period. While it was only 3.29% in 1950-51, it increased to 8.63% by 2010-11. Similarly the area under the category of land under miscellaneous tree crops & groves not included in net area also decreased from 6.97% to 1.05%.

- The data reveals that there is a shift in the area in favour of non-food crops from food crops. While the average area under food crops between 1987-88 and 1999-00 was 139.24 Mha, it increased marginally to 141.01 Mha between 2000-01 and 2012-13. But the area under non-food crops increased from 46.45 Mha to 50.60 Mha during the same period. The area under food crops has registered an increase of only 1.77 Mha, whereas the area under non-food crops has registered an increase of 4.15 million hectare. The share of area under non-food crops increased from 24.98% to 26.39%.

- Agriculture sector in Karnataka is dominated by marginal and small farmers. According to agriculture census of 2010-11, out of the total land holders of 78.32 lakh, 38.49 lakh (49.14%) are marginal farmers owning less than 1 ha. Small farmers with 1 to 2 ha constitute 21.38 lakh (27.29%) of the total land owners. Semi medium farmers with 2 to 4 ha constitute 12.67 lakh (16.17%)
and medium farmers with 4 to 10 ha are 5.11 lakh (6.52%). Large farmers with more than 10 ha constitutes 68 thousand (0.86%) of the land owners.

- In terms of operational area, marginal farmers constitute 18.51 lakh ha (15.22%). Operational area of small farmers constitutes 30.20% lakh ha (24.83%), semi medium farmers 33.93% lakh ha (27.90%), medium farmers 29.04 lakh ha (23.87%) and large farmers constitutes 9.94 lakh ha (8.17%). While average land holdings of marginal farmers is 0.48 ha, small farmers is 1.41 ha, medium farmers is 2.68 ha. Average size of operational holdings of semi medium farmers is 5.69 ha and large farmers are 14.71% ha.

- According to 2010-11 agriculture census small and marginal holdings accounts for 76.44% of total holdings. While semi –medium, medium and large holdings account for 23.57% of the total holdings and their operational land holding is 59.95% out of the total operational area.

- Between 1995-96 and 2010-11 the share of marginal farmers in the total number of land holdings has increased from 41.95% to 49.14%. Similarly their share in the area also increased from 10.30% to 15.22%. Accordingly the share of large farmers with more than 10 ha has decreased from 1.70% to 0.86%. The share of large farmers in the area declined from 13.15% to 8.17% during the same period. The share of small farmers in the area increased from 20.48% to 24.83%. The share of medium farmers declined from 28.82% to 23.87%.

- The data shows that area under forests has increased over a period of time. While it was 27.09 lakh ha in 1960-61, it has increased to 30.72 lakh ha in 2011-12. An increase of 3.63 lakh ha. Land put to non-agricultural uses has increased from 8.12 lakh ha in 1960-61 to 14.33 lakh ha in 2011-12. Barren and uncultivable land, miscellaneous, tree crops, groves have decreased. Total cropped area has increased to 120.29 lakh ha in 2011-12 from 105.88 lakh ha in 1960-61. Cropping intensity has also increased from 103.52% to 121.30%. Net area shown has decreased marginally to 99.41 lakh ha from 102.28 lakh ha in 1960-61.
According to 9th Agricultural Census 2010-11, India’s total area under irrigation is 64.7 Mha. Of this maximum 45% is shared by tube wells followed by Canals and wells. Since 1950-1951 Government gave a more priority to development of command area under canals, in 1950-1951 canals irrigated area was 8.3 Mha and in 2010-2011 it stands for 17 ha.

Canal irrigated area came down 40% in 1950, to 26 % in 2011, because of increase in the number of tube well irrigation.

Tube well irrigation in the year 1951 was 29%, on the other hand it was 64% in 2011. Most of the farmers have been using tube well, because some of the time canal irrigation will not be provided by Government, when monsoon failed, therefore they preferred on time water for their crop production and for protection.

