# Impact Evaluation Study on Rural Road Projects supported under RIDF in Karnataka

Sponsored by

**National Bank for Agriculture and Rural Development (NABARD)**

Head Office, State Projects Department, Mumbai - 400 051

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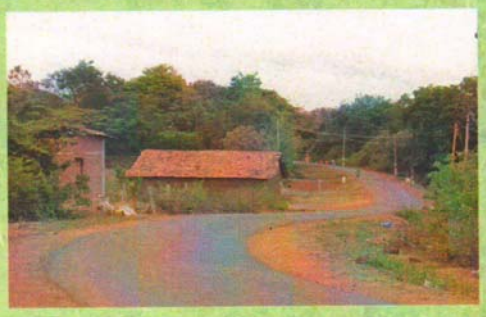

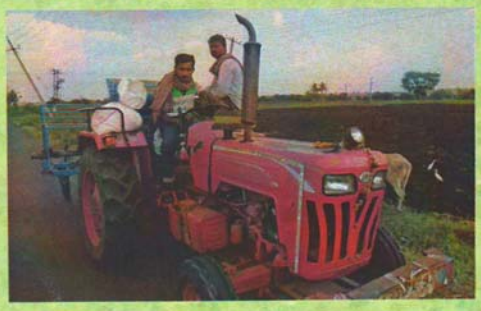


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सा विद्या या विमुक्तये

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# CHAPTER 6
# DETAILS OF SAMPLE PROJECTS

In this chapter, the details of the selected projects, the areas/villages benefited, physical and financial progress and the impacts of these projects have been discussed.

## 6.1 IMPROVEMENT OF ROAD FROM INGALAGI TO JEERAGAL IN MUDHOL TALUK OF BAGALKOT DISTRICT (0.00 Km to 2.85 Km (RIDF Code: R8063 Trench: XV)

The improvement to road from Ingalagi to Jeeragal in Mudhol Taluk of Bagalkot District was approved for Rs. 90.00 lakhs under the trench RIDF XV. The length of the road is 2.85 Km. This is an important road connecting Ingalagi Village to Jeeragal State Highway (Aurad - Sadashivagad SH No-34). It also helps to connect with taluk heal quarter as it passes through the one major district road. Five villages and one State highway are connected through this road. The road provides communication to marketing centers and to the taluk head quarters i.e. Lokapur, Mudhol, Bagalkot, Belgaum and Hubli. All the five villages are on the banks of Ghataprabha River and the main crops grown are sugarcane and oil seeds. There are seven Sugar factories and three cement factories in the radius of 30 kms at Sameerwadi, Siddapur, Kundargi and Timmapur. The transportation of sugarcane, fruits and other commercial crops is being carried out from this road and it will take 40 minutes as compared with earlier period of 1 ½ hours. This road is most helpful to villagers for day to day travelling and their other minimum needs. Before the commencement of this road project, the road from Ingalagi to Jeeragal was of cart track surface and it was very difficult to travel. After the improvement of the road, it is very much useful for the villagers and vehicle owners and hence the movement of vehicles has increased.

### 6.1.1 PHYSICAL AND FINANCIAL PROGRESS OF THE PROJECT

**Physical Progress of the Project**

To initiate the work of after administrative approval, the project took one year and nine months for the improvement of road from Ingalagi to Jeeragal. This is mainly because of official procedures and tendering process. But after the initiation of the work the project got completed within the stipulated time period i.e. 6 months. The improvement in this road is made by

providing with Side shoulder of *murrum*, a base course of Gr. II & Gr.III Metal for thickness of 8.15Mtr. Surface dressing is provided over the metal surface and asphalting with 20mm thick MSS for a width of 3.75 Mtrs. Presently the road is maintained by Panchayat Raj Engineering Department using state government funds. It was observed that the project was completed in all respects without any compromise in the quality. Table 6.1 shows details of physical progress of the project.

**Table 6.1: Physical Progress of the Project: Improvement of Road from Ingalagi Jeeragal**

| Date of Administrative Approval | Date of Initiation of Work | Date of Completion of Work | Time Taken to Complete the Work | Potential (in Km) |
|---|---|---|---|---|
| 19/03/2010 | 21/12/2011 | 5/6/2012 | 6 Months | 2.85 |

**Financial Progress of the Project**

Financial progress of the project shows (table 6.2) that the work has been completed within the estimated costs. The actual project expenditure was less than estimated project cost. This is mainly due to tender premiums. It has been found that all the RIDF sanctioned loan has been released at regular intervals without affecting progress of the work.

**Table 6.2: Financial Progress of the Project: Improvement to Road from Ingalagi Jeeragal** (Rs. In lakhs)

| Estimated Cost | RIDF Loan | RIDF Loan Released | Govt. Contribution | Actual Project Expenditure |
|---|---|---|---|---|
| 90.00 | 72.00 | 72.00 | 18.00 | 88.36 |

### 6.1.2 Social Benefits to Stakeholders

**Education**

It reveals that student travelling by bus and tempo has increased from 7.4 per cent to 53.8 and 14.8 per cent to 19.2 per cent. At the same time student travelling by bike and cycle has also reduced. On the whole improvement of road has facilitated better and safe mode of travel.

**Table 6.3: Changes in Mode of Travel to School: Road from Ingalagi to Jeeragal**

| Period | Bus | Tempo | Bike | Cycle | Auto | Walk |
|---|---|---|---|---|---|---|
| Before Project | 7.4 | 14.8 | 29.6 | 18.5 | 0.0 | 29.6 |
| After Project | 53.8 | 19.2 | 0.0 | 3.8 | 0.0 | 23.1 |

- 52 per cent of households felt that absenteeism of children has reduced after the improvement of the road. Average days of absenteeism from school has reduced from 7.1 days to 0.8 days in a year.

- The percentage of households reporting teachers remaining absent for many days during the year has reduced from 17.9 per cent to 7.1 per cent. This shows that teachers' absenteeism has reduced with the improvement of roads in Karnataka.

- Households reporting timely availability of school articles have increased from 0.0 per cent to 100.0 per cent. Thus, improvement of road has improved the availability of school articles in the village at right time.

**Health Services**

- As a result of improvement of road, the number of visits by the households to the nearby health centres has increased from 7 to 11. This reveals that rural people were not able to travel by bad road during the illness and after the improvement of road people are able to safely travel to nearby towns to get health facilities.

- Mode of travel to nearby health centre or hospital using the RIDF road reveals that earlier, most of the households used to reach the hospital by using cart, tractor, and tempo. Some people used cycles and even went by walk. But after the improvement of road, 94 per cent of the households use bus which is considered as the safe mode of transportation. Following table shows the various modes used to reach health centres by the sample households.

**Table 6.4: Mode Used to Reach Health Centres: Road from Ingalagi Jeeragal**

| | Bus | Tempo | Tractor | Cycle | Cart | Walk |
|---|---|---|---|---|---|---|
| Before Project | 22 | 32 | 10 | 2 | 32 | 2 |
| After Project | 94 | 6 | 0 | 0 | 0 | 0 |

- The proportion of households feeling difficulty in reaching nearby health centre has also reduced from 64.0 per cent to 2.0 per cent.

- Opinion of households regarding visits of health providers to villages shows that on an average 88.0 per cent of households feel that visits of health providers have increased and 12.0 per cent feel that there has been no change in the number of visits after improvement of road.

- Absenteeism of health service providers in the villages shows that proportion of households reporting 'more absent' has reduced from 80.0 per cent to 2.0 per cent after improvement of road. This shows that absenteeism of health personnel has reduced significantly after improvement of road.

- Availability of medical services has also improved in the villages with the improvement of road. Proportion of households reporting availability of medical services has increased from 22.0 per cent to 100.0 per cent.

- The study found that on an average, household health expenditure has increased from Rs. 320 to Rs.607. This means that households are now able to spend on health/afford health facilities which they were not able to do earlier.

**Water Supply**

It is found that due to low rainfall, underground water level has gone down over the years. As a result of this dependence on wells or bore wells has gone down. Now people are mainly depending on public taps. Presently, 80 per cent of the households are depending on public taps.

**Toilet Facility**

After the road improvement, the percentage of households having their own toilet has increased from 0.00 per cent to 11.4 per cent.

**Fuel for Cooking**

Almost all the households are still using firewood and crop residues for cooking mainly due to easy availability of these resources.

**Household Assets**

After the improvement of road, there has been increase in number of mobile phones (51.6%), motor cycles (41.2%), electric fan (47.1%), sewing machine (33.3%) and insect pump (11.1%).

**Social Interaction**

- After the improvement of road, visits of households to nearby cities or towns for social purposes like marriages, attending funerals and Jatras have increased from 4 to 6.

- Number of visits to nearby cities or town by the household members reveals that female visits have increased from 2.4 to 3.6, male visits increased from 2.9 to 4.6 and children visits increased from 1.5 to 2.8

**Political Participation**

- The study reveals that 90.0 per cent of the households agreed that transportation facilities aided to influence political activities in village and 92.0 per cent of households have reported that their political participation has increased after construction of road.

- As a result of increasing political activities in the village, the proportion of household participation has also increased. The average numbers of Days of household participation in political activities have increased from 1.9 to 3.7 days during a month.

- Proportion of households having membership in community and political organizations has increased from 6.0 per cent to 66.0 per cent after construction of road. It indicates that improvement of road can lead to social and political integration of rural people.

### 6.1.3 ECONOMIC BENEFITS: QUALITATIVE AND QUANTITATIVE

Economic benefits of RIDF rural road projects, namely quantitative and qualitative benefits have been presented in this section.

**Traffic Intensity**

It is found that after the improvement of road, traffic intensity has increased from 81.5 PCR to 148 PCR. After improvement of road, movement of cars, tempo, tractor, bus, trucks, two wheelers, *tum tum* and cycles has increased significantly. Table – shows comparison of traffic intensity.

**Table 6.5:Comparison of Traffic Intensity: Road from Ingalagi Jeeragal in Mudhol taluk of Bagalkot Distict**

| Type of Vehicles | Total Number of Vehicles Per Day (24 Hours) | | Passenger Car Units (P.C.U) Per Day (24 Hours) | |
|---|---|---|---|---|
| | After Project | Before Project | After Project | Before Project |
| Car | 12 | 5 | 12 | 5 |
| Jeep | | | 0 | 0 |
| Tempo | 3 | 0 | 6 | 0 |
| Tractor | 18 | 10 | 18 | 10 |
| Bus | 4 | 2 | 12 | 6 |
| Trucks & Mini Trucks | 4 | 1 | 12 | 3 |
| Motor Cycle & 2 Wheelers | 45 | 15 | 22.5 | 7.5 |
| Auto Rickshaw/Tumtum | 18 | 5 | 18 | 5 |
| Cycle | 15 | 10 | 7.5 | 5 |
| Animal Drawn | 5 | 5 | 40 | 40 |
| Total | 124 | 53 | 148 | 81.5 |

*Note: Recommended PCU Factors recommended by Indian Road Congress Manual, 2001 for Various Types of Vehicles on Rural Roads: Car=1, Jeep=1, Tempo=2, Tractor=1, Bus=3, Truck and Mini Trucks=3, Motor Cycle & 2 Wheelers=0.5, Auto Rickshaw/Tum tum=1, Cycle=0.5 and Animal Drawn=8*

**Employment and Income During Construction**

The improvement of road was taken up on tender basis and all the labourers were engaged by the entrusted agency. Hence, the local households did not get employment opportunity during the construction of road.

**Induced Employment and Income**

- The study reveals that on an average, 18.0 per cent of the households are able to enhance their income in the sample villages due to improvement of rural road.

- On an average the household income has increased from Rs. 6733 to Rs. 10400 i.e. 54 per cent increase from previous income level.

- Due to improvement of road, employment in Petty business and other rural works like blacksmith, carpenter, tailor and painter has been improved.

**Marketing of Household Items**

- The proportion of households using the road for the purchasing their household need after the improvement of road has increased from 22.0 per cent to 100.0 per cent.

- The road has helped 52.0 per cent of households to reduce the distance to be travelled to market.

- On an average time required to reach the market has been reduced from 36.2 minutes to 23.5 minutes.

- After the improvement of road, people can move easily to nearby towns. On an average, the number of visits of households has increased from 3.1 visits to 5.1 during a month.

- On an average 86.0 per cent of the households are purchasing more number of products and 84.0 per cent are purchasing more quantity of products after the improvement of road from the nearby cities. Thus, people are getting more variety and good quality products at a reasonable price.

- As a result of increase in number of products and quantity of products purchased from the market, the total value of products purchased from the market has also increased from Rs.780 to Rs.1613.

- Improvement of road has led to better transportation facility. Now the local shop owners are able to bring variety of products to the shop for selling. This can help in meeting the needs of the households. On an average, 32.0 per cent of households have reported that availability of goods in the villages has increased after the road improvement.

**Marketing of Agricultural Products**

The study reveals that there has been significant improvement in the proportion of households using road after improvement i.e. 18.0 per cent to 98.0 per cent. Now the farmers are utilizing this road for their day to day travelling and transportation of agriculture products like Sugarcane (major crop), maize, sunflower, jawar, wheat and fruits, etc. The economic activity especially for the transportation of sugarcane and allied products has increased. Before improvement of road, farmers had to struggle a lot to transport their grown products to sugarcane factories. Lot of labour and time was being wasted. Many a time tractors were struck in muddy ditch and through the help of JCB Machines, tractors were moved.

- Improvement of road has also reduced the time required to reach the agricultural market in the nearby town. On an average 85.7 per cent of the households reported reduced time. The time taken to reach agricultural market has reduced from 36.1 minutes to 23.2 minutes.

- Easy accessibility to agricultural market has induced the households to sell their produce in regulated markets. On an average, 83.7 per cent of the households have increased their selling in agricultural market due to improvement of road. The value of agricultural produce sold in market increased from Rs.13850 to Rs.18625.

- Frequency of visits to market has also increased due to improvement of road. Now, even small and marginal farmers frequently visit market to purchase inputs and take their produce to market by tractors, tempo, etc. On an average 93.0 per cent of

households increased their visit to market and the actual number increased from 9.6 to 13.4 during a year.

**Agricultural Activities**

The study reveals that due to increased transportation facility, farmers are able to purchase HYV seeds and other agricultural implements from the nearby cities. This has also helped mobility of labour from one village/habitation to other for continuous work and better wage. This has helped agricultural families to get labourers easily. The wage rate of agricultural workers has increased from Rs.116 to Rs.209.

- Improved all weather road can also help the extension workers to visit the village to impart knowledge to farmers. All the selected households feel that after improvement of road, visits of extension workers have increased.

- About 74.0 per cent of households reported change in the crop pattern after implementation of road project.

### 6.1.4 BENEFITS TO BANKING SECTOR

After the improvement of the road, Central Bank of India and State Bank of Mysore, located in Mudhol taluk headquater, are able to increase their business. It is found that the extent of agricultural loan issued, total number of SB accounts and deposits mobilized by the farmers have increased by 183 per cent, 348 per cent and 162 per cent respectively.

- After implementation of RIDF projects, the proportion of households having SB accounts has increased from 78.0 per cent to 94.0.

- This indicates that still many households are not getting the benefits of financial institutions. The financial institutions must make strong efforts to remove the barriers to financial inclusion by providing necessary information, co-operation and necessary assistance to villagers in project implemented area.

On the whole, after implementation of RIDF road projects, banking business has improved in terms of agricultural credit lending, increasing the number of SB accounts and deposits.

### 6.1.5 OVERALL IMPACT

Impact of RIDF rural road - Ingalagi to JeEragal in Mudhol Taluk of Bagalkot District has been presented using the approach 'before and after' the project in graph 6.1. The graph reveals that there has been significant improvement in traffic intensity. This has led to improvement in income, expenditure on education and health and access to safe drinking water. There has been less impact on construction of toilets and using LPG for cooking.

**Graph 6.1: Impact of RIDF Road Project in Ingalagi**

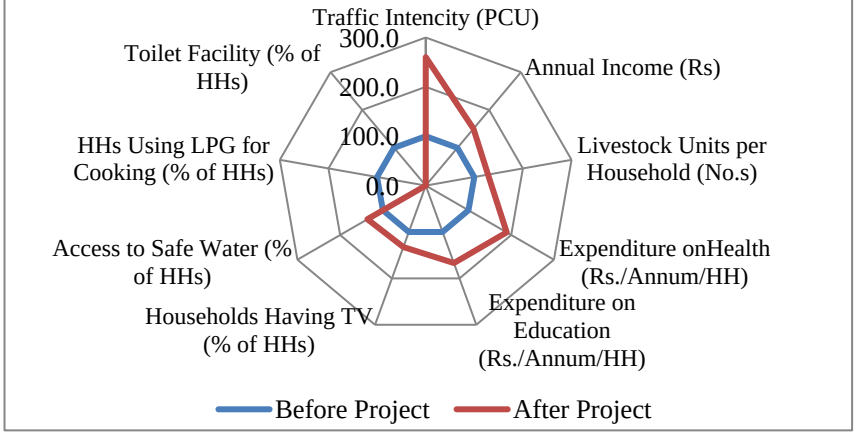


Table 6.6 presents the impact of the project. It can be noted from the table that there has been significant improvement in household income, education, health and other indicators. It can be observed that there in no positive impact on use of LPG and absenteeism of children at schools.

**Table 6.6:Impact of RIDF Road Project in Road from Ingalagi Jeeragal (Double Difference Method)**

| Particular | Percentage Change | | Difference (Beneficiary over Non-Beneficiary) |
|---|---|---|---|
| | Beneficiary | Non-Beneficiary | |
| **Household Income** | 50.7 | 16.7 | 33.9 |
| **Impact on Education** | | | |
| Mode of Travel to School | | | |
| Bus | 46.4 | 0 | 46.4 |
| Tempo | 4.4 | 0 | 4.4 |
| Two Wheeler | -29.6 | 0 | -29.6 |
| Cycle | -14.7 | 0 | -14.7 |
| Auto | 0.0 | 0 | 0.0 |
| Walk | -6.6 | 0 | -6.6 |
| HH reporting Absenteeism of Children (%) | -6.3 | -0.8 | -5.5 |
| Households Reporting Absenteeism of Teachers (%)-Many Days | -10.8 | -20.6 | 9.8 |
| Households Reporting School Articles -in time (%) | 100.0 | 17.6 | 82.4 |
| Expenditure on Education | 95.0 | 69 | 26.0 |
| **Impact on Health** | | | |
| Changes in Household Visit to Health Centers (No) | 57.1 | 0.0 | 57.1 |
| Opinion about the road in reaching the hospital (%) | -62.0 | 0 | -62.0 |
| Opinion of households about availability of medical services-Good (%) | 78.0 | 0 | 78.0 |
| Health (Rs) | 89.5 | 25 .3 | 64.2 |
| **Impact on Agriculture** | | | |
| Households Reporting decline in Time Required to Reach Market (%) | -12.7 | -0.1 | -12.6 |
| No. of Visits to Market (No) | 64.5 | 0.0 | 64.5 |
| Value of Products Purchased from Market (Rs) | 106.8 | 9.0 | 97.8 |
| Visits to Agricultural Market (No) | 39.6 | 3.5 | 36.1 |
| Wage per day (Rs) | 79.8 | 61.6 | 18.2 |
| **Impact on Social interaction** | | | |
| No. of Household Visits to Nearby Cities/Towns (No) | 50.0 | 0.0 | 50.0 |
| No. of Participations in Social Activities (No) | 50.9 | 19.0 | 31.8 |
| Average No. of Days of Household Participation in Political Activities | 94.7 | 0.0 | 94.7 |
| Household Membership in Community/Political Organization | 60.0 | 0 | 60.0 |
| **Impact on Slandered of Living** | | | |
| Drinking Water (%) | 53.9 | 0 | 53.9 |
| Fuel Facility (LPG) (%) | 0.0 | 6 | -6.0 |
| Toilet Facility (%) | 11.4 | 0 | 11.4 |

## 6.2 IMPROVEMENT OF ROAD FROM NARENOOR-FAKIRBUDHIHAL-KAINKATTI ROAD (RIDF Code: R17285 Trench: XVII)

The improvement of road from Narenur to Fakirbudihal, KainKatti road in Badami Taluka of Bagalkot District was approved for Rs. 110.00 lakhs under the trench RIDF XVII. The length of the road is 13.0 Km. This work was given administrative approval on 29th December 2011. The road facilitates communication among Kerur, Narenur , Narenur Tanda , Saganur, Hosakoti and Kainkatti villages of Badami Taluka.

### 6.2.1 PHYSICAL AND FINANCIAL PROGRESS OF THE PROJECT

**Physical Progress of the Project**

The project improvement to road from Narenur to Fakirbudihal, KainKatti road took seven months to initiate the work after administrative approval. After the initiation of the work the project got completed within five months. Road was having one coat of Grade–II metal surface. Therefore it was felt necessary to strengthen the road by providing another layer of Grade -II and Grade –III metalling for this length of road, over this single coat surface dressing and 20mm thick mix seal surfacing is done for this length of road. For tackled road length, side *murrum* of 0.15 meter thick, 1.80 meter wide is provided to this road as per guidelines from NABARD. Table 6.7 shows details of physical progress of the project.

**Table 6.7: Physical Progress of the Project: Improvement to Road from Narenoor-Fakirbudhihal-Kainkatti road**

| Date of Administrative Approval | Date of Initiation of Work | Date of Completion of Work | Time Taken to Complete the Work | Potential (in Kms) |
|---|---|---|---|---|
| 29/12/2011 | 4/7/2012 | 25/12/2012 | 5 Months | 6.1 |

**Financial Progress of the Project**

Financial progress of the project shows (table 6.8) that the work has been completed within the estimated costs. The actual project expenditure was less than estimated project cost. This is mainly due to tender premiums. It has been found that entire RIDF sanctioned loan has been released at regular intervals without affecting progress of the work.

**Table 6.8: Financial Progress of the Project: Improvement to Road from Narenoor-Fakirbudhihal-Kainkatti road (Rs. In Lakhs)**

| Estimated Cost | RIDF Loan | RIDF Loan Released | Govt. Contribution | Actual Project Expenditure |
|---|---|---|---|---|
| 110.00 | 88.00 | 88.00 | 22.00 | 109.72 |

### 6.2.2 SOCIAL BENEFITS TO STAKEHOLDERS

**Education**

Villagers used to travel by foot to reach other villages and towns. There are many examples where the persons were deprived of seeking education and also health services. After improvement of road, vehicles started operating from Kerur city which is about 7 kilometre from Narenoor. Also, students started using cycles to reach their school which is located in the nearby village. The proportion of students using tempo and auto has slightly increased.

- 66 per cent of households felt that absenteeism of children has reduced after the improvement of the road. Average days of absenteeism from school have reduced from 6.6 days to 2 days in a year.

- The percentage of households reporting teachers remaining absent for many days during the year has reduced from 94.7 per cent to 0.0 per cent. This shows that teachers' absenteeism has reduced with the improvement of roads in Karnataka.

- Households reporting timely availability of school articles have increased from 2.6 per cent to 97.4 per cent. Thus, improvement of road has improved the availability of school articles in the village at right time.

**Health Services**

- As result of improvement of road, the numbers of visits by the households to the nearby health centres have increased from 9 to 15.

- Mode of travel to nearby health centre or hospital using the RIDF road reveals that earlier, most of the households used to reach the hospital by using cart, tractor, and tempo. After the improvement of road, public transport buses started operating. People started using these buses along with tempo and auto. The use of tractor and cart has been reduced. And the people travelling to health centre by walk have also reduced significantly. Following table shows mode used to reach health centres by the sample households.

**Table 6.9: Mode Used to Reach Health Centres: Road from Narenoor-Fakirbudhihal-Kainkatti road**

| | Bus | Tempo | Tractor | Cart | Auto | Walk |
|---|---|---|---|---|---|---|
| Before Project | 0 | 67.3 | 10.2 | 4.1 | 4.1 | 14.3 |
| After Project | 6.1 | 77.6 | 0 | 0 | 8.2 | 8.2 |

- The proportion of households feeling difficulty in reaching nearby health centre has also reduced from 79.6 per cent to 6.1 per cent.

- Opinion of households regarding visits of health providers to villages shows that on an average 95.9 per cent of households feel that visits of health providers have increased and 4.1 per cent feel that there has been no change in number of visits after improvement of road.

- Absenteeism of health service providers in the villages shows that proportion of households reporting 'more absent' has reduced from 85.7 per cent to 4.1 per cent after improvement of road. This shows that absenteeism of health personnel has reduced significantly after improvement of road.

- Availability of medical services has also improved in the villages with the improvement of road. Proportion of households reporting availability of medical services has increased from 2 per cent to 85.7 per cent.

- The household health expenditure has increased from Rs. 276 to Rs.391. This means that households are now able to spend on health/afford health facilities which they were not able to do earlier.

**Water Supply**

The proportion of households having own tap has increased from 18.4 per cent to 44.9 per cent. The use of borewells and wells has declined due to improvement in the public water supply system.

**Toilet Facility**

Large sections of households are still depending on open defecation. Only 6.3 per cent of households have own toilets.

**Fuel for Cooking**

98 per cent of the selected households use firewood for cooking mainly due to easy availability. Only 2 per cent households use LPG for the same purpose.

**Household Assets**

There has been no significant change in the asset holdings of the sample households. Two wheelers, cycle, mobile and electric fans increased over the period.

**Social Interaction**

- Earlier our relatives were reluctant about visiting the village. In many instances marrying a groom of this village was difficult. Now things have changed and small taxies like "*Tum Tum's"* are connecting to cities and nearby villages.

- After the improvement of road, visits of households to nearby cities or towns for social purpose like marriages, attending funerals and Jatras have increased from 5 to 8.

- Number of visits to nearby cities or town by the household members reveal that female visits have increased from 2.6 to 3.5, male visits increased from 3.8 to 5.5 and child's visits increased from 1.6 to 2.6

**Political Participation**

- The study reveals that 94.0 per cent of the households agreed that transportation facilities aided to influence political activities in village and 87.8 per cent of households have reported that their political participation has increased after construction of road.

- As a result of increasing political activities in the village, proportion of household participation has also increased. The average numbers of Days of household participation in political activities have increased from 2.2 to 3.4 days during a month.

- Households having membership in community and political organizations have increased from 0.0 per cent to 10.0 per cent after construction of road. It indicates that improvement of road can lead to social and political integration of rural people.

### 6.2.3 Economic Benefits: Qualitative and Quantitative

Economic benefits of RIDF rural road projects, namely quantitative and qualitative benefits have been presented in this section.

**Traffic Intensity**

It is found that after the improvement of road, traffic intensity has increased from 161 PCR to 177 PCR. After improvement of road, movement of cars, *tum tum*, two wheelers, tractor, tempo, bus, trucks, and cycles has increased significantly. Table – shows comparison of traffic intensity.

**Table 6.10:Comparison of Traffic Intensity: Narenoor-Fakirbudhihal-Kainkatti road in Badami Taluk of Bagalkot District**

| Type of Vehicles | Total Number of Vehicles Per Day (24 Hours) | | Passenger Car Units (P.C.U) Per Day (24 Hours) | |
|---|---|---|---|---|
| | After Project | Before Project | After Project | Before Project |
| Car | 15 | 2 | 15 | 2 |
| Jeep | 0 | 0 | 0 | 0 |
| Tractor | 10 | 5 | 10 | 5 |
| Auto Rickshaw/Tumtum | 40 | 20 | 40 | 20 |
| Tempo | 5 | 2 | 10 | 4 |
| Bus | 10 | 8 | 30 | 24 |
| Trucks & Mini Trucks | 4 | 2 | 12 | 6 |
| Motor Cycle & 2 Wheelers | 30 | 25 | 15 | 12.5 |
| Cycle | 10 | 15 | 5 | 7.5 |
| Animal Drawn | 5 | 10 | 40 | 80 |
| Total | 129 | 89 | 177 | 161 |

*Note: Recommended PCU Factors recommended by Indian Road Congress Manual, 2001 for Various Types of Vehicles on Rural Roads: Car=1, Jeep=1, Tempo=2, Tractor=1, Bus=3, Truck and Mini Trucks=3, Motor Cycle & 2 Wheelers=0.5, Auto Rickshaw/Tum tum=1, Cycle=0.5 and Animal Drawn=8*

**Employment and Income During Construction**

About 10 per cent of the households reported to get direct employment during the construction of road. Each household got 34 days of employment and earned Rs.8100/.

**Induced Employment and Income**

- After the improvement of road, the government and private buses, mini taxies have started operating giving employment opportunity to many of the labours of the surrounding villages.
- The study reveals that on an average, 18.0 per cent of the households are able to increase their income in the sample villages due to improvement of rural road.
- On an average the household income has increased from Rs. 5857 to Rs. 9750 i.e. 66 per cent increase from previous income level.
- Due to improvement of road, employment in Petty business has been improved.

**Marketing of Household Items**

- The proportion of households using the road for purchasing their household needs after the improvement of road has increased from 20.0 per cent to 98.0 per cent.

- The road has helped to reduce the distance to be travelled to market for 44.9 per cent of households.
- On an average time required to reach the market has been reduced from 27.6 minutes to 18.0 minutes.
- After the improvement of road, people can move easily to nearby towns. On an average, the number of visits of households has increased from 3.6 visits to 5.8 during a month.
- On an average 89.8 per cent of the households are purchasing more number of products and 89.8 per cent are purchasing more quantity of products from the nearby cities after the improvement of road. Thus, people are getting more variety and good quality products at a reasonable price.
- As a result of increase in number of products and quantity of products purchased from the market, the total value of products purchased from the market has also increased from Rs.1466 to Rs.1896.
- Improvement of road has led to better transportation facility. Now the local shop owners are able to bring variety of products to the shop for selling. This can help in meeting the needs of the households. On an average, 85.4 per cent of households have reported that availability of goods in the villages has increased after the road improvement.

**Marketing of Agricultural Products**

The road helped many farmers to carry their agricultural products to cities to get more profit. Reaching time to Fakirbudhial to Kerur is been reduced from 40 minutes to 20 minutes.

The study reveals that there has been significant improvement in the proportion of households using road after improvement i.e. 8.0 per cent to 86.0 per cent.

- Improvement of road has also reduced the time required to reach the agricultural market in the nearby town. On an average 88.4 per cent of the households reported reduced time. The time taken to reach agricultural market has reduced from 29.0 minutes to 17.8 minutes.

- Easy accessibility to agricultural market has induced the households to sell their produce in regulated markets. On an average, 92.9 per cent of the households have increased their selling in agricultural market due to improvement of road. The value of agricultural produce sold in market increased from Rs.63175 to Rs. 64363.

- Frequency of visits to market has also increased due to improvement of road. Now, even small and marginal farmers frequently visit market to purchase inputs and take their produce to market by tractors, tempo, etc. On an average 90.0 per cent of households increased their visit to market and the actual number increased from 7.6 to 14.1 during a year.

**Agricultural Activities in Village**

The study reveals that due to increased transportation facility, farmers are able to purchase HYV seeds and other agricultural implements from the nearby cities. This has also helped mobility of labour from one village/habitation to other for continuous work and better wage. This has helped agricultural families to get labourers easily. The wage rate of agricultural workers has increased from Rs.198 to Rs.295.

- Improved all weather road can also help the extension workers to visit the village to impart knowledge to farmers. About 82 per cent households feel that after improvement of road, visits of extension workers have increased.

- About 58.0 per cent of households reported change in the crop pattern after implementation of road project.

### 6.2.4 BENEFITS TO BANKING SECTOR

- After implementation of RIDF projects, the proportion of households having SB accounts has increased from 92.0 per cent to 94.0.
- This indicates that still many households are not getting the benefits of financial institutions. The financial institutions must make strong efforts to remove the barriers to financial inclusion by providing necessary information, co-operation and necessary assistance to villagers in project implemented area.

On the whole, after implementation of RIDF road projects, banking business has improved in terms of agricultural credit lending, increasing the number of SB accounts and deposits.

### 6.2.5 OVERALL IMPACT

Impact of RIDF rural road - Narenoor-Fakirbudhihal-Kainkatti has been presented using the approach 'before and after' the project in graph 6.2. The graph reveals that there has been significant improvement in traffic intensity. This has led to improvement in income, expenditure on education and health, access to safe drinking water and livestock units. There has been less impact on construction of toilets and using LPG for cooking.

**Graph 6.2: Impact of RIDF Road Project in Kainkatti Road**

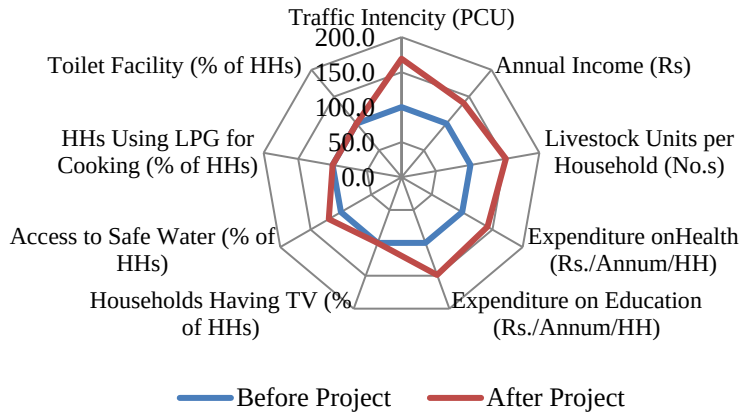


Table 6.11 presents the impact of the project. It can be noted from the table that there has been significant improvement in household income, health and other indicators. It can be observed that there is no positive impact on use of LPG and absenteeism of children and teachers.

**Table 6.11:Impact of RIDF Road Project in Narenoor-Fakirbudhihal-Kainkatti road (Double Difference Method)**

| Particular | Percentage Change | | Difference (Beneficiary over Non-Beneficiary) |
|---|---|---|---|
| | Beneficiary | Non-Beneficiary | |
| Household Income | 38.15 | 20.72 | 17.4 |
| Impact on Education | | | |
| Mode of Travel to School | | | |
| Bus | 0.0 | 0 | 0.0 |
| Tempo | 1.3 | 0 | 1.3 |
| Two Wheeler | 0.0 | 0 | 0.0 |
| Cycle | 5.6 | 0 | 5.6 |
| Auto | 0.3 | 0 | 0.3 |
| Walk | -7.2 | 0 | -7.2 |
| HH reporting Absenteeism of Children (%) | -4.6 | -1.3 | -3.3 |
| Households Reporting Absenteeism of Teachers (%)-Many Days | -94.7 | -12.8 | -81.9 |
| Households Reporting School Articles -in time (%) | 94.7 | 25.5 | 69.2 |
| Expenditure on Education | 77.4 | 60 | 17.4 |
| Impact on Health | | | |
| Changes in Household Visit to Health Centers | 66.7 | 0.0 | 66.7 |
| Opinion about the road in reaching the hospital | -73.5 | 0 | -73.5 |
| Opinion of households about availability of medical services-Good | 83.7 | 0 | 83.7 |
| Health | 41.7 | 26.5 | |
| Impact on Agriculture | | | |
| Households Reporting decline in Time Required to Reach Market | -9.6 | 1 | -10.6 |
| No. of Visits to Market | 61.1 | 0.0 | 61.1 |
| Value of Products Purchased from Market | 29.3 | 25.6 | 3.7 |
| Visits to Agricultural Market | 85.5 | 0.0 | 85.5 |
| Wage per day | 49.4 | 41.2 | 8.2 |
| Impact on Social interaction | | | |
| No. of Household Visits to Nearby Cities/Towns | 60.0 | 0.0 | 60.0 |
| No. of Participations in Social Activities | 53.9 | 48.1 | 5.7 |
| Average No. of Days of Household Participation in Political Activities | 54.5 | 0.0 | 54.5 |
| Household Membership in Community/Political Organization | 10.0 | 0 | 10.0 |
| Impact on Slandered of Living | | | |
| Drinking Water | 135.5 | 12 | 123.5 |
| Fuel Facility (LPG) | 0.0 | 2 | -2.0 |
| Toilet Facility | 0.0 | -2.62097 | 2.6 |

## 6.3 IMPROVEMENT TO ROAD FROM NARANJA SUGAR FACTORY TO HIPPALGAON (RIDF Code: R16474 Trench: XVI)

The improvement to road from Naranja Sugar Factory to Hippalgaon in Bidar Taluka of Bidar District was undertaken under the trench RIDF XVI by Public Works Department (PWD) at the cost of Rs. 50 lakhs. The length of the road is 2.80 Km. The improvement of road has helped to reduce the distance to be travelled from Hippalgaon to Bidar by 5 Km i.e. from 20 Kilometre to 15 Kilometre. The new road has helped around 5 thousand people in and around Hippalagaon.

### 6.3.1 PHYSICAL AND FINANCIAL PROGRESS OF THE PROJECT

**Physical Progress of the Project**

To initiate the work after administrative approval, the project took about six months for the improvement of road from Naranja Sugar Factory to Hippalgaon. But after the initiation of the work the project got completed within the stipulated time period i.e. 6 months. Table 6.12 shows details of physical progress of the project.

**Table 6.12: Physical Progress of the Project: Improvement to Road from Naranja Sugar Factory to Hippalgaon**

| Date of Administrative Approval | Date of Initiation of Work | Date of Completion of Work | Time Taken to Complete the Work | Potential (in Kms) |
|---|---|---|---|---|
| 11/11/2010 | 5/5/2011 | 10/11/2011 | 6 Months | 2.1 |

**Financial Progress of the Project**

Financial progress of the project shows (table 6.13) that the work has been completed within the estimated costs. It has been found that the entire RIDF sanctioned loan has been released. The state government contributed Rs.10 lakhs. There was no hurdle in the progress of work due to undue delay in flow of funds.

**Table 6.13: Financial Progress of the Project: Improvement to Road from Naranja Sugar Factory to Hippalgaon (Rs. In Lakhs)**

| Estimated Cost | RIDF Loan | RIDF Loan Released | Govt. Contribution | Actual Project Expenditure |
|---|---|---|---|---|
| 50 | 40 | 40 | 10 | 50 |

### 6.3.2 SOCIAL BENEFITS TO STAKEHOLDERS

**Education**

There has been no change in the mode of travel to school after the improvement of road. Students who travel to other villages depend on tempo, bus and autos.

- Though there was no change in the mode of transport of students to schools, households feel that absenteeism of children has reduced after the improvement of the road due to increased intensity of vehicles. About 70 per cent of households feel that absenteeism of children has reduced. Average days of absenteeism from school have reduced from 6.0 days to 2.5 days in a year.

- The percentage of households reporting teachers remaining absent for many days during the year has reduced from 87.5 per cent to 5.0 per cent.

- Households reporting timely availability of school articles have increased from 15.4 per cent to 97.4 per cent. Thus, improvement of road has improved the availability of school articles in the village at right time.

**Health Services**

- As result of improvement of road, the number of visits by the households to the nearby health centres have increased from 11 to 15. This reveals that rural people were not able to travel by bad road during the illness and after the improvement of road people are able to safely travel to nearby towns to get health facilities.

- Most of the households used to reach the hospital by using tempo (88 %). But after the improvement of road, households started using bus (46 %) which is considered as the safe mode of transportation. Following table shows mode used to reach health centres by the sample households.

**Table 6.14: Mode Used to Reach Hospital (Before Project):Road from Naranja Sugar Factory to Hippalgaon**

| | Bus | Tempo | Auto | Cart |
|---|---|---|---|---|
| Before Project | 10.0 | 88.0 | 2.0 | 0.0 |
| After Project | 46.0 | 52.0 | 0.0 | 2.0 |

- The proportion of households feeling difficulty in reaching nearby health centre has also reduced from 96.0 per cent to 2.0 per cent.

- Opinion of households regarding visits of health providers to villages shows that on an average 80.0 per cent of households feel that visits of health providers have increased and 20.0 per cent feel that there has been no change in number of visits after the improvement of road.

- Absenteeism of health service providers in the villages shows that proportion of households reporting 'more absent' has reduced from 70.0 per cent to 10.0 per cent after improvement of road. This shows that absenteeism of health personnel has reduced significantly after improvement of road.

- Proportion of households reporting availability of medical services has increased from 0.0 per cent to 82.0 per cent.

- On an average, household health expenditure has increased from Rs. 320.8 to Rs.438.0. This means that households are now able to spend on health/afford health facilities which they were not able to do earlier.

**Water Supply**

There has been improvement in the drinking water supply in the village. After the improvement of road, the proportion of households depending on own tap and public tap has increased from 6.00 per cent to 22.0 per cent and 46.0 per cent to 50.0 per cent respectively. Dependence on borewells or wells has declined.

**Toilet Facility**

Only 25.8 per cent of households use own toilet and remaining households still depend on open defecation.

**Fuel for Cooking**

There has been no change in the pattern of fuel use for cooking. Most of the households are still using firewood (86 %) and remaining 14 per cent use LPG.

**Household Assets**

There has been no such improvement in the asset holdings of the households. Some increase in tractors (25.0%), motor cycles (22.2%), electric fan (21.9%)and insect pump (18.2%) has been observed.

**Social Interaction**

- After the improvement of road, numbers of visits of households to nearby cities or towns for social purpose like marriages, attending funerals and Jatras have increased from 4 to 6.