Although plan expenditure on irrigation has increased from Rs 441.8 crore in the First Plan to Rs 95743.42 crore (outlay) in the Tenth Plan, the share in total plan expenditure has decreased from 23% in the First Plan to 6.3% in the Tenth Plan.

The gross irrigated area as percentage of total cultivated area has doubled from 16 % in 1980-81 to 34 % in 2011-12.

The gross irrigated area has increased from 16.76 lakh ha in 1980-81 to 41.37 lakh ha in 2010-11.

The net irrigated area in the state is 34.40 lakh ha in 2011-12. Out of this about 17.01 lakh ha comes under well irrigation.

The cumulative irrigation potential under major, medium and minor irrigation (Surface Water) is anticipated to go up to 39.50 lakh ha in 2013-14. The cumulative irrigation potential under major, medium and minor irrigation projects is expected to reach 40.52 lakh ha in 2014-15 from 39.40 lakh ha in 2013-14. The average annual yield of the rivers of the Karnataka has been roughly estimated as 98406 m.cum. (3475 TMC).
The share of total net irrigated area of 37.15% during 2013 to 2014. Canal irrigation stands second place with the share of net irrigated area of 34.24% during 2013-2014. Canal irrigation has low cost and provides irrigation facilitates to large areas. It includes marginal, semi marginal and for large farmers.

Net irrigated area in the year 1990 to 1991 was 8.62 ha in canal irrigation, it counts 9.66 ha and 11.57% during 2000-2001 and 2010-2011 and in 2011-2012 was 14.73%. Here data shows since 1990-2012 net irrigated area was increased.

The gross irrigated area since 1990-1991, is 10.92 Mha in 2000-2001 with 12.54 Mha then in 2010-2011 with 15.22 Mha and in 2011-2012 with 14.73 Mha. Here first three decades gross irrigated area has been increased but in the year 2011-2012 it was decreased.

Majority of the sources used for agriculture sector is Tube well, according to 2011-2012 data 37% of the irrigation facilities provided by tube well irrigation. While canal performed 36% of net irrigated area, it stands second place. Then wells accounts 11%, other sources accounts 8% and tanks accounts 5%, finally lift irrigation accounts for 3%.

In the year 2011-12 major and minor irrigation with 25.26% and in the year 2012-13 with 27.43% and in 2013-14 was 26.97%, in 2014-15 with 27.85% and in this year 28.61%.

The data shows clearly an increase from 2011-12 to 2015-16 except in the year 2013-14 it was declined to 0.46%. Over all irrigation potential created area in lakh ha is growing year by year. On the other hand Minor Irrigation (Surface Water) shows the positive growth since 2011-12 to 2015-16, it was 10.28% in 2011-12 and in the year 2015-16 is 11.16%. Data clearly shows the positive growth in the all years.

The data shows the year wise allocation in 2002 - 2003 it with 1613.52 crores. Same kind of priority was given in the entire budget, but in the year 2013 - 2016, budget allocation has been raised significantly. From last three
years irrigation sector received 35,993.32 crores, and a average of 11,997 crores per year.

- According water resources department in 2014 to 2015 with 41.38 lakh ha was benefited from both projects. 20.52 lakh ha was increased from VII plans to XII five year plans. Major and medium is also was 12.27 lakh ha in 1985 to 1986, it has been changed to 29.55 lakh ha in 2014 to 2015. 17.28 lakh ha was increased during these years. Minor irrigation during 1985 to 1986 with 8.59 lakh ha was irrigated, later year by year investment has been provided, thereafter potential also increased and it hence the net irrigated area. Therefore in 2014 to 15 with 11.83 lakh ha was benefited from minor irrigation. At the end of the 2015 minor irrigated area of 2.79 lakh ha was increased. Overall table shows the clear picture of increased net irrigated area since 1986 to 2015.

- Hassan district has 21,918 ha of net irrigated area in tank irrigation during 2012-13. Grass irrigated area accounts 25,628 ha. Totally there are 6066 tanks were accounted in the district.

- Canal irrigated area have more in the district during 2012-13. The length of the canals has estimated as 519.80 Kms and the net irrigated area accounts 35,897 ha and grass irrigated area accounts 39,338 ha in the district.

- Highest cropping intensity founded in Arskikere taluk 91,572 ha, followed by Hassan 82,899 ha, Channarayapatna 71,875 ha. On the other hand lowest cropping intensity founded in Alur 24,829 ha followed by Holenarasipura 39,293 ha and Sakleshpura 45,760 ha.

- Hassan district has 1,28,058 ha of irrigation intensity during 2012-13. Highest irrigation intensity is founded in Hassan taluk 33,429 ha, followed by Channarayapatna 20,453 ha and Holenarasipura 17,919 ha. Arkalgud has 16,863 ha, Arskikere 11,874 ha. On the other hand lowest irrigation intensity in the district is founded in Sakleshpura 7,260 ha, followed by Alur 9,638 ha, Belur has 10,662 ha.
The irrigation intensity in percentage of Hassan district. Hassan taluk recorded highest irrigation intensity with 160.56%, followed by Sakleshpura with 123.26 %, Alur 117.51%. Lowest irrigation intensity percentage is recorded in Arkalgud with 104.49%, followed by Holenarasipura with 108.41%, Belur with 108.67%. Medium irrigation intensity was founded in Channarayapatna with 109.49%, Arasikere with 115.8% respectively.

In the year 2010-2011 Hassan district has a net irrigated area of 1, 19,408 when compare to 2012-2013 where, net irrigated area was 95,177. There has been a decrease of 24231 ha.
5.2 FINDINGS BASED ON PRIMARY DATA ANALYSIS

- A total of 404 respondents were considered for the study. Firstly, with respect to age group of the respondents, it is observed nearly fourth (74.8%) of the respondents belong to the middle age group (41 to 60 years). This is followed by the age group of 61 to 70 years (10.9%) and 20-40 years with 10.9% of respondents. Less than one percent of the respondents are above 80 years of age.

- The data shows that 19.8% of respondents are illiterate indicating that nearly one fifth of respondents are with no formal education. Interestingly about one fourth (about 21.3%) of respondents has completed their Primary education (completing their fifth standard of schooling). Similarly, the highest percent of 36.6% of them completing their high school education while 13% of them completing their under graduation (pre university). Further, it has observed that 7.9% of the respondents completing their graduation and one respondent even completing the post graduation.

- The data shows that among the respondents, 22.5% were the scheduled caste. The Scheduled Tribes were 13.1%, Other Backward Classes 61.1% (which is the highest percentage) and 3.2% of them belong to other category.

- The data revealed that 10.1% of respondents have annual earnings of Rs 25,000 and below. Similarly, about 35.1% of respondents disclosed that their annually earnings is between Rs 25,000 and 50,000 indicating that a majority of them are marginal farmers with very less earnings. Furthermore, 35.9% of the respondents have annual income between Rs 50,000 to Rs 75,000 and 5.7% of the respondents had income above Rs one lakh annually.

- The shows that primary occupation of the all the respondents are agriculture. In addition, a few respondents have secondary occupation for their livelihood. Accordingly, it is observed that 88.1% of the respondents are into dairy activity as their secondary occupation along with agriculture.
However, a few respondents are doing sheep rearing and poultry activities as subsidiary activities.

- The data revealed that all the respondents have their own agricultural land for cultivation. On the holdings of irrigated lands, it is observed that 11% of respondents have less than one acre of irrigated lands. Likewise, 48.2% of them seem to have irrigated lands between one to two acres and 26.5% of them possessing irrigated land between 2 to 3 acres of land. This is an indicative of the fact that most of the respondents possessing less irrigated lands. Similarly, 10.1% of them respondents possess between 3 to 4 acres and remaining four percent of farmers have more than four acres of land.