- Number of visits to nearby cities or town by the household members reveals that female visits have increased from 1.9 to 2.4, male visits increased from 2.8 to 3.9 and children visits increased from 1.4 to 2.6

**Political Participation**

- The study reveals that 98.0 per cent of the households agreed that transportation facilities helped influence political activities in village and 88.0 per cent of households have reported that their political participation has increased after construction of road.

- As a result of the above, number of household participation has also increased. The average numbers of Days of household participation in political activities have increased from 1.8 to 3.2 days during a month.

- Households having membership in community and political organizations have increased from 2.0 per cent to 8.0 per cent after construction of road. It indicates that improvement of road can lead to social and political integration of rural people.

### 6.3.3 Economic Benefits: Qualitative and Quantitative

Economic benefits of RIDF rural road projects, namely quantitative and qualitative benefits have been presented in the following discussion.

**Traffic Intensity**

It is found that after the improvement of road, traffic intensity has increased from 115.5 PCR to 141.0 PCR. After improvement of road, movement of cars, tempo, two wheelers and autos have increased significantly. Table 6.15 shows comparison of traffic intensity.

**Table 6.15:Comparison of Traffic Intensity: Road from Naranja Sugar Factory to Hippalgaon in Bidar Taluk of Bidar District**

| Type of Vehicles | Total Number of Vehicles Per Day (24 Hours) | | Passenger Car Units (P.C.U) Per Day (24 Hours) | |
|---|---|---|---|---|
| | After Project | Before Project | After Project | Before Project |
| Car | 5 | 4 | 5 | 4 |
| Jeep | | | 0 | 0 |
| Tempo | 3 | 1 | 6 | 2 |
| Tractor | 10 | 10 | 10 | 10 |
| Bus | | | 0 | 0 |
| Trucks & Mini Trucks | 2 | 2 | 6 | 6 |
| Motor Cycle & 2 Wheelers | 35 | 30 | 17.5 | 15 |
| Auto Rickshaw/Tumtum | 30 | 20 | 30 | 20 |
| Cycle | 5 | 5 | 2.5 | 2.5 |
| Animal Drawn | 8 | 7 | 64 | 56 |
| Total | 98 | 79 | 141 | 115.5 |

*Note: Recommended PCU Factors recommended by Indian Road Congress Manual, 2001 for Various Types of Vehicles on Rural Roads: Car=1, Jeep=1, Tempo=2, Tractor=1, Bus=3, Truck and Mini Trucks=3, Motor Cycle & 2 Wheelers=0.5, Auto Rickshaw/Tum tum=1, Cycle=0.5 and Animal Drawn=8*

**Employment and Income During Construction**

The work was taken up on tender basis and all the labours were engaged from a different region by the entrusted agency. Hence, the local households did not get employment opportunity during the construction of road.

**Induced Employment and Income**

- The study reveals that on an average, 28.0 per cent of the households are able to enhance their income in the sample villages due to improvement of rural road.

- On an average the household income has increased from Rs. 8000 to Rs. 14,286 i.e. 79 per cent increase from previous income level.

- Improvement of rural road has a positive bearing on different occupations like blacksmith, carpenter, tailor and painter.

**Marketing of Household Items**

- The proportion of households using the road for purchasing their household needs after the improvement of road has increased from 54.0 per cent to 100.0 per cent.

- The road has helped to reduce the distance to be travelled to market for 30.0 per cent of the households.

- On an average time required to reach the market has been reduced from 39.9 minutes to 29.9 minutes through vehicles.

- After the improvement of road, people can move easily to nearby towns. On an average, number of visits of households to nearby towns has increased from 2.9 visits to 4.7 during a month.

- On an average 80.0 per cent of the households are purchasing more number of products and 86.0 per cent are purchasing more quantity of products after the improvement of road from the nearby cities. Thus, people are getting larger variety and good quality of products at a reasonable price.

- As a result of increase in number of products and quantity of products purchased from the market, the total value of products purchased from the market has also increased from Rs.1673 to Rs.2095 per family during the reference year.

- Improvement of road has led to better transportation facility. Now the local shop owners are able to bring variety of products to the shop for selling. This can help in meeting the needs of the households. On an average, 75.0 per cent of households have reported that availability of goods in the villages has increased after the road improvement.

**Marketing of Agricultural Products**

The study reveals that there has been significant improvement in the proportion of households using road after improvement i.e. 52.0 per cent to 96.0 per cent. It has helped farmers to transport agriculture products especially sugarcane to Naranja Sugar factory.

- Improvement of road has also reduced the time required to reach the agricultural market in the nearby town. On an average 81.6 per cent of the households reported reduced time. The time taken to reach agricultural market has reduced from 41.9 minutes to 31.5 minutes.

- Easy accessibility to agricultural market has induced the households to sell their produce in regulated markets. On an average, 66.7 per cent of the households have increased their selling in agricultural market due to improvement of road. The value of agricultural produce sold in market has increased from Rs.73,889 to Rs.94,733.

- Frequency of visits to market has also increased due to improvement of road. Now, even small and marginal farmers frequently visit market to purchase inputs and take their produce to market by tractors, tempo, etc. On an average 85.1 per cent of households increased their visit to market and the actual number increased from 9.0 to 13.9 during a year.

**Agricultural Activities in Village**

After the improvement of the road, the wage rate of agricultural workers has increased from Rs.165 to Rs.242.

- About 84 per cent households feel that after improvement of road, visits of extension workers have increased.
- About 82.0 per cent of households reported change in the crop pattern after implementation of road project.

### 6.3.4 BENEFITS TO BANKING SECTOR

- After implementation of RIDF projects, the proportion of households having SB accounts has increased from 82.0 per cent to 96.0.

On the whole, after implementation of RIDF road projects, banking business has improved in terms of agricultural credit lending, increasing the number of SB accounts and deposits.

### 6.3.5 OVERALL IMPACT

Impact of RIDF rural road - Naranja sugar factory to Hippalgaon has been presented using the approach 'before and after' the project in graph 6.3. The graph reveals that there has been significant improvement in traffic intensity. This has led to improvement in income, expenditure on education and health and access to safe drinking water. There has been less impact on construction of toilets and using LPG for cooking.

**Graph 6.3: Impact of RIDF Road Project in Hippalgaon**

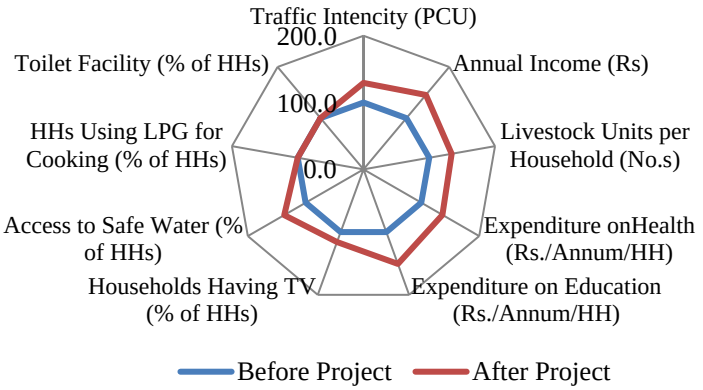


Table 6.16 presents the impact of the project. It can be noted from the table that there has been significant improvement in household income, education, health and other indicators. It can be observed that there is no positive impact on use of LPG, construction of toilet and absenteeism of children and teachers.

**Table 6.16:Impact of RIDF Road Project in Road from Naranja Sugar Factory to Hippalgaon Double Difference Method)**

| Particular | Percentage Change | | Difference (Beneficiary over Non-Beneficiary) |
|---|---|---|---|
| | Beneficiary | Non-Beneficiary | |
| Household Income | 45.3 | 10.0 | 35.3 |
| Impact on Education | | | |
| Mode of Travel to School | | | |
| Bus | 0.0 | 0 | 0.0 |
| Tempo | 0.0 | 0 | 0.0 |
| Two Wheeler | 0.0 | 0 | 0.0 |
| Cycle | 0.0 | 3 | -3.0 |
| Auto | 0.0 | 0 | 0.0 |
| Walk | 0.0 | -3 | 3.0 |
| HH reporting Absenteeism of Children (%) | -3.5 | -0.2 | -3.3 |
| Households Reporting Absenteeism of Teachers (%)-Many Days | -82.5 | -5.9 | -76.6 |
| Households Reporting School Articles -in time (%) | 82.1 | 10.7 | 71.4 |
| Expenditure on Education | 93.4 | 56 | 37.4 |
| Impact on Health | | | |
| Changes in Household Visit to Health Centers | 36.4 | 0.0 | 36.4 |
| Opinion about the road in reaching the hospital | -94.0 | 22 | -116.0 |
| Opinion of households about availability of medical services-Good | 82.0 | 2 | 80.0 |
| Health | 36.5 | 21.5 | 15.0 |
| Impact on Agriculture | | | |
| Households Reporting decline in Time Required to Reach Market | -10.4 | 0.1 | -10.5 |
| No. of Visits to Market | 62.1 | 4.5 | 57.5 |
| Value of Products Purchased from Market | 25.2 | 4.6 | 20.6 |
| Visits to Agricultural Market | 54.4 | 9.6 | 44.9 |
| Wage per day | 47.0 | 11.4 | 35.5 |
| Impact on Social interaction | | | |
| No. of Household Visits to Nearby Cities/Towns | 50.0 | 0.0 | 50.0 |
| No. of Participations in Social Activities | 47.7 | 9.5 | 38.2 |
| Average No. of Days of Household Participation in Political Activities | 77.8 | 0.0 | 77.8 |
| Household Membership in Community/Political Organization | 6.0 | 0 | 6.0 |
| Impact on Slandered of Living | | | |
| Drinking Water | 88.0 | 0 | 88.0 |
| Fuel Facility (LPG) | 0.0 | 6.2449 | -6.2 |
| Toilet Facility | 0.0 | 0 | 0.0 |

## 6.4 IMPROVEMENT TO ROAD FROM GANESHPURWADI TO AMBESANGAVI IN BHALKI TULUK (RIDF Code: R16633 Trench: XVI)

The improvement of road from Bhalki to Bhatambra via Anadwadi, Bhatambra to Bhatsangvi Village and Ganeshpurwadi to Ambesangvi Village was under taken by PWD under RIDF XVI at the cost of Rs. 119.8 lakhs. The total length of the improved road is 3.0 kilometre. The road connects 14 villages to taluk head quarter and 3 marketing centres benefiting 48 thousand population of this region.

### 6.4.1 PHYSICAL AND FINANCIAL PROGRESS OF THE PROJECT

**Physical Progress of the Project**

The project, improvement of road from Bhalki to Bhatambra has been completed only in six months and it has been declared completed on 29th December 2011. It took eleven months to initiate the work after administrative approval which involved official procedures and tendering process. Table 6.17 shows details of physical progress of the project.

**Table 6.17: Physical Progress of the Project: Improvement to Road from Ganeshpurwadi to Ambesangavi Village from 0.00 to 3.00 in Bhalki Tuluk**

| Date of Administrative Approval | Date of Initiation of Work | Date of Completion of Work | Time Taken to Complete the Work | Potential (in Kms) |
|---|---|---|---|---|
| 23/6/2010 | 22/05/2011 | 29/12/2011 | 6 Months | 3.0 |

**Financial Progress of the Project**

Financial progress of the project shows that the work has been completed within the estimated cost. The actual project expenditure was less than estimated project cost. This is mainly due to tender premiums. It has been found that all the RIDF sanctioned loan has been released at regular intervals without affecting progress of the work. The discussions with the implementing agencies revealed that there were no hurdles or delays in the smooth flow of resources while implementing the project. Table 6.18 shows details of financial progress of the project.

**Table 6.18: Financial Progress of the Project: Improvement to Road from Ganeshpurwadi to Ambesangavi Village in Bhalki Tuluk (Rs. In Lakhs)**

| Estimated Cost | RIDF Loan | RIDF Loan Released | Govt. Contribution | Actual Project Expenditure |
|---|---|---|---|---|
| 177.5 | 159.75 | 159.75 | 17.75 | 119.83 |

### 6.4.2 Social Benefits to Stakeholders

**Education**

Before the implementation of the project, students used to walk or go by bike to reach the schools. After the improvement of road, the proportion of students taking a walk to reach school has reduced from 78.6 per cent to 61.5 per cent. Students going by bike has also reduced from14.3 per cent to 0.0 per cent. Now the students have switched to travel by bus or cycle. Table 6.19 shows changes in mode of travel to school.

**Table 6.19: Changes in Mode of Travel to School: Road from Ganeshpurwadi to Ambesangavi**

| Period | Bus | Tempo | Bike | Cycle | Auto | Walk |
|---|---|---|---|---|---|---|
| Before Project | 0.0 | 7.1 | 14.3 | 0.0 | 0.0 | 78.6 |
| After Project | 23.1 | 0.0 | 0.0 | 15.4 | 0.0 | 61.5 |

- 18 per cent of households felt that absenteeism of children has reduced after the improvement of the road. Average days of absenteeism from school have been reduced from 4.5 days to 2.7 days in a year.

- The percentage of households reporting teachers remaining absent for many days during the year has reduced from 21.4 per cent to 0.0 per cent.

- Households reporting timely availability of school articles have increased from 0.0 per cent to 92.9 per cent. Thus, improvement of road has improved the availability of school articles in the village at the right time.

**Health Services**

- As result of improvement of road, the numbers of visits by the households to the nearby health centres have increased from 9 to 12. This reveals that rural people were not able to travel by bad road during the illness and after the improvement of road people are able to safely travel to nearby towns to get health services.

- Mode of travel to nearby health centre or hospital using the RIDF road reveals that earlier, most of the households used to reach the hospital by walk. Now this has drasticall reduced to from 56.5 per cent to 26.1 per cent. With the improvement of road, private tempos have started operating, people are now preferring these vehicles to reach

health centres. Following table shows mode used to reach health centres by the sample households.

**Table 6.20 : Mode Used to Reach Health Centres: Road from Ganeshpurwadi to Ambesangavi**

| | Bus | Tempo | Tractor | Bike | Cycle | Walk |
|---|---|---|---|---|---|---|
| Before Project | 34.8 | 6.5 | 0 | 0 | 2.2 | 56.5 |
| After Project | 28.3 | 37 | 0 | 8.7 | 0 | 26.1 |

- The proportion of households feeling difficulty in reaching nearby health centre has also reduced from 50.0 per cent to 28.3 per cent.

- Opinion of households regarding visits of health providers to villages shows that on an average 60.9 per cent of households feel that visits of health providers have increased.

- Absenteeism of health service providers in the villages shows that proportion of households reporting 'more absent' has reduced from 34.8 per cent to 23.9 per cent after improvement of road. This shows that absenteeism of health personnel has reduced significantly after the improvement of road.

- Availability of medical services has also improved in the villages with the improvement of road. Proportion of households reporting availability of medical services has increased from 8.7 per cent to 69.6 per cent.
- The study found that on average, household health expenditure has increased from Rs. 226.6 to Rs.319.0 per year. This means that households are now able to spend on health/afford health services which they were not able to do earlier.

**Water Supply**

With the improvement of public water supply, the proportion of households depending on own tap and public tap has increased, from 4.0 per cent to 24.5 per cent and 20.0 per cent to 22.4 per cent respectively. The proportion of households depending on bore well/MWS or wells has declined. The proportion of households depending on bore well/ MWS or wells has declined from 52.0 per cent to 40.8 per cent and 24.0 per cent to 12.2 per cent respectively.

**Toilet Facility**

After the road improvement, the percentage of households having their own toilet has increased from 75.0 per cent to 94.1 per cent.

**Fuel for Cooking**

Most of the households are still using fuel wood for cooking purpose. But the proportion of households using LPG has increased from 4.1 per cent to 11.6 per cent. The proportion of households using fuel wood has decreased from 95.9 per cent to 88.4 per cent.

**Household Assets**

After the improvement of road, there has been increase in number of mobile phones (54.3%), motor cycles (41.2%) and electric fans (22.2%).

**Social Interaction**

- After the improvement of road, numbers of visits of households to nearby cities or towns for social purpose like marriages, attending funerals and Jatras have increased from 4 to 5.

- Number of visits to nearby cities or towns by the household members reveals that female visits have increased from 1.3 to 1.9, male visits increased from 1.8 to 2.3 and children visits increased from 1.0 to 1.7

**Political Participation**

- The study reveals that 68.0 per cent of the households agreed that transportation facilities aided to influence political activities in village and 63.3 per cent of households have reported that their political participation has increased after the construction of road.

- As a result of increasing political activities in the village, number of household participation has also increased. The average numbers of Days of household participation in political activities have increased from 1.4 to 2.1 days during a month.

- Households having membership in community and political organizations has increased from 8.0 per cent to 38.0 per cent after construction of the road. It indicates that improvement of road can lead to social and political integration of rural people.

### 6.4.3 ECONOMIC BENEFITS: QUALITATIVE AND QUANTITATIVE

Economic benefits of RIDF rural road projects, namely quantitative and qualitative benefits have been presented in the following section.

**Traffic Intensity**

After the improvement of road, traffic intensity has increased from 124 PCR to 147.5 PCR. The movement of cars, tractor, trucks, two wheelers and *tum tum* has increased significantly. Table 6.21 shows comparison of traffic intensity.

**Table 6.21:Comparison of Traffic Intensity: Road from Ganeshpurwadi to Ambesangavi in Bhalki Tuluk of Bidar District**

| Type of Vehicles | Total Number of Vehicles Per Day (24 Hours) | | Passenger Car Units (P.C.U) Per Day (24 Hours) | |
|---|---|---|---|---|
| | After Project | Before Project | After Project | Before Project |
| Car | 10 | 5 | 10 | 5 |
| Jeep | 0 | 0 | 0 | 0 |
| Tempo | 4 | 4 | 8 | 8 |
| Tractor | 15 | 10 | 15 | 10 |
| Bus | 0 | 0 | 0 | 0 |
| Trucks & Mini Trucks | 4 | 2 | 12 | 6 |
| Motor Cycle & 2 Wheelers | 45 | 40 | 22.5 | 20 |
| Auto Rickshaw/Tumtum | 35 | 30 | 35 | 30 |
| Cycle | 10 | 10 | 5 | 5 |
| Animal Drawn | 5 | 5 | 40 | 40 |
| Total | 128 | 106 | 147.5 | 124 |

*Note: Recommended PCU Factors recommended by Indian Road Congress Manual, 2001 for Various Types of Vehicles on Rural Roads: Car=1, Jeep=1, Tempo=2, Tractor=1, Bus=3, Truck and Mini Trucks=3, Motor Cycle & 2 Wheelers=0.5, Auto Rickshaw/Tum tum=1, Cycle=0.5 and Animal Drawn=8*

**Employment and Income During Construction**

About 4 per cent of the households reported that they got direct employment during the construction of road. Each household got 15 days of employment and earned Rs.1500/.

**Induced Employment and Income**

- The study reveals that on an average, 22.0 per cent of the households were able to increase their income in the sample villages due to improvement of rural road.

- On an average the household income has increased from Rs. 3318 to Rs. 4545 i.e. 37 per cent increase from the previous income level.

- After the improvement of road, employment in Petty business and other rural occupations like black smithy, carpentry, tailoring and painting witnessed improvement.

**Marketing of Household Items**

- The proportion of households using the road for purchasing their household needs after the improvement of road has increased from 58.0 per cent to 70.0 per cent.

- The road has helped to reduce the distance to be travelled to market for 37.1 per cent of households.

- On an average time required to reach the market has been reduced from 46.3 minutes to 33.3 minutes by vehicles.

- After the improvement of road, people can move easily to nearby towns. On an average, number of visits of households has increased from 2.9 visits to 6.1 during a month.

- On an average 62.9 per cent of the households are purchasing more number of products and 60.0 per cent are purchasing more quantity of products after the improvement of road from the nearby cities. Thus, people are getting larger variety and good quality of products at a reasonable price.

- As a result of increase in number of products and quantity of products purchased from the market, the total value of products purchased from the market has also increased from Rs.813 to Rs.1892 per household.

- Improvement of road has led to better transportation facility. Now the local shop owners are able to bring variety of products to the shop for selling. This can help in meeting the needs of the households. On an average, 80.0 per cent of households have reported that availability of goods in the villages has increased after the road improvement.

**Marketing of Agricultural Products**

The study reveals that there has been significant improvement in the proportion of households using road after improvement i.e. 24.0 per cent to 34.0 per cent. Earlier this road was muddy road with a carriage width of 3.75metre which was in bad condition and fully damaged. This was causing lot of inconvenience to the villagers and the vehicles operating from this road were forced to use the alternative road. By improving this road, the trading of agricultural produces has improved and inter-state traffic has also improved.

- Improvement of road has also reduced the time required to reach the agricultural market in the nearby town. On an average 21.4 per cent of the households reported reduced time. The time taken to reach agricultural market has reduced from 55.4 minutes to 43.8 minutes by vehicle.

- Easy accessibility to agricultural market has induced the households to sell their produce in regulated markets. On an average, 48.5 per cent of the households have increased their selling in agricultural market due to improvement of road. The value of agricultural produce sold in the market increased from Rs.9375 to Rs.21083 in a year.

- Frequency of visits to market has also increased due to improvement of road. Now, even small and marginal farmers frequently visit market to purchase inputs and take their produce to market by tractors, tempo, etc. On an average 44.1 per cent of

households increased their visit to market and the actual number increased from 6.1 to 8.8 during a year.

- Improvement of road has helped to reduce distance to market. As a result of this quantity of sale in regulated markets has increased.

**Agricultural Activities**

The wage rate of agricultural workers has increased from Rs.145 to Rs.244.

- About 50 per cent of households feel that after improvement of road, visits of extension workers have increased.

- About 38.0 per cent of households reported change in the crop pattern (especially commercial crops) after implementation of road project.

### 6.4.4 BENEFITS TO BANKING SECTOR

After the improvement of the road, Pragati Krishna Paltan Sahakari Sangh, Ambesangavi, located in Bhalki taluk is able to increase their business. It is found that the extent of agricultural loan issued, total number of SB accounts and deposits mobilized by the farmers have increased by 419 per cent, 115 per cent and 171 per cent respectively. This really is a significant contribution.

- The proportion of sample households having SB accounts has remained same i.e. 74.0 per cent even after improvement of road.

- This indicates that efforts have not been made to include all the households in the banking business. Therefore, efforts should be made remove the barriers to financial inclusion by providing necessary information, co-operation and necessary assistance to villagers in project implemented area.

On the whole, after implementation of RIDF road projects, banking business has improved in terms of agricultural credit lending, increasing the number of SB accounts and deposits.

### 6.4.5 Overall Impact

Impact of RIDF rural road - Ganeshpurwadi To Ambesangavi in Bhalki Tuluk has been presented using the approach 'before and after' the project in graph 6.4. The graph reveals that there has been significant improvement in traffic intensity. This has led to improvement in income, expenditure on education and health. There has been less impact on construction of toilets, using LPG for cooking, safe drinking water and owning livestock.

**Graph 6.4: Impact of RIDF Roadn Project in Ambesangavi**

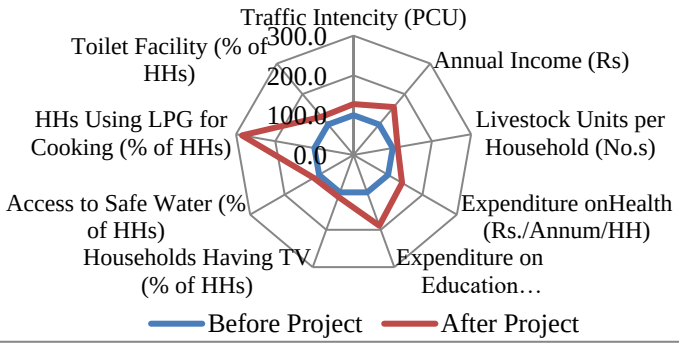


Table 6.22 presents the impact of the project. It can be noted from the table that there has been significant improvement in household income, education, health and other indicators. It can be observed that there is no positive impact on construction of toilets.

**Table 6.22:Impact of RIDF Road Project in Road from Ganeshpurwadi to Ambesangavi (Double Difference Method)**

| Particular | Percentage Change | | Difference (Beneficiary over Non-Beneficiary) |
|---|---|---|---|
| | Beneficiary | Non-Beneficiary | |
| Household Income | 57.5 | 40.8 | 16.8 |
| Impact on Education | | | |
| Mode of Travel to School | | | |
| Bus | 23.1 | 25 | -1.9 |
| Tempo | -7.1 | 8 | -15.1 |
| Two Wheeler | -14.3 | 0 | -14.3 |
| Cycle | 15.4 | 20.5 | -5.1 |
| Auto | 0.0 | -4.5 | 4.5 |
| Walk | -17.0 | -48.9 | 31.9 |
| HH reporting Absenteeism of Children (%) | -1.8 | 1.5 | -3.3 |
| Households Reporting Absenteeism of Teachers (%)-Many Days | -21.4 | -2.7 | -18.7 |
| Households Reporting School Articles -in time (%) | 92.9 | -9.1 | 102.0 |
| Expenditure on Education | 131.0 | -20 | 151.0 |
| Impact on Health | | | |
| Changes in Household Visit to Health Centers | 33.3 | 0.0 | 33.3 |
| Opinion about the road in reaching the hospital | -21.7 | -26.1 | 4.4 |
| Opinion of households about availability of medical services-Good | 60.9 | 4.3 | 56.6 |
| Health | 40.8 | 22.7 | 18.1 |
| Impact on Agriculture | | | |
| Households Reporting decline in Time Required to Reach Market | -13.0 | 1 | -14.0 |
| No. of Visits to Market | 110.3 | 17.4 | 93.0 |
| Value of Products Purchased from Market | 132.7 | 38.9 | 93.9 |
| Visits to Agricultural Market | 44.3 | 10.6 | 33.6 |
| Wage per day | 68.6 | 45.6 | 23.0 |
| Impact on Social interaction | | | |
| No. of Household Visits to Nearby Cities/Towns | 66.7 | 25.0 | 41.7 |
| No. of Participations in Social Activities | 78.0 | 0.0 | 78.0 |
| Average No. of Days of Household Participation in Political Activities | 50.0 | -13.3 | 63.3 |
| Household Membership in Community/Political Organization | 30.0 | 6 | 24.0 |
| Impact on Slandered of Living | | | |
| Drinking Water | 95.2 | 1.3 | 93.9 |
| Fuel Facility (LPG) | 7.5 | 1.6 | 5.9 |
| Toilet Facility | 19.1 | 100.0 | -80.9 |

## 6.5, IMPROVEMENT TO RATTANAHALLI-K.NAGANAHALLI ROAD VIA GUNGRAL CHATRA (RIDF Code: R17063 Trench: XVII)

Improvements to road from Rattanahalli to Kallur Naganahalli via Gungral Chatra in Mysore Taluk of Mysure District was undertaken under RIDF XVII with the administrative approval for Rs. 75.00 lakhs. The work was implemented by PWD. The road starts from Rattanhalli village to Kalur Naganahalli village. The total length of the road is 3.0 kilometre and connects Rattanahalli, Gungral Chatra, Kallur Naganahalli villages in Mysore taluk and benefits population of 5659.

### 6.5.1 PHYSICAL AND FINANCIAL PROGRESS OF THE PROJECT

**Physical Progress of the Project**

The project, improvement to road from Rattanahalli to Kallur Naganahalli via Gungral Chatra took nine months to initiate the work after administrative approval. After the initiation of the work the project got completed within the stipulated time period i.e. 6 months. Before the improvement of this road it was in a deteriorated condition and had almost vanished, leaving the base jelly exposed and the deep potholes made travelling a nightmare for commuters. There were frequent accident and breakdown of vehicles, farmers were facing lot of problems to transport their agricultural produce. The improvement of road include following works; A) earth work excavation and formation of road embankment in low laying portion and sunken portion and widening the narrow embankment B) collection and consolidation of grade II and grade III metal C) providing single coat surface dressing D) providing 20 mm thick mix seal surface E) earth work excavation for opening the longitudinal check drain at very essential reaches and F) providing and fixing Guard stones and kilometre stones, etc. It was observed that the project was completed in all respects without any compromise in quality. Table 6.23 shows details of physical progress of the project.

**Table 6.23 Physical Progress of the Project: Improvement to Rattanahalli-K.Naganahalli road via Gungral Chatra**

| Date of Administrative Approval | Date of Initiation of Work | Date of Completion of Work | Time Taken to Complete the Work | Potential (in Kms) |
|---|---|---|---|---|
| 12/7/2011 | 22/04/2012 | 16/10/2012 | 6 Months | 3.0 |

**Financial Progress of the Project**

Financial progress of the project shows that the work has been completed within the estimated cost. It has been found that entire RIDF sanctioned loan has been released at regular intervals. Table 6.24 shows details of financial progress of the project.

**Table 6.24: Financial Progress of the Project: Improvement to Road from Rattanahalli-K.Naganahalli road via Gungral Chatra (Rs. In Lakhs)**

| Estimated Cost | RIDF Loan | RIDF Loan Released | Govt. Contribution | Actual Project Expenditure |
|---|---|---|---|---|
| 75.00 | 60.00 | 60.00 | 15.00 | 75.00 |

### 6.5.2 Social Benefits to Stakeholders

**Education**

- About 86 per cent of the students used to walk to reach the school but after the improvement of the road their number has reduced to 38 per cent. Now students are travelling by bus, tempo and auto.

- 30 per cent of households felt that absenteeism of children has reduced after the improvement of the road. Average days of absenteeism from school have got reduced from 5.2 days to 2.2 days in a year.

- The percentage of households reporting teachers remaining absent for many days during the year has reduced from 71.4 per cent to 10.0 per cent. This shows that teachers' absenteeism has reduced with the improvement of roads in Karnataka.

- Households reporting timely availability of school articles have increased from 4.8 per cent to 61.9 per cent. Thus, improvement of road has improved the availability of school articles in the village at right time.

**Health Services**

- As result of improvement of road, the numbers of visits by the households to the nearby health centres have increased from 7 to 10.

- Mode of travel to nearby health centre or hospital using the RIDF road reveals that earlier, most of the households used to reach the hospital by walk (64 %). But after the improvement of road, people are using tempo, bus and auto to reach the health centre.

- The proportion of households feeling difficulty in reaching nearby health centre has also reduced from 82.0 per cent to 14.0 per cent.

- Opinion of households regarding visits of health providers to villages shows that on an average 62.0 per cent of households feel that visits of health providers have increased and 2.0 per cent feel that there has been no change in number visits after improvement of road.

- Absenteeism of health service providers in the villages shows that proportion of households reporting 'more absent' has reduced from 64.0 per cent to 26.0 per cent after improvement of road. This shows that absenteeism of health personnel has reduced significantly after the improvement of road.

- Availability of medical services has also improved in the villages with the improvement of road. Proportion of households reporting availability of medical services has increased from 8.0 per cent to 86.0 per cent.

- On an average, household health expenditure has increased from Rs. 168.4 to Rs.279.9. This means that households are now able to spend on health/afford health services which they were not able to do earlier.

**Water Supply**

Households having own tap has increased from 58 per cent to 84 per cent and use of bore wells, wells and public tap has declined.

**Toilet Facility**

After the road improvement, the percentage of households having their own toilet has increased from 68.8 per cent to 79.2 per cent.

**Fuel for Cooking**

The use of LPG has increased from 28 per cent to 44 per cent and remaining households are still using firewood and crop residues for cooking mainly due to easily availability of these resources.

**Household Assets**

After the improvement of road, there has been increase in number of mobile phones (48.6%), motor cycles (36.4%), electric fan (50.0%), sewing machine (50.0%) and insect pump (66.7%).

**Social Interaction**

- After the improvement of road, numbers of visits of households to nearby cities or towns for social purpose like marriages, attending funerals and Jatras have increased from 4 to 6

- Number of visits to nearby cities or towns by the household members reveals that female visits have increased from 1.3 to 2.4, male visits increased from 2.6 to 4.0 and children visits increased from 1.2 to 2.1

- With the improvement of road, households' numbers of visits to different villages and cities have increased from 5 to 8 in a month. Visits of children have increased substantially as compared to elderly male and female members.

**Political Participation**

- The study reveals that 78.0 per cent of the households felt that transportation facilities aided to influence political activities in the village and 83.0 per cent of households have reported that their political participation has increased after construction of road.

- As a result of increasing political activities in the village, number of household participation has also increased. The average numbers of Days of household participation in political activities have increased from 1.9 to 3.5 days during a month.

- Households having membership in community and political organizations has increased from 6.0 per cent to 56.0 per cent after construction of road. It indicates that improvement of road can lead to social and political integration of rural people.

### 6.5.3 Economic Benefits: Qualitative and Quantitative

Economic benefits of RIDF rural road projects, namely quantitative and qualitative benefits have been presented in the following section.

**Traffic Intensity**

It is found that after the improvement of road, traffic intensity has increased from 153.5 PCR to 158.5 PCR. After the improvement of road, movement of cars, tempo, tractor, bus, trucks, two wheelers, *tum tum* and cycles have increased significantly. Table 6.25 shows comparison of traffic intensity.

**Table 6.25:Comparison of Traffic Intensity: Rattanahalli-K.Naganahalli Road via Gungral Chatra in Mysore Taluk of**

| Type of Vehicles | Total Number of Vehicles Per Day (24 Hours) | | Passenger Car Units (P.C.U) Per Day (24 Hours) | |
|---|---|---|---|---|
| | After Project | Before Project | After Project | Before Project |
| Car | 20 | 4 | 20 | 4 |
| Jeep | | | 0 | 0 |
| Tempo | | | 0 | 0 |
| Tractor | 12 | 4 | 12 | 4 |
| Bus | | | 0 | 0 |
| Trucks & Mini Trucks | 3 | 1 | 9 | 3 |
| Motor Cycle & 2 Wheelers | 150 | 25 | 75 | 12.5 |
| Auto Rickshaw/Tumtum | | | 0 | 0 |
| Cycle | 5 | 20 | 2.5 | 10 |
| Animal Drawn | 5 | 15 | 40 | 120 |
| Total | 195 | 69 | 158.5 | 153.5 |

*Note: Recommended PCU Factors recommended by Indian Road Congress Manual, 2001 for Various Types of Vehicles on Rural Roads: Car=1, Jeep=1, Tempo=2, Tractor=1, Bus=3, Truck and Mini Trucks=3, Motor Cycle & 2 Wheelers=0.5, Auto Rickshaw/Tum tum=1, Cycle=0.5 and Animal Drawn=8*

**Employment and Income During Construction**

The work was taken up on tender basis and all the labours were engaged from a different region by the entrusted agency. Hence, the local households did not get employment opportunity during the construction of road.

**Induced Employment and Income**

- The study reveals that on an average, 42.0 per cent of the households are able to increase their income in the sample villages due to improvement of rural road.

- On an average the household income has increased from Rs. 4000 to Rs. 6500 i.e. 63 per cent increase from previous income level.

- Due to improvement of road, employment in Petty business and other rural works like blacksmith, carpenter, tailor and painter has been has improved.

**Marketing of Household Items**

- The proportion of households using the road for the purchasing their household need after the improvement of road has increased from 98 per cent to 100 per cent.

- The road has helped to reduce the distance to be travelled to market for 58.0 per cent of households.

- On an average time required to reach the market has got reduced from 38.9 minutes to 33.3 minutes by vehicles.

- After the improvement of road, people can move easily to nearby towns. On an average, number of visits of households has increased from 4.1 visits to 6.8 during a month.

- On an average 82.0 per cent of the households are purchasing more number of products and 82.0 per cent are purchasing more quantity of products after the improvement of road from the nearby cities. Thus, people are getting more variety and good quality of products at a reasonable price.

- As a result of increase in number of products and quantity of products purchased from the market, the total value of products purchased from the market has also increased from Rs.2434 to Rs.3638 in a year.

- Improvement of road has led to better transportation facility. Now the local shop owners are able to bring variety of products to the shop for selling. This can help in meeting the needs of the households. On an average,80.0 per cent of households have reported that availability of goods in the villages has increased after the road improvement.

**Marketing of Agricultural Products**

The study reveals that there has been significant improvement in the proportion of households using road after improvement i.e. 74.0 to 74.0. The road runs in plain terrain and part of the road runs in Agricultural area. Main crops grown in this area are Ragi, Jawar, and Groundnut which are staple crops in the area. After improving the road the long cherished dream of this region has been fulfilled. Now farmers can easily transport their goods to the market.

- Improvement of road has also reduced the time required to reach the agricultural market in the nearby town. On an average 67.5 per cent of the households reported reduced time. The time taken to reach agricultural market has reduced from 50.3 minutes to 44.0 minutes by vehicles.

- Easy accessibility to agricultural market has induced the households to sell their produce in regulated markets. On an average, 77.5 per cent of the households have increased their selling in agricultural market due to improvement of road. The value of agricultural produce sold in market increased from Rs.16527 to Rs.26104

- Frequency of visits to market has also increased due to improvement of road. Now, even small and marginal farmers frequently visit market to purchase inputs and take their produce to market by tractors, tempo, etc. On an average 62.5 per cent of

households increased their visit to market and the actual number increased from 13.4 to 17.4 during a year.

- Improvement of road has helped to reduce distance to market. As a result of this quantity of sale in regulated markets has increased.

**Agricultural Activities**

The wage rate of agricultural workers has increased from Rs.149 to Rs.218 as a result of improved road.

- 78 per cent of the households feel that after improvement of road, visits of extension workers have increased.
- About 56.0 per cent of households reported change in the cropping pattern after implementation of road project.

### 6.5.4 BENEFITS TO BANKING SECTOR

After the improvement of the road, Canara bank, Elwala branch and Gungralchatra branches are able to increase their business. It is found that the extent of agricultural loan issued, total number of SB accounts and deposits mobilized by the farmers have increased by 283 per cent, 543 per cent and 350 per cent respectively.

- After implementation of RIDF projects, the proportion of households having SB accounts has increased from 74.0 per cent to 86.0

On the whole, after implementation of RIDF road projects, banking business has improved in terms of agricultural credit lending, increasing the number of SB accounts and deposits.

### 6.5.5 OVERALL IMPACT

Impact of RIDF rural road - Rattanahalli-K.Naganahalli Road Via Gungral Chatra has been presented using the approach ‘before and after’ the project in graph 6.5. The graph reveals that there has been significant improvement in traffic intensity. This has led to improvement in

income, expenditure on education and health. There has been less impact on construction of toilets, using LPG for cooking and access to safe drinking water.

**Graph 6.5: Impact of RIDF Road Project in K.Naganahalli**

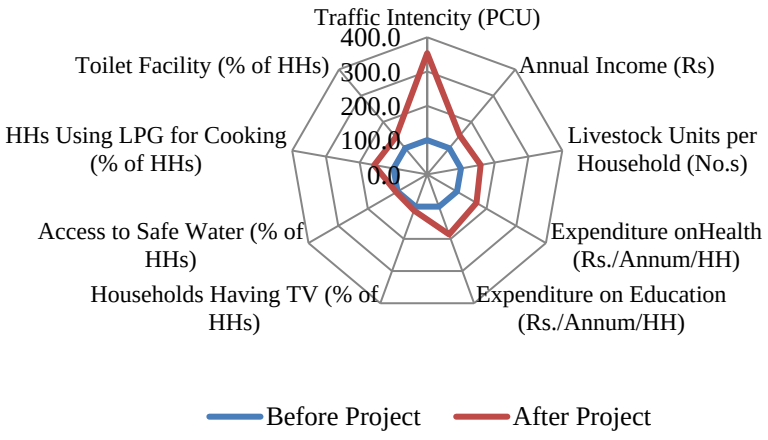


Table 6.26 presents the impact of the project. It can be noted from the table that there has been improvement in household income, education, health and other indicators. It can be observed that there is no positive impact on use of LPG and absenteeism of children and teachers.