- The data describes the source of water for irrigation, it emerged from the data that hardly four percent of the respondents acknowledging that they are depended on rainfall or the canal for irrigation. Accordingly, 11.1% of the respondents having less than one acre of land stated that they are dependent on rainfall while 7.4% of the respondents under less than one acre landholdings category disclosing that they are dependent on canal for irrigation purpose. Likewise, 48.2% of the respondents having landholdings between one and two acres of landholdings stated that they are dependent on rainfall while 39.8% of the respondents under one to two acres of landholdings category disclosing that they are dependent on canal for irrigation purpose. Similarly, 26.5% of the respondents having landholdings between two and three acres of landholdings stated that they are dependent on rainfall while 29.7% of the respondents under two to three acres of landholdings category disclosing that they are dependent on canal for irrigation purpose. In continuation, it is observed that 10.1% of the respondents having landholdings between three to four acres of landholdings stated that they are dependent on rainfall while 15.8% of the respondents under three and four acres of landholdings category disclosing that they are dependent on canal for irrigation purpose.

- The data stated that the respondents have bank accounts, it is emerged that expect for three respondents the rest 401 sample respondents (consisting of
99.3% stated that they have bank account and more than one third (39.9%) of them having bank account over a decade and nearly one fourth (about 23%) of them having more than 12 years. Interestingly, one respondent said that he do not possess any kind of account in the bank.

- The data shows that the percentage of the respondents growing different crops before and after the setting up of the canal. As observed, nearly half of the respondents (47.8%) of the respondents were growing four major crops viz., maize, ragi, green gram and horse gram using only rainfall as source of water. A similar percentage (43.8%) of the respondents disclosed that they were growing ragi, horse gram and green gram before obtaining the water from Hemavathi Canal. Interestingly, the percentage of respondents growing single such as maize was hardly one percent.

- The data shows that paddy is grown by the highest percentage of the respondents. 61.1% of the respondents stating that they have started growing paddy – which require a considerable quantum of water after the introduction of canal irrigation in their district. Further, about 30% of the respondents stated that ginger was added along with paddy (which again requires ample of water) in their cultivation after getting canal water. This is a major shift in the cropping pattern after canal irrigation. Even Tobacco and horticultural crops was a later addition to cropping pattern in which about 10% of the respondents started cultivating after the canal irrigation.

- The data describes that the percentage of the respondents’ with respect to Cropped Area (in acres) before and after the implementation of canal irrigation. Accordingly, the percentage of respondents having the cropped areas less one area of land was 6.4% before canal irrigation. This was increased to 7.2% thereby an increase of 1.8% points was observed in the quantum of farmers carrying out the cultivation with a landholdings less than one acre. Similarly, the percentage of respondents having the cropped areas between one to two acres of land was 37.8% before canal irrigation. This was increased to 38.8% thereby a marginal increase of 1.0% points was
observed in the quantum of farmers carrying out the cultivation with a landholdings one to two acres of land.

- The data revealed that the percentage of respondents having the cropped areas between two to three acres of land was 30.7% before canal irrigation. This has a marginal decline to 30.2% thereby a marginal decline of 0.5% points was observed in the quantum of farmers carrying out the cultivation with a landholdings two to three acres of land.

- The study observed that the percentage of respondents having the cropped areas between two to three acres of land was 18.3% before canal irrigation and was declined to 16.1% with a two percentage points decline in the quantum of farmers carrying out the cultivation in this landholdings category. On the other, 1% point increase is observed with regard to the percent of the respondents in the landholdings category of 3 to 4 acres after the implementation of Hemavati Canal project in the study area. Yet, the percentage increase in the respondents against each of the landholdings category seems to be not significant in post implementation of canal irrigation enough in terms of shift the quantum of cultivation.

- It is observed that t-value is -0.032 and the p-value are 0.976. As the p-value is higher than the significance level of alpha 0.05 (i.e., 0.976 > 0.05), we accept the null hypothesis ($H_0$) and reject the alternative hypothesis ($H_1$). In essence, we can say that there is no statistical evidence to conclude there has been a significant increase in the percentage of farmers across the category of landholdings after the implementation of the canal irrigation. In other words, one could draw a conclusion that there is no significant additional increase in number of marginal as well as small farmers going in for cultivation after the implementation of canal irrigation. A similar scenario is observed in case of semi medium and medium farmers also.

- The data revealed that the percentage of the respondents with respect to changes in their annual income before and after the implementation of canal irrigation. Accordingly, the percentage of respondents earning their income below Rs 10,000 with 7.2% before canal irrigation and no change in their
income was observed after the implementation of canal irrigation. Similarly, the percentage of respondents earning their income between Rs 10,000 to Rs 20,000 with 48.8 % before canal irrigation. This was sharply reduced to 9.4 % thereby showing a decline of 31.4 % points in the percentage of the farmers in this income group. Furthermore, the percentage of respondents earning their income between Rs 25,000 to Rs 50,000 with 45.5 % before canal irrigation. This was reduced to 36.4 % thereby showing a decline of 9.1 % points in the percentage of the farmers in this income group.

- It is observed that the percentage of respondents earning their income between Rs 50,000 to Rs 75,000 was 4.7 % before canal irrigation. This was sharply increased to 33.2 % thereby showing a decline of 28.5 % points in the percentage of the farmers in this income group. This clearly indicate that the income level definitely increase with the change in the cropping pattern which directly helped the farmers to improve their economic status. Similarly, the percentage of respondents earning their income between Rs 75,000 to Rs one lakh was 1.2 % before canal irrigation. This was increased to 14.2 % thereby showing a decline of 13.4 % points in the percentage of the farmers in this income group. This clearly indicate that the income level definitely increase with the change in the cropping pattern. Paddy, Horticulture and Tobacco crops has indeed given the sample farming community to stabilize their income.

- It is observed that the percentage of the respondents with respect to changes in number of Farm Assets before and after the implementation of canal irrigation. Firstly, speaking on the owning of the Poultry Farm house, it is observed that none of the respondents had any poultry farm house on their own before and after the canal irrigation.

- The data showed that with respect to owning Cow shed, it is observed that 92.2 % of the respondents had less than two in numbers and 6.8 % of them had between 2 to 4 before canal irrigation. On the contrary, the post canal
irrigation implementation data from the above table shows that the percentage of the respondents owing cow shed more than two has increased from 6.8% to 7.7% resulting in an overall marginal increase of less than one percentage point in the number of farmers owing cow shed. This clearly indicates that the income level had not made an impact on increasing the Farm assets.

- The data shows that with respect to owning Bullock Carts, it is observed that 98.4% of the respondents had possessed one bullock cart while 1.6% of them possessed two carts before canal irrigation. On the contrary, the post canal irrigation implementation data from the above table shows that the percentage of the respondents owing two bullock carts has increased from 1.6% to 4.6% resulting in an overall marginal increase of three percentage points in the number of farmers owing Bullock Carts.

- The study describes that the percentage of the respondents’ with respect to changes in quantity of livestock before and after the implementation of canal irrigation. Firstly, speaking on the possessing of the number of buffaloes, it is observed that 81% of the respondents had less than two in numbers and 12% of them had between 3 to 5 and 7.0% of them had more than five buffaloes before canal irrigation. On the contrary, the post canal irrigation implementation data from the above table shows that the percentage of the respondents possessing buffaloes more than three has increased from 12% to 69.0% resulting in an overall increase of 57% points in the number of farmers rearing buffaloes.

- The study shows that the rearing the number of Cows, it is observed that 86% of the respondents had less than two in numbers and 13% of them had between 3 to 5 and 7.0% of them had more than five Cows before canal irrigation. On the contrary, the post canal irrigation implementation data from the above table shows that the percentage of the respondents possessing buffaloes more than three has increased from 13% to 73.0% resulting in an overall increase of 60% points in the number of farmers rearing cows.
Looking at the data with regard to rearing the number of sheep’s, it is observed that 67.8% of the respondents had less than two in numbers and 32.2% of them had between 3 to 5 sheep’s before canal irrigation. On the contrary, the post canal irrigation implementation data from the above table shows a marginal percentage decline in the respondents possessing sheep’s more than three has increased from 32.2% to 30.0% resulting in no overall change in the percentage points in the number of farmers rearing cows.