**Table 6.26:Impact of RIDF Road Project in Road from Rattanahalli-K.Naganahalli (Double Difference Method)**

| Particular | Percentage Change | | Difference (Beneficiary over Non-Beneficiary) |
|---|---|---|---|
| | Beneficiary | Non-Beneficiary | |
| Household Income | 47.7 | 37.1 | 10.6 |
| Impact on Education | | | |
| Mode of Travel to School | | | |
| Bus | 24.0 | 8 | 16.0 |
| Tempo | 19.5 | 11.2 | 8.3 |
| Two Wheeler | 0.0 | 0 | 0.0 |
| Cycle | 0.0 | 10.5 | -10.5 |
| Auto | 4.8 | 0 | 4.8 |
| Walk | -48.3 | -29.7 | -18.6 |
| HH reporting Absenteeism of Children (%) | -3.0 | -1.6 | -1.4 |
| Households Reporting Absenteeism of Teachers (%)-Many Days | -61.4 | 0 | -61.4 |
| Households Reporting School Articles -in time (%) | 57.1 | 0 | 57.1 |
| Expenditure on Education | 99.8 | 29.4 | 70.4 |
| Impact on Health | | | |
| Changes in Household Visit to Health Centers | 42.9 | 20.0 | 22.9 |
| Opinion about the road in reaching the hospital | -68.0 | -2 | -66.0 |
| Opinion of households about availability of medical services-Good | 78.0 | 2 | 76.0 |
| Health | 66.1 | 65.6 | 0.5 |
| Impact on Agriculture | | | |
| Households Reporting decline in Time Required to Reach Market | -5.6 | -0.2 | -5.4 |
| No. of Visits to Market | 65.9 | 41.8 | 24.1 |
| Value of Products Purchased from Market | 49.5 | 27.1 | 22.4 |
| Visits to Agricultural Market | 29.1 | 36.4 | -7.3 |
| Wage per day | 46.1 | 58.7 | -12.6 |
| Impact on Social interaction | | | |
| No. of Household Visits to Nearby Cities/Towns | 60.0 | 37.5 | 22.5 |
| No. of Participations in Social Activities | 53.5 | 2.9 | 50.6 |
| Average No. of Days of Household Participation in Political Activities | 84.2 | 15.8 | 68.4 |
| Household Membership in Community/Political Organization | 50.0 | 8 | 42.0 |
| Impact on Slandered of Living | | | |
| Drinking Water | 75.8 | 0 | 75.8 |
| Fuel Facility (LPG) | 16.0 | 30 | -14.0 |
| Toilet Facility | 29.1 | 0 | 29.1 |

## 6.6, IMPROVEMENT TO ROAD FROM M.M.ROAD TO RAMENAHALLI - NERALE HOSUR ROAD VIA ANAGATTI (0.00 to 5.00 km) (RIDF Code: R152701614 Trench: XV)

H D Kote Taluk is considered as one of the backward taluka in the district. The improvements to road from Mysore - Mananthavady Road to Ramenahalli- Narale Hosur Road via Anagatti (5.0 Km) was undertaken under RIDF XV at the cost of Rs.73.10 lakh. This road connects surrounding villages Narale Hosur, Ramenahalli, Anagatti, Yalemattur, Jeeyara and Pura to nearer Gram Panchayat villages like Nuralakuppe and Antharsanthe. People from these villages used to travel to taluk head quarter i.e. H.D.Kote via Antharsanthe using the road Mysure - Mananthavady Road and up to Antharsanthe, the villagers used to walk. After improvement of road, these villages got bus facility and many private vehicles are also operating. Thus, the improvement of road has positively affected the lives of these villagers.

### 6.6.1 PHYSICAL AND FINANCIAL PROGRESS OF THE PROJECT

**Physical Progress of the Project**

The project, improvement to road from M.B.G road to Nerale Hosur took about one year and four months to initiate the work after administrative approval. This is mainly because of official procedures and tendering process. But after the initiation of the work the project got completed within the stipulated time period i.e. 5 months. The works include, earth work excavation and formation of road embankment, collection and consolidation of grade II and grade III metal, single coat surface dressing, and providing 20 mm thick mix seal surface. It was observed that the project was completed in all respects without any compromise on the quality. Table 6.27 shows details of physical progress of the project.

**Table 6.27: Physical Progress of the Project: Improvement to Road from M.M.road to Ramenahalli - Nerale Hosur road via Anagatti**

| Date of Administrative Approval | Date of Initiation of Work | Date of Completion of Work | Time Taken to Complete the Work | Potential (in Kms) |
|---|---|---|---|---|
| 6/1/2010 | 16/05/2012 | 15/10/2012 | 5 Months | 5.0 |

**Financial Progress Of The Project**

Financial progress of the project shows that the work has been completed within the estimated costs. The actual project expenditure was less than estimated project cost due to tender premium. It has been found that entire RIDF sanctioned loan has been released at regular intervals. Table 6.28 shows details of financial progress of the project.

**Table 6.28: Financial Progress of the Project: Improvement to Road from M.M.road to Ramenahalli - Nerale Hosur road via Anagatti (Rs. In Lakhs)**

| Estimated Cost | RIDF Loan | RIDF Loan Released | Govt. Contribution | Actual Project Expenditure |
|---|---|---|---|---|
| 73.33 | 67.50 | 67.50 | 7.50 | 73.10 |

## 6.6.2 SOCIAL BENEFITS TO STAKEHOLDERS

**Education**

After the improvement of the road, the public transport buses have started operating. Hence, the students can travel by buses rather than by tempo. The proportion of students travelling by bus has increased from 16.2 per cent to 81.1 and the proportion of students travelling by tempo has reduced from 51.4 per cent to 0.0 per cent. At the same time students walking to school has got reduced from 21.6 per cent to 18.9 per cent. On the whole improvement of road has facilitated better and safe mode of travel.

**Table 6.29: Changes in Mode of Travel to School: Road from M.B.G road to Kattehundi**

| Period | Bus | Tempo | Bike | Cycle | Auto | Walk |
|---|---|---|---|---|---|---|
| Before Project | 16.2 | 51.4 | 10.8 | 0.0 | 0.0 | 21.6 |
| After Project | 81.1 | 0.0 | 0.0 | 0.0 | 0.0 | 18.9 |

- 76 per cent of households felt that absenteeism of children has reduced after the improvement of the road. Average days of absenteeism from school have reduced from 15.4 days to 2.6 days in a year.

- The percentage of households reporting teachers remaining absent for many days during the year has reduced from 94.7 per cent to almost nil (0 per cent). This shows that teachers' absenteeism has reduced with the improvement of roads in Karnataka.

- Households reporting timely availability of school articles have increased from 2.6 per cent to 84.6 per cent. Thus, improvement of road has improved the availability of school articles in the village at right time.

**Health Services**

- As a result of improvement of road, numbers of visits by the households to the nearby health centres have increased from 10 to 14. This reveals that rural people were finding it difficult to travel by bad road during the illness and after the improvement of road people are able to safely travel to nearby towns to get health services.

- Mode of travel to nearby health centre or hospital using the RIDF road reveals that prior to this road, most of the households used to reach the hospital by using bus, tempo and cycle. But after the improvement of the road, 97.6 per cent of the households use bus which is considered as the safe mode of transportation. Following table shows mode used to reach health centres by the sample households.

**Table 6.30: Mode Used to Reach Health Centres: M.B.G road to Kattehundi**

| | Bus | Tempo | Tractor | Cycle | Auto | Walk |
|---|---|---|---|---|---|---|
| Before Project | 31 | 64.3 | 0 | 4.8 | 0 | 0 |
| After Project | 97.6 | 2.4 | 0 | 0 | 0 | 0 |

- The proportion of households feeling difficulty in reaching nearby health centre has also reduced from 92.9 per cent to 4.8 per cent.

- Opinion of households regarding visits of health providers to villages shows that on an average 81.0 per cent of households feel that visits of health providers have increased and 19.0 per cent feel that there has been no change in number of visits after improvement of road.

- Absenteeism of health service providers in the villages shows that proportion of households reporting 'more absent' has dropped from 80.0 per cent to 0 after improvement of road. This shows that absenteeism of health personnel has reduced tremendously after improvement of road.

- Availability of medical services has also improved in the villages with the improvement of road. Proportion of households reporting availability of medical services has increased from 4.8 per cent to 85.7 per cent.

- The study found that on an average, household health expenditure has increased from Rs. 302 to Rs.399. This means that households are now able to spend on health/afford health services which they were not able to do earlier.

**Water Supply**

The percentage of households possessing own taps have increased from 56.0 to 64.0 per cent. While the usage of borewell and well has not changed much, the dependence on public taps has reduced from 20.0 per cent to 12.0 per cent.

**Toilet Facility**

After the road improvement, the percentage of households having their own toilet has increased from 43.2 per cent to 52.2 per cent.

**Fuel for Cooking**

There is no significant changes there can be observed in the fuel usage.

**Household Assets**

After the improvement of road, there has been an increase in number of cooking stove (50.0 %), motor cycles (14.3 %), cycles (18.8), tractor (30.0%) and insect pump (17.6%).

**Social Interaction**

- After the improvement of road, numbers of visits of households to nearby cities or towns for social purpose like marriages, attending funerals and Jatras have increased from from 3 to 6 in a month.

- Number of visits to nearby cities or town by the household members reveals that female visits have increased from 2.2 to 4.1, male visits increased from 2.6 to 5.3 and children visits increased from 1.7 to 5.1.

**Political Participation**

- The study reveals that 80.0 per cent of the households felt that transportation facilities aided to influence political activities in village and 80.0 per cent of households have reported that their political participation has increased after construction of the road.

- As a result of increasing political activities in the village, number of household participation has also increased. The average numbers of Days of household participation in political activities have increased from 2.6 to 4.1 days during a month.

- Households having membership in community and political organizations has increased from 16.0 per cent to 18.0 per cent after construction of road. It indicates that improvement of road can lead to social and political integration of rural people.

### 6.6.3 Economic Benefits: Qualitative and Quantitative

Economic benefits of RIDF rural road projects, namely quantitative and qualitative benefits have been presented in the following section.

**Traffic Intensity**

It is found that after the improvement of road traffic intensity has increased from 81.5 PCR to 60.5 PCR. After improvement of road, movement of cars, tractor, two wheelers and *tum tum* have increased significantly. Table 6.31 shows comparison of traffic intensity.

**Table 6.31:Comparison of Traffic Intensity: Road from M.M.road to Ramenahalli in H.D.Kote Taluk of Mysore District**

| Type of Vehicles | Total Number of Vehicles Per Day (24 Hours) | | Passenger Car Units (P.C.U) Per Day (24 Hours) | |
|---|---|---|---|---|
| | After Project | Before Project | After Project | Before Project |
| Car | 10 | 2 | 10 | 2 |
| Jeep | | | 0 | 0 |
| Tempo | | | 0 | 0 |
| Tractor | 5 | 1 | 5 | 1 |
| Bus | | | 0 | 0 |
| Trucks & Mini Trucks | | 1 | 0 | 3 |
| Motor Cycle & 2 Wheelers | 25 | 5 | 12.5 | 2.5 |
| Auto Rickshaw/Tumtum | 8 | 4 | 8 | 4 |
| Cycle | 2 | 10 | 1 | 5 |
| Animal Drawn | 3 | 8 | 24 | 64 |
| Total | 53 | 31 | 60.5 | 81.5 |

*Note: Recommended PCU Factors recommended by Indian Road Congress Manual, 2001 for Various Types of Vehicles on Rural Roads: Car=1, Jeep=1, Tempo=2, Tractor=1, Bus=3, Truck and Mini Trucks=3, Motor Cycle & 2 Wheelers=0.5, Auto Rickshaw/Tum tum=1, Cycle=0.5 and Animal Drawn=8*

**Employment and Income During Construction**

The work was taken up on tender basis and all the labours from a different region were engaged by the entrusted agency. Hence, the local households have not got employment opportunity during the construction of road.

**Induced Employment and Income**

- The study reveals that on an average, 18.0 per cent of the households were able to increase their income in the sample villages due to improvement of rural road.

- On an average the household income has increased from Rs. 10,778 to Rs. 15,444 i.e. 43 per cent increase from previous income level. Due to better transportation facility agricultural incomes have increased.

**Marketing of Household Items**

- The proportion of households using the road for purchasing their household need after the improvement of road has increased from 12.0 per cent to 100.0 per cent.
- The road has helped to reduce the distance to be travelled to market for 48.0 per cent of households.
- On an average time required to reach the market has been reduced from 23.5 minutes to 16.2 minutes by vehicles.
- After the improvement of road, people can move easily to nearby towns. On an average, number of visits of households has increased from 3 visits to 6 during a month.
- On an average 80.0 per cent of the households are purchasing different products and 82.0 per cent are purchasing more quantity of products after the improvement of road from the nearby cities. Thus, people are getting more variety and good quality of products at a reasonable price.
- As a result of increase in number of products and quantity of products purchased from the market, the total value of products purchased from the market has also increased from Rs. 2,392 to Rs.3,154.
- Improvement of road has led to better transportation facility. Now the local shop owners are able to bring variety of products to the shop for selling. This can help in meeting the needs of the households. On an average, 84 per cent of households have reported that availability of goods in the villages has increased after the road improvement.

**Marketing of Agricultural Products**

The study reveals that there has been significant improvement in the proportion of households using road after improvement i.e. 12.0 per cent to 94.0 per cent.

- Improvement of road has also reduced the time required to reach the agricultural market in the nearby town. On an average 85.1 per cent of the households reported reduced time. The time taken to reach agricultural market has reduced from 32.8 minutes to 33 minutes by tractor.

- Easy accessibility to agricultural market has induced the households to sell their produce in regulated markets. On an average, 72.7 per cent of the households have increased their selling in agricultural market due to improvement of road. The value of agricultural produce sold in market increased from Rs. 2,68,177 to Rs. 3,27,632.

- Frequency of visits to market has also increased due to improvement of road. Now, even small and marginal farmers frequently visit market to purchase inputs and take their produce to market by tractors, tempo, etc. On an average 97.9 per cent of households increased their visit to market and the actual number increased from 14.5 to 20.2 during a year.

**Agricultural Activities**

- The wage rate of agricultural workers has increased from Rs.197 to Rs.295 per day.

- About 81 per cent of households feel that after improvement of road, visits of extension workers have increased.

- About 20.0 per cent of households reported change in the cropping pattern after implementation of road project.

### 6.6.4 Benefits to Banking Sector

After the improvement of the road, Cauvery Grameena Bank, located at Anthrasanthe in H D Kote taluk has increased its business. It is found that the extent of agricultural loan issued, total number of SB accounts and deposits mobilized by the farmers have increased by 40 per cent, 110 per cent and 63 per cent respectively. Significant increase in number of SB accounts is note worthy.

- After implementation of RIDF projects, the proportion of households having SB accounts has increased from 80.0 per cent to 98.0 per cent. The financial institutions need to expand further to cover the total population.

### 6.6.5 Overall Impact

Impact of RIDF rural road - from M.M.road to Ramenahalli has been presented using the approach 'before and after' the project in graph 6.6. The graph reveals that there has been significant improvement in traffic intensity. This has led to improvement in income, expenditure on education and health and owning livestock. There has been less impact on construction of toilets, using LPG for cooking and use of safe drinking water.

**Graph 6.6: Impact of RIDF Road Project: M M Road to Ramenahalli**

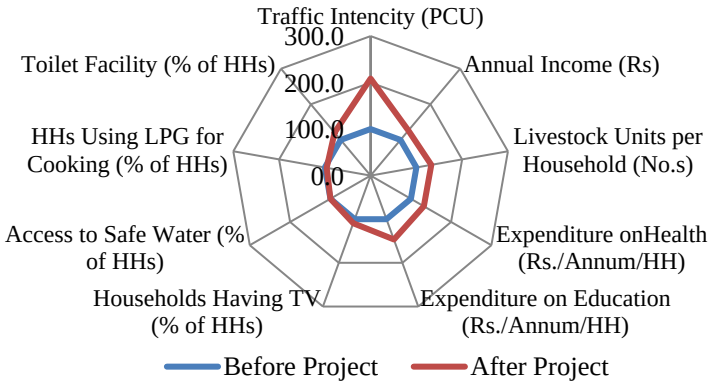


Table 6.32 presents the impact of the project. It can be noted from the table that there has been significant improvement in household income, education, health and other indicators. It can be observed that there is no positive or significant impact on use of LPG, absenteeism of children and constriction of toilets.

**Table 6.32:Impact of RIDF Road Project in Road from M.M.road to Ramenahalli**

**(Double Difference Method)**

| Particular | Percentage Change | | Difference (Beneficiary over Non-Beneficiary) |
|---|---|---|---|
| | Beneficiary | Non-Beneficiary | |
| Household Income | 26.4 | 9.7 | 16.7 |
| Impact on Education | | | |
| Mode of Travel to School | | | |
| Bus | 64.9 | 0 | 64.9 |
| Tempo | -51.4 | 0 | -51.4 |
| Two Wheeler | -10.8 | 0 | -10.8 |
| Cycle | 0.0 | 2.2 | -2.2 |
| Auto | 0.0 | 0 | 0.0 |
| Walk | -2.7 | -2.2 | -0.5 |
| HH reporting Absenteeism of Children (%) | -12.8 | -0.3 | -12.5 |
| Households Reporting Absenteeism of Teachers (%)-Many Days | -94.7 | -6.8 | -87.9 |
| Households Reporting School Articles -in time (%) | 82.0 | 2.2 | 79.8 |
| Expenditure on Education | 95.2 | 62.2 | 33.0 |
| Impact on Health | | | |
| Changes in Household Visit to Health Centers | 40.0 | 0.0 | 40.0 |
| Opinion about the road in reaching the hospital | -88.1 | 10 | -98.1 |
| Opinion of households about availability of medical services-Good | 80.9 | 0 | 80.9 |
| Health | 32.2 | 26.6 | 5.5 |
| Impact on Agriculture | | | |
| Households Reporting decline in Time Required to Reach Market | -7.3 | -0.2 | -7.1 |
| No. of Visits to Market | 85.0 | 2.9 | 82.1 |
| Value of Products Purchased from Market | 31.9 | 1.7 | 30.2 |
| Visits to Agricultural Market | 39.3 | 0.0 | 39.3 |
| Wage per day | 51.5 | 31.5 | 19.9 |
| Impact on Social interaction | | | |
| No. of Household Visits to Nearby Cities/Towns | 100.0 | 0.0 | 100.0 |
| No. of Participations in Social Activities | 50.3 | 19.5 | 30.7 |
| Average No. of Days of Household Participation in Political Activities | 57.7 | 0.0 | 57.7 |
| Household Membership in Community/Political Organization | 2.0 | 0 | 2.0 |
| Impact on Slandered of Living | | | |
| Drinking Water | 128.6 | 0.0 | 128.6 |
| Fuel Facility (LPG) | -0.6 | 12 | -12.6 |
| Toilet Facility | 8.9 | 0 | 8.9 |

## 6.7 Improvement to Road from BGH Road to join CN Halli (RIDF Code: R7312 Trench: XIV)

Improvement of road connecting BGH Road to C. N. Halli taluk border road via Muddenahalli, Muddenahalli tandya, Halkurike and Doddikatte village has been undertaken under RIDF XIV with cost of Rs.113.62 lakhs. The road has benefited 7 villages, namely, Bhommennahalli Tandya, H. Mudenahalli, H. Muddenahalli Tandya, Halkurike, Halkurike Amanikere, Halkurike Kaval and Doddikatte. This road is very helpful for villagers in connecting rural places to Tiptur and C. N. Halli taluk, especially for marketing purpose. The villagers used to travel to Halkurki by walk to get the required agricultural inputs and marketing their produce. There is a big temple of Revanasiddeswara beside the road. The road is very useful for the devotees who usually visit temple on Monday and Friday from different villages and even from Bangalore also. There are temples of Kalamma (Betta) and Choudappa and devotees visit the temples from Salakurki, Huliyaru and Tiptur. This road is very useful for these people as well.

### 6.7.1 Physical and Financial Progress of the Project

**Physical Progress of the Project**

The project, improvement to road from BGH Road to join CN Halli took ten months to initiate the work after administrative approval. It took 2 years and 5 months to complete. Discussion with the implementing agencies and observation of the researchers reveal that all the works have been completed except construction of drainage especially in residential areas due to non-co-operation of households. Table 6.33 shows details of physical progress of the project.

**Table 6.33: Physical Progress of the Project: Improvement to Road from BGH Road to join C.N. Halli Taluk border in Tiptur Taluk**

| Date of Administrative Approval | Date of Initiation of Work | Date of Completion of Work | Time Taken to Complete the Work | Potential (in Kms) |
|---|---|---|---|---|
| 28/01/2009 | 30/11/2009 | 5/5/2012 | 2 years and 5 Months | 6.4 |

**Financial Progress of the Project**

Financial progress of the project shows (table 6.34) that the work has been completed within the estimated costs. The actual project expenditure was less than estimated project cost. This is mainly due to non execution of construction of drainage work and tender premiums. It has been found that entire RIDF sanctioned loan has been released at regular intervals without affecting progress of the work.

**Table 6.34: Financial Progress of the Project: Improvement to Road from BGH Road to join C.N. Halli Taluk in Tiptur Taluk**

| Estimated Cost | RIDF Loan | RIDF Loan Released | Govt. Contribution | Actual Project Expenditure |
|---|---|---|---|---|
| 143.00 | 114.40 | 114.40 | 28.60 | 113.62 |

## 6.7.2 Social Benefits to Stakeholders

**Education**

After the improvement of the road the proportion of students travelling by bus and tempo has increased from 5.3 per cent to 40.0 and 0.00 per cent to 40.0 per cent respectively. At the same time number of students walking to school has reduced. On the whole improvement of road has facilitated better and safe mode of travel.

- 40 per cent of households felt that absenteeism of children has reduced after the improvement of the road. Average days of absenteeism from school have reduced from 14.3 days to 3.4 days in a year.

- The percentage of households reporting teachers remaining absent for many days during the year has reduced from 31.8 per cent to 0.0 per cent. This shows that teachers' absenteeism has reduced with the improvement of roads in Karnataka.

- Households reporting timely availability of school articles have increased from 0.0 per cent to 83.3 per cent. Thus, improvement of road has improved the availability of school articles in the village at right time.

**Health Services**

- As result of improvement of road, numbers of visits by the households to the nearby health centres have increased from 6 to 10. This reveals that rural people were not able to travel by bad road during the illness and after the improvement of road people are able to safely travel to nearby towns to get health services.

- Mode of travel to nearby health centre or hospital using the RIDF road reveals that prior to this road, most of the households used to walk (54.2%) to reach the hospital and some used to travel by bus, tempo, cycle and cart. After improvement of the road, the proportion of households using bus has increased from 20.8 per cent to 74.0 per cent. Following table shows mode used to reach health centres by the sample households.

**Table 6.35: Mode Used to Reach Health Centres: BGH Road to join C N Halli**

| | Bus | Tempo | Tractor | Cycle | Cart | Walk |
|---|---|---|---|---|---|---|
| Before Project | 20.8 | 8.3 | 0 | 2.1 | 14.6 | 54.2 |
| After Project | 74 | 20 | 0 | 2 | 0 | 0 |

- The proportion of households finding difficulty in reaching nearby health centre has also reduced from 56.0 per cent to 30.0 per cent.

- Opinion of households regarding visits of health providers to villages shows that on an average 96.0 per cent of households feel that visits of health providers have increased and 4.0 per cent feel that there has been no change in number of visits after improvement of road.

- As for as absenteeism of health service providers in the villages, the proportion of households reporting 'more absent' has reduced from 64.0 per cent to 12.0 per cent after improvement of road. This shows that absenteeism of health personnel has reduced significantly after improvement of road.

- Availability of medical services has also improved in the villages with the improvement of road. Proportion of households reporting availability of medical services has increased from 14.0 per cent to 90.0 per cent.

- On an average, household health expenditure has increased from Rs. 171 to Rs.237. This means that households are now able to spend on health/afford health facilities which they were not able to do earlier.

**Water Supply**

People owning (own) tap has increased considerably from 56.3 per cent to 89.8 per cent after the completion of the project. While borewell, well and public tap usage has reduced significantly.

**Toilet Facility**

After the road improvement, the percentage of households having their own toilet has increased from 60.00 per cent to 82.9 per cent.

**Fuel for Cooking**

There is considerable increase in the usage of LPG from 34.7 per cent to 83.7 per cent since the arrival of new road. Many have reduced the usage of fuel wood (65.3 per cent to 16.3 per cent). Scarcity of fuel wood and better transportation facilities prompted households to go for LPG.

**Household Assets**

There has been significant increase in LPG stoves, electric fan, cycle and two wheelers.

**Social Interaction**

- After the improvement of road, numbers of visits of households to nearby cities or towns for social purpose like marriages, attending funerals and Jatras have increased from 4 to 7.

- Number of visits to nearby cities or town by the household members reveals that female visits have increased from 1.6 to 2.7, male visits increased from 2.5 to 3.6 and children visits increased from 1.8 to 2.3

**Political Participation**

- The study reveals that 70.0 per cent of the households felt that transportation facilities aided to influence political activities in village and 77.3 per cent of households have reported that their political participation has increased after construction of road.

- As a result of increasing political activities in the village, number of household participation has also increased. The average numbers of Days of household participation in political activities have increased from 2.6 to 4.1 days during a month.

- Households having membership in community and political organizations has increased from 8.0 per cent to 34.0 per cent after construction of road. It indicates that improvement of road can lead to social and political integration of rural people.

### 6.7.3 Economic Benefits: Qualitative and Quantitative

Economic benefits of RIDF rural road projects, namely quantitative and qualitative benefits have been presented in the following section.

**Traffic Intensity**

It is found that after the improvement of road, traffic intensity has increased from 28.0 PCR to 196.5 PCR. After improvement of road, movement of car, tempo, tractor, two wheelers, *tum tum* and trucks have increased significantly. Table 6.36 shows comparison of traffic intensity.

**Table 6.36: Comparison of Traffic Intensity: Road from BGH Road to join C.N. Halli Taluk in Tiptur Taluk of Tumkur District**

| Type of Vehicles | Total Number of Vehicles Per Day (24 Hours) | | Passenger Car Units (P.C.U) Per Day (24 Hours) | |
|---|---|---|---|---|
| | After Project | Before Project | After Project | Before Project |
| Car | 12 | 0 | 12 | 0 |
| Jeep | 0 | 0 | 0 | 0 |
| Tempo | 12 | 0 | 24 | 0 |
| Tractor | 15 | 3 | 15 | 3 |
| Bus | 0 | 0 | 0 | 0 |
| Trucks & Mini Trucks | 1 | 0 | 3 | 0 |
| Motor Cycle & 2 Wheelers | 150 | 10 | 75 | 5 |
| Auto Rickshaw/Tumtum | 60 | 0 | 60 | 0 |
| Cycle | 15 | 40 | 7.5 | 20 |
| Animal Drawn | 0 | 0 | 0 | 0 |
| Total | 265 | 53 | 196.5 | 28 |

*Note: Recommended PCU Factors recommended by Indian Road Congress Manual, 2001 for Various Types of Vehicles on Rural Roads: Car=1, Jeep=1, Tempo=2, Tractor=1, Bus=3, Truck and Mini Trucks=3, Motor Cycle & 2 Wheelers=0.5, Auto Rickshaw/Tum tum=1, Cycle=0.5 and Animal Drawn=8*

**Employment and Income During Construction**

During the construction stage of the road, about 4 per cent of the local households got employment. Each households got 60 days of employment and earned Rs.12000/.

**Induced Employment and Income**

- The study reveals that on an average, 62.0 per cent of the households are able to increase their income in the sample villages due to improvement of rural road.
- On an average the household income has increased from Rs. 5035 to Rs. 6819 i.e. 35 per cent increase from previous income level.
- Due to improvement of road, employment in Petty business and other rural occupations like black smithy, carpentry, tailoring and painting has been improved.

**Marketing of Household Items**

- The proportion of households using the road for the purchasing their household need after the improvement of road has increased from 68.0 per cent to 96.0 per cent.

- The road has helped to reduce the distance to be travelled to market for 52.0 per cent of households.

- On an average time required to reach the market has been reduced from 48.9 minutes to 32.8 minutes by vehicle.

- After the improvement of road, people can move easily to nearby towns. On an average, number of visits of households has increased from 5.9 visits to 9.7 during a month.

- On an average 62.0 per cent of the households are purchasing more number of products and 68.0 per cent are purchasing more quantity of products after the improvement of road from the nearby cities. Thus, people are getting more variety and good quality of products at a reasonable price.

- As a result of increase in number of products and quantity of products purchased from the market, the total value of products purchased from the market has also increased from Rs.996 to Rs.1958 in a year.

- Improvement of road has led to better transportation facility. Now the local shop owners are able to bring variety of products to the shop for selling. This can help in meeting the needs of the households. On an average, 88.0 per cent of households have reported that availability of goods in the villages has increased after the road improvement.

**Marketing of Agricultural Products**

The study reveals that there has been significant improvement in the proportion of households using road after improvement i.e. 48.0 per cent to 64.0 per cent.

- Improvement of road has also reduced the time required to reach the agricultural market in the nearby town. On an average 76.9 per cent of the households reported reduced time. The time taken to reach agricultural market has reduced from 54.3 minutes to 39.9 minutes by vehicle.

- Easy accessibility to agricultural market has induced the households to sell their produce in regulated markets. On an average, 82.1 per cent of the households have increased their selling in agricultural market due to improvement of road. The value of agricultural produce sold in market increased from Rs. 14,372 to Rs. 23,487.

- Frequency of visits to market has also increased due to improvement of road. Now, even small and marginal farmers frequently visit market to purchase inputs and take their produce to market by tractors, tempo, etc. On an average 84.6 per cent of households increased their visit to market and the actual number increased from 7.9 to 15.6 during a year.

**Agricultural Activities**

The study reveals that due to increased transportation facility, farmers are able to purchase HYV seeds and other agricultural implements from the nearby village. This has also helped mobility of labour from one village/habitation to other for yearlong work and better wage. This has helped agricultural families to get labourers easily. The wage rate of agricultural workers has increased from Rs.113 to Rs.195.

- About 50 households feel that visits of extension workers have increased after the improvement of road.

- About 48.0 per cent of households reported change in the crop pattern after implementation of road project.

### 6.7.4 Benefits to Banking Sector

With the better employment opportunities after the improvement of the road, the proportion of households having SB accounts has increased from 44.0 per cent to 84.0.

### 6.7.5 Overall Impact

Impact of RIDF rural road - from BGH Road to join CN Halli has been presented using the approach 'before and after' the project in graph 6.7. The graph reveals that there has been significant improvement in traffic intensity, income, expenditure on education and health. There has been less impact or no impact on construction of toilets and using LPG for cooking, access to safe drinking water and owning livestock.

**Graph 6.7: Impact of RIDF Road Project in C.N. Halli**

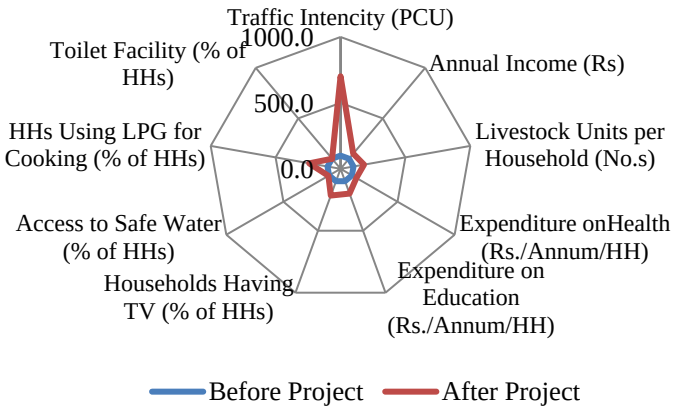


Table 6.37 presents the impact of the project. It can be noted from the table that there has been significant improvement in household income, education, health and other indicators. It can be observed that there is no positive impact on construction of toilets.

**Table 6.37: Impact of RIDF Road Project in BGH Road to join C.N. Halli Taluk (Double Difference Method)**

| Particular | Percentage Change | | Difference (Beneficiary over Non-Beneficiary) |
|---|---|---|---|
| | Beneficiary | Non-Beneficiary | |
| Household Income | 49.9 | 31.2 | 18.7 |
| Impact on Education | | | |
| Mode of Travel to School | | | |
| Bus | 34.7 | 4.5 | 30.2 |
| Tempo | 40.0 | 0 | 40.0 |
| Two Wheeler | 0.0 | 0 | 0.0 |
| Cycle | 0.0 | 0 | 0.0 |
| Auto | 0.0 | 0 | 0.0 |
| Walk | -74.7 | -4.5 | -70.2 |
| HH reporting Absenteeism of Children (%) | -10.9 | -0.6 | -10.3 |
| Households Reporting Absenteeism of Teachers (%)-Many Days | -31.8 | 0 | -31.8 |
| Households Reporting School Articles -in time (%) | 83.3 | 0 | 83.3 |
| Expenditure on Education | 113.4 | 76.6 | 36.8 |
| Impact on Health | | | |
| Changes in Household Visit to Health Centers | 66.7 | 33.3 | 33.3 |
| Opinion about the road in reaching the hospital | -26.0 | 10.2 | -36.2 |
| Opinion of households about availability of medical services-Good | 76.0 | 18.4 | 57.6 |
| Health | 38.8 | 24.9 | 13.9 |
| Impact on Agriculture | | | |
| Households Reporting decline in Time Required to Reach Market | -16.1 | -1.4 | -14.7 |
| No. of Visits to Market | 64.4 | 32.1 | 32.3 |
| Value of Products Purchased from Market | 96.6 | 36.2 | 60.4 |
| Visits to Agricultural Market | 97.5 | 22.1 | 75.3 |
| Wage per day | 71.5 | 76.2 | -4.7 |
| Impact on Social interaction | | | |
| No. of Household Visits to Nearby Cities/Towns | 75.0 | 40.0 | 35.0 |
| No. of Participations in Social Activities | 46.0 | 17.5 | 28.5 |
| Average No. of Days of Household Participation in Political Activities | 57.7 | 28.6 | 29.1 |
| Household Membership in Community/Political Organization | 26.0 | 12 | 14.0 |
| Impact on Slandered of Living | | | |
| Drinking Water | 51.7 | 2 | 49.7 |
| Fuel Facility (LPG) | 49.0 | 37.5 | 11.5 |
| Toilet Facility | 0.0 | 7.1 | -7.1 |

## 6.8, Improvement to Road from Hebbur Kallur Road to Idagur (II Phase) (RIDF Code: R8168 Trench: XV)

Improvements to road from Hubbur Kallur road to Idagur Via, Manikuppe, Cheeranahally and Naranahally (from Km 6.50 to 9.60km) in Gubbi taluk (Phase-II) was undertaken in the year 2009 under RIDF XV with an approved cost of Rs. 73.80 lakhs. The work was completed on 24th December 2006. Improvement of road has directly benefited 6 villages, namely; Manikuppe, Cheeranahally, Naranahally, Ramanpalya, Haranapalya and Idagur and helps to connect these villages to Gubbi, Hebbur and Kallur (Marketing centres). Villagers from Abbanakuppe and Naranahalli have got direct connecting road to Igagur Gram Panchayat. The road has helped the students of surrounding villages to attend high school in Idagur village.

### 6.8.1 Physical and Financial Progress of the Project

**Physical Progress of the Project**

The project, improvement to road from Hebbur Kallur Road to Idagur took one year and one month to initiate the work after administrative approval. The delay in initiation of work was on account of official procedures and tendering processes. But, after the initiation of the work the project got completed within one year. It was observed that the project was completed in all respects without any compromise in the quality. Table 3.68 shows details of physical progress of the project.

**Table 6.38: Physical Progress of the Project: Improvement to Road from Hebbur kallur Road to Idagur**

| Date of Administrative Approval | Date of Initiation of Work | Date of Completion of Work | Time Taken to Complete the Work | Potential (in Kms) |
|---|---|---|---|---|
| 30/10/2009 | 24/12/2010 | 31/12/2011 | 1 Year | 3.1 |

**Financial Progress of the Project**

Financial progress of the project shows (table 3.39) that the work has been completed within the estimated costs. The actual project expenditure was less than estimated project cost due to tender premiums. It has been found that entire RIDF sanctioned loan has been released at regular intervals to facilitate the progress of the work.

**Table 6.39: Financial Progress of the Project: Improvement to Road from Hebbur kallur Road to Idagur (Rs. In Lakhs)**

| Estimated Cost | RIDF Loan | RIDF Loan Released | Govt. Contribution | Actual Project Expenditure |
|---|---|---|---|---|
| 80.00 | 64.00 | 64.00 | 16.00 | 73.80 |

### 6.8.2 SOCIAL BENEFITS TO STAKEHOLDERS

**Education**

After the improvement of the road, the proportion of students travelling by bus has significantly increased from 9.1 per cent to 30.0 per cent. The use of tempo by the students has increased slightly from 4.5 per cent to 5.0 per cent.

- 26 per cent of households felt that absenteeism of children has reduced after the improvement of the road. Average days of absenteeism from school have reduced from 5.2 days to 4.4 days in a year.

- The percentage of households reporting teachers remaining absent for many days during the year has reduced from 27.3 per cent to 13.6 per cent. This shows that teachers' absenteeism has reduced with the improvement of road in the village.

- Households reporting timely availability of school articles have increased from 0.0 per cent to 90.9 per cent. Thus, improvement of road has improved the availability of school articles in the village at right time.

**Health Services**

- As a result of improvement of road, numbers of visits by the households to the nearby health centres have increased from 6 to 8. This reveals that rural people were not able to travel by bad road during the illness and after the improvement of road people are able to travel safely to nearby towns to get health services.

- Most of the households used to walk to reach nearby health centres in times of illness. But after the improvement of road, people started to use tractors, tempo, auto and bus to reach the health centre. Following table shows mode of travel used to reach health centres by the sample households.

**Table 6.40: Mode Used to Reach Health Centres: BGH Road to join CNHalli**

| | Bus | Tempo | Tractor | Cycle | Auto | Walk |
|---|---|---|---|---|---|---|
| Before Project | 0.0 | 2.1 | 2.1 | 2.1 | 0.0 | 93.8 |
| After Project | 2.1 | 14.6 | 14.6 | 4.2 | 6.3 | 58.3 |

- The proportion of households finding difficulty in reaching nearby health centre has also reduced from 77.1 per cent to 14.6 per cent.

- Opinion of households regarding visits of health providers to villages shows that on an average 77.1 per cent of households feel that visits of health providers have increased and 22.9 per cent feel that there has been no change in number of visits after improvement of road.

- As far as absenteeism of health service providers in the villages, the proportion of households reporting 'more absent' has reduced from 60.4 per cent to 25 per cent after improvement of road. This shows that absenteeism of health personnel has reduced significantly after improvement of road.

- Availability of medical services has also improved in the villages with the improvement of road. Proportion of households reporting availability of medical services has increased from 4.2 per cent to 89.6 per cent.

- On an average, household health expenditure has increased from Rs. 194 to Rs.289 per year. This means that households are now able to spend on health/afford health services which they were not able to do earlier.

**Water Supply**

Due to improvement in the public water supply, the proportion of households using public tap has increased from 26.0 per cent to 52.0 per cent. This has resulted in decline in use of bore wells and wells in the village.

**Toilet Facility**

After the road improvement, the percentage of households having their own toilet has increased from 77.8 per cent to 83.3 per cent.

**Fuel for Cooking**

There is considerable increase in the usage of LPG from 18.4 per cent to 34.2 per cent. As a result of this dependence on fuel wood has got reduced i.e. 81.6 per cent to 65.8 per cent.

**Household Assets**

After the improvement of road, there has been an increase in number of two wheelers (70.6 %), insect pumps (50.0%) and mobile phones (47.4 %).

**Social Interaction**

- After the improvement of road, visits of households to nearby cities or towns for social purpose like marriages, attending funerals and Jatras have increased from 3 to 6 per month.

- Number of visits to nearby cities or town by the household members reveals that female visits have increased from 1.6 to 2.7, male visits increased from 3.2 to 5.5 and children visits increased from 1.1 to 1.6 per month.

**Political Participation**

- About 84.0 per cent of the households felt that transportation facilities aided to influence political activities in the village and 83.0 per cent of households have reported that their political participation has increased after construction of road.

- Household participation in political activities has also increased i.e. 1.8 days to 3.0 days during a month.

- Households having membership in community and political organizations has increased from 4.0 per cent to 62.0 per cent. It indicates that improvement of road can lead to social and political integration of rural people.

### 6.8.3 ECONOMIC BENEFITS: QUALITATIVE AND QUANTITATIVE

Economic benefits of RIDF rural road projects, namely quantitative and qualitative benefits have been presented in the following section.

**Traffic Intensity**

It is found that after the improvement of road, traffic intensity has increased from 65.0 PCR to 272.5 PCR. The movements of cars, tempo, two wheelers and tum tum have increased significantly. Table 6.41 shows comparison of traffic intensity.

**Table 6.41 :Comparison of Traffic Intensity: Road from Hebbur Kallur Road to Idagurin Gubbi Taluk of Tumkur District**

| Type of Vehicles | Total Number of Vehicles Per Day (24 Hours) | | Passenger Car Units (P.C.U) Per Day (24 Hours) | |
|---|---|---|---|---|
| | After Project | Before Project | After Project | Before Project |
| Car | 30 | 0 | 30 | 0 |
| Jeep | 0 | 0 | 0 | 0 |
| Tempo | 50 | 20 | 100 | 40 |
| Tractor | 0 | 0 | 0 | 0 |
| Bus | 0 | 0 | 0 | 0 |
| Trucks & Mini Trucks | 0 | 0 | 0 | 0 |
| Motor Cycle & 2 Wheelers | 225 | 50 | 112.5 | 25 |
| Auto Rickshaw/Tumtum | 30 | 0 | 30 | 0 |
| Cycle | 0 | 0 | 0 | 0 |
| Animal Drawn | 0 | 0 | 0 | 0 |
| Total | 335 | 70 | 272.5 | 65 |

*Note: Recommended PCU Factors recommended by Indian Road Congress Manual, 2001 for Various Types of Vehicles on Rural Roads: Car=1, Jeep=1, Tempo=2, Tractor=1, Bus=3, Truck and Mini Trucks=3, Motor Cycle & 2 Wheelers=0.5, Auto Rickshaw/Tum tum=1, Cycle=0.5 and Animal Drawn=8*

**Employment and Income During Construction**

During the construction stage of the road, about 6 per cent of the local households got employment. Each households got 33 days of employment and earned Rs.8667/.