Looking at the data with regard to rearing the number of goats, it is observed that 100% of the respondents had less than two in numbers and 0% of them had between 3 to 5 goats before canal irrigation. On the contrary, the post canal irrigation implementation data from the above table shows a drastic increase in the percentage of the respondents possessing goats more than three has increased from zero percent to 58.6% resulting in an overall change of 58.6% points in the percentage points in the number of farmers rearing goats.

This clearly indicate that the income level definitely increase with the change in the percentage of the households rearing the livestock such as Cows, buffaloes, Sheeps etc. The post canal irrigation has indeed given the sample farming community to stabilize their income in addition to the agricultural activities over the years.

The data depict the land utilization (in terms of net sown area) in the post canal irrigation period, it is observed that 39.3% of the respondents acknowledging that the total net sown area is between one to two acres of land. This is followed by the respondents having the net sown area between two to three acres where in 30.4% of the respondents acknowledge that the fact that they were able to sow up to three acres of land. Likewise, 16.1% of the respondents disclosed that the total net sown area is between three to four acres of land and remaining 7.2% of respondents stated that the total sown area is above four acres of land. This again indicate that cumulatively about three fourth (75%) of the respondents are able to cultivate less than three acres of land from canal irrigation water.
The data shows that the number of water required for cultivation, that all most all the respondents (99.5 % ) acknowledging to the fact the water is required for at least 165 days in a year. In other words, according to the farmers, water storage in the reservoir had to be maintained for nearly six months supplying the water for both Kharif and Rabi crops.

The data reveled that the water availability in the Hemavathi Reservoir, it is observed that 16.3 % of the respondents acknowledging the fact that water would be available in the reservoir for the four months (120 days) in a year while overwhelming 81.2 % of the respondents pragmatically stating that water would be available for the required number of days (165 days) for cultivation. Presuming this fact is true, then one could arrive at a conclusion that the Hemavathi canal has really come as boon for the farming community in the district.

The data shows that the respondents think canal irrigation would definitely improve their agricultural productivity, again almost all the respondents (99.3 %) of them categorically accepting that the canal irrigation would definitely improve their agricultural productivity which help all the respondents in growing major crops such as paddy and tobacco. About 75 % of the respondents, acknowledge that the canal irrigation both minor and major crop productions.

The data shows that the issue of the problems faced by the sample farmers under the study by Hemavathi Canal irrigation, the percentage of respondents against each type of problem is provided. Accordingly, the highest percentage (30.9 %) states that inadequate supply of the water is the major problem faced by the farmers. This is followed by a similar percentage (32.2 %) of the respondents complain about the lack of proper maintenance and low quality of civil works has led to more leakage of water. Similarly, about e tenth of the respondents said that low quality of civil works, leakage of water and overall improper maintenance of the canal are the major problems as perceived by the farmers under the study.
The data shows that the resolving the pertaining problems with regard to present canal irrigation facility, 35.9% said that there is a need for a better scientific canal network while 36.6% of the respondents said that there is a need for proper maintenance and quality of civil work that is long standing and there would not be requirement of frequent maintenance work. Likewise, 11.6% of the farmers said that require or maintenance work shall be completed within a stipulated time frame which otherwise would result in unnecessary wastage of water in the form of leakage.

The data stated that they think that level of the Hemavathi canal, interestingly 67.3% of the respondents stating that the water level of the canal is adequate enough or sufficient to cater the need of the farming community in the vicinity of the canal area. On the other 27.5% of the respondents categorically voiced the need for an increase in the water level of dam.

The data indicated that there is a need to raise the level of the dam, 57.2% of the sample respondents under the study firmly demanding the need for the increase in the dam level while 42.8% of them are of the view that there is no necessity of increase in the water level of the dam.