**Induced Employment and Income**

- The study reveals that on an average, 38.0 per cent of the households are able to enhance their income in the village due to improvement of rural road.

- On an average the household income has increased from Rs. 4816 to Rs. 7105 i.e. 48 per cent increase from previous income level.

- Due to improvement of road, employment in Petty business and other rural occupancies like black smithy, carpentry, tailoring and painting has been improved.

**Marketing of Household Items**

- The proportion of households using the road for the purchasing their household need after the improvement of road has increased from 92.0 per cent to 100.0 per cent.

- The road has helped to reduce the distance to be travelled to market for 18.0 per cent of households.

- On an average time required to reach the market has been reduced from 62.8 minutes to 44.9 minutes by vehicles.

- After the improvement of road, people can move easily to nearby towns. On an average, number of visits of households has increased from 3.5 visits to 6.5 during a month.

- On an average 84.0 per cent of the households are purchasing more number of products and 92.0 per cent are purchasing more quantity of products after the improvement of road from the nearby cities. Thus, people are getting more variety and good quality of products at a reasonable price.

- As a result of increase in number of products and quantity of products purchased from the market, the total value of products purchased from the market has also increased from Rs. 1221 to Rs. 1923 per month.

- Improvement of the road has led to better transportation facility. Now the local shop owners are able to bring variety of products to the shop for selling. This can help in meeting the needs of the households. On an average, 69.4 per cent of households have reported that availability of goods in the villages has increased after the road improvement.

**Marketing of Agricultural Products**

The study reveals that there has been significant improvement in the proportion of households using road after improvement i.e. 72.0 per cent to 82.0 per cent.

- The time required to reach the agricultural market, located in the nearby town, has been reduced from 68.2 minutes to 51.7 minutes by bus/tempo. On an average 56.5 per cent of the households reported reduced time.

- Easy accessibility to agricultural market has induced the households to sell their produce in regulated markets. On an average, 72.7 per cent of the households have increased their selling in agricultural market due to improvement of road. The value of agricultural produce sold in market increased from Rs. 14,518 to Rs. 20,231.

- Frequency of visits to market has also increased due to improvement of road. Now, even small and marginal farmers frequently visit market to purchase inputs and take their produce to market by tractors, tempo, etc. On an average 71.1 per cent of households increased their visit to market and the actual number increased from 10.2 to 10.6 during per year.

**Agricultural Activities**

The wage rate of agricultural workers has increased from Rs.167 to Rs.262 per day.

- About 68 per cent of households felt that after improvement of road, visits of extension workers have increased.
- About 76.0 per cent of households reported change in the croppimng pattern after implementation of road project.

### 6.8.4 BENEFITS TO BANKING SECTOR

- After implementation of RIDF projects, the proportion of households having SB accounts has increased from 64.0 per cent to 82.0.

### 6.8.5 OVERALL IMPACT

Impact of RIDF rural road from Hebbur Kallur Road to Idagur has been presented using the approach 'before and after' the project in graph 6.8. The graph reveals that there has been significant improvement in traffic intensity. This has led to improvement in income, expenditure on education and health. There has been less impact on construction of toilets, use of safe drinking water and using LPG for cooking.

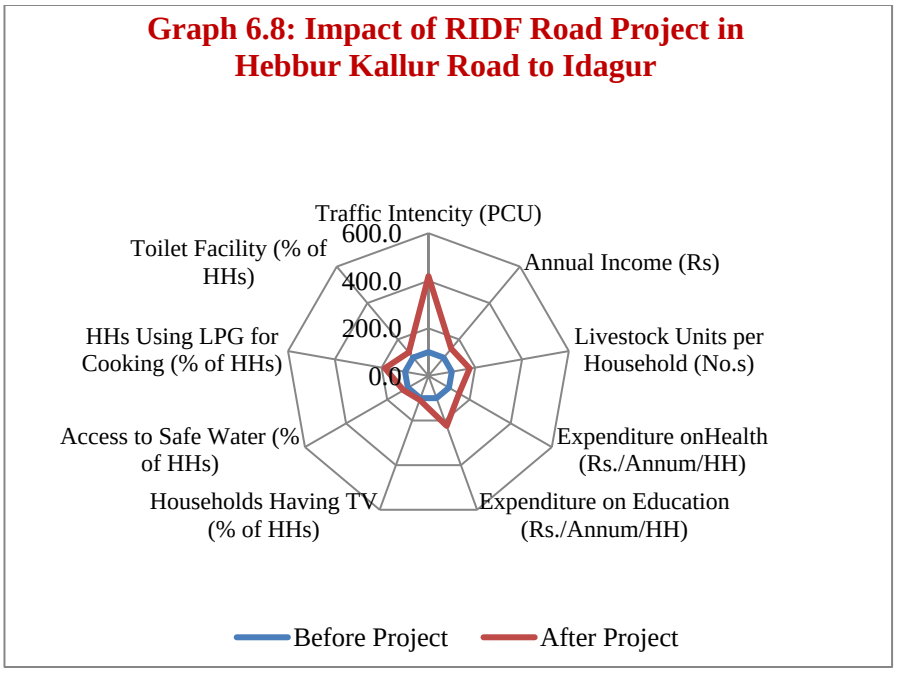


Table 6.42 presents the impact of the project. It can be noted from the table that there has been significant improvement in household income, education, health and other indicators. It can be observed that there is no positive impact on construction of toilets.

**Table 6.42: Impact of RIDF Road Project in Hebbur Kallur Road to Idagur (Double Difference Method)**

| Particular | Percentage Change | | Difference (Beneficiary over Non-Beneficiary) |
|---|---|---|---|
| | Beneficiary | Non-Beneficiary | |
| Household Income | 48.8 | 14.4 | 34.4 |
| Impact on Education | | | |
| Mode of Travel to School | | | |
| Bus | 20.9 | 50 | -29.1 |
| Tempo | 0.5 | 0.8 | -0.3 |
| Two Wheeler | 0.5 | 0.8 | -0.3 |
| Cycle | 0.0 | 0.8 | -0.8 |
| Auto | 0.0 | 0 | 0.0 |
| Walk | -21.8 | -52.7 | 30.9 |
| HH reporting Absenteeism of Children (%) | -0.8 | 0.6 | -1.4 |
| Households Reporting Absenteeism of Teachers (%)-Many Days | -13.7 | 0 | -13.7 |
| Households Reporting School Articles -in time (%) | 90.9 | 21.5 | 69.4 |
| Expenditure on Education | 235.0 | 25 | 210.0 |
| Impact on Health | | | |
| Changes in Household Visit to Health Centers | 33.3 | 14.3 | 19.0 |
| Opinion about the road in reaching the hospital | -62.5 | 13.2 | -75.7 |
| Opinion of households about availability of medical services-Good | 85.4 | 7.9 | 77.5 |
| Health | 48.8 | 26.3 | 22.5 |
| Impact on Agriculture | | | |
| Households Reporting decline in Time Required to Reach Market | -17.9 | -18.8 | 0.9 |
| No. of Visits to Market | 85.7 | 43.9 | 41.8 |
| Value of Products Purchased from Market | 57.5 | 31.5 | 26.0 |
| Visits to Agricultural Market | 3.9 | 23.2 | -19.3 |
| Wage per day | 57.3 | 36.9 | 20.4 |
| Impact on Social interaction | | | |
| No. of Household Visits to Nearby Cities/Towns | 100.0 | 20.0 | 80.0 |
| No. of Participations in Social Activities | 42.6 | 26.2 | 16.5 |
| Average No. of Days of Household Participation in Political Activities | 66.7 | 0.0 | 66.7 |
| Household Membership in Community/Political Organization | 58.0 | 0 | 58.0 |
| Impact on Slandered of Living | | | |
| Drinking Water | 98.7 | 0 | 98.7 |
| Fuel Facility (LPG) | 15.8 | 22.9 | -7.1 |
| Toilet Facility | 22.2 | 0 | 22.2 |

## 6.9 Economic Evaluation of Rural Road Projects

Economic analysis of rural roads is extremely important especially for planners as the investments involved are very large and the investment options available are many. Economic analysis helps in;

- Determining whether the investments are worthwhile at all under the generally prevailing scarcity of resources in an economy.
- Arriving at a rate of return, normally known by the term Internal Rate of Return (IRR) or Economic Internal Rate of Return (EIRR);
- Prioritization of projects in terms of their attractiveness; and
- Evaluating alternative design options and maintenance strategies.

In this section, economic viability of selected projects has been presented using savings in vehicle operating costs (VOC). The economic evaluation of the selected rural road projects is based on the methodology suggested in the Manual on Economic Evaluation of Highway Projects in India (second revised special publication-30), brought out by the Indian Road Congress (2009). The detailed procedure for estimating the cost of operation of vehicles (VOC) and results of economic analysis has been presented below.

Vehicle Operating Costs (VOC) are worked out under two scenarios namely "with" and "without" project condition. Under "without project condition, the VOC are determined year by year, on the existing route with the given value of rise and fall, roughness, traffic volume and composition and the travel distance (lead) whereas under "with project" condition, VOC are determined for the improved road taking into account all the above road and traffic characteristics. VOC savings in ‘with project’ condition will arise first, due to short distance and secondly on account of less congestion. Following are the assumptions made to work out the economics of roads.

- Economic life of the project: 10 years
- The rate of growth of traffic is 9.0 per cent per annum.
- Rate of discount is taken as 12%, as suggested by Planning Commission for road projects.

- ❖ Vehicle Operating Costs from Road User Cost Study (IRC 2009) are adopted
- ❖ The costs are exclusive of taxes.
- ❖ Time costs and accident costs of passengers are neglected
- ❖ The roughness of the road (single line): Before Project 15000 mm/km, After Project 2000 mm/km.

Procedure for estimating the cost of operation of vehicles (VOC)

Step 1: Year wise growth (9 per cent) in the number of vehicles was calculated, which will be required for calculating the yearly saving in VOC (for each type of vehicles), in the last step.

Step 2: To calculate Volume Capacity Ratio (VCR), first the traffic data were converted in terms of Passenger Car Units (PCU) and 10 per cent of daily traffic is considered as peak hourly traffic for the purpose of calculating distance related and time related congestion factors. Volume Capacity Ratio (VCP) is calculated by dividing PCU per hour by capacity (maximum capacity of vehicles on single line is 600 PCU per hour).

Step 3: Distance related congestion factor was calculated by using equations given in the IRC Manual, which will be needed for appropriate (upward) adjustment in VOC in congested conditions. The congestion factors calculated were 'corrected' to consider the effect of assuming 10% of total daily traffic to represent peak hourly traffic for 24 hours on the computations for congestion, by multiplying factors with 0.8. Following are the distance related congestion cost equations for single-line.

**Distance Related Congestion Cost Equations for Single- Line**

| Vehicles | Equations |
|---|---|
| Cars | 0.924+0.680* (V/C) |
| Two Wheelers | 0.990+0.830*(V/C) |
| Buses | 1.000+1.000*(V/C) |
| Light Commercial Vehicles (LCV) | 1.000+0.90*(V/C) |
| Two Axle Heavy Commercial Vehicles (HCV) | 1.179+0.757*(V/C) |
| Multi-Axle Heavy Commercial Vehicles (MAV) | 1.179+0.757*(V/C) |

Step 4: "Time' related congestion factors were calculated, by using speed-flow (SF) equations for different vehicles given in the IRC Manual. These SF equations are basically statistical regression equations which measure the impact of peak traffic flow (PCU per hour traffic) on speed flow of the vehicle. It may be seen that coefficients of peak traffic flow have a negative sign, indicating that in the hours of peak traffic flow, the speed of vehicles decreases. The SF equations used for each type of vehicle are given as under:

**Speed-Flow Equations (Plain Terrain)**

| Speed of Vehicles (Km/Hour) | Equations |
|---|---|
| Cars | 61.748-0.0562*Q |
| Buses | 51.744-0.0478*Q |
| Light Commercial Vehicles (LCV) | 51.937-0.0510*Q |
| Two Axle Heavy Commercial Vehicles (HCV) | 47.283-0.0373*Q |
| Multi-Axle Heavy Commercial Vehicles (MAV) | 39.718-0.0313*Q |
| Two Wheelers | 42.666-0.03000*Q |

Source: IRC 2009
Note: Q=PCU/Hour; and 'constant' value=Intercept

'Time' related congestion factor for each type of vehicle was calculated from above, by dividing the "Intercept" value in each equation with the respective 'speed' value V.
Time related congestion factor = Intercept/Speed
The congestion factors thus calculated were "'corrected" to consider the effect of assuming 10% of total daily traffic to represent peak hourly traffic for 24 hours on the computations for congestion, by multiplying factors with 0.8.

Step 5: 'Distance related' VOC was calculated, by considering the components of fuel types, lubricants, spares and maintenance of the vehicle. The VOC (vehicle wise) values given in different Tables in the IRC Manual are at 2009 prices. The economic cost of operation of vehicles was collected from these tables. These distance related VOC values thus collected, were "'corrected" for congested conditions, by multiplying VOC values with the respective "distance related "congestion factors calculated in the previous step-4.

Step 6: Distance related VOC (Rs/Km) at 2009 prices was converted into VOC at reference year 2014-15 prices, using following formula.

$$\text{Conversion Factor (CF)} = \frac{\text{WPI of all commodities in 2008-09 (130.8)}}{\text{WPI of all commodities in 2014-15 (178.6)}} = 0.732$$

Step 7: Time related VOC was calculated by considering the components of fixed cost, depreciation cost and crew cost given in the relevant tables for VOC in the IRC Manual. The time related VOC of each vehicle at 2009 prices was corrected by time related congestion factors, for congested road conditions.

Step 8: Time related VOC at 2009 prices was converted into VOC at reference year 2014-15 prices.

Step 9: VOC for distance related factors and time related factors together was calculated, by adding the VOC calculated earlier for these two types of components in step-6 and step-8, respectively.

Step 10: Total value of VOC (in terms of Rs) of number of different vehicles plying on the road was calculated. Total VOC for each type of vehicle was calculated, by multiplying the total number of vehicles (given in step-1), rate of VOC in Rs per km calculated in step-9, length of the improved road, and number of days in a year i.e. 365. This procedure was repeated for calculating total VOC, for each year.

Economic viability of the selected RIDF rural roads has been evaluated in terms of benefit-Cost Ratio method, Net Present Value Method and Internal Rate of Return Method. The details of these methods are given below.

- Benefit-Cost Ratio Method: Discount all costs and benefits to their present worth and calculate the ratio of the benefits to costs. Negative flows are considered as costs whereas positive flows as benefits. Thus the savings in the transport costs are

considered as benefits. If the B/C ratio is more than one, the project is worth undertaking.

- Net Present Value Method: The stream of costs/benefits associated with the project over an extended period of time is calculated and is discounted at a selected discounted rate to give the present value. Benefits are treated as positive and costs as negative and the summation give the Net Present Value (NPV). Any project with positive NPV is treated as acceptable. In comparing more than one project, a project with the higher NPV should be accepted.

- Internal Rate of Return Method: The Internal Rate of Return (IRR) is the discount rate which makes the discounted future benefits equal to the initial outlay. In other words, it is the discount rate which makes the stream of cash flows to zero. If the IRR is greater than the rate of interest obtainable by investing the capital in the open market, the scheme is considered acceptable.

## CALCULATION OF VEHICLE OPERATION COSTS (VOC)

### 1. Mudhol Taluk: Improvement to Road from Ingalagi to Jeeragal

**Step 1: Yearly Growth in Total Number of Vehicles Per Day (9 % Growth)**

| Year | Car | LCV | Bus | HCV (Truck) | TW (Two Wheelers) |
|---|---|---|---|---|---|
| 1 | 12 | 39 | 4 | 4 | 60 |
| 2 | 13 | 43 | 4 | 4 | 65 |
| 3 | 14 | 46 | 5 | 5 | 71 |
| 4 | 16 | 51 | 5 | 5 | 78 |
| 5 | 17 | 55 | 6 | 6 | 85 |
| 6 | 18 | 60 | 6 | 6 | 92 |
| 7 | 20 | 65 | 7 | 7 | 101 |
| 8 | 22 | 71 | 7 | 7 | 110 |
| 9 | 24 | 78 | 8 | 8 | 120 |
| 10 | 26 | 85 | 9 | 9 | 130 |

**Step 2:Volume Capacity Ratio (VCR)**

| Year | PCU/Day | Peak Traffic Flow (PCU/Hour) | VCR |
|---|---|---|---|
| 1 | 148 | 15 | 0.025 |
| 2 | 161 | 16 | 0.027 |
| 3 | 176 | 18 | 0.029 |
| 4 | 192 | 19 | 0.032 |
| 5 | 209 | 21 | 0.035 |
| 6 | 228 | 23 | 0.038 |
| 7 | 248 | 25 | 0.041 |
| 8 | 271 | 27 | 0.045 |
| 9 | 295 | 29 | 0.049 |
| 10 | 321 | 32 | 0.054 |

**Step 3: 'Distance' Related Congestion Factor (Corrected by Multiplying with 0.8)**

| Year | Congestion Factor (Corrected) | | | | |
|---|---|---|---|---|---|
| | CAR | LCV | Bus | Truck | TW |
| 1 | 0.75 | 0.82 | 0.82 | 0.96 | 0.81 |
| 2 | 0.75 | 0.82 | 0.82 | 0.96 | 0.81 |
| 3 | 0.76 | 0.82 | 0.82 | 0.96 | 0.81 |
| 4 | 0.76 | 0.82 | 0.83 | 0.96 | 0.81 |
| 5 | 0.76 | 0.83 | 0.83 | 0.96 | 0.82 |
| 6 | 0.76 | 0.83 | 0.83 | 0.97 | 0.82 |
| 7 | 0.76 | 0.83 | 0.83 | 0.97 | 0.82 |
| 8 | 0.76 | 0.83 | 0.84 | 0.97 | 0.82 |
| 9 | 0.77 | 0.84 | 0.84 | 0.97 | 0.82 |
| 10 | 0.77 | 0.84 | 0.84 | 0.98 | 0.83 |

**Step 4: 'Time' Related Congestion Factors (Corrected by Multiplying with 0.80)**

| Year | Congestion Factors (Corrected) | | | | |
|---|---|---|---|---|---|
| | CAR | LCV | Bus | Truck | TW |
| 1 | 0.789 | 0.788 | 0.789 | 0.791 | 0.792 |
| 2 | 0.788 | 0.787 | 0.788 | 0.790 | 0.791 |
| 3 | 0.787 | 0.786 | 0.787 | 0.789 | 0.790 |
| 4 | 0.786 | 0.785 | 0.786 | 0.788 | 0.789 |
| 5 | 0.785 | 0.784 | 0.785 | 0.787 | 0.788 |
| 6 | 0.783 | 0.782 | 0.783 | 0.786 | 0.787 |
| 7 | 0.782 | 0.781 | 0.782 | 0.784 | 0.786 |
| 8 | 0.780 | 0.779 | 0.780 | 0.783 | 0.785 |
| 9 | 0.779 | 0.777 | 0.778 | 0.782 | 0.783 |
| 10 | 0.777 | 0.775 | 0.776 | 0.780 | 0.782 |

**Step 5: 'Distance' Related VOC at 2009 Prices**

| Year | VOC (in Rs/Km) | | | | |
|---|---|---|---|---|---|
| | CAR | LCV | Bus | Truck | TW |
| 1 | 3.936 | 7.204 | 11.288 | 9.984 | 1.374 |
| 2 | 3.943 | 7.219 | 11.312 | 9.998 | 1.377 |
| 3 | 3.949 | 7.234 | 11.339 | 10.013 | 1.379 |
| 4 | 3.957 | 7.251 | 11.368 | 10.030 | 1.382 |
| 5 | 3.965 | 7.269 | 11.400 | 10.048 | 1.386 |
| 6 | 3.974 | 7.289 | 11.434 | 10.068 | 1.389 |
| 7 | 3.984 | 7.310 | 11.472 | 10.089 | 1.393 |
| 8 | 3.994 | 7.334 | 11.513 | 10.113 | 1.397 |
| 9 | 4.006 | 7.360 | 11.557 | 10.138 | 1.402 |
| 10 | 4.018 | 7.388 | 11.606 | 10.166 | 1.407 |

**Step 6: 'Distance' Related VOC at 2014-15 Prices**

| Year | VOC (in Rs/Km) | | | | |
|---|---|---|---|---|---|
| | CAR | LCV | Bus | Truck | TW |
| 1 | 5.377 | 9.842 | 15.420 | 13.639 | 1.877 |
| 2 | 5.386 | 9.861 | 15.454 | 13.658 | 1.881 |
| 3 | 5.395 | 9.882 | 15.490 | 13.679 | 1.885 |
| 4 | 5.406 | 9.905 | 15.530 | 13.702 | 1.889 |
| 5 | 5.417 | 9.930 | 15.573 | 13.727 | 1.893 |
| 6 | 5.429 | 9.957 | 15.620 | 13.754 | 1.898 |
| 7 | 5.442 | 9.987 | 15.672 | 13.783 | 1.903 |
| 8 | 5.457 | 10.019 | 15.728 | 13.815 | 1.909 |
| 9 | 5.472 | 10.054 | 15.789 | 13.850 | 1.915 |
| 10 | 5.490 | 10.093 | 15.855 | 13.888 | 1.922 |

**Step 7: 'Time' Related VOC at 2009 Prices**

| Year | VOC (in Rs/Km) | | | | |
|---|---|---|---|---|---|
| | CAR | LCV | Bus | Truck | TW |
| 1 | 4.128 | 6.946 | 10.865 | 8.239 | 1.346 |
| 2 | 4.123 | 6.936 | 10.852 | 8.231 | 1.345 |
| 3 | 4.117 | 6.926 | 10.837 | 8.221 | 1.343 |
| 4 | 4.111 | 6.915 | 10.821 | 8.211 | 1.342 |
| 5 | 4.104 | 6.903 | 10.803 | 8.200 | 1.340 |
| 6 | 4.097 | 6.890 | 10.784 | 8.187 | 1.338 |
| 7 | 4.089 | 6.876 | 10.763 | 8.174 | 1.336 |
| 8 | 4.081 | 6.861 | 10.741 | 8.160 | 1.334 |
| 9 | 4.072 | 6.844 | 10.716 | 8.144 | 1.332 |
| 10 | 4.062 | 6.826 | 10.689 | 8.126 | 1.329 |

**Step 8: 'Time' Related VOC at 2014-15 Prices**

| Year | VOC (in Rs/Km) | | | | |
|---|---|---|---|---|---|
| | CAR | LCV | Bus | Truck | TW |
| 1 | 5.639 | 9.488 | 14.843 | 11.256 | 1.839 |
| 2 | 5.632 | 9.476 | 14.825 | 11.244 | 1.837 |
| 3 | 5.624 | 9.462 | 14.805 | 11.231 | 1.835 |
| 4 | 5.616 | 9.447 | 14.783 | 11.217 | 1.833 |
| 5 | 5.607 | 9.431 | 14.759 | 11.202 | 1.831 |
| 6 | 5.597 | 9.413 | 14.733 | 11.185 | 1.828 |
| 7 | 5.587 | 9.394 | 14.704 | 11.167 | 1.825 |
| 8 | 5.575 | 9.373 | 14.673 | 11.147 | 1.823 |
| 9 | 5.562 | 9.350 | 14.639 | 11.125 | 1.819 |
| 10 | 5.549 | 9.325 | 14.602 | 11.102 | 1.816 |

**Step 9: 'Distance' and 'Time' Related VOC at 2014-15 Prices**

| Year | VOC (in Rs/Km) | | | | |
|---|---|---|---|---|---|
| | CAR | LCV | Bus | Truck | TW |
| 1 | 11.016 | 19.331 | 30.264 | 24.895 | 3.716 |
| 2 | 11.018 | 19.337 | 30.279 | 24.902 | 3.718 |
| 3 | 11.020 | 19.345 | 30.295 | 24.910 | 3.719 |
| 4 | 11.022 | 19.352 | 30.313 | 24.919 | 3.721 |
| 5 | 11.024 | 19.361 | 30.332 | 24.928 | 3.724 |
| 6 | 11.026 | 19.370 | 30.353 | 24.939 | 3.726 |
| 7 | 11.029 | 19.381 | 30.376 | 24.950 | 3.729 |
| 8 | 11.032 | 19.392 | 30.401 | 24.962 | 3.731 |
| 9 | 11.035 | 19.404 | 30.428 | 24.975 | 3.735 |
| 10 | 11.038 | 19.417 | 30.458 | 24.990 | 3.738 |

## Step 10: Total VOC (in Rs) of Number of Vehicles on Improved Road at 2014-15 Prices

| Year | VOC (in Rs/Km) | | | | | |
|---|---|---|---|---|---|---|
| | CAR | LCV | Bus | Truck | TW | Total |
| 1 | 137515 | 784240 | 125928 | 103589 | 231932 | 1383203 |
| 2 | 149914 | 855115 | 137329 | 112945 | 252921 | 1508224 |
| 3 | 163434 | 932425 | 149769 | 123149 | 275820 | 1644596 |
| 4 | 178176 | 1016757 | 163343 | 134279 | 300805 | 1793360 |
| 5 | 194250 | 1108758 | 178157 | 146419 | 328070 | 1955655 |
| 6 | 211779 | 1209132 | 194326 | 159663 | 357824 | 2132724 |
| 7 | 230894 | 1318649 | 211975 | 174110 | 390299 | 2325928 |
| 8 | 251739 | 1438154 | 231243 | 189873 | 425748 | 2536758 |
| 9 | 274473 | 1568570 | 252281 | 207072 | 464449 | 2766844 |
| 10 | 299267 | 1710908 | 275254 | 225839 | 506704 | 3017972 |

## 2. Badami Taluk: Improvements from Narenoor-Fakirbudhihal-Kainkatti road

### Step 1: Yearly Growth in Total Number of Vehicles Per Day (9 % Growth)

| Year | Car | LCV | Bus | HCV (Truck) | TW (Two Wheelers) |
|---|---|---|---|---|---|
| 1 | 15 | 55 | 10 | 4 | 45 |
| 2 | 16 | 60 | 11 | 4 | 49 |
| 3 | 18 | 65 | 12 | 5 | 53 |
| 4 | 19 | 71 | 13 | 5 | 58 |
| 5 | 21 | 78 | 14 | 6 | 64 |
| 6 | 23 | 85 | 15 | 6 | 69 |
| 7 | 25 | 92 | 17 | 7 | 75 |
| 8 | 27 | 101 | 18 | 7 | 82 |
| 9 | 30 | 110 | 20 | 8 | 90 |
| 10 | 33 | 119 | 22 | 9 | 98 |

### Step 2:Volume Capacity Ratio (VCR)

| Year | PCU/Day | Peak Traffic Flow (PCU/Hour) | VCR |
|---|---|---|---|
| 1 | 177 | 18 | 0.030 |
| 2 | 193 | 19 | 0.032 |
| 3 | 210 | 21 | 0.035 |
| 4 | 229 | 23 | 0.038 |
| 5 | 250 | 25 | 0.042 |
| 6 | 272 | 27 | 0.045 |
| 7 | 297 | 30 | 0.049 |
| 8 | 324 | 32 | 0.054 |
| 9 | 353 | 35 | 0.059 |
| 10 | 384 | 38 | 0.064 |

### Step 3: 'Distance' Related Congestion Factor (Corrected by Multiplying with 0.8)

| | Congestion Factor (Corrected) | | | | |
|---|---|---|---|---|---|
| Year | CAR | LCV | Bus | Truck | TW |
| 1 | 0.76 | 0.82 | 0.82 | 0.96 | 0.81 |
| 2 | 0.76 | 0.82 | 0.83 | 0.96 | 0.81 |
| 3 | 0.76 | 0.83 | 0.83 | 0.96 | 0.82 |
| 4 | 0.76 | 0.83 | 0.83 | 0.97 | 0.82 |
| 5 | 0.76 | 0.83 | 0.83 | 0.97 | 0.82 |
| 6 | 0.76 | 0.83 | 0.84 | 0.97 | 0.82 |
| 7 | 0.77 | 0.84 | 0.84 | 0.97 | 0.82 |
| 8 | 0.77 | 0.84 | 0.84 | 0.98 | 0.83 |
| 9 | 0.77 | 0.84 | 0.85 | 0.98 | 0.83 |
| 10 | 0.77 | 0.85 | 0.85 | 0.98 | 0.83 |

**Step 4: 'Time' Related Congestion Factors (Corrected by Multiplying with 0.80)**

| Year | Congestion Factors (Corrected) | | | | |
|---|---|---|---|---|---|
| | CAR | LCV | Bus | Truck | TW |
| 1 | 0.787 | 0.786 | 0.787 | 0.789 | 0.790 |
| 2 | 0.786 | 0.785 | 0.786 | 0.788 | 0.789 |
| 3 | 0.785 | 0.783 | 0.784 | 0.787 | 0.788 |
| 4 | 0.783 | 0.782 | 0.783 | 0.786 | 0.787 |
| 5 | 0.782 | 0.780 | 0.782 | 0.784 | 0.786 |
| 6 | 0.780 | 0.779 | 0.780 | 0.783 | 0.785 |
| 7 | 0.778 | 0.777 | 0.778 | 0.781 | 0.783 |
| 8 | 0.776 | 0.775 | 0.776 | 0.780 | 0.782 |
| 9 | 0.774 | 0.772 | 0.774 | 0.778 | 0.780 |
| 10 | 0.772 | 0.770 | 0.772 | 0.776 | 0.778 |

**Step 5: 'Distance' Related VOC at 2009 Prices**

| Year | VOC (in Rs/km) | | | | |
|---|---|---|---|---|---|
| | CAR | LCV | Bus | Truck | TW |
| 1 | 3.950 | 7.235 | 11.341 | 10.014 | 1.380 |
| 2 | 3.958 | 7.252 | 11.370 | 10.031 | 1.383 |
| 3 | 3.966 | 7.270 | 11.402 | 10.049 | 1.386 |
| 4 | 3.975 | 7.290 | 11.437 | 10.069 | 1.390 |
| 5 | 3.984 | 7.312 | 11.475 | 10.091 | 1.393 |
| 6 | 3.995 | 7.336 | 11.516 | 10.115 | 1.398 |
| 7 | 4.007 | 7.362 | 11.561 | 10.140 | 1.402 |
| 8 | 4.019 | 7.390 | 11.610 | 10.168 | 1.407 |
| 9 | 4.033 | 7.421 | 11.664 | 10.199 | 1.413 |
| 10 | 4.048 | 7.454 | 11.722 | 10.232 | 1.419 |

**Step 6: 'Distance' Related VOC at 2014-15 Prices**

| Year | VOC (in Rs/km) | | | | |
|---|---|---|---|---|---|
| | CAR | LCV | Bus | Truck | TW |
| 1 | 5.396 | 9.884 | 15.493 | 13.681 | 1.885 |
| 2 | 5.406 | 9.907 | 15.533 | 13.704 | 1.889 |
| 3 | 5.418 | 9.932 | 15.577 | 13.729 | 1.893 |
| 4 | 5.430 | 9.959 | 15.624 | 13.756 | 1.898 |
| 5 | 5.443 | 9.989 | 15.676 | 13.785 | 1.904 |
| 6 | 5.458 | 10.022 | 15.732 | 13.818 | 1.909 |
| 7 | 5.474 | 10.057 | 15.794 | 13.853 | 1.916 |
| 8 | 5.491 | 10.096 | 15.861 | 13.891 | 1.923 |
| 9 | 5.510 | 10.138 | 15.934 | 13.933 | 1.930 |
| 10 | 5.530 | 10.184 | 16.013 | 13.979 | 1.938 |

Note: Conversion Factor= 0.732

**Step 7: 'Time' Related VOC at 2009 Prices**

| Year | VOC (in Rs/km) | | | | |
|---|---|---|---|---|---|
| | CAR | LCV | Bus | Truck | TW |
| 1 | 4.117 | 6.926 | 10.836 | 8.220 | 1.343 |
| 2 | 4.111 | 6.914 | 10.820 | 8.209 | 1.342 |
| 3 | 4.104 | 6.902 | 10.802 | 8.198 | 1.340 |
| 4 | 4.097 | 6.889 | 10.783 | 8.185 | 1.338 |
| 5 | 4.089 | 6.875 | 10.762 | 8.172 | 1.336 |
| 6 | 4.080 | 6.860 | 10.739 | 8.157 | 1.334 |
| 7 | 4.071 | 6.843 | 10.714 | 8.141 | 1.332 |
| 8 | 4.061 | 6.824 | 10.687 | 8.123 | 1.329 |
| 9 | 4.050 | 6.804 | 10.657 | 8.104 | 1.326 |
| 10 | 4.038 | 6.782 | 10.625 | 8.083 | 1.323 |

**Step 8: 'Time' Related VOC at 2014-15 Prices**

| Year | VOC (in Rs/km) | | | | |
|---|---|---|---|---|---|
| | CAR | LCV | Bus | Truck | TW |
| 1 | 5.624 | 9.461 | 14.803 | 11.229 | 1.835 |
| 2 | 5.615 | 9.446 | 14.781 | 11.215 | 1.833 |
| 3 | 5.606 | 9.430 | 14.757 | 11.199 | 1.830 |
| 4 | 5.597 | 9.412 | 14.731 | 11.182 | 1.828 |
| 5 | 5.586 | 9.392 | 14.702 | 11.164 | 1.825 |
| 6 | 5.574 | 9.371 | 14.671 | 11.143 | 1.822 |
| 7 | 5.561 | 9.348 | 14.637 | 11.121 | 1.819 |
| 8 | 5.548 | 9.322 | 14.599 | 11.097 | 1.816 |
| 9 | 5.532 | 9.295 | 14.559 | 11.071 | 1.812 |
| 10 | 5.516 | 9.265 | 14.515 | 11.043 | 1.808 |

**Step 9: 'Distance' and 'Time' Related VOC at 2014-15 Prices**

| Year | VOC (in Rs/Km) | | | | |
|---|---|---|---|---|---|
| | CAR | LCV | Bus | Truck | TW |
| 1 | 11.020 | 19.345 | 30.296 | 24.910 | 3.720 |
| 2 | 11.022 | 19.353 | 30.314 | 24.918 | 3.722 |
| 3 | 11.024 | 19.362 | 30.333 | 24.928 | 3.724 |
| 4 | 11.027 | 19.371 | 30.355 | 24.938 | 3.726 |
| 5 | 11.029 | 19.381 | 30.378 | 24.949 | 3.729 |
| 6 | 11.032 | 19.393 | 30.403 | 24.961 | 3.732 |
| 7 | 11.035 | 19.405 | 30.430 | 24.974 | 3.735 |
| 8 | 11.039 | 19.418 | 30.460 | 24.989 | 3.738 |
| 9 | 11.042 | 19.433 | 30.493 | 25.004 | 3.742 |
| 10 | 11.046 | 19.449 | 30.528 | 25.021 | 3.746 |

**Step 10: Total VOC (in Rs) of Number of Vehicles on Improved Road at 2014-15 Prices**

| Year | VOC (in Rs/Km) | | | | | |
|---|---|---|---|---|---|---|
| | CAR | LCV | Bus | Truck | TW | Total |
| 1 | 368036 | 2368955 | 674546 | 221846 | 372680 | 4006062 |
| 2 | 401233 | 2583221 | 735687 | 241895 | 406441 | 4368478 |
| 3 | 437432 | 2816971 | 802413 | 263765 | 443282 | 4763862 |
| 4 | 476906 | 3071996 | 875240 | 287621 | 483487 | 5195249 |
| 5 | 519951 | 3350254 | 954736 | 313647 | 527370 | 5665958 |
| 6 | 566894 | 3653890 | 1041524 | 342041 | 575271 | 6179620 |
| 7 | 618090 | 3985251 | 1136284 | 373021 | 627566 | 6740212 |
| 8 | 673926 | 4346907 | 1239765 | 406828 | 684665 | 7352091 |
| 9 | 734826 | 4741672 | 1352789 | 443720 | 747020 | 8020028 |
| 10 | 801254 | 5172634 | 1476256 | 483986 | 815125 | 8749254 |

## 3. Bidar Taluk: Improvements to road from Naranja Sugar Factory to Hippalgaon

### Step 1: Yearly Growth in Total Number of Vehicles Per Day (9 % Growth)

| Year | Car | LCV | Bus | HCV (Truck) | TW (Two Wheelers) |
|---|---|---|---|---|---|
| 1 | 8 | 51 | 0 | 3 | 53 |
| 2 | 9 | 56 | 0 | 3 | 58 |
| 3 | 10 | 61 | 0 | 4 | 63 |
| 4 | 10 | 66 | 0 | 4 | 69 |
| 5 | 11 | 72 | 0 | 4 | 75 |
| 6 | 12 | 78 | 0 | 5 | 82 |
| 7 | 13 | 86 | 0 | 5 | 89 |
| 8 | 15 | 93 | 0 | 5 | 97 |
| 9 | 16 | 102 | 0 | 6 | 106 |
| 10 | 17 | 111 | 0 | 7 | 115 |

### Step 2:Volume Capacity Ratio (VCR)

| Year | PCU/Day | Peak Traffic Flow (PCU/Hour) | VCR |
|---|---|---|---|
| 1 | 164 | 16 | 0.027 |
| 2 | 178 | 18 | 0.030 |
| 3 | 194 | 19 | 0.032 |
| 4 | 212 | 21 | 0.035 |
| 5 | 231 | 23 | 0.038 |
| 6 | 252 | 25 | 0.042 |
| 7 | 274 | 27 | 0.046 |
| 8 | 299 | 30 | 0.050 |
| 9 | 326 | 33 | 0.054 |
| 10 | 355 | 36 | 0.059 |

### Step 3: 'Distance' Related Congestion Factor (Corrected by Multiplying with 0.8)

| Year | Congestion Factor (Corrected) | | | | |
|---|---|---|---|---|---|
| | CAR | LCV | Bus | Truck | TW |
| 1 | 0.75 | 0.82 | 0.82 | 0.96 | 0.81 |
| 2 | 0.76 | 0.82 | 0.82 | 0.96 | 0.81 |
| 3 | 0.76 | 0.82 | 0.83 | 0.96 | 0.81 |
| 4 | 0.76 | 0.83 | 0.83 | 0.96 | 0.82 |
| 5 | 0.76 | 0.83 | 0.83 | 0.97 | 0.82 |
| 6 | 0.76 | 0.83 | 0.83 | 0.97 | 0.82 |
| 7 | 0.76 | 0.83 | 0.84 | 0.97 | 0.82 |
| 8 | 0.77 | 0.84 | 0.84 | 0.97 | 0.83 |
| 9 | 0.77 | 0.84 | 0.84 | 0.98 | 0.83 |
| 10 | 0.77 | 0.84 | 0.85 | 0.98 | 0.83 |

**Step 4: 'Time' Related Congestion Factors (Corrected by Multiplying with 0.80)**

| Year | Congestion Factors (Corrected) | | | | |
|---|---|---|---|---|---|
| | CAR | LCV | Bus | Truck | TW |
| 1 | 0.788 | 0.787 | 0.788 | 0.790 | 0.791 |
| 2 | 0.787 | 0.786 | 0.787 | 0.789 | 0.790 |
| 3 | 0.786 | 0.785 | 0.786 | 0.788 | 0.789 |
| 4 | 0.785 | 0.783 | 0.784 | 0.787 | 0.788 |
| 5 | 0.783 | 0.782 | 0.783 | 0.786 | 0.787 |
| 6 | 0.782 | 0.780 | 0.781 | 0.784 | 0.786 |
| 7 | 0.780 | 0.778 | 0.780 | 0.783 | 0.785 |
| 8 | 0.778 | 0.777 | 0.778 | 0.781 | 0.783 |
| 9 | 0.776 | 0.774 | 0.776 | 0.780 | 0.782 |
| 10 | 0.774 | 0.772 | 0.774 | 0.778 | 0.780 |

**Step 5: 'Distance' Related VOC at 2009 Prices**

| Year | VOC (in Rs/Km) | | | | |
|---|---|---|---|---|---|
| | CAR | LCV | Bus | Truck | TW |
| 1 | 3.944 | 7.221 | 11.316 | 10.000 | 1.377 |
| 2 | 3.951 | 7.236 | 11.343 | 10.016 | 1.380 |
| 3 | 3.958 | 7.253 | 11.373 | 10.032 | 1.383 |
| 4 | 3.966 | 7.272 | 11.405 | 10.051 | 1.386 |
| 5 | 3.975 | 7.292 | 11.440 | 10.071 | 1.390 |
| 6 | 3.985 | 7.314 | 11.478 | 10.093 | 1.394 |
| 7 | 3.996 | 7.338 | 11.519 | 10.117 | 1.398 |
| 8 | 4.008 | 7.364 | 11.565 | 10.142 | 1.403 |
| 9 | 4.020 | 7.392 | 11.614 | 10.171 | 1.408 |
| 10 | 4.034 | 7.423 | 11.668 | 10.202 | 1.413 |

**Step 6: 'Distance' Related VOC at 2014-15 Prices**

| Year | VOC (in Rs/Km) | | | | |
|---|---|---|---|---|---|
| | CAR | LCV | Bus | Truck | TW |
| 1 | 5.387 | 9.865 | 15.459 | 13.661 | 1.881 |
| 2 | 5.397 | 9.886 | 15.496 | 13.682 | 1.885 |
| 3 | 5.407 | 9.909 | 15.536 | 13.706 | 1.889 |
| 4 | 5.419 | 9.934 | 15.580 | 13.731 | 1.894 |
| 5 | 5.431 | 9.962 | 15.628 | 13.758 | 1.899 |
| 6 | 5.444 | 9.992 | 15.680 | 13.788 | 1.904 |
| 7 | 5.459 | 10.024 | 15.737 | 13.820 | 1.910 |
| 8 | 5.475 | 10.060 | 15.799 | 13.856 | 1.916 |
| 9 | 5.492 | 10.099 | 15.866 | 13.895 | 1.923 |
| 10 | 5.511 | 10.141 | 15.940 | 13.937 | 1.931 |

**Step 7: 'Time' Related VOC at 2009 Prices**

| Year | VOC (in Rs/Km) | | | | |
|---|---|---|---|---|---|
| | CAR | LCV | Bus | Truck | TW |
| 1 | 4.122 | 6.935 | 10.850 | 8.229 | 1.344 |
| 2 | 4.116 | 6.925 | 10.835 | 8.220 | 1.343 |
| 3 | 4.110 | 6.914 | 10.818 | 8.209 | 1.341 |
| 4 | 4.103 | 6.901 | 10.801 | 8.198 | 1.340 |
| 5 | 4.096 | 6.888 | 10.781 | 8.185 | 1.338 |
| 6 | 4.088 | 6.874 | 10.760 | 8.172 | 1.336 |
| 7 | 4.080 | 6.858 | 10.737 | 8.157 | 1.334 |
| 8 | 4.070 | 6.841 | 10.712 | 8.141 | 1.331 |
| 9 | 4.060 | 6.823 | 10.684 | 8.123 | 1.329 |
| 10 | 4.049 | 6.802 | 10.655 | 8.104 | 1.326 |

**Step 8: 'Time' Related VOC at 2014-15 Prices**

| Year | VOC (in Rs/Km) | | | | |
|---|---|---|---|---|---|
| | CAR | LCV | Bus | Truck | TW |
| 1 | 5.631 | 9.474 | 14.822 | 11.242 | 1.837 |
| 2 | 5.623 | 9.460 | 14.801 | 11.229 | 1.835 |
| 3 | 5.615 | 9.445 | 14.779 | 11.215 | 1.833 |
| 4 | 5.606 | 9.428 | 14.755 | 11.199 | 1.830 |
| 5 | 5.596 | 9.410 | 14.728 | 11.182 | 1.828 |
| 6 | 5.585 | 9.391 | 14.699 | 11.164 | 1.825 |
| 7 | 5.573 | 9.369 | 14.668 | 11.144 | 1.822 |
| 8 | 5.560 | 9.346 | 14.634 | 11.122 | 1.819 |
| 9 | 5.546 | 9.320 | 14.596 | 11.098 | 1.815 |
| 10 | 5.531 | 9.293 | 14.556 | 11.072 | 1.812 |

Step 9: 'Distance' and 'Time' Related VOC at 2014-15 Prices

| Year | VOC (in Rs/Km) | | | | |
|---|---|---|---|---|---|
| | CAR | LCV | Bus | Truck | TW |
| 1 | 11.018 | 19.338 | 30.281 | 24.904 | 3.718 |
| 2 | 11.020 | 19.346 | 30.298 | 24.912 | 3.720 |
| 3 | 11.022 | 19.354 | 30.316 | 24.920 | 3.722 |
| 4 | 11.024 | 19.362 | 30.335 | 24.930 | 3.724 |
| 5 | 11.027 | 19.372 | 30.356 | 24.940 | 3.726 |
| 6 | 11.029 | 19.382 | 30.380 | 24.952 | 3.729 |
| 7 | 11.032 | 19.394 | 30.405 | 24.964 | 3.732 |
| 8 | 11.035 | 19.406 | 30.433 | 24.977 | 3.735 |
| 9 | 11.039 | 19.419 | 30.463 | 24.992 | 3.738 |
| 10 | 11.043 | 19.434 | 30.495 | 25.008 | 3.742 |

**Step 10: Total VOC (in Rs) of Number of Vehicles on Improved Road at 2014-15 Prices**

| Year | VOC (in Rs/Km) | | | | | |
|---|---|---|---|---|---|---|
| | CAR | LCV | Bus | Truck | TW | Total |
| 1 | 67563 | 755966 | 0 | 57266 | 151039 | 1031835 |
| 2 | 73657 | 824316 | 0 | 62440 | 164715 | 1125127 |
| 3 | 80301 | 898876 | 0 | 68083 | 179637 | 1226897 |
| 4 | 87545 | 980216 | 0 | 74239 | 195921 | 1337922 |
| 5 | 95445 | 1068960 | 0 | 80955 | 213692 | 1459052 |
| 6 | 104060 | 1165790 | 0 | 88281 | 233088 | 1591219 |
| 7 | 113456 | 1271452 | 0 | 96274 | 254261 | 1735441 |
| 8 | 123702 | 1386762 | 0 | 104995 | 277376 | 1892834 |
| 9 | 134877 | 1512615 | 0 | 114512 | 302615 | 2064619 |
| 10 | 147066 | 1649993 | 0 | 124898 | 330177 | 2252133 |

## 4. Balki Taluk: Improvements to Road from Ganeshpurwadi to Ambesangavi Village

### Step 1: Yearly Growth in Total Number of Vehicles Per Day (9 % Growth)

| Year | Car | LCV | Bus | HCV (Truck) | TW (Two Wheelers) |
|---|---|---|---|---|---|
| 1 | 14 | 61 | 0 | 4 | 75 |
| 2 | 15 | 66 | 0 | 4 | 82 |
| 3 | 17 | 72 | 0 | 5 | 89 |
| 4 | 18 | 79 | 0 | 5 | 97 |
| 5 | 20 | 86 | 0 | 6 | 106 |
| 6 | 22 | 94 | 0 | 6 | 115 |
| 7 | 23 | 102 | 0 | 7 | 126 |
| 8 | 26 | 112 | 0 | 7 | 137 |
| 9 | 28 | 122 | 0 | 8 | 149 |
| 10 | 30 | 132 | 0 | 9 | 163 |

### Step 2:Volume Capacity Ratio (VCR)

| Year | PCU/Day | Peak Traffic Flow (PCU/Hour) | VCR |
|---|---|---|---|
| 1 | 171 | 17 | 0.028 |
| 2 | 186 | 19 | 0.031 |
| 3 | 203 | 20 | 0.034 |
| 4 | 221 | 22 | 0.037 |
| 5 | 241 | 24 | 0.040 |
| 6 | 262 | 26 | 0.044 |
| 7 | 286 | 29 | 0.048 |
| 8 | 312 | 31 | 0.052 |
| 9 | 340 | 34 | 0.057 |
| 10 | 370 | 37 | 0.062 |

### Step 3: 'Distance' Related Congestion Factor (Corrected by Multiplying with 0.8)

| Year | Congestion Factor (Corrected) | | | | |
|---|---|---|---|---|---|
| | CAR | LCV | Bus | Truck | TW |
| 1 | 0.75 | 0.82 | 0.82 | 0.96 | 0.81 |
| 2 | 0.76 | 0.82 | 0.82 | 0.96 | 0.81 |
| 3 | 0.76 | 0.82 | 0.83 | 0.96 | 0.81 |
| 4 | 0.76 | 0.83 | 0.83 | 0.97 | 0.82 |
| 5 | 0.76 | 0.83 | 0.83 | 0.97 | 0.82 |
| 6 | 0.76 | 0.83 | 0.83 | 0.97 | 0.82 |
| 7 | 0.77 | 0.83 | 0.84 | 0.97 | 0.82 |
| 8 | 0.77 | 0.84 | 0.84 | 0.97 | 0.83 |
| 9 | 0.77 | 0.84 | 0.85 | 0.98 | 0.83 |
| 10 | 0.77 | 0.84 | 0.85 | 0.98 | 0.83 |

**Step 4: 'Time' Related Congestion Factors (Corrected by Multiplying with 0.80)**

| Year | Congestion Factors (Corrected) | | | | |
|---|---|---|---|---|---|
| | CAR | LCV | Bus | Truck | TW |
| 1 | 0.788 | 0.787 | 0.787 | 0.789 | 0.790 |
| 2 | 0.786 | 0.785 | 0.786 | 0.788 | 0.790 |
| 3 | 0.785 | 0.784 | 0.785 | 0.787 | 0.789 |
| 4 | 0.784 | 0.783 | 0.784 | 0.786 | 0.788 |
| 5 | 0.782 | 0.781 | 0.782 | 0.785 | 0.786 |
| 6 | 0.781 | 0.779 | 0.781 | 0.784 | 0.785 |
| 7 | 0.779 | 0.778 | 0.779 | 0.782 | 0.784 |
| 8 | 0.777 | 0.776 | 0.777 | 0.780 | 0.782 |
| 9 | 0.775 | 0.773 | 0.775 | 0.779 | 0.781 |
| 10 | 0.773 | 0.771 | 0.773 | 0.777 | 0.779 |

**Step 5: 'Distance' Related VOC at 2009 Prices**

| Year | VOC (in Rs/Km) | | | | |
|---|---|---|---|---|---|
| | CAR | LCV | Bus | Truck | TW |
| 1 | 3.947 | 7.228 | 11.329 | 10.007 | 1.378 |
| 2 | 3.954 | 7.244 | 11.357 | 10.024 | 1.381 |
| 3 | 3.962 | 7.262 | 11.388 | 10.041 | 1.385 |
| 4 | 3.971 | 7.281 | 11.421 | 10.060 | 1.388 |
| 5 | 3.980 | 7.302 | 11.458 | 10.081 | 1.392 |
| 6 | 3.990 | 7.325 | 11.498 | 10.104 | 1.396 |
| 7 | 4.002 | 7.350 | 11.541 | 10.129 | 1.400 |
| 8 | 4.014 | 7.378 | 11.588 | 10.156 | 1.405 |
| 9 | 4.027 | 7.407 | 11.640 | 10.185 | 1.410 |
| 10 | 4.042 | 7.439 | 11.696 | 10.218 | 1.416 |

**Step 6: 'Distance' Related VOC at 2014-15 Prices**

| Year | VOC (in Rs/Km) | | | | |
|---|---|---|---|---|---|
| | CAR | LCV | Bus | Truck | TW |
| 1 | 5.392 | 9.875 | 15.477 | 13.671 | 1.883 |
| 2 | 5.402 | 9.897 | 15.515 | 13.693 | 1.887 |
| 3 | 5.413 | 9.921 | 15.557 | 13.717 | 1.891 |
| 4 | 5.424 | 9.947 | 15.603 | 13.744 | 1.896 |
| 5 | 5.437 | 9.976 | 15.653 | 13.772 | 1.901 |
| 6 | 5.451 | 10.007 | 15.707 | 13.803 | 1.907 |
| 7 | 5.467 | 10.041 | 15.766 | 13.837 | 1.913 |
| 8 | 5.483 | 10.079 | 15.831 | 13.874 | 1.919 |
| 9 | 5.502 | 10.119 | 15.901 | 13.915 | 1.927 |
| 10 | 5.521 | 10.163 | 15.978 | 13.958 | 1.935 |

**Step 7: 'Time' Related VOC at 2009 Prices**

| Year | VOC (in Rs/Km) | | | | |
|---|---|---|---|---|---|
| | CAR | LCV | Bus | Truck | TW |
| 1 | 4.119 | 6.930 | 10.842 | 8.225 | 1.344 |
| 2 | 4.113 | 6.919 | 10.827 | 8.215 | 1.342 |
| 3 | 4.107 | 6.908 | 10.810 | 8.204 | 1.341 |
| 4 | 4.100 | 6.895 | 10.791 | 8.192 | 1.339 |
| 5 | 4.092 | 6.881 | 10.771 | 8.179 | 1.337 |
| 6 | 4.084 | 6.866 | 10.749 | 8.165 | 1.335 |
| 7 | 4.075 | 6.850 | 10.725 | 8.149 | 1.333 |
| 8 | 4.065 | 6.832 | 10.699 | 8.133 | 1.330 |
| 9 | 4.055 | 6.813 | 10.670 | 8.114 | 1.328 |
| 10 | 4.043 | 6.792 | 10.639 | 8.094 | 1.325 |

**Step 8: 'Time' Related VOC at 2014-15 Prices**

| Year | VOC (in Rs/Km) | | | | |
|---|---|---|---|---|---|
| | CAR | LCV | Bus | Truck | TW |
| 1 | 5.627 | 9.467 | 14.812 | 11.236 | 1.836 |
| 2 | 5.619 | 9.453 | 14.791 | 11.222 | 1.834 |
| 3 | 5.610 | 9.437 | 14.768 | 11.207 | 1.831 |
| 4 | 5.601 | 9.420 | 14.742 | 11.191 | 1.829 |
| 5 | 5.591 | 9.401 | 14.715 | 11.174 | 1.826 |
| 6 | 5.579 | 9.380 | 14.684 | 11.154 | 1.824 |
| 7 | 5.567 | 9.358 | 14.652 | 11.133 | 1.821 |
| 8 | 5.554 | 9.334 | 14.616 | 11.110 | 1.817 |
| 9 | 5.539 | 9.307 | 14.577 | 11.085 | 1.814 |
| 10 | 5.523 | 9.278 | 14.534 | 11.058 | 1.810 |

**Step 9: 'Distance' and 'Time' Related VOC at 2014-15 Prices**

| Year | VOC (in Rs/Km) | | | | |
|---|---|---|---|---|---|
| | CAR | LCV | Bus | Truck | TW |
| 1 | 11.019 | 19.342 | 30.289 | 24.907 | 3.719 |
| 2 | 11.021 | 19.350 | 30.306 | 24.916 | 3.721 |
| 3 | 11.023 | 19.358 | 30.325 | 24.925 | 3.723 |
| 4 | 11.025 | 19.367 | 30.345 | 24.935 | 3.725 |
| 5 | 11.028 | 19.377 | 30.367 | 24.946 | 3.728 |
| 6 | 11.031 | 19.388 | 30.392 | 24.958 | 3.730 |
| 7 | 11.034 | 19.399 | 30.418 | 24.970 | 3.733 |
| 8 | 11.037 | 19.412 | 30.447 | 24.984 | 3.737 |
| 9 | 11.041 | 19.426 | 30.478 | 25.000 | 3.740 |
| 10 | 11.045 | 19.442 | 30.512 | 25.016 | 3.744 |

**Step 10: Total VOC (in Rs) of Number of Vehicles on Improved Road at 2014-15 Prices**

| Year | VOC (in Rs/Km) | | | | | |
|---|---|---|---|---|---|---|
| | CAR | LCV | Bus | Truck | TW | Total |
| 1 | 168922 | 1291941 | 0 | 109095 | 305408 | 1875365 |
| 2 | 184158 | 1408772 | 0 | 118953 | 333068 | 2044951 |
| 3 | 200771 | 1536224 | 0 | 129706 | 363250 | 2229951 |
| 4 | 218886 | 1675271 | 0 | 141436 | 396188 | 2431781 |
| 5 | 238641 | 1826980 | 0 | 154233 | 432136 | 2651989 |
| 6 | 260184 | 1992518 | 0 | 168193 | 471374 | 2892269 |
| 7 | 283678 | 2173164 | 0 | 183425 | 514209 | 3154476 |
| 8 | 309301 | 2370316 | 0 | 200046 | 560976 | 3440638 |
| 9 | 337247 | 2585507 | 0 | 218184 | 612044 | 3752981 |
| 10 | 367729 | 2820415 | 0 | 237979 | 667817 | 4093940 |

## 5. Mysore Taluk: Improvements to Rattanahalli-K.Naganahalli road via Gungral Chatra

**Step 1: Yearly Growth in Total Number of Vehicles Per Day (9 % Growth)**

| Year | Car | LCV | Bus | HCV (Truck) | TW (Two Wheelers) |
|---|---|---|---|---|---|
| 1 | 20 | 12 | 0 | 3 | 155 |
| 2 | 22 | 13 | 0 | 3 | 169 |
| 3 | 24 | 14 | 0 | 4 | 184 |
| 4 | 26 | 16 | 0 | 4 | 201 |
| 5 | 28 | 17 | 0 | 4 | 219 |
| 6 | 31 | 18 | 0 | 5 | 238 |
| 7 | 34 | 20 | 0 | 5 | 260 |
| 8 | 37 | 22 | 0 | 5 | 283 |
| 9 | 40 | 24 | 0 | 6 | 309 |
| 10 | 43 | 26 | 0 | 7 | 337 |

**Step 2:Volume Capacity Ratio (VCR)**

| Year | PCU/Day | Peak Traffic Flow (PCU/Hour) | VCR |
|---|---|---|---|
| 1 | 159 | 16 | 0.026 |
| 2 | 173 | 17 | 0.029 |
| 3 | 188 | 19 | 0.031 |
| 4 | 205 | 21 | 0.034 |
| 5 | 224 | 22 | 0.037 |
| 6 | 244 | 24 | 0.041 |
| 7 | 266 | 27 | 0.044 |
| 8 | 290 | 29 | 0.048 |
| 9 | 316 | 32 | 0.053 |
| 10 | 344 | 34 | 0.057 |

**Step 3: 'Distance' Related Congestion Factor (Corrected by Multiplying with 0.8)**

| Year | Congestion Factor (Corrected) | | | | |
|---|---|---|---|---|---|
| | CAR | LCV | Bus | Truck | TW |
| 1 | 0.75 | 0.82 | 0.82 | 0.96 | 0.81 |
| 2 | 0.75 | 0.82 | 0.82 | 0.96 | 0.81 |
| 3 | 0.76 | 0.82 | 0.83 | 0.96 | 0.81 |
| 4 | 0.76 | 0.82 | 0.83 | 0.96 | 0.81 |
| 5 | 0.76 | 0.83 | 0.83 | 0.97 | 0.82 |
| 6 | 0.76 | 0.83 | 0.83 | 0.97 | 0.82 |
| 7 | 0.76 | 0.83 | 0.84 | 0.97 | 0.82 |
| 8 | 0.77 | 0.83 | 0.84 | 0.97 | 0.82 |
| 9 | 0.77 | 0.84 | 0.84 | 0.98 | 0.83 |
| 10 | 0.77 | 0.84 | 0.85 | 0.98 | 0.83 |

**Step 4: 'Time' Related Congestion Factors (Corrected by Multiplying with 0.80)**

| Year | Congestion Factors (Corrected) | | | | |
|---|---|---|---|---|---|
| | CAR | LCV | Bus | Truck | TW |
| 1 | 0.788 | 0.788 | 0.788 | 0.790 | 0.791 |
| 2 | 0.787 | 0.786 | 0.787 | 0.789 | 0.790 |
| 3 | 0.786 | 0.785 | 0.786 | 0.788 | 0.789 |
| 4 | 0.785 | 0.784 | 0.785 | 0.787 | 0.788 |
| 5 | 0.784 | 0.782 | 0.783 | 0.786 | 0.787 |
| 6 | 0.782 | 0.781 | 0.782 | 0.785 | 0.786 |
| 7 | 0.781 | 0.779 | 0.780 | 0.783 | 0.785 |
| 8 | 0.779 | 0.777 | 0.779 | 0.782 | 0.784 |
| 9 | 0.777 | 0.775 | 0.777 | 0.780 | 0.782 |
| 10 | 0.775 | 0.773 | 0.775 | 0.778 | 0.781 |

**Step 5: 'Distance' Related VOC at 2009 Prices**

| Year | VOC (in Rs/Km) | | | | |
|---|---|---|---|---|---|
| | CAR | LCV | Bus | Truck | TW |
| 1 | 3.941 | 7.216 | 11.307 | 9.995 | 1.376 |
| 2 | 3.948 | 7.231 | 11.333 | 10.010 | 1.379 |
| 3 | 3.955 | 7.247 | 11.362 | 10.026 | 1.382 |
| 4 | 3.963 | 7.265 | 11.393 | 10.044 | 1.385 |
| 5 | 3.972 | 7.285 | 11.427 | 10.063 | 1.388 |
| 6 | 3.982 | 7.306 | 11.464 | 10.085 | 1.392 |
| 7 | 3.992 | 7.329 | 11.504 | 10.108 | 1.396 |
| 8 | 4.003 | 7.354 | 11.548 | 10.133 | 1.401 |
| 9 | 4.016 | 7.382 | 11.596 | 10.160 | 1.406 |
| 10 | 4.029 | 7.412 | 11.648 | 10.190 | 1.411 |

**Step 6: 'Distance' Related VOC at 2014-15 Prices**

| Year | VOC (in Rs/Km) | | | | |
|---|---|---|---|---|---|
| | CAR | LCV | Bus | Truck | TW |
| 1 | 5.384 | 9.857 | 15.447 | 13.654 | 1.880 |
| 2 | 5.393 | 9.878 | 15.483 | 13.675 | 1.884 |
| 3 | 5.403 | 9.900 | 15.522 | 13.697 | 1.888 |
| 4 | 5.414 | 9.925 | 15.564 | 13.721 | 1.892 |
| 5 | 5.426 | 9.952 | 15.610 | 13.748 | 1.897 |
| 6 | 5.439 | 9.981 | 15.661 | 13.777 | 1.902 |
| 7 | 5.454 | 10.012 | 15.716 | 13.808 | 1.908 |
| 8 | 5.469 | 10.047 | 15.776 | 13.843 | 1.914 |
| 9 | 5.486 | 10.085 | 15.841 | 13.880 | 1.921 |
| 10 | 5.504 | 10.126 | 15.913 | 13.921 | 1.928 |

**Step 7: 'Time' Related VOC at 2009 Prices**

| Year | VOC (in Rs/Km) | | | | |
|---|---|---|---|---|---|
| | CAR | LCV | Bus | Truck | TW |
| 1 | 4.124 | 6.938 | 10.855 | 8.233 | 1.345 |
| 2 | 4.118 | 6.928 | 10.840 | 8.223 | 1.343 |
| 3 | 4.112 | 6.918 | 10.824 | 8.213 | 1.342 |
| 4 | 4.106 | 6.906 | 10.807 | 8.202 | 1.340 |
| 5 | 4.099 | 6.893 | 10.788 | 8.190 | 1.339 |
| 6 | 4.091 | 6.879 | 10.768 | 8.177 | 1.337 |
| 7 | 4.083 | 6.864 | 10.745 | 8.163 | 1.335 |
| 8 | 4.074 | 6.847 | 10.721 | 8.147 | 1.332 |
| 9 | 4.064 | 6.829 | 10.695 | 8.130 | 1.330 |
| 10 | 4.053 | 6.810 | 10.666 | 8.111 | 1.327 |

**Step 8: 'Time' Related VOC at 2014-15 Prices**

| Year | VOC (in Rs/Km) | | | | |
|---|---|---|---|---|---|
| | CAR | LCV | Bus | Truck | TW |
| 1 | 5.633 | 9.479 | 14.829 | 11.247 | 1.837 |
| 2 | 5.626 | 9.465 | 14.809 | 11.234 | 1.835 |
| 3 | 5.618 | 9.450 | 14.787 | 11.220 | 1.833 |
| 4 | 5.609 | 9.434 | 14.764 | 11.205 | 1.831 |
| 5 | 5.599 | 9.417 | 14.738 | 11.189 | 1.829 |
| 6 | 5.589 | 9.398 | 14.710 | 11.171 | 1.826 |
| 7 | 5.578 | 9.377 | 14.680 | 11.151 | 1.823 |
| 8 | 5.565 | 9.354 | 14.646 | 11.130 | 1.820 |
| 9 | 5.552 | 9.330 | 14.610 | 11.107 | 1.817 |
| 10 | 5.537 | 9.303 | 14.571 | 11.081 | 1.813 |

**Step 9: 'Distance' and 'Time' Related VOC at 2014-15 Prices**

| Year | VOC (in Rs/Km) | | | | |
|---|---|---|---|---|---|
| | CAR | LCV | Bus | Truck | TW |
| 1 | 11.018 | 19.336 | 30.276 | 24.901 | 3.717 |
| 2 | 11.019 | 19.343 | 30.292 | 24.909 | 3.719 |
| 3 | 11.021 | 19.351 | 30.309 | 24.917 | 3.721 |
| 4 | 11.023 | 19.359 | 30.328 | 24.926 | 3.723 |
| 5 | 11.026 | 19.368 | 30.348 | 24.936 | 3.726 |
| 6 | 11.028 | 19.378 | 30.371 | 24.947 | 3.728 |
| 7 | 11.031 | 19.389 | 30.396 | 24.959 | 3.731 |
| 8 | 11.034 | 19.401 | 30.422 | 24.973 | 3.734 |
| 9 | 11.038 | 19.414 | 30.451 | 24.987 | 3.737 |
| 10 | 11.041 | 19.429 | 30.483 | 25.002 | 3.741 |

**Step 10: Total VOC (in Rs) of Number of Vehicles on Improved Road at 2014-15 Prices**

| Year | VOC (in Rs/Km) | | | | | |
|---|---|---|---|---|---|---|
| | CAR | LCV | Bus | Truck | TW | Total |
| 1 | 241283 | 254074 | 0 | 81799 | 630918 | 1208075 |
| 2 | 263042 | 277042 | 0 | 89189 | 688035 | 1317308 |
| 3 | 286768 | 302097 | 0 | 97249 | 750354 | 1436468 |
| 4 | 312638 | 329430 | 0 | 106041 | 818357 | 1566466 |
| 5 | 340849 | 359249 | 0 | 115632 | 892568 | 1708297 |
| 6 | 371611 | 391785 | 0 | 126094 | 973564 | 1863054 |
| 7 | 405159 | 427286 | 0 | 137508 | 1061974 | 2031928 |
| 8 | 441746 | 466029 | 0 | 149963 | 1158490 | 2216227 |
| 9 | 481648 | 508312 | 0 | 163552 | 1263868 | 2417381 |
| 10 | 525169 | 554465 | 0 | 178383 | 1378940 | 2636957 |

**6. H D Kote Taluk: Improvements to road from M.M.road to Ramenahalli - Nerale Hosur road via Anagatti**

**7.**

**Step 1: Yearly Growth in Total Number of Vehicles Per Day (9 % Growth)**

| Year | Car | LCV | Bus | HCV (Truck) | TW (Two Wheelers) |
|---|---|---|---|---|---|
| 1 | 10 | 17 | 2 | 3 | 36 |
| 2 | 11 | 19 | 2 | 3 | 39 |
| 3 | 12 | 20 | 2 | 4 | 43 |
| 4 | 13 | 22 | 3 | 4 | 47 |
| 5 | 14 | 24 | 3 | 4 | 51 |
| 6 | 15 | 26 | 3 | 5 | 55 |
| 7 | 17 | 29 | 3 | 5 | 60 |
| 8 | 18 | 31 | 4 | 5 | 66 |
| 9 | 20 | 34 | 4 | 6 | 72 |
| 10 | 22 | 37 | 4 | 7 | 78 |

**Step 2:Volume Capacity Ratio (VCR)**

| Year | PCU/Day | Peak Traffic Flow (PCU/Hour) | VCR |
|---|---|---|---|
| 1 | 84 | 8 | 0.014 |
| 2 | 92 | 9 | 0.015 |
| 3 | 100 | 10 | 0.017 |
| 4 | 109 | 11 | 0.018 |
| 5 | 119 | 12 | 0.020 |
| 6 | 129 | 13 | 0.022 |
| 7 | 141 | 14 | 0.023 |
| 8 | 154 | 15 | 0.026 |
| 9 | 167 | 17 | 0.028 |
| 10 | 182 | 18 | 0.030 |

**Step 3: 'Distance' Related Congestion Factor (Corrected by Multiplying with 0.8)**

| Year | Congestion Factor (Corrected) | | | | |
|---|---|---|---|---|---|
| | CAR | LCV | Bus | Truck | TW |
| 1 | 0.75 | 0.81 | 0.81 | 0.95 | 0.80 |
| 2 | 0.75 | 0.81 | 0.81 | 0.95 | 0.80 |
| 3 | 0.75 | 0.81 | 0.81 | 0.95 | 0.80 |
| 4 | 0.75 | 0.81 | 0.81 | 0.95 | 0.80 |
| 5 | 0.75 | 0.81 | 0.82 | 0.96 | 0.81 |
| 6 | 0.75 | 0.82 | 0.82 | 0.96 | 0.81 |
| 7 | 0.75 | 0.82 | 0.82 | 0.96 | 0.81 |
| 8 | 0.75 | 0.82 | 0.82 | 0.96 | 0.81 |
| 9 | 0.75 | 0.82 | 0.82 | 0.96 | 0.81 |
| 10 | 0.76 | 0.82 | 0.82 | 0.96 | 0.81 |

**Step 4: 'Time' Related Congestion Factors (Corrected by Multiplying with 0.80)**

| Year | Congestion Factors (Corrected) | | | | |
|---|---|---|---|---|---|
| | CAR | LCV | Bus | Truck | TW |
| 1 | 0.794 | 0.793 | 0.794 | 0.795 | 0.795 |
| 2 | 0.793 | 0.793 | 0.793 | 0.794 | 0.795 |
| 3 | 0.793 | 0.792 | 0.793 | 0.794 | 0.794 |
| 4 | 0.792 | 0.791 | 0.792 | 0.793 | 0.794 |
| 5 | 0.791 | 0.791 | 0.791 | 0.793 | 0.793 |
| 6 | 0.791 | 0.790 | 0.790 | 0.792 | 0.793 |
| 7 | 0.790 | 0.789 | 0.790 | 0.791 | 0.792 |
| 8 | 0.789 | 0.788 | 0.789 | 0.790 | 0.791 |
| 9 | 0.788 | 0.787 | 0.788 | 0.790 | 0.791 |
| 10 | 0.787 | 0.786 | 0.787 | 0.789 | 0.790 |

**Step 5: 'Distance' Related VOC at 2009 Prices**

| Year | VOC (in Rs/Km) | | | | |
|---|---|---|---|---|---|
| | CAR | LCV | Bus | Truck | TW |
| 1 | 3.906 | 7.137 | 11.170 | 9.916 | 1.362 |
| 2 | 3.909 | 7.145 | 11.184 | 9.924 | 1.364 |
| 3 | 3.913 | 7.154 | 11.199 | 9.933 | 1.365 |
| 4 | 3.918 | 7.163 | 11.216 | 9.943 | 1.367 |
| 5 | 3.922 | 7.173 | 11.234 | 9.953 | 1.369 |
| 6 | 3.927 | 7.185 | 11.253 | 9.964 | 1.371 |
| 7 | 3.933 | 7.197 | 11.275 | 9.976 | 1.373 |
| 8 | 3.939 | 7.210 | 11.298 | 9.990 | 1.375 |
| 9 | 3.945 | 7.225 | 11.323 | 10.004 | 1.378 |
| 10 | 3.953 | 7.241 | 11.351 | 10.020 | 1.381 |

**Step 6: 'Distance' Related VOC at 2014-15 Prices**

| Year | VOC (in Rs/Km) | | | | |
|---|---|---|---|---|---|
| | CAR | LCV | Bus | Truck | TW |
| 1 | 5.336 | 9.750 | 15.260 | 13.547 | 1.861 |
| 2 | 5.341 | 9.761 | 15.279 | 13.558 | 1.863 |
| 3 | 5.346 | 9.773 | 15.299 | 13.570 | 1.865 |
| 4 | 5.352 | 9.786 | 15.322 | 13.583 | 1.867 |
| 5 | 5.358 | 9.800 | 15.347 | 13.597 | 1.870 |
| 6 | 5.365 | 9.815 | 15.373 | 13.612 | 1.873 |
| 7 | 5.373 | 9.832 | 15.403 | 13.629 | 1.876 |
| 8 | 5.381 | 9.850 | 15.434 | 13.647 | 1.879 |
| 9 | 5.390 | 9.870 | 15.469 | 13.667 | 1.882 |
| 10 | 5.400 | 9.892 | 15.507 | 13.689 | 1.886 |

**Step 7: 'Time' Related VOC at 2009 Prices**

| Year | VOC (in Rs/Km) | | | | |
|---|---|---|---|---|---|
| | CAR | LCV | Bus | Truck | TW |
| 1 | 4.152 | 6.990 | 10.931 | 8.281 | 1.352 |
| 2 | 4.149 | 6.985 | 10.923 | 8.276 | 1.351 |
| 3 | 4.146 | 6.979 | 10.914 | 8.271 | 1.350 |
| 4 | 4.143 | 6.973 | 10.905 | 8.265 | 1.350 |
| 5 | 4.139 | 6.966 | 10.895 | 8.259 | 1.349 |
| 6 | 4.135 | 6.959 | 10.884 | 8.252 | 1.348 |
| 7 | 4.130 | 6.951 | 10.873 | 8.244 | 1.347 |
| 8 | 4.126 | 6.942 | 10.860 | 8.236 | 1.345 |
| 9 | 4.120 | 6.932 | 10.846 | 8.227 | 1.344 |
| 10 | 4.115 | 6.922 | 10.830 | 8.217 | 1.343 |

**Step 8: 'Time' Related VOC at 2014-15 Prices**

| Year | VOC (in Rs/Km) | | | | |
|---|---|---|---|---|---|
| | CAR | LCV | Bus | Truck | TW |
| 1 | 5.672 | 9.549 | 14.932 | 11.313 | 1.847 |
| 2 | 5.668 | 9.542 | 14.922 | 11.306 | 1.846 |
| 3 | 5.664 | 9.534 | 14.910 | 11.299 | 1.845 |
| 4 | 5.659 | 9.526 | 14.898 | 11.291 | 1.844 |
| 5 | 5.654 | 9.516 | 14.884 | 11.282 | 1.842 |
| 6 | 5.649 | 9.506 | 14.870 | 11.273 | 1.841 |
| 7 | 5.643 | 9.495 | 14.853 | 11.262 | 1.840 |
| 8 | 5.636 | 9.483 | 14.836 | 11.251 | 1.838 |
| 9 | 5.629 | 9.470 | 14.816 | 11.239 | 1.836 |
| 10 | 5.621 | 9.456 | 14.796 | 11.225 | 1.834 |

**Step 9: 'Distance' and 'Time' Related VOC at 2014-15 Prices**

| Year | VOC (in Rs/Km) | | | | |
|---|---|---|---|---|---|
| | CAR | LCV | Bus | Truck | TW |
| 1 | 11.008 | 19.299 | 30.192 | 24.860 | 3.708 |
| 2 | 11.009 | 19.302 | 30.201 | 24.864 | 3.709 |
| 3 | 11.010 | 19.307 | 30.210 | 24.869 | 3.710 |
| 4 | 11.011 | 19.311 | 30.220 | 24.874 | 3.711 |
| 5 | 11.012 | 19.316 | 30.231 | 24.879 | 3.712 |
| 6 | 11.014 | 19.321 | 30.243 | 24.885 | 3.714 |
| 7 | 11.015 | 19.327 | 30.256 | 24.891 | 3.715 |
| 8 | 11.017 | 19.333 | 30.270 | 24.898 | 3.717 |
| 9 | 11.019 | 19.340 | 30.285 | 24.906 | 3.718 |
| 10 | 11.021 | 19.348 | 30.302 | 24.914 | 3.720 |

**Step 10: Total VOC (in Rs) of Number of Vehicles on Improved Road at 2014-15 Prices**

| Year | VOC (in Rs/Km) | | | | | |
|---|---|---|---|---|---|---|
| | CAR | LCV | Bus | Truck | TW | Total |
| 1 | 200896 | 598743 | 110202 | 136110 | 243608 | 1289559 |
| 2 | 218996 | 652757 | 120154 | 148384 | 265601 | 1405892 |
| 3 | 238728 | 711657 | 131007 | 161768 | 289586 | 1532747 |
| 4 | 260241 | 775886 | 142845 | 176362 | 315746 | 1671081 |
| 5 | 283695 | 845930 | 155758 | 192276 | 344278 | 1821936 |
| 6 | 309266 | 922318 | 169843 | 209630 | 375399 | 1986455 |
| 7 | 337145 | 1005628 | 185209 | 228555 | 409347 | 2165883 |
| 8 | 367542 | 1096493 | 201972 | 249194 | 446381 | 2361582 |
| 9 | 400685 | 1195604 | 220262 | 271704 | 486783 | 2575038 |
| 10 | 436823 | 1303715 | 240219 | 296255 | 530866 | 2807876 |

**7 Tiptur Taluk: Improvements to road from BGH Road to join C.N. Halli Taluk border via Muddanahalli,**

**Halkurike, Doddikatte Road**

**Step 1: Yearly Growth in Total Number of Vehicles Per Day (9 % Growth)**

| Year | Car | LCV | Bus | HCV (Truck) | TW (Two Wheelers) |
|---|---|---|---|---|---|
| 1 | 12 | 87 | 0 | 1 | 165 |
| 2 | 13 | 95 | 0 | 1 | 180 |
| 3 | 14 | 103 | 0 | 1 | 196 |
| 4 | 16 | 113 | 0 | 1 | 214 |
| 5 | 17 | 123 | 0 | 1 | 233 |
| 6 | 18 | 134 | 0 | 2 | 254 |
| 7 | 20 | 146 | 0 | 2 | 277 |
| 8 | 22 | 159 | 0 | 2 | 302 |
| 9 | 24 | 173 | 0 | 2 | 329 |
| 10 | 26 | 189 | 0 | 2 | 358 |

**Step 2:Volume Capacity Ratio (VCR)**

| Year | PCU/Day | Peak Traffic Flow (PCU/Hour) | VCR |
|---|---|---|---|
| 1 | 196 | 20 | 0.033 |
| 2 | 213 | 21 | 0.036 |
| 3 | 232 | 23 | 0.039 |
| 4 | 253 | 25 | 0.042 |
| 5 | 276 | 28 | 0.046 |
| 6 | 301 | 30 | 0.050 |
| 7 | 328 | 33 | 0.055 |
| 8 | 358 | 36 | 0.060 |
| 9 | 390 | 39 | 0.065 |
| 10 | 425 | 42 | 0.071 |

**Step 3: 'Distance' Related Congestion Factor (Corrected by Multiplying with 0.8)**

| | Congestion Factor (Corrected) | | | | |
|---|---|---|---|---|---|
| Year | CAR | LCV | Bus | Truck | TW |
| 1 | 0.76 | 0.82 | 0.83 | 0.96 | 0.81 |
| 2 | 0.76 | 0.83 | 0.83 | 0.96 | 0.82 |
| 3 | 0.76 | 0.83 | 0.83 | 0.97 | 0.82 |
| 4 | 0.76 | 0.83 | 0.83 | 0.97 | 0.82 |
| 5 | 0.76 | 0.83 | 0.84 | 0.97 | 0.82 |
| 6 | 0.77 | 0.84 | 0.84 | 0.97 | 0.83 |
| 7 | 0.77 | 0.84 | 0.84 | 0.98 | 0.83 |
| 8 | 0.77 | 0.84 | 0.85 | 0.98 | 0.83 |
| 9 | 0.77 | 0.85 | 0.85 | 0.98 | 0.84 |
| 10 | 0.78 | 0.85 | 0.86 | 0.99 | 0.84 |

**Step 4: 'Time' Related Congestion Factors (Corrected by Multiplying with 0.80)**

| Year | Congestion Factors (Corrected) | | | | |
|---|---|---|---|---|---|
| | CAR | LCV | Bus | Truck | TW |
| 1 | 0.786 | 0.785 | 0.786 | 0.788 | 0.789 |
| 2 | 0.784 | 0.783 | 0.784 | 0.787 | 0.788 |
| 3 | 0.783 | 0.782 | 0.783 | 0.785 | 0.787 |
| 4 | 0.782 | 0.780 | 0.781 | 0.784 | 0.786 |
| 5 | 0.780 | 0.778 | 0.780 | 0.783 | 0.784 |
| 6 | 0.778 | 0.776 | 0.778 | 0.781 | 0.783 |
| 7 | 0.776 | 0.774 | 0.776 | 0.779 | 0.782 |
| 8 | 0.774 | 0.772 | 0.774 | 0.778 | 0.780 |
| 9 | 0.772 | 0.769 | 0.771 | 0.776 | 0.778 |
| 10 | 0.769 | 0.767 | 0.769 | 0.773 | 0.776 |

**Step 5: 'Distance' Related VOC at 2009 Prices**

| Year | VOC (in Rs/Km) | | | | |
|---|---|---|---|---|---|
| | CAR | LCV | Bus | Truck | TW |
| 1 | 3.959 | 7.255 | 11.375 | 10.034 | 1.383 |
| 2 | 3.967 | 7.273 | 11.407 | 10.052 | 1.387 |
| 3 | 3.976 | 7.294 | 11.443 | 10.073 | 1.390 |
| 4 | 3.986 | 7.316 | 11.481 | 10.095 | 1.394 |
| 5 | 3.997 | 7.340 | 11.523 | 10.119 | 1.398 |
| 6 | 4.009 | 7.366 | 11.569 | 10.145 | 1.403 |
| 7 | 4.022 | 7.395 | 11.618 | 10.173 | 1.408 |
| 8 | 4.036 | 7.426 | 11.672 | 10.204 | 1.414 |
| 9 | 4.051 | 7.460 | 11.732 | 10.238 | 1.420 |
| 10 | 4.067 | 7.497 | 11.796 | 10.275 | 1.426 |