The data shows that the source of drinking water to their respective houses before canal irrigation, 64% of the respondents said that used the pubic piped water supply (taps) installed by the municipality as the source of drinking water while 21% of the respondents were dependent on public water tank installed in their village by the respective grama panchayats. 8.9% of the respondents were using well water for drinking water. But after the implementation of the canal irrigation, a tremendous increase in the owned piped water drinking facility is observed with the sample respondents with 96.3% of them having own piped drinking water facility. Again, in terms of social improvement, one could conclude that Hemavathi canal has not only helped them commercially but also domestically.

The data shows that the having sanitation facility, almost all the respondents said they have proper sanitation facility in their houses and surprisingly 93.1
of the respondents disclosed that they had proper sanitation facility (better toilets within the house premises) only after the implementation of the Hemavati canal irrigation.

- The data revealed that the issue of grid electricity to their respective houses, it is observed from Table 24 that almost all the respondents have electricity connection in their houses. Among them, about 72% of the respondents said they got their house electrified after the implementation of the canal irrigation.

- The data stated that the Percentage of the respondents with respect to changes in cooking purpose before and after the implementation of canal irrigation. Firstly, speaking on the number of respondents’ family using Fuel Wood as a fuel source, it is observed that 99.8% of the respondents were using fuel wood and hardly one respondent’s family using other forms of fuel for cooking purpose. On the contrary, the post canal irrigation implementation data from the above table shows that 97.3% of the respondents’ families are not using Fuel Wood as a fuel source anymore and thanks to the facility being provided by the government. It emerges from the table that 97.8% of the respondents’ family are now using LPG which has became the most used fuel for cooking purpose.

- The data describes that the other sources of devices used for cooking purpose such as solar and elective stove, it is observed that there is hardly any significant percentage of the respondents using these two fuel sources for cooking purpose.

- We could conclude that there has been a major shift in the usage of fuel from traditional fuel to smoke free equipments for cooking purpose in recent times. This could happen due to the improvement in social status and courtesy is the Hemavathi Canal irrigation.

- The data shows that the argument that there has been an improvement in social parameters such as usage of LPG gas stoves, House/land purchased, possession of Vehicles, having better amenities and furniture etc.
The data shows that the argument that there has been an improvement in social parameters such as usage of LPG gas stoves, House/land purchased possession of Vehicles, having better amenities and furniture etc.

From the two sample test of proportion result, it emerges the p-value (0.000) for the is less than the significance level of 0.05; we accept the hypothesis $H_2$ that the proportion of respondents saying “Yes” [on purchasing of House/land assets] after the implementation of canal irrigation is significantly greater than the proportion of respondents saying “Yes” before the implementation period. In essence, it has emerged that a higher percentage of respondents are concluding that they were able purchase house/lands after obtaining better income in post canal irrigation period as compared to pre canal irrigation period.

The proportion of the respondents saying “Yes” before the implementation is 31.0 % (0.31) and proportion of the respondents saying “Yes” after the implementation is 87.0 % (0.870) of canal irrigation with regard to having better housing amenities.

From the two sample test of proportion result, it emerges the p-value (0.000) for the is less than the significance level of 0.05; we accept the hypothesis $H_2$ that the proportion of respondents saying “Yes” [on having better amenities] after the implementation of canal irrigation is significantly greater than the proportion of respondents saying “Yes” before the implementation period. In essence, it has emerged that a higher percentage of respondents are concluding that they were able to have better amenities in the household after obtaining better income in post canal irrigation period as compared to pre canal irrigation period.

The data shows that the proportion of the respondents saying “Yes” before the implementation is 8.7 % (0.087) and proportion of the respondents saying “Yes” after the implementation is 96.1 % (0.961) of canal irrigation with regard to possessing two wheeler vehicles.

From the two sample test of proportion result, it emerges the p-value (0.000) for the is less than the significance level of 0.05; we accept the hypothesis
H₂ that the proportion of respondents saying “Yes” [on possessing two wheeler vehicles] after the implementation of canal irrigation is significantly greater than the proportion of respondents saying “Yes” before the implementation period. In essence, it has emerged that a higher percentage of respondents are concluding that they were able to possess two wheeler vehicles in the household after obtaining better income in post canal irrigation period as compared to pre canal irrigation period.