**Step 6: 'Distance' Related VOC at 2014-15 Prices**

| Year | VOC (in Rs/Km) | | | | |
|---|---|---|---|---|---|
| | CAR | LCV | Bus | Truck | TW |
| 1 | 5.408 | 9.911 | 15.540 | 13.707 | 1.890 |
| 2 | 5.420 | 9.936 | 15.584 | 13.733 | 1.894 |
| 3 | 5.432 | 9.964 | 15.632 | 13.760 | 1.899 |
| 4 | 5.446 | 9.994 | 15.685 | 13.790 | 1.904 |
| 5 | 5.460 | 10.027 | 15.742 | 13.823 | 1.910 |
| 6 | 5.476 | 10.063 | 15.804 | 13.859 | 1.917 |
| 7 | 5.494 | 10.102 | 15.872 | 13.898 | 1.924 |
| 8 | 5.513 | 10.145 | 15.946 | 13.940 | 1.931 |
| 9 | 5.534 | 10.191 | 16.027 | 13.986 | 1.940 |
| 10 | 5.557 | 10.242 | 16.115 | 14.037 | 1.949 |

**Step 7: 'Time' Related VOC at 2009 Prices**

| Year | VOC (in Rs/Km) | | | | |
|---|---|---|---|---|---|
| | CAR | LCV | Bus | Truck | TW |
| 1 | 4.110 | 6.913 | 10.817 | 8.208 | 1.341 |
| 2 | 4.103 | 6.900 | 10.799 | 8.197 | 1.340 |
| 3 | 4.096 | 6.887 | 10.780 | 8.184 | 1.338 |
| 4 | 4.088 | 6.873 | 10.758 | 8.171 | 1.336 |
| 5 | 4.079 | 6.857 | 10.735 | 8.156 | 1.334 |
| 6 | 4.069 | 6.840 | 10.710 | 8.140 | 1.331 |
| 7 | 4.059 | 6.821 | 10.682 | 8.122 | 1.329 |
| 8 | 4.048 | 6.801 | 10.652 | 8.103 | 1.326 |
| 9 | 4.036 | 6.778 | 10.619 | 8.082 | 1.323 |
| 10 | 4.022 | 6.754 | 10.584 | 8.059 | 1.319 |

**Step 8: 'Time' Related VOC at 2014-15 Prices**

| Year | VOC (in Rs/Km) | | | | |
|---|---|---|---|---|---|
| | CAR | LCV | Bus | Truck | TW |
| 1 | 5.614 | 9.443 | 14.777 | 11.214 | 1.832 |
| 2 | 5.605 | 9.427 | 14.753 | 11.198 | 1.830 |
| 3 | 5.595 | 9.409 | 14.726 | 11.181 | 1.828 |
| 4 | 5.584 | 9.389 | 14.697 | 11.162 | 1.825 |
| 5 | 5.572 | 9.367 | 14.665 | 11.142 | 1.822 |
| 6 | 5.559 | 9.344 | 14.631 | 11.120 | 1.819 |
| 7 | 5.545 | 9.318 | 14.593 | 11.096 | 1.815 |
| 8 | 5.530 | 9.290 | 14.552 | 11.069 | 1.811 |
| 9 | 5.513 | 9.260 | 14.507 | 11.041 | 1.807 |
| 10 | 5.495 | 9.227 | 14.459 | 11.009 | 1.802 |

**Step 9: 'Distance' and 'Time' Related VOC at 2014-15 Prices**

| Year | VOC (in Rs/Km) | | | | |
|---|---|---|---|---|---|
| | CAR | LCV | Bus | Truck | TW |
| 1 | 11.022 | 19.354 | 30.317 | 24.921 | 3.722 |
| 2 | 11.024 | 19.363 | 30.337 | 24.931 | 3.724 |
| 3 | 11.027 | 19.373 | 30.358 | 24.941 | 3.727 |
| 4 | 11.030 | 19.383 | 30.382 | 24.953 | 3.729 |
| 5 | 11.033 | 19.395 | 30.407 | 24.965 | 3.732 |
| 6 | 11.036 | 19.407 | 30.435 | 24.979 | 3.735 |
| 7 | 11.039 | 19.420 | 30.465 | 24.993 | 3.739 |
| 8 | 11.043 | 19.435 | 30.498 | 25.010 | 3.742 |
| 9 | 11.047 | 19.451 | 30.534 | 25.027 | 3.747 |
| 10 | 11.051 | 19.469 | 30.573 | 25.046 | 3.751 |

## Step 10: Total VOC (in Rs) of Number of Vehicles on Improved Road at 2014-15 Prices

| Year | VOC (in Rs/Km) | | | | | |
|---|---|---|---|---|---|---|
| | CAR | LCV | Bus | Truck | TW | Total |
| 1 | 308975 | 3933432 | 0 | 58216 | 1434603 | 5735226 |
| 2 | 336852 | 4289386 | 0 | 63480 | 1564651 | 6254369 |
| 3 | 367250 | 4677742 | 0 | 69222 | 1706581 | 6820795 |
| 4 | 400399 | 5101485 | 0 | 75486 | 1861492 | 7438863 |
| 5 | 436550 | 5563880 | 0 | 82321 | 2030594 | 8113346 |
| 6 | 475977 | 6068505 | 0 | 89779 | 2215210 | 8849471 |
| 7 | 518977 | 6619276 | 0 | 97917 | 2416791 | 9652961 |
| 8 | 565878 | 7220481 | 0 | 106798 | 2636932 | 10530089 |
| 9 | 617036 | 7876825 | 0 | 116492 | 2877379 | 11487732 |
| 10 | 672842 | 8593462 | 0 | 127073 | 3140054 | 12533431 |

**8 Gubbi Taluk: road from Hebbur kallur Road to Idagur Via, Manikuppe, Cheeranahally, Naranahally**

**Step 1: Yearly Growth in Total Number of Vehicles Per Day (9 % Growth)**

| Year | Car | LCV | Bus | HCV (Truck) | TW (Two Wheelers) |
|---|---|---|---|---|---|
| 1 | 30 | 80 | 0 | 0 | 225 |
| 2 | 33 | 87 | 0 | 0 | 245 |
| 3 | 36 | 95 | 0 | 0 | 267 |
| 4 | 39 | 104 | 0 | 0 | 291 |
| 5 | 42 | 113 | 0 | 0 | 318 |
| 6 | 46 | 123 | 0 | 0 | 346 |
| 7 | 50 | 134 | 0 | 0 | 377 |
| 8 | 55 | 146 | 0 | 0 | 411 |
| 9 | 60 | 159 | 0 | 0 | 448 |
| 10 | 65 | 174 | 0 | 0 | 489 |

**Step 2:Volume Capacity Ratio (VCR)**

| Year | PCU/Day | Peak Traffic Flow (PCU/Hour) | VCR |
|---|---|---|---|
| 1 | 273 | 27 | 0.045 |
| 2 | 297 | 30 | 0.050 |
| 3 | 324 | 32 | 0.054 |
| 4 | 353 | 35 | 0.059 |
| 5 | 385 | 38 | 0.064 |
| 6 | 419 | 42 | 0.070 |
| 7 | 457 | 46 | 0.076 |
| 8 | 498 | 50 | 0.083 |
| 9 | 543 | 54 | 0.090 |
| 10 | 592 | 59 | 0.099 |

**Step 3: 'Distance' Related Congestion Factor (Corrected by Multiplying with 0.8)**

| Year | Congestion Factor (Corrected) | | | | |
|---|---|---|---|---|---|
| | CAR | LCV | Bus | Truck | TW |
| 1 | 0.76 | 0.83 | 0.84 | 0.97 | 0.82 |
| 2 | 0.77 | 0.84 | 0.84 | 0.97 | 0.82 |
| 3 | 0.77 | 0.84 | 0.84 | 0.98 | 0.83 |
| 4 | 0.77 | 0.84 | 0.85 | 0.98 | 0.83 |
| 5 | 0.77 | 0.85 | 0.85 | 0.98 | 0.83 |
| 6 | 0.78 | 0.85 | 0.86 | 0.99 | 0.84 |
| 7 | 0.78 | 0.85 | 0.86 | 0.99 | 0.84 |
| 8 | 0.78 | 0.86 | 0.87 | 0.99 | 0.85 |
| 9 | 0.79 | 0.87 | 0.87 | 1.00 | 0.85 |
| 10 | 0.79 | 0.87 | 0.88 | 1.00 | 0.86 |

**Step 4: 'Time' Related Congestion Factors (Corrected by Multiplying with 0.80)**

| Year | Congestion Facotrs (corrected) | | | | |
|---|---|---|---|---|---|
| | CAR | LCV | Bus | Truck | TW |
| 1 | 0.780 | 0.779 | 0.780 | 0.783 | 0.785 |
| 2 | 0.778 | 0.777 | 0.778 | 0.781 | 0.783 |
| 3 | 0.776 | 0.775 | 0.776 | 0.780 | 0.782 |
| 4 | 0.774 | 0.772 | 0.774 | 0.778 | 0.780 |
| 5 | 0.772 | 0.770 | 0.772 | 0.776 | 0.778 |
| 6 | 0.769 | 0.767 | 0.769 | 0.774 | 0.776 |
| 7 | 0.767 | 0.764 | 0.766 | 0.771 | 0.774 |
| 8 | 0.764 | 0.761 | 0.763 | 0.769 | 0.772 |
| 9 | 0.760 | 0.757 | 0.760 | 0.766 | 0.769 |
| 10 | 0.757 | 0.754 | 0.756 | 0.763 | 0.767 |

**Step 5: 'Distance' Related VOC at 2009 Prices**

| Year | VOC (in Rs/Km) | | | | |
|---|---|---|---|---|---|
| | CAR | LCV | Bus | Truck | TW |
| 1 | 3.995 | 7.336 | 11.516 | 10.115 | 1.398 |
| 2 | 4.007 | 7.362 | 11.561 | 10.141 | 1.402 |
| 3 | 4.020 | 7.390 | 11.610 | 10.169 | 1.407 |
| 4 | 4.033 | 7.421 | 11.664 | 10.199 | 1.413 |
| 5 | 4.048 | 7.455 | 11.722 | 10.233 | 1.419 |
| 6 | 4.065 | 7.491 | 11.786 | 10.269 | 1.425 |
| 7 | 4.083 | 7.531 | 11.855 | 10.309 | 1.432 |
| 8 | 4.102 | 7.575 | 11.931 | 10.352 | 1.440 |
| 9 | 4.123 | 7.622 | 12.013 | 10.399 | 1.449 |
| 10 | 4.147 | 7.674 | 12.103 | 10.451 | 1.458 |

**Step 6: 'Distance' Related VOC at 2014-15 Prices**

| Year | VOC (in Rs/Km) | | | | |
|---|---|---|---|---|---|
| | CAR | LCV | Bus | Truck | TW |
| 1 | 5.458 | 10.022 | 15.733 | 13.818 | 1.909 |
| 2 | 5.474 | 10.057 | 15.794 | 13.853 | 1.916 |
| 3 | 5.491 | 10.096 | 15.861 | 13.892 | 1.923 |
| 4 | 5.510 | 10.138 | 15.934 | 13.933 | 1.930 |
| 5 | 5.531 | 10.184 | 16.014 | 13.979 | 1.938 |
| 6 | 5.553 | 10.234 | 16.101 | 14.029 | 1.947 |
| 7 | 5.577 | 10.288 | 16.195 | 14.083 | 1.957 |
| 8 | 5.604 | 10.348 | 16.299 | 14.142 | 1.967 |
| 9 | 5.633 | 10.413 | 16.411 | 14.207 | 1.979 |
| 10 | 5.665 | 10.483 | 16.534 | 14.277 | 1.991 |

**Step 7: 'Time' Related VOC at 2009 Prices**

| Year | VOC (in Rs/Km) | | | | |
|---|---|---|---|---|---|
| | CAR | LCV | Bus | Truck | TW |
| 1 | 4.080 | 6.859 | 10.739 | 8.158 | 1.334 |
| 2 | 4.071 | 6.842 | 10.714 | 8.142 | 1.332 |
| 3 | 4.061 | 6.824 | 10.687 | 8.125 | 1.329 |
| 4 | 4.050 | 6.804 | 10.657 | 8.106 | 1.326 |
| 5 | 4.038 | 6.782 | 10.625 | 8.085 | 1.323 |
| 6 | 4.024 | 6.758 | 10.589 | 8.063 | 1.320 |
| 7 | 4.010 | 6.732 | 10.551 | 8.038 | 1.316 |
| 8 | 3.994 | 6.703 | 10.509 | 8.011 | 1.312 |
| 9 | 3.977 | 6.672 | 10.463 | 7.982 | 1.308 |
| 10 | 3.959 | 6.638 | 10.414 | 7.950 | 1.303 |

**Step 8: 'Time' Related VOC at 2014-15 Prices**

| Year | VOC (in Rs/Km) | | | | |
|---|---|---|---|---|---|
| | CAR | LCV | Bus | Truck | TW |
| 1 | 5.574 | 9.371 | 14.670 | 11.145 | 1.822 |
| 2 | 5.561 | 9.348 | 14.636 | 11.123 | 1.819 |
| 3 | 5.547 | 9.322 | 14.599 | 11.099 | 1.816 |
| 4 | 5.532 | 9.295 | 14.559 | 11.074 | 1.812 |
| 5 | 5.516 | 9.265 | 14.514 | 11.045 | 1.808 |
| 6 | 5.498 | 9.232 | 14.466 | 11.014 | 1.803 |
| 7 | 5.478 | 9.196 | 14.414 | 10.981 | 1.798 |
| 8 | 5.457 | 9.157 | 14.357 | 10.944 | 1.793 |
| 9 | 5.433 | 9.115 | 14.294 | 10.904 | 1.787 |
| 10 | 5.408 | 9.069 | 14.226 | 10.861 | 1.781 |

**Step 9: 'Distance' and 'Time' Related VOC at 2014-15 Prices**

| Year | VOC (in Rs/Km) | | | | |
|---|---|---|---|---|---|
| | CAR | LCV | Bus | Truck | TW |
| 1 | 11.032 | 19.393 | 30.403 | 24.963 | 3.732 |
| 2 | 11.035 | 19.405 | 30.430 | 24.976 | 3.735 |
| 3 | 11.039 | 19.418 | 30.460 | 24.991 | 3.738 |
| 4 | 11.042 | 19.433 | 30.493 | 25.007 | 3.742 |
| 5 | 11.046 | 19.449 | 30.528 | 25.024 | 3.746 |
| 6 | 11.051 | 19.466 | 30.567 | 25.043 | 3.750 |
| 7 | 11.056 | 19.485 | 30.609 | 25.064 | 3.755 |
| 8 | 11.061 | 19.505 | 30.655 | 25.086 | 3.760 |
| 9 | 11.067 | 19.528 | 30.705 | 25.111 | 3.766 |
| 10 | 11.073 | 19.552 | 30.760 | 25.137 | 3.772 |

**Step 10: Total VOC (in Rs) of Number of Vehicles on Improved Road at 2014-15 Prices**

| Year | VOC (in Rs/Km) | | | | | |
|---|---|---|---|---|---|---|
| | CAR | LCV | Bus | Truck | TW | Total |
| 1 | 374483 | 1755432 | 0 | 0 | 950045 | 3079960 |
| 2 | 408302 | 1914628 | 0 | 0 | 1036410 | 3359340 |
| 3 | 445187 | 2088378 | 0 | 0 | 1130708 | 3664273 |
| 4 | 485417 | 2278036 | 0 | 0 | 1233686 | 3997139 |
| 5 | 529299 | 2485083 | 0 | 0 | 1346160 | 4360543 |
| 6 | 577166 | 2711146 | 0 | 0 | 1469029 | 4757341 |
| 7 | 629385 | 2958006 | 0 | 0 | 1603277 | 5190669 |
| 8 | 686356 | 3227622 | 0 | 0 | 1749991 | 5663969 |
| 9 | 748515 | 3522141 | 0 | 0 | 1910365 | 6181020 |
| 10 | 816340 | 3843926 | 0 | 0 | 2085712 | 6745979 |

**Table 6.43: Savings in Vehicle Operating Costs (Rs)**

**Road from Ingalagi Jeeragal in Mudhol taluk**

| Year | VOC without Project | VOC with Project | Savings in VOC |
|---|---|---|---|
| 1 | 2692322 | 1383203 | 1309118 |
| 2 | 2935212 | 1508224 | 1426989 |
| 3 | 3200073 | 1644596 | 1555477 |
| 4 | 3488900 | 1793360 | 1695540 |
| 5 | 3803877 | 1955655 | 1848222 |
| 6 | 4147384 | 2132724 | 2014661 |
| 7 | 4522026 | 2325928 | 2196098 |
| 8 | 4930644 | 2536758 | 2393886 |
| 9 | 5376346 | 2766844 | 2609502 |
| 10 | 5862526 | 3017972 | 2844554 |

**Narenoor-Fakirbudhihal-Kainkatti road in Badami Taluk**

| Year | VOC without Project | VOC with Project | Savings in VOC |
|---|---|---|---|
| 1 | 7222660 | 4006062 | 3216598 |
| 2 | 7874251 | 4368478 | 3505774 |
| 3 | 8584777 | 4763862 | 3820915 |
| 4 | 9359598 | 5195249 | 4164348 |
| 5 | 10204564 | 5665958 | 4538606 |
| 6 | 11126066 | 6179620 | 4946446 |
| 7 | 12131085 | 6740212 | 5390873 |
| 8 | 13227247 | 7352091 | 5875156 |
| 9 | 14422885 | 8020028 | 6402857 |
| 10 | 15727105 | 8749254 | 6977851 |

**Road from Naranja Sugar Factory to Hippalgaon in Bidar Taluk**

| Year | VOC without Project | VOC with Project | Savings in VOC |
|---|---|---|---|
| 1 | 1884414 | 1031835 | 852579 |
| 2 | 2054577 | 1125127 | 929450 |
| 3 | 2240163 | 1226897 | 1013265 |
| 4 | 2442577 | 1337922 | 1104655 |
| 5 | 2663359 | 1459052 | 1204307 |
| 6 | 2904190 | 1591219 | 1312971 |
| 7 | 3166908 | 1735441 | 1431467 |
| 8 | 3453523 | 1892834 | 1560689 |

**Road from Ganeshpurwadi to Ambesangavi in Bhalki Tuluk**

| Year | VOC without Project | VOC with Project | Savings in VOC |
|---|---|---|---|
| 1 | 3543106 | 1875365 | 1667741 |
| 2 | 3863117 | 2044951 | 1818166 |
| 3 | 4212142 | 2229951 | 1982190 |
| 4 | 4592832 | 2431781 | 2161051 |
| 5 | 5008085 | 2651989 | 2356096 |
| 6 | 5461067 | 2892269 | 2568798 |
| 7 | 5955242 | 3154476 | 2800766 |
| 8 | 6494397 | 3440638 | 3053758 |
| 9 | 7082674 | 3752981 | 3329693 |
| 10 | 7724608 | 4093940 | 3630668 |

**Rattanahalli-K.Naganahalli Road via Gungral Chatra in Mysore Taluk**

| Year | VOC without Project | VOC with Project | Savings in VOC |
|---|---|---|---|
| 1 | 3307021 | 1208075 | 2098946 |
| 2 | 3605329 | 1317308 | 2288020 |
| 3 | 3930611 | 1436468 | 2494143 |
| 4 | 4285321 | 1566466 | 2718855 |
| 5 | 4672133 | 1708297 | 2963836 |
| 6 | 5093972 | 1863054 | 3230919 |
| 7 | 5554030 | 2031928 | 3522102 |
| 8 | 6055795 | 2216227 | 3839568 |
| 9 | 6603075 | 2417381 | 4185695 |
| 10 | 7200036 | 2636957 | 4563079 |

**Road from M.M.road to Ramenahalli in H.D.Kote Taluk**

| Year | VOC without Project | VOC with Project | Savings in VOC |
|---|---|---|---|
| 1 | 2667844 | 1289559 | 1378285 |
| 2 | 2908234 | 1405892 | 1502341 |
| 3 | 3170311 | 1532747 | 1637564 |
| 4 | 3456040 | 1671081 | 1784959 |
| 5 | 3767559 | 1821936 | 1945622 |
| 6 | 4107204 | 1986455 | 2120748 |
| 7 | 4477523 | 2165883 | 2311640 |
| 8 | 4881298 | 2361582 | 2519716 |
| 9 | 5321562 | 2575038 | 2746524 |
| 10 | 5801628 | 2807876 | 2993751 |

**Road from BGH Road to join C.N. Halli Taluk in Tiptur Taluk**

| Year | VOC without Project | VOC with Project | Savings in VOC |
|---|---|---|---|
| 1 | 11423064 | 5735226 | 5687838 |
| 2 | 12452030 | 6254369 | 6197661 |
| 3 | 13573771 | 6820795 | 6752977 |
| 4 | 14796668 | 7438863 | 7357806 |
| 5 | 16129862 | 8113346 | 8016516 |
| 6 | 17583325 | 8849471 | 8733854 |
| 7 | 19167932 | 9652961 | 9514971 |
| 8 | 20895552 | 10530089 | 10365462 |
| 9 | 22779128 | 11487732 | 11291396 |
| 10 | 24832786 | 12533431 | 12299355 |

**Road from Hebbur Kallur Road to Idagurin Gubbi Taluk**

| Year | VOC without Project | VOC with Project | Savings in VOC |
|---|---|---|---|
| 1 | 6713385 | 3079960 | 3633425 |
| 2 | 7318779 | 3359340 | 3959439 |
| 3 | 7978881 | 3664273 | 4314608 |
| 4 | 8698659 | 3997139 | 4701520 |
| 5 | 9483532 | 4360543 | 5122990 |
| 6 | 10339419 | 4757341 | 5582078 |
| 7 | 11272782 | 5190669 | 6082113 |
| 8 | 12290676 | 5663969 | 6626708 |
| 9 | 13400810 | 6181020 | 7219790 |
| 10 | 14611604 | 6745979 | 7865625 |

# TABLES 6.44 TO 6.51

**Table 6.44: Economic Cost-Benefit Analysis: Road from Ingalagi Jeeragal in Mudhol taluk of Bagalkot Distict**

| Sl. No | Years | Investment (Rs) | Repairs & Maintenance Cost | Total Project Cost (Rs) | Net Incremental Benefits With Project | Net Benefits (Col 6 - Col 5) | Discount Factor (12%) | Present Value of Costs (Col 5 X Col 8) | Present Value Benefits (Col 6 X Col 8) | Present Value of Net Benefits (Col 7 X Col 8) |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
| 1 | 2011-12 | 8836000 | | 8836000 | 1309118 | -7526882 | 1.4049 | 12413944 | 1839217 | -10574727 |
| 2 | 2012-13 | | 427500 | 427500 | 1426989 | 999489 | 1.2544 | 536256 | 1790015 | 1253759 |
| 3 | 2013-14 | | 427500 | 427500 | 1555477 | 1127977 | 1.1200 | 478800 | 1742134 | 1263334 |
| 4 | 2014-15 | | 427500 | 427500 | 1695540 | 1268040 | 1.0000 | 427500 | 1695540 | 1268040 |
| 5 | 2015-16 | | 427500 | 427500 | 1848222 | 1420722 | 0.8869 | 379158 | 1639226 | 1260067 |
| 6 | 2016-17 | | 427500 | 427500 | 2014661 | 1587161 | 0.7866 | 336283 | 1584788 | 1248505 |
| 7 | 2017-18 | | 427500 | 427500 | 2196098 | 1768598 | 0.6977 | 298257 | 1532165 | 1233909 |
| 8 | 2018-19 | | 427500 | 427500 | 2393886 | 1966386 | 0.6188 | 264530 | 1481297 | 1216767 |
| 9 | 2019-20 | | 427500 | 427500 | 2609502 | 2182002 | 0.5488 | 234617 | 1432125 | 1197508 |
| 10 | 2020-21 | | 427500 | 427500 | 2844554 | 2417054 | 0.4868 | 208087 | 1384593 | 1176507 |
| | Total | 8836000 | 3847500 | 12683500 | 19894045 | 7210545 | | 15577432 | 16121099 | 543668 |

Road Length=2.85 Km

| | |
|---|---|
| Net Present Value (NPV) at 12% | 543668 |
| Present Value of Benefits | 16121099 |
| Present Value of Costs | 15577432 |
| Benefit/Cost (B/C) Ratio | 1.03 |
| Internal Rate of Return (IRR) | 1.03% |
| Payback Period | 8 Years |

**Table 6.45: Economic Cost-Benefit Analysis: Narenoor-Fakirbudhihal-Kainkatti road in Badami Taluk of Bagalkot District**

| Sl. No | Years | Investment (Rs) | Repairs & Maintenance Cost | Total Project Cost (Rs) | Net Incremental Benefits With Project | Net Benefits (Col 6 - Col 5) | Discount Factor (12%) | Present Value of Costs (Col 5 X Col 8) | Present Value Benefits (Col 6 X Col 8) | Present Value of Net Benefits (Col 7 X Col 8) |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
| 1 | 2012-13 | 10972000 | | 10972000 | 3216598 | -7755402 | 1.2544 | 13763277 | 4034901 | -9728376 |
| 2 | 2013-14 | | 915000 | 915000 | 3505774 | 2590774 | 1.1200 | 1024800 | 3926467 | 2901667 |
| 3 | 2014-15 | | 915000 | 915000 | 3820915 | 2905915 | 1.0000 | 915000 | 3820915 | 2905915 |
| 4 | 2015-16 | | 915000 | 915000 | 4164348 | 3249348 | 0.8869 | 811532 | 3693446 | 2881913 |
| 5 | 2016-17 | | 915000 | 915000 | 4538606 | 3623606 | 0.7866 | 719764 | 3570194 | 2850429 |
| 6 | 2018-19 | | 915000 | 915000 | 4946446 | 4031446 | 0.6977 | 638374 | 3451018 | 2812645 |
| 7 | 2024-25 | | 915000 | 915000 | 5390873 | 4475873 | 0.6188 | 566187 | 3335783 | 2769596 |
| 8 | 2025-26 | | 915000 | 915000 | 5875156 | 4960156 | 0.5488 | 502163 | 3224354 | 2722192 |
| 9 | 2026-27 | | 915000 | 915000 | 6402857 | 5487857 | 0.4868 | 445378 | 3116605 | 2671227 |
| 10 | 2027-28 | | 915000 | 915000 | 6977851 | 6062851 | 0.4317 | 395015 | 3012412 | 2617396 |
| | Total | 10972000 | 8235000 | 19207000 | 48839425 | 29632425 | | 19781490 | 35186094 | 15404604 |

Road Length=6.1 Km

| | |
|---|---|
| Net Present Value (NPV) at 12% | 15404604 |
| Present Value of Benefits | 35186094 |
| Present Value of Costs | 19781490 |
| Benefit/Cost (B/C) Ratio | 1.78 |
| Internal Rate of Return (IRR) | 25.41% |
| Payback Period | 6 Years |

**Table 6.46: Economic Cost-Benefit Analysis: Road from Naranja Sugar Factory to Hippalgaon in Bidar Taluk of Bidar District**

| Sl. No | Years | Investment (Rs) | Repairs & Maintenance Cost | Total Project Cost (Rs) | Net Incremental Benefits With Project | Net Benefits (Col 6 - Col 5) | Discount Factor (12%) | Present Value of Costs (Col 5 X Col 8) | Present Value Benefits (Col 6 X Col 8) | Present Value of Net Benefits (Col 7 X Col 8) |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
| 1 | 2011-12 | 5000000 | | 5000000 | 852579 | -4147421 | 1.4049 | 7024640 | 1197812 | -5826828 |
| 2 | 2012-13 | | 315000 | 315000 | 929450 | 614450 | 1.2544 | 395136 | 1165902 | 770766 |
| 3 | 2013-14 | | 315000 | 315000 | 1013265 | 698265 | 1.1200 | 352800 | 1134857 | 782057 |
| 4 | 2014-15 | | 315000 | 315000 | 1104655 | 789655 | 1.0000 | 315000 | 1104655 | 789655 |
| 5 | 2015-16 | | 315000 | 315000 | 1204307 | 889307 | 0.8869 | 279380 | 1068124 | 788744 |
| 6 | 2016-17 | | 315000 | 315000 | 1312971 | 997971 | 0.7866 | 247788 | 1032819 | 785032 |
| 7 | 2017-18 | | 315000 | 315000 | 1431467 | 1116467 | 0.6977 | 219768 | 998700 | 778932 |
| 8 | 2018-19 | | 315000 | 315000 | 1560689 | 1245689 | 0.6188 | 194917 | 965728 | 770812 |
| 9 | 2019-20 | | 315000 | 315000 | 1701614 | 1386614 | 0.5488 | 172876 | 933866 | 760990 |
| 10 | 2020-21 | | 315000 | 315000 | 1855311 | 1540311 | 0.4868 | 153327 | 903077 | 749750 |
| | Total | 5000000 | 2835000 | 7835000 | 12966307 | 5131307 | | 9355631 | 10505541 | 1149910 |

Road Length=2.1 Km

| | |
|---|---|
| Net Present Value (NPV) at 12% | 1149910 |
| Present Value of Benefits | 10505541 |
| Present Value of Costs | 9355631 |
| Benefit/Cost (B/C) Ratio | 1.12 |
| Internal Rate of Return (IRR) | 3.78% |
| Payback Period | 8 Years |

**Table 6.47: Economic Cost-Benefit Analysis: Road from Ganeshpurwadi to Ambesangavi in Bhalki Tuluk of Bidar District**

| Sl. No | Years | Investment (Rs) | Repairs & Maintenance Cost | Total Project Cost (Rs) | Net Incremental Benefits With Project | Net Benefits (Col 6 - Col 5) | Discount Factor (12%) | Present Value of Costs (Col 5 X Col 8) | Present Value Benefits (Col 6 X Col 8) | Present Value of Net Benefits (Col 7 X Col 8) |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
| 1 | 2011-12 | 11983000 | | 11983000 | 1667741 | -10315259 | 1.4049 | 15031475 | 2092014 | -12939461 |
| 2 | 2012-13 | | 450000 | 450000 | 1818166 | 1368166 | 1.2544 | 504000 | 2036346 | 1532346 |
| 3 | 2013-14 | | 450000 | 450000 | 1982190 | 1532190 | 1.1200 | 450000 | 1982190 | 1532190 |
| 4 | 2014-15 | | 450000 | 450000 | 2161051 | 1711051 | 1.0000 | 399114 | 1916680 | 1517566 |
| 5 | 2015-16 | | 450000 | 450000 | 2356096 | 1906096 | 0.8869 | 353983 | 1853370 | 1499388 |
| 6 | 2016-17 | | 450000 | 450000 | 2568798 | 2118798 | 0.7866 | 313954 | 1792189 | 1478235 |
| 7 | 2017-18 | | 450000 | 450000 | 2800766 | 2350766 | 0.6977 | 278453 | 1733068 | 1454615 |
| 8 | 2018-19 | | 450000 | 450000 | 3053758 | 2603758 | 0.6188 | 246965 | 1675938 | 1428973 |
| 9 | 2019-20 | | 450000 | 450000 | 3329693 | 2879693 | 0.5488 | 219039 | 1620736 | 1401697 |
| 10 | 2020-21 | | 450000 | 450000 | 3630668 | 3180668 | 0.4868 | 219039 | 1767236 | 1548197 |
| | Total | 11983000 | 4050000 | 16033000 | 25368927 | 9335927 | | 18016021 | 18469767 | 453746 |

Road Length= 3.0 Km

| | |
|---|---|
| Net Present Value (NPV) at 12% | 453746 |
| Present Value of Benefits | 18469767 |
| Present Value of Costs | 18016021 |
| Benefit/Cost (B/C) Ratio | 1.03 |
| Internal Rate of Return (IRR) | 0.70% |
| Payback Period | 8 Years |

**Table 6.48: Economic Cost-Benefit Analysis: Rattanahalli-K.Naganahalli Road via Gungral Chatra in Mysore Taluk of Mysore District**

| Sl. No | Years | Investment (Rs) | Repairs & Maintenance Cost | Total Project Cost (Rs) | Net Incremental Benefits With Project | Net Benefits (Col 6 - Col 5) | Discount Factor (12%) | Present Value of Costs (Col 5 X Col 8) | Present Value Benefits (Col 6 X Col 8) | Present Value of Net Benefits (Col 7 X Col 8) |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
| 1 | 2012-13 | 7500000 | | 7500000 | 2098946 | -5401054 | 1.2544 | 9408000 | 2632918 | -6775082 |
| 2 | 2013-14 | | 450000 | 450000 | 2288020 | 1838020 | 1.1200 | 504000 | 2562583 | 2058583 |
| 3 | 2014-15 | | 450000 | 450000 | 2494143 | 2044143 | 1.0000 | 450000 | 2494143 | 2044143 |
| 4 | 2015-16 | | 450000 | 450000 | 2718855 | 2268855 | 0.8869 | 399114 | 2411408 | 2012294 |
| 5 | 2016-17 | | 450000 | 450000 | 2963836 | 2513836 | 0.7866 | 353983 | 2331436 | 1977453 |
| 6 | 2018-19 | | 450000 | 450000 | 3230919 | 2780919 | 0.6977 | 313954 | 2254135 | 1940181 |
| 7 | 2024-25 | | 450000 | 450000 | 3522102 | 3072102 | 0.6188 | 278453 | 2179418 | 1900966 |
| 8 | 2025-26 | | 450000 | 450000 | 3839568 | 3389568 | 0.5488 | 246965 | 2107199 | 1860234 |
| 9 | 2026-27 | | 450000 | 450000 | 4185695 | 3735695 | 0.4868 | 219039 | 2037396 | 1818358 |
| 10 | 2027-28 | | 450000 | 450000 | 4563079 | 4113079 | 0.4317 | 194270 | 1969929 | 1775660 |
| | Total | 7500000 | 4050000 | 11550000 | 31905163 | 20355163 | | 12367777 | 22980566 | 10612789 |

Road Length=3.0 Km

| | |
|---|---|
| Net Present Value (NPV) at 12% | 10612789 |
| Present Value of Benefits | 22980566 |
| Present Value of Costs | 12367777 |
| Benefit/Cost (B/C) Ratio | 1.86 |
| Internal Rate of Return (IRR) | 25.5% |
| Payback Period | 5 Years |

**Table 6.49: Economic Cost-Benefit Analysis: Road from M.M.road to Ramenahalli in H.D.Kote Taluk of Mysore District**

| Sl. No | Years | Investment | Repairs & Maintaince Cost | Total Project Cost (Rs) | Net Increamental Benefits With Project | Net Benefits (Col 6 - Col 5) | Discount Factor (12%) | Present Value of Costs (Col 5 X Col 8) | Present Value Benefits (Col 6 X Col 8) | Present Value of Net Benefits (Col 7 X Col 8) |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
| 1 | 2012-13 | 7310000 | | 7310000 | 1378285 | -5931715 | 1.2544 | 9169664 | 1728921 | -7440743 |
| 2 | 2013-14 | | 750000 | 750000 | 1502341 | 752341 | 1.1200 | 840000 | 1682622 | 842622 |
| 3 | 2014-15 | | 750000 | 750000 | 1637564 | 887564 | 1.0000 | 750000 | 1637564 | 887564 |
| 4 | 2015-16 | | 750000 | 750000 | 1784959 | 1034959 | 0.8869 | 665190 | 1583117 | 917926 |
| 5 | 2016-17 | | 750000 | 750000 | 1945622 | 1195622 | 0.7866 | 589971 | 1530481 | 940510 |
| 6 | 2017-18 | | 750000 | 750000 | 2120748 | 1370748 | 0.6977 | 523257 | 1479596 | 956339 |
| 7 | 2018-19 | | 750000 | 750000 | 2311640 | 1561640 | 0.6188 | 464088 | 1430404 | 966317 |
| 8 | 2019-20 | | 750000 | 750000 | 2519716 | 1769716 | 0.5488 | 411609 | 1382849 | 971241 |
| 9 | 2020-21 | | 750000 | 750000 | 2746524 | 1996524 | 0.4868 | 365064 | 1336877 | 971813 |
| 10 | 2021-22 | | 750000 | 750000 | 2993751 | 2243751 | 0.4317 | 323783 | 1292434 | 968651 |
| | Total | 7310000 | 6750000 | 14060000 | 20941151 | 6881151 | | 14102626 | 15084865 | 982239 |

Road Length=5.0 Km

| | |
|---|---|
| Net Present Value (NPV) at 12% | 982239 |
| Present Value of Benefits | 15084865 |
| Present Value of Costs | 14102626 |
| Benefit/Cost (B/C) Ratio | 1.07 |
| Internal Rate of Return (IRR) | 2.50% |
| Payback Period | 10 Years |

**Table 6.50: Economic Cost-Benefit Analysis:Road from BGH Road to join C.N. Halli Taluk in Tiptur Taluk of Tumkur District**

| Sl. No | Years | Investment (Rs) | Repairs & Maintenance Cost | Total Project Cost (Rs) | Net Incremental Benefits With Project | Net Benefits (Col 6 - Col 5) | Discount Factor (12%) | Present Value of Costs (Col 5 X Col 8) | Present Value Benefits (Col 6 X Col 8) | Present Value of Net Benefits (Col 7 X Col 8) |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
| 1 | 2011-12 | 11362000 | | 11362000 | 0 | -11362000 | 1.4049 | 15962792 | 0 | -15962792 |
| 2 | 2012-13 | | 960000 | 960000 | 5687838 | 4727838 | 1.2544 | 1204224 | 7134824 | 5930600 |
| 3 | 2013-14 | | 960000 | 960000 | 6197661 | 5237661 | 1.1200 | 1075200 | 6941380 | 5866180 |
| 4 | 2014-15 | | 960000 | 960000 | 6752977 | 5792977 | 1.0000 | 960000 | 6752977 | 5792977 |
| 5 | 2015-16 | | 960000 | 960000 | 7357806 | 6397806 | 0.8869 | 851444 | 6525788 | 5674345 |
| 6 | 2016-17 | | 960000 | 960000 | 8016516 | 7056516 | 0.7866 | 755163 | 6306015 | 5550852 |
| 7 | 2017-18 | | 960000 | 960000 | 8733854 | 7773854 | 0.6977 | 669769 | 6093403 | 5423634 |
| 8 | 2018-19 | | 960000 | 960000 | 9514971 | 8554971 | 0.6188 | 594032 | 5887706 | 5293674 |
| 9 | 2019-20 | | 960000 | 960000 | 10365462 | 9405462 | 0.5488 | 526859 | 5688686 | 5161827 |
| 10 | 2020-21 | | 960000 | 960000 | 11291396 | 10331396 | 0.4868 | 467282 | 5496113 | 5028830 |
| | Total | 11362000 | 8640000 | 20002000 | 73918481 | 53916481 | | 23066765 | 56826892 | 33760128 |

Road Length=6.4 Km

| | |
|---|---|
| Net Present Value (NPV) at 12% | 33760128 |
| Present Value of Benefits | 56826892 |
| Present Value of Costs | 23066765 |
| Benefit/Cost (B/C) Ratio | 2.46 |
| Internal Rate of Return (IRR) | 33.09% |
| Payback Period | 3 Years |

**Table 6.51: Economic Cost-Benefit Analysis: Road from Hebbur Kallur Road to Idagurin Gubbi Taluk of Tumkur District**

| Sl. No | Years | Investment (Rs) | Repairs & Maintenance Cost | Total Project Cost (Rs) | Net Incremental Benefits With Project | Net Benefits (Col 6 - Col 5) | Discount Factor (12%) | Present Value of Costs (Col 5 X Col 8) | Present Value Benefits (Col 6 X Col 8) | Present Value of Net Benefits (Col 7 X Col 8) |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
| 1 | 2011-12 | 7380000 | | 7380000 | 0 | -7380000 | 1.4049 | 10368369 | 0 | -10368369 |
| 2 | 2012-13 | | 465000 | 465000 | 3959439 | 3494439 | 1.2544 | 583296 | 4966720 | 4383424 |
| 3 | 2013-14 | | 465000 | 465000 | 4314608 | 3849608 | 1.1200 | 520800 | 4832361 | 4311561 |
| 4 | 2014-15 | | 465000 | 465000 | 4701520 | 4236520 | 1.0000 | 465000 | 4701520 | 4236520 |
| 5 | 2015-16 | | 465000 | 465000 | 5122990 | 4657990 | 0.8869 | 412418 | 4543684 | 4131266 |
| 6 | 2016-17 | | 465000 | 465000 | 5582078 | 5117078 | 0.7866 | 365782 | 4391018 | 4025236 |
| 7 | 2017-18 | | 465000 | 465000 | 6082113 | 5617113 | 0.6977 | 324419 | 4243346 | 3918927 |
| 8 | 2018-19 | | 465000 | 465000 | 6626708 | 6161708 | 0.6188 | 287734 | 4100497 | 3812762 |
| 9 | 2019-20 | | 465000 | 465000 | 7219790 | 6754790 | 0.5488 | 255197 | 3962305 | 3707107 |
| 10 | | | 465000 | 465000 | 7865625 | 7400625 | 0.4868 | 226340 | 3828611 | 3602271 |
| | Total | 7380000 | 4185000 | 11565000 | 51474870 | 39909870 | | 13809356 | 39570061 | 25760706 |

Road Length=3.1 Km

| | |
|---|---|
| Net Present Value (NPV) at 12% | 25760706 |
| Present Value of Benefits | 39570061 |
| Present Value of Costs | 13809356 |
| Benefit/Cost (B/C) Ratio | 2.87 |
| Internal Rate of Return (IRR) | 38.33% |
| Payback Period | 3 Years |

# CHAPTER 7
# BEST PRACTICES

For the success of any projects the quality assurance assumes significance. In fact one should go by the Total Quality Management (TQM) approach in this regard. Unless and until we build the elements of quality right from the inception of the project we cannot reap the benefits that we expect. In order to do so there is a need to have best practices in place to achieve the desired results. Following are such best practices which have been followed in the road projects in the state of Karnataka.

**Identification of Projects**

Demand for rural road projects usually comes from villagers through the people representatives (MLAs). In almost all the road projects this established and people friendly practice is being followed. However it would be better to route such demands through the Gram Sabhas so that the issue would carry better weight.

**Evaluation of project proposals**

The projects pertaining to eligible sectors under each RIDF tranche are submitted by the implementing agencies through their Finance Department to NABARD's Regional Office (RO). The project proposals are appraised by the Regional Office with the help of Consultants by conducting desk and field appraisal. Appraisal reports submitted by the Regional Offices are then scrutinized by State Projects Department at Head Office before placing the same before Project Sanctioning Committee (PSC) for consideration of sanction. The proposal contains details of costs and benefits which would be the criteria for the selection of the project. This arrangement is healthy in the background of the feasibility of the project.

**Release of funds by NABARD**

Mobilisation advance / Start up advance @ 20% of the RIDF Loan sanctioned under the projects is released to the State Governments on conveying acceptance of the terms & conditions of sanction by the State Government. This would happen before incurring expenditure on the

projects for procurement and supply of materials, etc. Loans are released on reimbursement basis against the actual expenditure incurred in execution of sanctioned projects. RIDF loans are released to the State Government by Regional Offices of NABARD. This arrangement is fit to ensure the built in checks and balances for the effective completion of the projects.

Quality of assets- quality control tests on materials and quality control tests during construction

Maintenance of rural roads

**EFFORTS TO CREATE QUALITY ASSETS**

To ensure the quality of work, the implementing agencies (PWD and PRED) have built their own internal system. They are; in-house quality control at the level of the executing agencies whereas the second tier provides for quality monitoring through independent State Quality Monitors (SQM). Monitoring by independent National Quality Monitors (NQM) constitutes the third tier of this arrangement. The Quality Control on Rural Roads is exercised as through the following established procedures.

- Quality Control Tests on Materials
- Quality Control Tests During Construction
- Stage Passing – quality monitoring at different stages of the project

All the above stated rules and procedures have been religiously followed in the road projects in Karnataka state.

# CHAPTER 8
# SUCCESS STORIES OF INDIVIDUAL BENEFICIARIES

Nothing Succeeds like Success so goes the saying. The Road projects in Karnataka supported by RIDF have produced many success stories though direct and indirect benefits to the poor people for whom such initiatives are meant. Economic gains, ease of reaching different locations, reaching to health facilities in times of distress, attending the schools on time, selling the produce in local markets and the like are the gains which have flown from such initiatives. The study team tried to sketch such impressions from the beneficiaries themselves. Following are some of the glimpses from such exercise.

## 1.Bagalkot District- Mudhol Taluk (Milk Business)

Mallappa a 60 year old belongs to Schedule Caste category and hails from Ingalagi village. He has 6 members in his family and owns 2 acres of land. He started the business of milk collection in the village and sells it in the nearby town. He started this in the year 2012. Initially, he found it very difficult to supply the milk to the areas on the main road of Lokapur-Mudhol Highway which is about 3 kilometer from the village. Milk containers which were carried on bicycle to main road posed many problems and he had to abandon during the bad weather. His earnings were very less. After improvement of road project from Ingalagi to Jeeraga the distance to reach the town has got reduced. He started earnings with supply the milk to Mudhol town and he also purchased a secondhand bike for transportation and now it will take 20 minutes to reach the selling place. Now he owns two cows and two she buffalo and one more young cow. He reports that improvement of road has helped his children to reach the school in time and to get the health facilities and to transport the agricultural products to market.

## 2. Bidar District- Bidar Taluk (Vehicle owner)

After the improve- ment of the road from Naranja Sugar Factory to Hippalgaon in Bidar taluka, the road has provided better connectivity to district headquarter for Hippalgaon village. Shankar Peerappa (28 year old) of Hippalgaon village purchased Tum Tum to transport the people from village to the city by using a loan provided by Co-operative Bank in Bidar. Before

the project, there was no proper road to reach Bidar and most of the villagers had to take round to Chombol village to reach Naranja Sugar Factory. By improvement to the road many of the villagers are travelling to nearby sugar factory and to Bidar city in search of work. After the purchase of vehicle Shanker made some alternatives to the vehicle to accomodate extra seats. Now, Tum Tums are the main transport vehicles for common people who don't or can't travel in government buses which are operating twice a day. At a time, 10 people can accommodate inside this small vehicle. Shankar earns Rs.300-Rs.400 per trip and earns around Rs.500 to Rs.750 per day. He sincerely thanks improvement to the road.

### 3.Bidar District- Balki Taluk

Shamanarao a 40 year old farmer stays in Ambesangvi village. He has eight acres of land and practices agriculture. He has five members in his house with two school going children. He has two he-buffalos and one cow. Improvement to the Road from Ambesangvi to Ganeshpurwadi and Bhalki has established his access to the taluk headquarters. Before the improvement he had to move around for about 10-15 kilometers via Ambe-sangvi cross to reach Bhalki town but now it is just four to five kilometers from the town. Prior improvement there were many hardships faced by the villagers like accidents on the bad road, difficulty in reaching schools and health facilities in time and the like. Improved road can get Ambulance to the village and has been very useful to the community. Pregnant women and old people have been benefitted most. Even the supply of agricultural produce had been very easy and timely now.

### 4. Bagalkot District- Badami Taluk

Parasappa Gadegappa Kargar is a 40 years old farmer having ten acres of land and he cultivates Bajra and vegetables for his livelihood. Along with Bajra he cultivates vegetables in his 10 acres of land. After fulfilling subsistence needs to his family, surplus produce will be sold at a market place which is 15 kilometers from his village. After the improvement of road he has got good access to market through better transport services to a town or rural center. Prior to the improvement to the road he was facing losses on account of difficulty of reaching the markets well in time. Now the net earnings have increased with very little cost in the transportation of goods. This only means that the upkeep of efficient rural transportation networks is important

for agricultural marketing, particularly in the case of seasonal and perishable products such as fruit and vegetables.

### 5.Tumkur District- Gubbi Taluk (Labour employment)

Peddegouda a 58 years old farmer lives in Naranahalli village of Gubbi Taluk, with six of his members having 2 acres of agricultural land for cultivation. He comes under below poverty line and stays in Kachha house. He earns Rs.35000 from agriculture on an average. On account of this he along with two sons work as agricultural labor. Before the construction of road, the wages were very low in the village and it was in the range of Rs. 100 to Rs. 120 per day. The improvement of road has gave them an opportunity to work under MGNAREGA works, from Idagur Gram Panchayat in the year 2013-14. The road which connects Narnahalli to Idagur has opened many employment opportunities to the villagers of Naranahalli. The road connects to many villages namely Ankalakoppe, Adakekere,Abbanakoppe, Idagur, Beeramaranahalli, Borappanahalli and Mattikeri. There is no public market in the village and the market center in Idagur village which is the nearest one. Since the Health Sub-Center in the village has inadequate medicine supplies, villagers go to the adjoining village for their needs. By the improvement to road the area comes under a mobile shopping facility and different types of vendors visit once a week and sell daily food necessities and plastic consumables to the villagers. Better road has helped the visit of health personnel and teachers as well.

### 6.Mysore District- Mysore Taluk (Increased in Labour Payment)

Chikkajavarayya 50 year old agricultural labour lives in K Naganalli village of Mysore taluka of Mysore district. He has 2.20 acres of agriculture land the family members work as agricultural labors. After the improvement of the road, Chikkajavarayya and his son visit Mysore city to work as construction workers. Every day both of them earn Rs.300 and they are also getting employment throughout the year. Earlier they had to walk four kilometers to get a bus to Mysore city. As Chikkajavarayya mentions, though the bus/ private vehicle's fare for a single journey is Rs.20, at least he can manage to get some food for his family every day. He returns before the sunset with vegetables, groceries, oil and other commodities for his house and they enjoy leisure hours together with their children.

## 7. Tumkur District- Tiptur Taluk (Improvement in Business)

Sale of coconut is a major activity in the village of H. Muddenahalli in Tipatur taluk of Tumkur district. Yatiraj a 39 years old farmer reports that improvement of road has benefited the coconut business. Prior to the improvement of the road he found it difficult to sell coconuts and other agricultural goods in bigger markets like Tiptur. He was forced to sell his produce at local market at a lower price. With road improvement the transport time to the town got reduced and he is also able to get a fair price for his produce.

## 8.MYSORE DISTRICT- H D KOTE TALUK (Education and Basic Facilities)

Puttamma, a 60 year old lady, lives at Seerana Hundi village of Nuralakuppe Gram Panchayat in H D Kote taluk. Seerana Hundi is a very small village consisting of about 400 persons. Most of the population belong to Schedule Caste community. There are 9 members in Puttamma's family. Puttamma said that improvement of road has helped her family in many ways. Before improvement to the road there was no proper connectivity to the village from the main road. Children had to travel by walk about 4 kms to reach high school. Thus, it was difficult for children to attend the school regularly. Now Puttamma's four grand children are going to high school regularly. She further said the road has helped her to sell the vegetables in nearby villages. The road has also helped Puttamma's son, who is employed in a private industry in H D Kote, to travel daily from Seerana Hundi village. Small busses, mini taxies and auto started travelling on the roads for carrying agricultural products to APMC yard or market. The road has also helping the family to get timely medical facility.

Above fact based information do reflect on the success and positive externalities of RIDF supported road projects in Karnataka. People at large have expressed their happiness and have enjoyed the benefits which have accrued to their families. Such initiatives would go along way in strengthening the rural economies in the long run.

# CHAPTER 9
# POLICY INTERVENTIONS

Infrastructure plays a crucial but indirect role in the development process through its contribution to increasing productivity of factors. It primary role is to promote growth. As growth has an indirect impact on poverty reduction, infrastructure also helps to alleviate poverty. Several empirical studies have brought out clearly the impact of rural infrastructure on rural growth and reduction in poverty. Investments in rural infrastructure are instrumental in enabling farmers to adopt new technologies in agriculture and promote the growth of the economy. This in turn will increase the productivity and income of the poor, small and marginal farmers. This will have a bearing on provision of more employment opportunities to the landless labor in agriculture and allied non-farm activities. Thus, investments in infrastructure on say roads, irrigation projects, power, watersheds and the like play a strategic but indirect role in the development process. Such investments will make significant contribution towards growth by increasing the factor productivity of land, labor and capital in the production process. Theoretically, economists proceed from the premise that the creation of infrastructure by generating external economies leads to widespread benefits.

Lack of such infrastructure would act as a hindrance for the population to reach out to the facilities like health & sanitation, drinking water, education, markets and finally employment and other economic opportunities. In this background the our efforts to eradicate chronic poverty do not yield results. In view of changing face of Development Goals the need to provide elementary infrastructure like roads and water to agriculture in rural areas assumes utmost significance.

It is being increasingly recognized that projects and programmes need to encompass both social and institutional dimensions which demand the participation of all members of society, i.e. all concerned stakeholders.

Community Participation needs to be strengthened especially in maintenance. Digging the roads, removing the boards, allowing the drainage water to flow on the road, etc need to be controlled especially by Gram Panchayats.

Gram Panchayats may also be asked to contribute towards construction of roads like drinking water supply projects, i.e. Jal Nirmal Yojana

People need to co-operate during construction stage of road by allowing to construct proper drainage. During the maintenance

More number of projects needs to be sanctioned to less developed areas to achieve the balanced and inclusive development.

Attention to improve irrigation, input usage, credit facility, construction of godowns etc along with improvement of road,. This will improve the overall socio-economic condition of people in the road influential area.

Construction /improvement of rural roads is the major policy intervention to reduce poverty and improve the livelihood conditions.

But the study reveals that some of the indicators, such as construction of toilets, use of fuel for cooking, water supply need extra efforts. For this, convergence of activities of concerned departments needs to be made, especially in less developed taluks. This would lead to overall improvement of the standard of living of rural households.

There is pressure to focus on maintenance of roads rather than new coverage owing to bad maintenance and shortage of funds at times.

NABARD can also insist the implementing agencies to use inorganic solid waste in construction of roads. This will help in reducing the cost of construction of road and improve the sanitation condition in rural areas.

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# PREFACE

National Bank for Agriculture and Rural Development (NABARD), Mumbai assigned the task of evaluating irrigation projects financed under Rural Infrastructure Development Fund (RIDF) in Karnataka to Centre for Multidisciplinary Development Research (CMDR). Dharwad which is a national level research institute recognized by the Indian Council of Social Science Research (ICSSR), Government of India.

The study team initiated the process of evaluation, and the present report is based on a comprehensive survey of 400 households from eight selected RIDF irrigation projects spread across different agro-climatic regions and administrative divisions in Karnataka. To isolate the impact of RIDF rural road projects, the study uses difference-in-difference (DD) estimation method and for this, the study selected eight control roads. From each control road, 50 households have been interviewed to get their socio-economic condition. Thus, totally 800 households have been interviewed from selected RIDF road and control road. The study finds that the projects have been implemented taking into consideration all the technical, financial and qualitative aspects. The selected projects have been found economically viable in terms of benefit-cost ratio and four projects showed internal rate of return less than the rate of interest. The payback period of selected projects varies from 3 years to 10 years. The study further reveals that RIDF projects have made a great impact on income and employment, health, education, marketing of agricultural products and improving social interaction of rural households.

It is my proud privilege to acknowledge the guidance and help received from various quarters in carrying out this research study. At the outset, I am indebted to National Bank for Agriculture and Rural Development (NABARD), Mumbai, for assigning this project. I am also indebted to all the NABARD Regional office Bengaluru and NABARD officers of Karnataka state for their constant co-operation and suggestions for the effective dompletion study. I am thankful to all the District officers of NABARD and officers of Minor Irrigation Department for providing the necessary data and information. I am also thankful to all the investigators, selected households, village elders, local officers for their excellent cooperation.

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November 2015

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# Executive Summary

## Impact evaluation study of RIDF Rural Road Projects in Karnataka State

- NABARD under RIDF has been playing major role in financing rural road projects in Karnataka. For rural roads, NABARD has sanctioned a total of Rs.398526.94 lakhs for 8770 rural road projects i.e. 27.66 per cent of total number of projects. The share of RIDF loan for rural road projects is significant though it varies from year to year. On an average 55.49 per cent of the loan has been sanctioned to rural road projects. This implies that the State Government had given due importance to road projects.
- **Selection of Projects:** The rural road projects which represent average project cost and average road size have been selected for the study. However, the final selection of the project will be done in consultation with NABARD Regional Office.

**Table 1: Sample RIDF Rural Road Projects for Study**

| Administrative Division | District | Taluk | Selected RIDF Road |
|---|---|---|---|
| Belgaum | Bagalkote | Mudhol (Developed) | Improvement to Road from Ingalagi Jeeragal km 0.00 to 2.85 (RIDF Code: R8063 Trench: XV) |
| | | Badami (Most Backward) | Improvements from Narenoor-Fakirbudhihal-Kainkatti road from Km.0.00 to 13.00 in selected reaches (RIDF Code: R17285 Trench:17) |
| Gulbarga | Bidar | Bidar (Developed) | Improvements to road from Naranja Sugar Factory to Hippalgaon (RIDF Code: R16474 Trench:16) |
| | | Bhalki (Most Backward) | Improvements to Road from Ganeshpurwadi to Ambesangavi Village from 0.00 to 3.00 in Bhalki Tuluk (RIDF Code: R16633 Trench:16) |
| Mysore | Mysore | Mysore (Developed) | Improvements to Rattanahalli-K.Naganahalli road via Gungral Chatra (RIDF Code: R17063 Trench:17) |
| | | H D Kote (Most Backward) | Improvements to road from M.M.road to Ramenahalli - Nerale Hosur road via Anagatti (0.00 to 5.00 km) (RIDF Code: R152701614 Trench: 15) |
| Bangalore | Tumkur | Tiptur (Developed) | Improvements to road from BGH Road to join C.N. Halli Taluk border via Muddanahalli, Halkurike, Doddikatte Road in Tiptur Taluk (RIDF Code: R7312 Trench:14) |
| | | Gubbi (Most Backward) | Impts.to road from Hebbur kallur Road to Idagur Via, Manikuppe, Cheeranahally, Naranahally from Km 6.50 to 9.60 Km in Gubbi taluk (II Phase) (RIDF Code: R8168 Trench:15) |

- Data Collection: Following data collection methods/tools have been used to collect the primary data. They are;
    - Traffic Survey
    - Village Schedule
    - FGD with GP members, Village leaders, NGOs, SHGs, etc
    - Households
    - Case Study
    - Schedule for Bank Managers
    - Project Officers

## Extricating Project Impact

- To isolate the impact of RIDF irrigation projects, the study uses difference-in-difference (DD) estimation method.

- For estimating the costs and benefits, 2014-15 has been considered as the reference year and the study assumes 20 years life time for the project.

## Physical Progress of the Projects

Table below shows physical progress of the selected projects in Karnataka. It shows that all of the projects to sometime to initiate the work after obtaining the administrative approval. But all the projects, except two, have completed the work within the stipulated time. The projects, 'road from BGH Road to join C.N. Halli Taluk' and 'road from Hebbur kallur Road to Idagur' took more time i.e. 2 years & 5 months and 4 months respectively. This is mainly on account of tendering agency. The length of the road varies from 2.85 Km to 6.4 Km across the selected roads.

**Table 2:Physical Progress of Selected Road Projects**

| Name of the Project | Date of Administrative Approval | Date of Initiation of Work | Date of Completion of Work | Time Taken to Complete the Work | Potential (in Kms) |
|---|---|---|---|---|---|
| Improvement to Road from Ingalagi Jeeragal km 0.00 to 2.85 (RIDF Code: R8063 Trench: XV) | 19/03/2010 | 21/12/2011 | 5/6/2012 | 6 Months | 2.85 |
| Improvements from Narenoor-Fakirbudhihal-Kainkatti road (RIDF Code: R17285 Trench: XVII) | 29/12/2011 | 4/7/2012 | 25/12/2012 | 5 Months | 6.1 |
| Improvements to road from Naranja Sugar Factory to Hippalgaon (RIDF Code: R16474 Trench: XVI) | 11/11/2010 | 5/5/2011 | 10/11/2011 | 6 Months | 2.1 |
| Improvements to Road from Ganeshpurwadi to Ambesangavi Village from 0.00 to 3.00 in Bhalki Tuluk (RIDF Code: R16633 Trench: XVI) | 23/6/2010 | 22/05/2011 | 29/12/2011 | 6 Months | 3.0 |
| Improvements to Rattanahalli-K.Naganahalli road via Gungral Chatra (RIDF Code: R17063 Trench: XVII) | 12/7/2011 | 22/04/2012 | 16/10/2012 | 6 Months | 3.0 |
| Improvements to road from M.M.road to Ramenahalli - Nerale Hosur road via Anagatti (0.00 to 5.00 km) (RIDF Code: R152701614 Trench: XV) | 6/1/2010 | 16/05/2012 | 15/10/2012 | 5 Months | 5.0 |
| Improvements to road from BGH Road to join C.N. Halli Taluk border via Muddanahalli, Halkurike, Doddikatte Road in Tiptur Taluk (RIDF Code: R7312 Trench: XIV) | 1/28/2009 | 30/11/2009 | 5/5/2012 | 2 years and 5 Months | 6.4 |
| Impts.to road from Hebbur kallur Road to Idagur Via, Manikuppe, Cheeranahally, Naranahally from Km 6.50 to 9.60 Km in Gubbi taluk (II Phase) (RIDF Code: R8168 Trench: XV) | 10/30/2009 | 24/12/2010 | 31/12/2011 | 1 Year | 3.1 |

Display Board: The projects financed under RIDF should have a board on the project site depicting physical and financial details of the project such as implemented by (department, project name, location, RIDF tranche, project code, project cost, NABARD loan, date of commencement, scheduled date of completion, the contractor) preferably in local language at suitable places of the project. It is found that out of the 9 projects, 6 project sites have project sign boards. We found some indications of existence of boards some time back. People in the project are reported that some miscreant had stolen the board.

## Financial Progress of the Projects

Table below shows financial progress of selected projects. It is observed that all the projects have been completed within the estimated costs. The actual cost of projects was less than estimated projects in 6 projects i.e. savings. For all the projects, the entire sanctioned NABARD loan has been released and savings have accrued to state government. Savings have

accrued mainly due to tender premiums and in project 'road from BGH Road to join C.N. Halli Taluk' savings are mainly due to non execution of some works (like drainage facility) and tender premiums.

**Table 3: Financial Progress of the Selected Projects (Rs. Lakhs)**

| Name of the Project | Estimated Cost | RIDF Loan | RIDF Loan Released | Govt. Contribution | Actual Project Expenditure |
|---|---|---|---|---|---|
| Improvement to Road from Ingalagi Jeeragal km 0.00 to 2.85 (RIDF Code: R8063 Trench: XV) | 90.00 | 72.00 | 72.00 | 18.00 | 88.36 |
| Improvements from Narenoor-Fakirbudhihal-Kainkatti road from Km.0.00 to 13.00 in selected reaches (RIDF Code: R17285 Trench:17) | 110.00 | 88.00 | 88.00 | 22.00 | 109.72 |
| Improvements to road from Naranja Sugar Factory to Hippalgaon (RIDF Code: R16474 Trench:16) | 50.00 | 40.00 | 40.00 | 10.00 | 50.00 |
| Improvements to Road from Ganeshpurwadi to Ambesangavi Village from 0.00 to 3.00 in Bhalki Tuluk (RIDF Code: R16633 Trench:16) | 177.50 | 159.75 | 159.75 | 17.75 | 119.83 |
| Improvements to Rattanahalli-K.Naganahalli road via Gungral Chatra (RIDF Code: R17063 Trench:17) | 75.00 | 60.00 | 60.00 | 15.00 | 75.00 |
| Improvements to road from M.M.road to Ramenahalli - Nerale Hosur road via Anagatti (0.00 to 5.00 km) (RIDF Code: R152701614 Trench: 15) | 73.33 | 67.50 | 67.50 | 7.50 | 73.10 |
| Improvements to road from BGH Road to join C.N. Halli Taluk border via Muddanahalli, Halkurike, Doddikatte Road in Tiptur Taluk (RIDF Code: R7312 Trench:14) | 143.00 | 114.40 | 114.40 | 28.60 | 113.62 |
| Impts.to road from Hebbur kallur Road to Idagur Via, Manikuppe, Cheeranahally, Naranahally from Km 6.50 to 9.60 Km in Gubbi taluk (II Phase) (RIDF Code: R8168 Trench:15) | 80.00 | 64.00 | 64.00 | 16.00 | 73.80 |

## Economic analysis of selected rural road projects

The economic viability of selected projects has been calculated using savings in vehicle operating costs (VOC). The economic evaluation of the selected rural road projects is based on the methodology suggested in the Manual on Economic Evaluation of Highway Projects in India (second revised special publication-30), brought out by the Indian Road Congress (2009).

Thedetailed procedure for estimating the cost of operation of vehicles (VOC) has been presented in the report. The results economic analysis has been presented below.

**Table 4: Economic Viability of Selected RIDF Rural Road Projects in Karnataka**

| Taluk | Name of the Project | Benefit/Cost (B/C) Ratio | Internal Rate of Return (IRR) % | Payback Period (Years) |
|---|---|---|---|---|
| Mudhol | Improvement to Road from Ingalagi Jeeragal | 1.03 | 1.03 | 8 Years |
| Badami | Improvements from Narenoor-Fakirbudhihal-Kainkatti road | 1.78 | 25.41 | 6 Years |
| Bidar | Improvements to road from Naranja Sugar Factory to Hippalgaon | 1.12 | 3.78 | 8 Years |
| Bhalki | Improvements to Road from Ganeshpurwadi to Ambesangavi Village | 1.32 | 0.70 | 8 Years |
| Mysore | Improvements to Rattanahalli-K.Naganahalli road via Gungral Chatra | 1.86 | 25.46 | 5 Years |
| H D Kote | Improvements to road from M.M.road to Ramenahalli - Nerale Hosur road via Anagatti | 1.07 | 2.50 | 10 Years |
| Tiptur | Improvements to road from BGH Road to join C.N. Halli Taluk border via Muddanahalli, Halkurike, Doddikatte Road | 2.46 | 33.09 | 3 Years |
| Gubbi | Impts.to road from Hebbur kallur Road to Idagur Via, Manikuppe, Cheeranahally, Naranahally | 2.87 | 38.33 | 3 Years |

**The calculations are based on following assumptions**

- Economic life of the project: 10 years
- The rate of growth of traffic is 9.0 per cent per annum.
- Rate of discount is taken as 12%, as suggested by Planning Commission for road projects.
- Vehicle Operating Costs from Road User Cost Study (IRC 2009) are adopted
- The costs are exclusive of taxes.
- Time costs and accident costs of passengers are neglected
- The roughness of the road (single line): Before Project 15000 mm/km, After Project 2000 mm/km.

## Impact on Employment and Income of Households

The study reveals that on an average, 32.3 per cent of the households are able to increase their income in the sample villages. Proportion of households reporting increase in their income is varied across the sample projects and it varies from 18 per cent to 62 per cent. On an average the household income has increased from Rs. 5675 to Rs. 8640 i.e. 52 per cent increase from previous income level. The percentage change in income varies from 35 per cent in 'BGH Road to join C.N. Halli Taluk' to 79 per cent in 'Road from Naranja Sugar Factory to Hippalgaon'. This shows that RIDF rural roads have helped the rural households to increase their income significantly. Following type of employment opportunities are gained by the beneficiaries after road improvement.

- Employment in Petty business has been reported from Road from 5 project areas (namely, Ingalagi Jeeragal, Narenoor-Fakirbudhihal-Kainkatti road, Road from Naranja Sugar Factory to Hippalgaon, Road from Ganeshpurwadi to Ambesangavi and Road from Rattanahalli-K.Naganahalli).

- Employment in profession and other rural works like blacksmith, carpenter, tailor and painter has been reported from Road from 6 project areas (namely,Road from Ingalagi Jeeragal, Narenoor-Fakirbudhihal-Kainkatti road, Road from Naranja Sugar Factory to Hippalgaon, Road from Ganeshpurwadi to Ambesangavi, Road from Rattanahalli-K.Naganahalli and Road from M.B.G road to Kattehundi)

## Employment and Income during Construction Stage

Out of the 8 selected projects, households in only 4 project influential areas reported to get employment during the construction/improvement of rural roads. Usually the construction/improvement of roads are given to contractor who employs his own laborers. Only in some cases the contractors take villagers for work. Therefore, in our sample projects, only 3 percent of the households have reported to get employment during the construction/improvement of road and they earned Rs.7792.

## Impact of Rural Road on Education

- Use of the specified road by the school going children for education purpose increased from 20.8 per cent to 56.0 per cent.

- On an average, 12.5 per cent of households reported distance to school has reduced and 31.0 per cent reported reduced time.

- Proportion of students travelling by bus and auto has increased from 5.9 per cent to 32.1 and 1.4 per cent to 1.8 per cent. At the same time students travelling by tempo and bike have reduced. On the whole improvement of road has facilitated better and safe mode of travel.

- Due to improvement of roads 47 per cent households felt reduced absenteeism. Average days of absent from school have reduced from 7.8 days to 2.3 days in a year.

- The households reporting teachers remaining absent for many days during the year has reduced from 64.1 per cent to 4.0 per cent. This shows that teachers' absenteeism has reduced with the improvement of roads in Karnataka.

- Timely availability of school materials like notebooks, pens, pencils, etc are very important in learning process. Before the project only 4.1 per cent of households reported timely availability school articles but this has increased to 89.5 per cent after the project. Thus, improvement of roads has improved the availability of school articles in the village at right time.

## Impact of Rural Road on Health

- Around 95 per cent of the households in the selected project areas depend on the same road for getting health care facilities.

- Total number of visits of households to the health centres has increased after improvement of roads from 8 visits to 12 visits. This reveals that rural people were not

able to travel by bad road during the illness and after the improvement of roads people are able to safely travel to nearby towns to get health facilities.

- Most of the households used to walk to hospital in the absence of better road and only about 12 per cent travelled by tractor, bike, bicycle and auto. After improvement of roads, proportion of households used to walk has reduced drastically i.e. 35.8 percent to 12.2 per cent. Now rural households are using mainly bus, tempo and auto to visit health centres.

- With the improvement of road, proportion of households feeling difficulty in reaching nearby hospital has reduced from 74.5 per cent to 12.7 per cent.

- Improvements of the roads have resulted in more number of visits of health staff to the village. On an average 80.3 per cent of households feel that visits of health providers have increased.

- Proportion of households reporting 'more absent' has reduced from 67.5 per cent to 13.0 per cent after improvement of roads. This shows that absenteeism of health personnel has reduced significantly after improvement of roads.

## Impact of Rural Road on Marketing of Household Items

- The proportion of households using the road marketing of household items after the improvement of road has increased from 53 per cent to 95.5 per cent.

- RIDF roads have helped to reduce the distance for 36.5 per cent of households.

- On an average time required to reach the market has reduced from 40.4 minutes to 28.8 minutes.

- Number of visits of households to market has increased from 4.1 visits to 6.8 during a month.

- The total value of products purchased from the market, using the road, has also increased from Rs1542 to Rs.2332 during a month.

## Impact of Rural Road on Marketing of Agricultural Products

- Proportion of households using road for agricultural marketing increased from 38.5 per cent to 78.5 per cent.

- On an average, 76.6 per cent of the households have increased their selling in agricultural market due to improvement of roads.

- On an average 80.1 per cent of households increased their visit to market and the actual number increased from 10.0 to 14.5 during a year.

## Impact of Rural Road on Agricultural Activities in Village

- Majority of household feel that after improvement of road, visits of extension workers have increased.

- Improvements of rural roads provide for better flow of inputs and outputs from the farms and it gives an opportunity to the farmers to adopt a more beneficial cropping pattern

- About 56.5 per cent of household changed their cropping pattern to get the benefit of better accessibility of roads.

- Wages of agricultural labours increased from Rs.157 to Rs. 246 per day.

## Social Interaction

- Number of visits of households to nearby cities or towns for social purpose like marriages, attending funerals and Jatras has increased from 4 to 6 after improvement of roads.

- Female members' visits have increased from 1.9 to 2.9 (i.e. 57.6 Percent), male visits increased from 2.8 to 4.4 (i.e. 58.0 per cent) and children visits increased from 1.4 to 2.7 (i.e. 89.8 percent). This shows that children's visits have increased substantially after the road improvement.
- Household visits for funeral, wedding and festivals have increased from 3.5 to 5.4, 4.9 to 7.4 and 2.8 to 4.3 per cent respectively.

## Impact of Road on Political Participation

- About 83 percent of the households agreed that transportation facilities aided to influence political activities in village and 81.9 per cent of household have reported that their political participation has increased after construction of road.

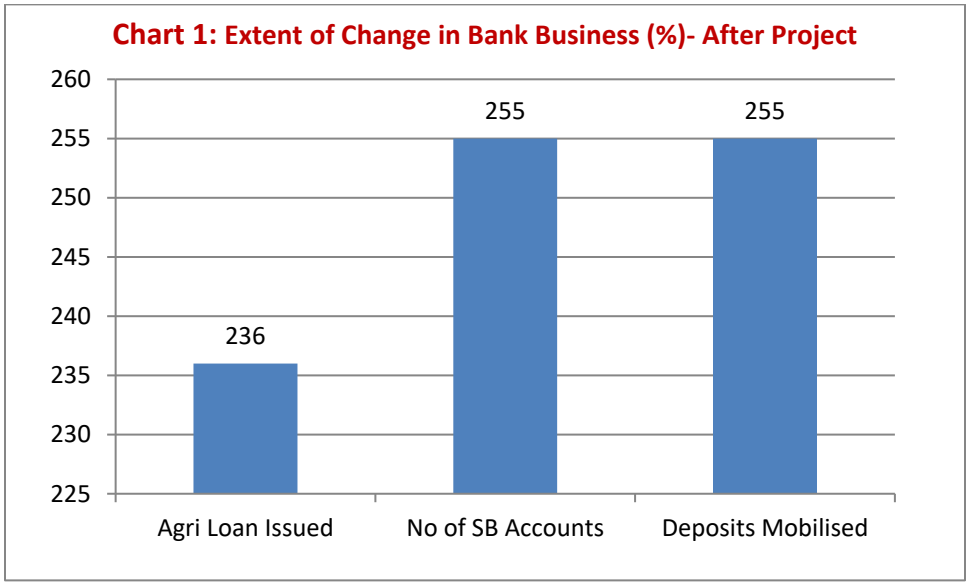
- No. of Days of household participation in political activities has increased from 2.0 days to 3.3 days during a month.

- Membership of households (in community and political organizations) has increased from 6.3 percent to 36.5 percent after construction of road. It indicates that improvement of road can lead to social and political integration of rural people.

## FINANCIAL INCLUSION

Financial inclusion means providing effective access to credit, savings (defined to include current accounts), payments, and insurance services from formal institutions. Access to finance by the rural households, especially poor and vulnerable groups is a prerequisite for poverty reduction and social cohesion. Financial inclusion has become one of the developmental goals of our nation. The objective of financial inclusion is to extend the scope of activities of the organized financial system to include within its ambit people with low incomes. In rural areas, apart from other factors, low incomes and lack of savings are the main reasons for not having access to institutional finance. It seems that after the implementation of RIDF irrigation projects the credit absorption capacities of farmers have increased. As a result of this, banking business

after implementation of RIDF projects has increased. Chart1 shows extent of change in bank business after implementation of irrigation projects in selected project command areas.




The above graph reveals that the extent of agricultural loan issued, total number of SB accounts and deposits mobilized by the farmers have increased by 236 per cent, 255 per cent and 255 per cent respectively.

# CHAPTER- 1
# INTRODUCTION

## 1.1 STATUS OF ROAD SECTOR IN KARNATAKA

As of 2015-16, Karnataka has a total road length of 2.40 lakh km with a road density of 1.25 km per sq km. National Highway density in Karnataka per 1000 population is highest among the comparable States, while it comes behind Tamil Nadu and Kerala in terms of density per sq km. Public Works Department (PWD) is responsible for road works including maintenance on National Highways, State Highways and Major District Roads while the Rural Development and Panchayat Raj Department and Zilla Panchayats are responsible for the other district roads and rural roads. Corporation and city municipal roads come under the jurisdiction of respective corporations/ municipalities. Given the current status of road development in the State, about 34% of the road network is under PWD, while a substantial 66% is under the Zilla Panchayats /Rural Development and Panchayat Raj (RDPR). Karnataka has a total rural length of 1.55 lakh km connecting 57417 habitations (2015-16, Economic Survey). Villages are largely accessible by roads with only 2235 unconnected habitations as on February 2012. However, only 45% of the village roads are all-weather roads. The surface wise composition of rural roads reveals that close to 52% (77013 km) of these roads are un-surfaced, with only 32% of the roads asphalted. There is a wide regional variation in the access to rural roads by surface. This highlights the urgency of upgrading such roads. Table 1.1 shows total and surfaced length of rural roads in Karnataka and India. It reveals that Karnataka has slightly higher proportion of surfaced road compared to All India.

Table 1.2 shows progress of road construction over the period of time in Karnataka.

**Table1.1: Total and Surfaced Length of Rural Roads in Karnataka (As on 31st March, 2009 to 2011)**

(In Km.)

| State | Total / Surfaced | 2009 | 2010 | 2011 (P) |
|---|---|---|---|---|
| Karnataka | Total | 153538 | 156558 | 158407 |
| | Surfaced | 73699 | 76719 | 78568 |
| India | Total | 1729165 | 1792535 | 1849805 |
| | Surfaced | 749849 | 813019 | 859334 |

*Note: (P)- Provisional*
*Source : Ministry of Road Transport and Highways, Govt. of India.*
*(Karnatakastat.com)*

Table 1.2- Progress of Road Construction over the period of Type in Karnataka

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|
| 1999-00 | 3728 | 9829 | 28247 | 1644 | 8366 | 96775 | 148589 |
| 2000-01 | 3728 | 9829 | 28247 | | 8366 | 104034 | 154204 |
| 2001-02 | 3728 | 9829 | 28247 | | 8366 | 104034 | 154204 |
| 2002-03 | 3728 | 9829 | 28247 | | 8366 | 104034 | 154204 |
| 2003-04 | 3967 | 9590 | 28247 | | 8366 | 94034 | 144204 |
| 2004-05 | 3973 | 17228 | 30760 | | 8366 | 115574 | 175901 |
| 2005-06 | 3958 | 17405 | 32572 | | 8366 | 146713 | 209014 |
| 2006-07 | 3958 | 18642 | 37671 | | 8366 | 147212 | 215849 |
| 2007-08 | 3958 | 20739 | 47763 | | 8366 | 147212 | 228038 |
| 2008-09 | 3982 | 20905 | 47836 | | 8366 | 147212 | 228301 |
| 2009-10 | 4490 | 20528 | 50436 | | 8366 | 147212 | 231032 |
| 2010-11 | 4490 | 20528 | 50436 | | 8366 | 147212 | 231032 |
| 2011-12 | 4490 | 20770 | 49959 | | 8366 | 148412 | 231997 |
| 2012-13 | 4490 | 20770 | 49959 | | 8366 | 148412 | 231997 |
| 2013-14 | 4688 | 20773 | 49683 | | 8366 | 155545 | 239055 |
| 2014-15 | 6572 | 19720 | 49928 | | 8366 | 155545 | 240131 |
| *Note:1. Source: Public Works Department and RDPR Department* | | | | | | | |
| *2. $ includes ODR and Village Roads* | | | | | | | |
| *Source: Economic Survey of Karnataka, 2015-16* | | | | | | | |

## 1.2 RIDF STATUS AND SHARE OF RURAL CONNECTIVITY

The major constraints and bottlenecks in providing rural connectivity faced are; insufficient funds with States for rural roads, inadequacy and unpredictability of funds and inadequate maintenance. Since 1995-96, NABARD has been supplementing the efforts of the State Government, through Rural Infrastructure Development Fund (RIDF), in augmenting the rural infrastructure. However, there is much to achieve and plan in this area as Karnataka ranks seventh in the country in infrastructure development index (106.12). So far 8770 rural road projects have been sanctioned by NABARD under RIDF i.e. about 27.66 per cent of total projects have been sanctioned to the state. This has resulted in constructing / improving 39,986 km of rural road in the state which is about 1/4$^{th}$ of total rural road. This indicates significance of RIDF in creating rural road network.

## 1.3 RURAL ROAD NETWORK

In Karnataka, rural roads are being improved / maintained under various schemes like the Pradhana Mantri Gram Sadak Yojane, NABARD, Rural Communications- General and Special Development, Finance Commission grants scheme as well as Mukhya Mantri Grameena Raste

Abivruddi Yojane. The State is receiving loans from NABARD through the Rural Infrastructure Development Fund (RIDF) for Road and Bridge works since 1996-97. The focus of NABARD assistance is on connectivity through rural roads. For these projects, the Government of Karnataka has to incur expenditure out of its own resources and the amount spent on individual works is reimbursed by NABARD (Govt. of Karnataka, 12th Five year plan, Vol-4 P-37).

## 1.4 Importance of Roads in Development

Development of any sector is accelerated only if it has the backing of good infrastructure. Lack of access to basic services and infrastructure in rural areas points to a need for intervention by the State and other stake holders. Rural infrastructure primarily refers to the basic facilities, services and installations, needed for the rural community or society. It mainly includes irrigation structures for agriculture, rural roads, bridges, water supply, sanitation, rural energy, education, health and communication systems. Rural infrastructure in sectors like irrigation and connectivity (roads and bridges) is essential for increasing productivity of land, capital formation, employment generation, reducing post harvest losses and improving living standards of the people. Rural Connectivity is a critical component in the socio-economic development of rural people. Rural roads provide basic inputs for all-round socio-economic development of the rural areas. The provision and construction of roads and road links brings multiple socio-economic benefits to the rural areas and results in forming a strong backbone for the agro-based economy. By reducing the transport costs, the construction/renovation of rural roads is expected to generate market for local products, affect input and output prices of agricultural products, and promote economic linkages that enhance agricultural production, alter land use, crop intensity and other production decisions, stimulate off-farm diversification and other income-earning opportunities, and encourage migration. Claims have also been made that by facilitating access to social service facilities, better roads enhance social outcomes.