The data shows that the percentage of the respondents’ changes with respect to having better health accessibility vis-à-vis the health expenditure before and after the implementation of canal irrigation. First, looking at the accessibility to the Government hospital by the respondents before the canal irrigation, it is observed that 83.9 Percent of the respondents had been visiting only the government hospital for medical treatment before the implementation of the canal irrigation with an overall decline of 78.7 % points in the percentage of respondents visiting the Government Hospital. Similarly, a mere 1.2 % of the respondents had been visiting private hospital for medical treatment before the implementation of the canal irrigation and this increase to 18.3 % of them had had been visiting the private hospital for medical treatment after the canal irrigation with an overall increase of 17.1 % points in the percentage of respondents visiting the private Hospitals. Yet, 14.9 percent of the respondents have been accessing both government and private hospitals for medical treatment before the implementation of the canal irrigation and saw an increase to 76.2 % of the respondents accessing to both type of hospitals with an overall change of 61.3 % points in the respondents. Finally, with respect to spending of money on health, it is observed that a mere 0.2 % of the respondents had been spending more than Rs 30,000 for medical treatment before the implementation of the canal irrigation while this increased to 73.5 % of the respondents spending in post implement of irrigation with an overall increase of 73.5 % points in the percentage of respondents spending on medical treatment. Thus, one could conclude that the post canal irrigation has indeed given sufficient income for the sample farming community to be able to afford to better medical facilities.
5.3 SUGGESTIONS

Suggestions made by the researchers based on the field visits and based on primary survey.

- The knowledge of crop water requirement is essential therefore agricultural department officials should provide information to the farmers at gross root level.

- Majority of the farmers are not interested in adopting modern agricultural techniques, such as sprinkler, drip and tank irrigation etc, therefore creating awareness among the farmers is very much needed.

- Most of the farmers not aware regarding soil testing, it is very important to know the soil fertility to get high production, therefore soil testing facilities should provide at grama panchayat level is necessary.

- It was observed during field visit that farmers in the study area are not aware about the government schemes, especially irrigation and agriculture department programmes. Hence it is need of the hour to provide each programmes information to the farmers.

- Farmers in the study area have knowledge about Raitha Samparka Kendra but so far they did not used. So it is very essential to provide Raitha Samparka Kendra information to the farmers at village level.

- It was observed during field visit there is a lack of canal maintenance. Therefore canal maintainges should be done regular basis.

- Farmers from the study area generated their income from secondary occupation of dairy activity. Therefore providing institutional support to the local private and government dairies in order to keep farmers income regularly.

- It is observed irrigation department officials did not visits canal banks regularly. So if the canal network is in the cracked stage, many times farmers has informed them, otherwise canal network will broke down and
so much of loss incurred in the canal net work area. Therefore employees should check the canal conditions regularly.

- It is observed that tail end farmers did not get the sufficient water and water reached after 5 to 6 days of release. So after releasing the water officials should visit tail end farmers filed at least monthly once.

- It is observed during the field visit illegal motor pumps operating from upper land of the canal network so water flow has reduced frequently. Therefore irrigation department authorities should avoid illegal pumping from canal.

- Most of the farmers opinioned that releasing water to the canal getting late and stopped the water soon. So before releasing water reservoirs official should publish the watering days.

- Most of the time canals have not cleaned. Therefore before releasing the water canal should be cleaned properly.

- Farmers from the study area have demanding water for two crops in a year. Only left bank canal farmers get the water for two crops in a year. Therefore Government should take immediate action in this regard.

- Sometimes farmers do not have information about water releasing dates and many farmers have prepared their land for cultivation and invested lot of capital but they did not have proper information of water release. Therefore reservoir officials should intimate the farmers through electronic media, print media is necessary.

- It is observed during the field visit that distributary canals have collapsed during rainy seasons due to high flow of water in the canals. Therefore better civil works should avoid the disaster.

- It is observed during field visit most of the supply canals (small canals) have collapsed due to farmers land disputes. So irrigation department employees should solve these kinds of problems time to time.