## 1.5 Need of Study

Despite a general consensus on the importance of rural roads for development and living standards, there is surprisingly little hard evidence on the size and nature of their benefits, or their distributional impacts. There have been relatively few rigorous and credible impact

evaluations of rural roads. In this context, the present study tried to estimate socio-economic impacts of RIDF supported rural road projects in the state of Karnataka.

## 1.6 OBJECTIVES OF THE STUDY

- To assess the physical and financial progress of the projects, adherence to technical and other specification & specific conditions as per sanction.
- To assess quality of assets created and its impact.
- To quantify the benefits (Economic viability in terms of Cost-Benefit Analysis and Economic rate of Return), income and employment generation emerging from the sample projects, vis-à-vis intended under Detailed Project Report.
- To examine the implementation process of selected sample units, to understand the factors affecting implementation of the project positively or otherwise.
- To prescribe policy intervention and action points for different stakeholders, other benefits to rural banks in terms of business (Deposits/Advances) and financial inclusion.

**Impact Assessment of the Following Aspects**

- Incremental income and employment opportunities due to development of RIDF interventions. Macro impact of the sample projects.
- Non tangible benefits like improvement on living standards, health, and sanitation.
- Economic benefit assessment/Social benefit assessment
- An area of concern in respect of infrastructure projects have been cost and time overrun. The absence of adequate budgetary support and delay in execution of projects also aggravate such situation. (This is a subject matter which requires thorough investigation).
- The study should be able to bring out sector specific, state-specific findings, issues and policy framework.
- The study report may document the success stories as a separate section giving spotlight on the process aspects of scheme implementation. The human factor and human relations in project grounding and execution may be highlighted.
- The study report may also capture Anecdotes/ Quotations of stakeholders.

- Wherever possible, the findings may be discussed in the light of observations report by similar studies by reported scholars/institutions. An analytical review of literature may be a rewarding and enriching exercise.
- Technical parameters need to be assessed by competent technical persons for effective presentation.

# CHAPTER 2
# DESIGN OF THE STUDY AND METHODOLOGY

## 2.1. RIDF RURAL ROAD PROJECTS IN KARNATAKA

To develop appropriate design of the study and methodology, one needs to understand the pattern of distribution pattern of RIDF rural roads, size of the projects, sanction and disbursements of funds and total length of road constructed/renovated across different regions, administrative zones and districts in Karnataka. The analysis is based on the secondary data provided by NABARD Karnataka Regional office, Bangalore, from the year 1995-96 to 2014-15.

### 2.1.1 PROGRESS OF RIDF ROAD PROJECTS IN KARNATAKA

Since the inception of RIDF, NABARD has supported 31,707 projects (up to 2014-15) sanctioning Rs.7,18,222.28 lakhs (2011-12) in Karnataka. For rural roads, NABARD has sanctioned a total of Rs.3,98,526.94 lakhs for 8770 rural road projects i.e. 27.66 per cent of total number of projects. The share of RIDF loan for rural road projects is significant though it varies from year to year. On an average 55.49 per cent of the loan has been sanctioned to rural road projects. This implies that the State Government had given due importance to road projects. Table 1 shows number and percentage of rural road projects supported under RIDF in Karnataka.

**Table-2.1: Implementation of RIDF Rural Road Projects in Karnataka**

| RIDF Trenche/Year | Total RIDF Projects* | | Road Projects ** | | % of Road Projects | |
|---|---|---|---|---|---|---|
| | No. of Projects | RIDF Loan (Rs.Lakhs) | No. of Projects | RIDF Loan (Rs.Lakhs) | % of Projects | % of RIDF Loan |
| RIDF I 1995-96 | 87 | 17567.60 | .-- | .-- | .-- | .-- |
| RIDF II 1996-97 | 247 | 19520.72 | 119 | 7054.20 | 48.18 | 36.14 |
| RIDF III 1997-98 | 486 | 17129.43 | 420 | 13884.13 | 86.42 | 81.05 |
| RIDF IV 1998-99 | 511 | 17234.41 | 437 | 13319.65 | 85.52 | 77.29 |
| RIDF V 1999-2000 | 366 | 17318.37 | 323 | 15376.83 | 88.25 | 88.79 |
| RIDF VI 2000-01 | 574 | 29052.60 | 448 | 22358.66 | 78.05 | 76.96 |
| RIDF VII 2001-02 | 5070 | 22310.37 | 253 | 10543.21 | 4.99 | 47.26 |
| RIDF VIII 2002-03 | 676 | 22019.39 | 495 | 13566.79 | 73.22 | 61.61 |
| RIDF IX 2003-04 | 901 | 28970.52 | 439 | 15934.54 | 48.72 | 55.00 |
| RIDF X 2004-05 | 3486 | 40672.64 | 558 | 20329.82 | 16.01 | 49.98 |
| RIDF XI 2005-06 | 1756 | 44993.55 | 445 | 16646.00 | 25.34 | 37.00 |
| RIDF XII 2006-07 | 3578 | 49763.82 | 527 | 23240.59 | 14.73 | 46.70 |
| RIDF XIII 2007-08 | 5335 | 96725.26 | 545 | 26369.76 | 10.22 | 27.26 |
| RIDF XIV 2008-09 | 2231 | 67449.04 | 356 | 23213.67 | 15.96 | 34.42 |
| RIDF XV 2009-10 | 1995 | 65656.06 | 508 | 25489.92 | 25.46 | 38.82 |
| RIDF XVI 2010-11 | 2493 | 86130.50 | 645 | 34994.80 | 25.87 | 40.63 |
| RIDF XVII 2011-12 | 1915 | 75708.00 | 916 | 42886.00 | 47.83 | 56.65 |
| RIDF XVIII 2012-13 | NA | NA | 584 | 29257.71 | -- | -- |
| RIDF XIX 2013-14 | NA | NA | 678 | 36846.26 | -- | -- |
| RIDF XX 2014-15 | NA | NA | 74 | 7214.40 | -- | -- |
| Total | 31707 | 718222.28 | 8770 | 398526.94 | 27.66 | 55.49 |

*Source: * State Focus Paper 2012-13 Karnataka, NABARD, Bangalore*

*** Data Provided by NABARD Karnataka Regional Office, Bangalore 2014 (December)*

### 2.1.2 DISTRIBUTION OF RIDF RURAL ROAD PROJECTS

In this section, an attempt has been made to know the distribution of RIDF rural road projects in Karnataka though the RIDF projects are need based. Table 2.2 shows the number of RIDF irrigation projects across administrative divisions and districts in Karnataka. In North Karnataka, 43.83 per cent of the projects have been implemented whereas in South Karnataka 56.17 per cent projects are implemented. The distribution of projects across the administrative divisions reveals that Mysore division has 32.09 per cent of projects and Gulbarga division has 17.65 per cent of projects. Belgaum and Bangalore divisions have 26.18 and 24.04 per cent respectively. The distribution of road projects across the districts indicates that some of the districts like Belgaum, Hassan, Tumkur and Kalburgi (Gulbarga) received more projects, while, Yadgir, Kodagu, Gadag and Bangalore (U) received less number of projects compared to other

districts. Basically, implementation of RIDF projects is need based and hence the spread of rural road projects varies across the regions.

**Table-2.2: RIDF Road Projects Across Different Districts and Regions in Karnataka**

| District/Division | No.of Projects | % |
|---|---|---|
| Bangalore Rural | 179 | 2.04 |
| Bangalore Urban | 158 | 1.80 |
| Chikkaballapur | 181 | 2.06 |
| Chitradurga | 297 | 3.39 |
| Davangere | 336 | 3.83 |
| Kolar | 274 | 3.12 |
| Ramanagaram | 200 | 2.28 |
| Tumkur | 487 | 5.55 |
| **Bangalore Division** | **2112** | **24.08** |
| Chamarajnagar | 165 | 1.88 |
| Chikkamagalur | 336 | 3.83 |
| D. Kannada | 305 | 3.48 |
| Hassan | 508 | 5.79 |
| Kodagu | 99 | 1.13 |
| Mandya | 404 | 4.61 |
| Mysore | 344 | 3.92 |
| Shimoga | 404 | 4.61 |
| Udupi | 249 | 2.84 |
| **Mysore Division** | **2814** | **32.09** |
| **South Karnataka** | **4926** | **56.17** |
| Bagalkot | 300 | 3.42 |
| Belgaum | 690 | 7.87 |
| Bijapur | 278 | 3.17 |
| Dharwad | 222 | 2.53 |
| Gadag | 156 | 1.78 |
| Haveri | 326 | 3.72 |
| U Kannada | 324 | 3.69 |
| **Belgaum Division** | **2296** | **26.18** |
| Bellary | 273 | 3.11 |
| Bidar | 289 | 3.30 |
| Kalburgi | 475 | 5.42 |
| Koppal | 212 | 2.42 |
| Raichur | 261 | 2.98 |
| Yadgir | 38 | 0.43 |
| **Kalburgi Division** | **1548** | **17.65** |
| **North Karnataka** | **3844** | **43.83** |
| **Grand Total** | **8770** | **100.00** |

### 2.1.3 SANCTIONS AND DISBURSEMENT

Table 2.3 shows amount of RIDF loan sanctioned and released to rural road projects in Karnataka. It shows since its inception, NABARD under RIDF has sanctioned Rs. 3,98,526.94 lakhs for rural roads in Karnataka. The share of loan sanctioned to the total project cost amounted to around 90 per cent during the year 1996-97 to 2002-03. Since 2003-04, the share of loan declined to 80 per cent. Of the total sanctioned amount, more than 90 per cent only has been released except in some years.

**Table-2.3: Trench Wise Details of Loan Sanctioned and Released to Road Projects in Karnataka (Rs. Lakhs)**

| RIDF Trench/Year | Total Project Cost | RIDF Loan Sanctioned | RIDF Loan Released | % Loan Sanctioned to Total Project Cost | % of Loan Released to Loan Sanctioned |
|---|---|---|---|---|---|
| RIDF II 1996-97 | 7837.99 | 7054.20 | 6356.97 | 90.00 | 90.12 |
| RIDF III 1997-98 | 15712.33 | 13884.13 | 13116.66 | 88.36 | 94.47 |
| RIDF IV 1998-99 | 14799.38 | 13319.65 | 12907.27 | 90.00 | 96.90 |
| RIDF V 1999-2000 | 17109.54 | 15376.83 | 14641.88 | 89.87 | 95.22 |
| RIDF VI 2000-01 | 24904.32 | 22358.66 | 20904.69 | 89.78 | 93.50 |
| RIDF VII 2001-02 | 11714.89 | 10543.21 | 9321.61 | 90.00 | 88.41 |
| RIDF VIII 2002-03 | 15124.31 | 13566.79 | 12095.10 | 89.70 | 89.15 |
| RIDF IX 2003-04 | 19918.18 | 15934.54 | 14706.52 | 80.00 | 92.29 |
| RIDF X 2004-05 | 25412.27 | 20329.82 | 19185.95 | 80.00 | 94.37 |
| RIDF XI 2005-06 | 20807.50 | 16646.00 | 16038.56 | 80.00 | 96.35 |
| RIDF XII 2006-07 | 29050.74 | 23240.59 | 22441.78 | 80.00 | 96.56 |
| RIDF XIII 2007-08 | 32962.20 | 26369.76 | 25342.68 | 80.00 | 96.11 |
| RIDF XIV 2008-09 | 29017.07 | 23213.67 | 21413.18 | 80.00 | 92.24 |
| RIDF XV 2009-10 | 31862.40 | 25489.92 | 22480.39 | 80.00 | 88.19 |
| RIDF XVI 2010-11 | 43743.50 | 34994.80 | 32633.90 | 80.00 | 93.25 |
| RIDF XVII 2011-12 | 53607.50 | 42886.00 | 34172.88 | 80.00 | 79.68 |
| RIDF XVIII 2012-13 | 36572.14 | 29257.71 | 14136.46 | 80.00 | 48.32 |
| RIDF XIX 2013-14* | 46071.58 | 36846.26 | 497.27 | 79.98 | 1.35 |
| RIDF XX 2014-15* | 9018.00 | 7214.40 | | | |
| Total | 485245.84 | 398526.94 | 312393.75 | 82.13 | 78.39 |

*Source: Data Provided by NABARD Karnataka Regional Office, Bangalore 2014*

*Note: * During the year 2013-14 and 2014-15, the process of release of loan was incomplete*

### 2.1.4 CONSTRUCTION/IMPROVEMENT OF ROADS

Table 2.4 shows trench wise length of roads constructed/improved under RIDF in Karnataka. It shows that since the inception of RIDF, a length of 39,986 kms of rural road has been constructed / improved. The length of road constructed/improved varied from 1541 Km to 3751 km in different trenches.

**Table-2.4: Trenche wise Road Length (Constructed/Improved) Under RIDF in Karnataka**

| RIDF Trenche/Year | Total Length (Kms) |
|---|---|
| RIDF II 1996-97 | 2283.14 |
| RIDF III 1997-98 | 3751.14 |
| RIDF IV 1998-99 | 3563.57 |
| RIDF V 1999-2000 | 2728.44 |
| RIDF VI 2000-01 | 3338.05 |
| RIDF VII 2001-02 | 1482.53 |
| RIDF VIII 2002-03 | 1927.82 |
| RIDF IX 2003-04 | 2150.30 |
| RIDF X 2004-05 | 2602.69 |
| RIDF XI 2005-06 | 2059.11 |
| RIDF XII 2006-07 | 2186.18 |
| RIDF XIII 2007-08 | 2093.26 |
| RIDF XIV 2008-09 | 1355.22 |
| RIDF XV 2009-10 | 1604.42 |
| RIDF XVI 2010-11 | 2009.08 |
| RIDF XVII 2011-12 | 2355.44 |
| RIDF XVIII 2012-13 | 1541.42 |
| RIDF XIX 2013-14* | 779.38 |
| RIDF XX 2014-15* | 175.41 |
| Total | 39986.60 |

The length of road constructed/improved also varied across the regions, administrative divisions and districts. Table 2.5 shows length of road constructed across regions, administrative divisions and districts in Karnataka.

**Table-2.5: District wise Road Length (Constructed/Improved) Under RIDF in Karnataka**

| Districts | Length of Road (Kms) | % to Total |
|---|---|---|
| Bangalore Rural | 707.19 | 1.77 |
| Bangalore Urban | 472.13 | 1.18 |
| Chikkaballapur | 1112.21 | 2.78 |
| Chitradurga | 1356.26 | 3.39 |
| Davangere | 1497.54 | 3.75 |
| Kolar | 1501.26 | 3.75 |
| Ramanagaram | 864.06 | 2.16 |
| Tumkur | 2684.83 | 6.71 |
| Bangalore Division | 10195.48 | 25.50 |
| Chamarajnagar | 829.58 | 2.07 |
| Chikkamagalur | 1446.81 | 3.62 |
| D. Kannada | 773.61 | 1.93 |
| Hassan | 2125.53 | 5.32 |
| Kodagu | 497.58 | 1.24 |
| Mandya | 1839.16 | 4.60 |
| Mysore | 1460.60 | 3.65 |
| Shimoga | 1572.85 | 3.93 |
| Udupi | 717.40 | 1.79 |
| Mysore Division | 11263.12 | 28.17 |
| South Karnataka | 21458.60 | 53.66 |
| Bagalkot | 1404.42 | 3.51 |
| Belgaum | 3001.27 | 7.51 |
| Bijapur | 1756.85 | 4.39 |
| Dharwad | 892.83 | 2.23 |
| Gadag | 917.26 | 2.29 |
| Haveri | 1440.55 | 3.60 |
| U Kannada | 1126.24 | 2.82 |
| Belgaum Division | 10539.42 | 26.36 |
| Bellary | 1301.56 | 3.25 |
| Bidar | 1146.82 | 2.87 |
| Kalburgi | 2784.47 | 6.96 |
| Koppal | 1107.10 | 2.77 |
| Raichur | 1521.99 | 3.81 |
| Yadgir | 126.64 | 0.32 |
| Kalburgi Division | 7988.58 | 19.98 |
| North Karnataka | 18528.00 | 46.34 |
| Total | 39986.60 | 100.00 |

Table 2.6 shows the number of RIDF road projects according to the size of the road in Karnataka state. It reveals that, more projects which have length less than 5 kilometres, have been supported by NABARD. Graph 2.1 shows share of RIDF road projects according to length. It shows that on an average, percentages of projects having less than 5 kilometre, 5-10 kilometre and 10-15 kilometre are 69.44 per cent, 22.19 per cent and 5.76 per cent respectively. Projects which have length more than 15 kilometre constitute only 2.62 per cent. District/division wise projects by length are also furnished below.

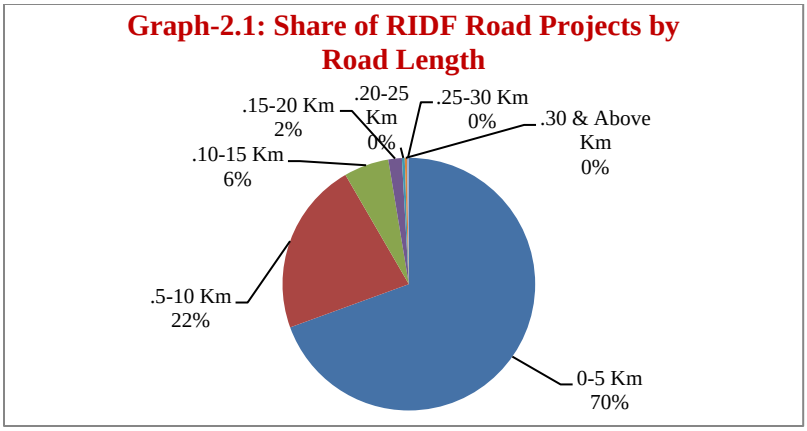



**Table-2.6: No. of RIDF Roads According to length in Karnataka**

| District/Division | Road Length (in Kms) | | | | | | | Total No. of Projects |
|---|---|---|---|---|---|---|---|---|
| | 0-5 | .5-10 | .10-15 | .15-20 | .20-25 | .25-30 | .30 & Above | |
| Bagalkot | 194 | 71 | 22 | 6 | | | | 300 |
| Belgaum | 477 | 146 | 36 | 6 | 3 | 3 | | 690 |
| Bijapur | 145 | 79 | 25 | 9 | 4 | 2 | 3 | 278 |
| Dharwad | 165 | 43 | 9 | 3 | 1 | | | 222 |
| Gadag | 87 | 47 | 14 | 6 | | 1 | | 156 |
| Haveri | 235 | 53 | 18 | 7 | 1 | 1 | 1 | 326 |
| U Kannada | 225 | 64 | 11 | 3 | | | | 324 |
| Belgaum Division | 1528 | 503 | 135 | 40 | 9 | 7 | 4 | 2296 |
| Bellary | 178 | 62 | 18 | 5 | | | | 273 |
| Bidar | 219 | 57 | 7 | | | | 1 | 289 |
| Kalburgi | 264 | 136 | 47 | 11 | 3 | 2 | 1 | 475 |
| Koppal | 126 | 60 | 16 | 5 | 1 | | | 212 |
| Raichur | 139 | 80 | 27 | 11 | | | | 261 |
| Yadgir | 28 | 5 | | 1 | | | | 38 |
| Kalburgi Division | 954 | 400 | 115 | 33 | 4 | 2 | 2 | 1548 |
| North Karnataka | 2482 | 903 | 250 | 73 | 13 | 9 | 6 | 3844 |
| Bangal Rural | 136 | 32 | 8 | 1 | | | | 179 |
| Bangalore Urban | 140 | 18 | | | | | | 158 |
| Chikkaballapur | 94 | 62 | 13 | 6 | 2 | | 2 | 181 |
| Chitradurga | 217 | 40 | 25 | 9 | 1 | | | 297 |
| Davangere | 225 | 72 | 13 | 9 | 2 | 1 | 1 | 336 |
| Kolar | 151 | 88 | 24 | 1 | 6 | 1 | | 274 |
| Ramanagaram | 140 | 45 | 6 | 3 | 1 | | | 200 |
| Tumkur | 278 | 133 | 42 | 10 | 2 | 2 | 5 | 487 |
| Bangalore Division | 1381 | 490 | 131 | 39 | 14 | 4 | 8 | 2112 |
| Chamarajnagar | 95 | 44 | 13 | 2 | 1 | 2 | | 165 |
| Chikkamagalur | 243 | 75 | 8 | 4 | | | 3 | 336 |
| D. Kannada | 272 | 26 | 1 | | | 1 | | 305 |
| Hassan | 385 | 86 | 21 | 7 | 1 | 1 | 3 | 508 |
| Kodugu | 65 | 21 | 7 | 2 | | | 2 | 99 |
| Mandya | 278 | 85 | 16 | 10 | 2 | | 3 | 404 |
| Mysore | 237 | 69 | 22 | 4 | | 2 | | 344 |
| Shimoga | 293 | 77 | 22 | 3 | | | | 404 |
| Udupi | 215 | 24 | 2 | 4 | | 1 | | 249 |
| Mysore Division | 2083 | 507 | 112 | 36 | 4 | 7 | 11 | 2814 |
| South Karnataka | 3464 | 997 | 243 | 75 | 18 | 11 | 19 | 4926 |
| Karnataka | 5946 | 1900 | 493 | 148 | 31 | 20 | 25 | 8770 |

*Note: Project cost not mentioned for 207 projects*

### 2.1.5 Size Of The Projects

Table 2.7 and graph 2.2 show number and percentage of RIDF rural road projects according to size of the project cost. On an average 24.25 per cent of the projects are up to Rs. 25 lakhs, 34.89 per cent are between Rs.25 and Rs.50 lakhs, 18.47 per cent are between 50 and 75 lakhs, 14.39 per cent are between Rs.75 and Rs.100 lakhs and 7.99 per cent are above Rs.100 lakhs of total project cost. Thus, around 60 per cent of the total number of projects having project cost of up to Rs.50 lakhs have been financed under RIDF by NABARD.

**Graph-2.2: RIDF Road Projects by Project Size (%)**

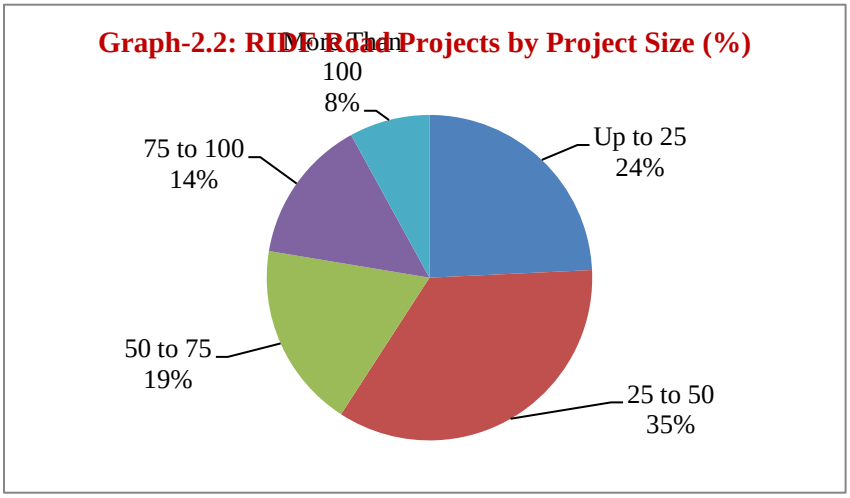



**Table-2.7: No. of RIDF Road Projects According to Size of the Project Cost**

| RIDF Trenche/Year | Size of the Projects (in Rs. Lakhs) | | | | | Total |
|---|---|---|---|---|---|---|
| | Up to 25 | 25 to 50 | 50 to 75 | 75 to 100 | More Than 100 | |
| RIDF II 1996-97 | 15 | 48 | 22 | 15 | 19 | 119 |
| RIDF III 1997-98 | 171 | 164 | 58 | 17 | 10 | 420 |
| RIDF IV 1998-99 | 180 | 169 | 70 | 16 | 2 | 437 |
| RIDF V 1999-2000 | 51 | 132 | 82 | 36 | 22 | 323 |
| RIDF VI 2000-01 | 74 | 171 | 101 | 68 | 34 | 448 |
| RIDF VII 2001-02 | 87 | 79 | 41 | 24 | 22 | 253 |
| RIDF VIII 2002-03 | 287 | 141 | 43 | 14 | 10 | 495 |
| RIDF IX 2003-04 | 194 | 108 | 53 | 52 | 32 | 439 |
| RIDF X 2004-05 | 199 | 152 | 115 | 63 | 29 | 558 |
| RIDF XI 2005-06 | 73 | 233 | 100 | 27 | 12 | 445 |
| RIDF XII 2006-07 | 52 | 244 | 134 | 65 | 32 | 527 |
| RIDF XIII 2007-08 | 35 | 229 | 143 | 101 | 37 | 545 |
| RIDF XIV 2008-09 | 14 | 61 | 109 | 111 | 61 | 356 |
| RIDF XV 2009-10 | 19 | 203 | 152 | 87 | 47 | 508 |
| RIDF XVI 2010-11 | 83 | 199 | 116 | 160 | 87 | 645 |
| RIDF XVII 2011-12 | 222 | 341 | 134 | 131 | 88 | 916 |
| RIDF XVIII 2012-13 | 148 | 190 | 93 | 74 | 79 | 584 |
| RIDF XIX 2013-14 | 209 | 171 | 48 | 181 | 69 | 678 |
| RIDF XX 2014-15 | 14 | 25 | 6 | 20 | 9 | 74 |
| Total | 2127 | 3060 | 1620 | 1262 | 701 | 8770 |

### 2.1.6 MAJOR OBSERVATIONS

- NABARD under RIDF has been playing major role in financing rural road projects in Karnataka. For rural roads, NABARD has sanctioned a total of Rs.398526.94 lakhs for 8770 rural road projects i.e. 27.66 per cent of total number of projects. The share of RIDF loan for rural road projects is significant though it varies from year to year. On an average 55.49 per cent of the loan has been sanctioned to rural road projects. This implies that the State Government had given due importance to road projects.
- The distribution of projects varied across the districts and administrative divisions as the projects are demand based. In North Karnataka, 43.83 per cent of the projects have been implemented whereas in South Karnataka 56.17 per cent projects are implemented.
- The share of loan sanctioned to the total projects cost amounted to around 90 per cent during the year 1996-97 to 2002-03. Since 2003-04, the share of loan declined to 80 per cent. Of the total sanctioned amount, more than 90 per cent only has been released except in some years.
- Since the inception of RIDF, a length 39,986 kms of rural road has been constructed /improved.
- 69.44 per cent of the projects which have length less than 5 kilometres, have been supported by NABARD.
- Around 60 per cent of the total number of projects having project cost of up to Rs.50 lakhs have been financed under RIDF by NABARD.

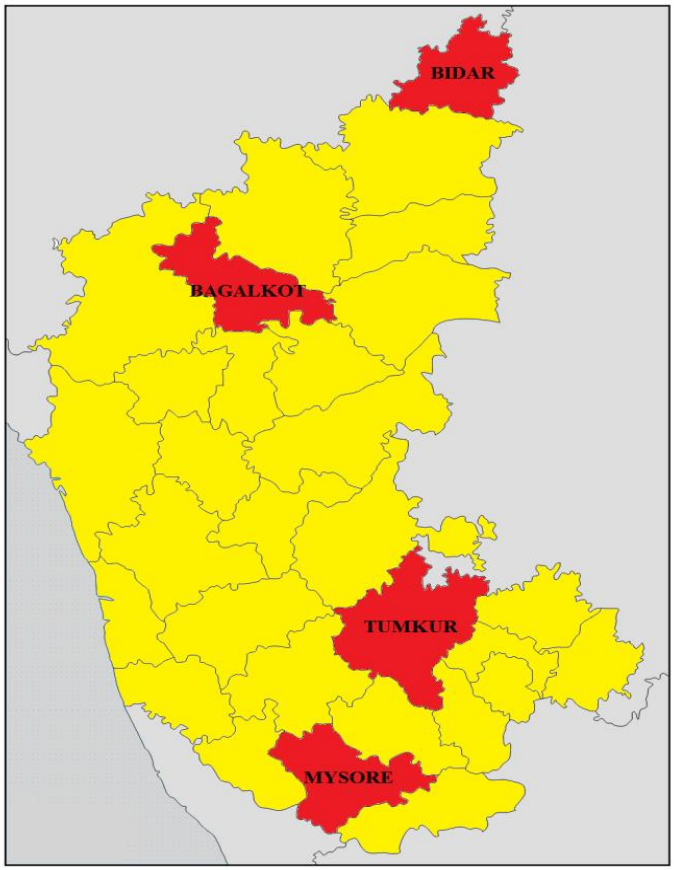
## 2.2 STUDY AREA

The study was conducted in Karnataka state in India. The state is 8th largest in terms of area and 9th largest in terms of population. The geographical area of Karnataka is 1,90,498 sq. km, accounting for 5.81 per cent of the total area of the country. According to 2011 census the state is having 61 million population and density of population is 300 per sq.km. The state is located between 11º 30 and 18º30 N latitudes and 74º15 and 78º30 E longitudes. It has a 300 km long coastline, which forms the western boundary. The state is bound by Goa in the North West,

Maharashtra in the north, Andhra Pradesh in the east, Tamil Nadu in the south and south east, and Kerala in the south west. The State has 30 administrative districts comprising 177 taluks. The city of Bangalore is the state capital. Karnataka is predominantly agriculture based, with more than 70 per cent of its population dependent on agriculture and ancillary activities. As per 2011 Census about 3.74 crore people (i.e. 61.32 %) live in rural areas of the State, spread over 59,630 habitations. Rural Connectivity becomes a critical component in the socio-economic development of rural people.

There are four administrative divisions in Karnataka state, namely, Belgaum, Gulbarga, Mysore and Bangalore. From each administrative division one district which has implemented more number of RIDF rural road projects has been selected. From each selected district, two taluks have been selected representing developed and backward areas and having more number of RIDF rural road projects. Thus, four districts and 8 taluks have been selected for the study. Map 2.1 indicates the selected districts in Karnataka.

Map 2.1: Selected Districts in Karnataka



## 2.3. SAMPLE FRAME

From each selected taluk, one RIDF rural road has been selected. Thus, total eight RIDF rural roads have been selected representing different regions in Karnataka. Table 2.8 shows sample frame for the study.

**Table 2.8: Sample RIDF Rural Road Projects for Study**

| Administrative Division | District | Taluk | Selected RIDF Road |
|---|---|---|---|
| Belgaum | Bagalkote | Mudhol (Developed) | Improvement to Road from Ingalagi Jeeragal km 0.00 to 2.85 (RIDF Code: R8063 Trench: XV) |
| | | Badami (Most Backward) | Improvements from Narenoor-Fakirbudhihal-Kainkatti road from Km.0.00 to 13.00 in selected reaches (RIDF Code: R17285 Trench:17) |
| Gulbarga | Bidar | Bidar (Developed) | Improvements to road from Naranja Sugar Factory to Hippalgaon (RIDF Code: R16474 Trench:16) |
| | | Bhalki (Most Backward) | Improvements to Road from Ganeshpurwadi to Ambesangavi Village from 0.00 to 3.00 in Bhalki Tuluk (RIDF Code: R16633 Trench:16) |
| Mysore | Mysore | Mysore (Developed) | Improvements to Rattanahalli-K.Naganahalli road via Gungral Chatra (RIDF Code: R17063 Trench:17) |
| | | H D Kote (Most Backward) | Improvements to road from M.M.road to Ramenahalli - Nerale Hosur road via Anagatti (0.00 to 5.00 km) (RIDF Code: R152701614 Trench: 15) |
| Bangalore | Tumkur | Tiptur (Developed) | Improvements to road from BGH Road to join C.N. Halli Taluk border via Muddanahalli, Halkurike, Doddikatte Road in Tiptur Taluk (RIDF Code: R7312 Trench:14) |
| | | Gubbi (Most Backward) | Impts.to road from Hebbur kallur Road to Idagur Via, Manikuppe, Cheeranahally, Naranahally from Km 6.50 to 9.60 Km in Gubbi taluk (II Phase) (RIDF Code: R8168 Trench:15) |

Apart from 8 selected RIDF rural roads, 8 control roads, which are not in good conditions and need improvement, have been selected to estimate the impacts of selected RIDF rural roads. Most of these roads are proposed for improvement. Table 2.9 shows list of control roads for the study.

**Table 2.9: Sample Control Rural Roads for Study**

| Administrative Division | District | Taluk | Control Road |
|---|---|---|---|
| Belgaum | Bagalkote | Mudhol (Developed) | Improvement from B K Alagundi to Machaknur |
| | | Badami (Most | Improvement from Kadarkoppa to Nandihal Road |
| Gulbarga | Bidar | Bidar (Developed) | Improvement from Chimkoda to Allapur |
| | | Bhalki (Most Backward) | Improvement from Gunjarga to Bhalki Road |
| Mysore | Mysore | Mysore (Developed) | Improvements to road from Jayapura_Kadakola road to join Doora via Marballi, Marballi Hundi from CH;2.90-3.60 KM & 5.50-6.05 |
| | | H D Kote (Most Backward) | M. M. Road to Chainhundi |
| Bangalore | Tumkur | Tiptur (Developed) | Improvements to road from Mandya-Hadagali road to join Arasikere taluk border via Marisiddaiahnapalya road in Tiptur taluk |
| | | Gubbi (Most Backward) | Improvements to Yadiyur-Kallur road to (SH-84) Sira-Nanjangudu road (SH-84) via K. Kallahalli, Beluru gollarahatti, Kodihalli, D.Kunnala, Jeeganahalli gollarahatt, Konemadenahalli, Kamberahatti, Neralekatte palya in Gubbi taluk |

From each selected road, 50 sample households have been selected. Sample households were representative of all the villages influenced by the road project. These households have been selected randomly to represent all categories of households. Thus, totally 800 sample households have been interviewed i.e. 400 from RIDF roads and 400 from control roads.

## 2.4. SOURCES OF DATA

For the study, both primary and secondary data has been collected. Apart from usual survey method, the study tried to get in-depth information from FGDs, Observation and Case Study methods. The following section reveals data collection methods, instruments and their purposes.

**Traffic Survey:** For calculating the cost and benefits of the road project, only direct benefits have been considered. Quantifiable direct benefits are mainly related to increase in volume of traffic (traffic intensity), change in composition of traffic, and saving in cost of operation of

vehicles (VOC). Traffic survey was conducted to record the changes in traffic volumes, composition, etc at each selected road project sites. Counting of vehicles of different types running on the road in both directions was done for 3 hours in morning i.e. 9 AM to 12 AM. Information on quantum of traffic during remaining duration of the day has been collected by conducting **FGD** with shopkeepers and other persons residing beside the road to get information on total volume of traffic (on normal days).

**Village Schedule**: Village level data was collected for all the project influenced villages to identify and document indicators that were relevant to village life. For this purpose, 'village schedule' was prepared to collect the data and information relating to Population, Occupation structure, urban/market connectivity, agriculture, rural development, distance from and access to the particular road, schools and clinics and available amenities, etc had been collected. These data were collected from GP secretaries.

**Focus Group Discussion:** FGD with GP members, village elders and community leaders was conducted to document the perceptions of the villagers about the socio-economic impacts of rural roads and resultant poverty reduction.

**Household Schedule:** Sample households have been interviewed to know and record the patterns of transport use and to identify the impacts associated with the road project. Household questionnaire was used to collect information regarding employment status, cropping pattern, yield, input-resources used in farming, sale of output, income, expenditure, wealth and assets, education and healthcare practices and urban linkage & travel habits, information on origin/destinations, travel times, fares and other travel costs, and income levels, etc.

**Case Study:** Case studies have been conducted to document the positive impact of roads in project village and impacts of non-availability of roads in 'control' villages.

**Schedule for Bank Managers:** Data on changes in banking business, in terms of number of accounts, deposits and agricultural credits have been collected from bank managers.

**Schedule for Project Level Officers:** Information on details such as starting the project, its completion, time overrun, actual project cost, change in design, maintenance and repair, funds availability, constraints in implementation, monitoring mechanism, etc have been collected from the project level officers (i.e. PWD officer)

**Survey Instruments and Other Details**

| Survey Instruments | Details |
|---|---|
| Traffic Survey | One in each project site. Totally 8 traffic surveys have been conducted. |
| Village Schedule | All the villages covering project and control villages have been covered. |
| FGD with Shopkeepers & others | One in each project site. Total 8 FGDs have been conducted. |
| FGD with GP members, Village leaders, NGOs, SHGs, etc | One in each project site. Total 8 FGDs have been conducted |
| Households | 50 from each project site. Total 8oo sample households have been interviewed (400 from project site + 400 from control villages). |
| Case Study | 1 from each selected road project (Total 8 Case studies) |
| Schedule for Bank Managers | 1 from each project village. Total 8. |
| Project Officers | 1 from each project (Total 8). |

## 2.5. Other Methodological Issues

### Study Approach

For the study, both 'before and after the project' and 'with and without' approach were used for estimating the impacts of selected RIDF rural road projects. As per discussion with the NABARD officers and PWD officers, no baseline studies were conducted to ascertain socio-economic status of the region/households. Therefore, the study team collected the baseline data from the stakeholders (households, shopkeepers, etc) out of their memory.

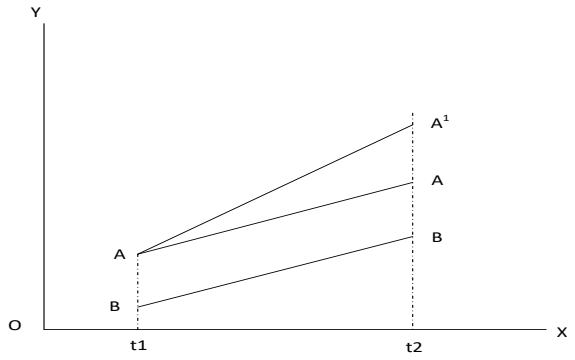
Review of progress of study by NABARD Officers (Mumbai) during field work at Bidar

**Economic Viability**

For assessing the Economic viability of the selected RIDF road projects, the costs and benefits of the projects have been discounted for the year 2014-15. Net Present Value (NPV), Benefit Cost Ratio (BCR) and Internal Rate of Return indicators have been used to know the economic viability of the projects. Further details are provided in the section- Economic evaluation of rural road projects.

**Isolation of Project Benefits**

The study used difference-in-difference (DD) method to isolate the socio-economic impacts of RIDF rural roads. The estimation assumes that in absence of treatment (here RIDF assisted rural road) the difference between control (B) (i.e., the place having no road) and treatment (A) group (i.e., having RIDF road) would be constant or fixed over time. Following figure illustrates the isolated benefits.




[1]http://econometricsense.blogspot.in/2012/12/difference-in-difference-estimators.html

As can be seen from figure:

(A-B) is the differences in groups pre-treatment – which represents the 'normal 'difference between the groups.

($A^1$ –B) is the total post treatment effects which is the sum of normal effect (i.e., A-B) and the treatment effect (i.e., $A^1$ –A).

DD estimates compare the difference in group averages for 'y ' pre-treatment to the difference in group averages post treatment. The larger the difference post treatment, the greater is the treatment effect.

| | t=1 | t=2 | Difference |
|---|---|---|---|
| A (treatment group) | $\bar{y}_{At1}$ | $\bar{y}_{At2}$ | $(\bar{y}_{At1}-\bar{y}_{At2}) = \Delta \bar{y}_A$ |
| B (control group) | $\bar{y}_{Bt1}$ | $\bar{y}_{Bt2}$ | $(\bar{y}_{Bt1}-\bar{y}_{Bt2}) = \Delta \bar{y}_B$ |
| | | Difference in Difference: | $\Delta \bar{y}_A - \Delta \bar{y}_B$ |

## 2.6. Reference Year of Study

The projects which have been implemented between trenches RIDF XIV to RIDF XVII/XVIII have been taken into consideration, for selecting the sample projects for the study. Such road projects which have been completed and started operating have been taken after consultation with the State NABARD officials as per instructions of the funding agency. Wherever there are no such projects implemented during the reference year, the projects which have been implemented in the previous trenches have been considered. For estimating the costs and benefits of the selected road projects the year 2014-15 has been considered.

# CHAPTER 3
# PROFILE OF STUDY AREA

In this chapter, an attempt has been made to present the brief profile along with the rationale for further improvement of rural road connectivity in Karnataka and in selected districts. A brief profile of selected roads has also been presented.

## 3.1 PROFILE OF STATE

The study was conducted in Karnataka state in India. The state is 8th largest state in terms of area (191791sq.km) and 9th largest in terms of population (6.11crore as per 2011 Census). The geographical area of Karnataka is 1,90,498 sq. km, accounting for 5.81 per cent of the total area of the country. According to 2011 census the state is having 61 million populations and density of population is 300 per sq.km. The state is located between 11º 30 and 18º30 N latitudes and 74º15 and 78º30 E longitudes. It has a 300 km long coastline, which forms the western boundary. The state is bound by Goa in the North West, Maharashtra in the north, Andhra Pradesh in the east, Tamil Nadu in the south and south east, and Kerala in the south west. The State has 30 administrative districts comprising 177 taluks. The city of Bangalore is the state capital.

Karnataka is predominantly agriculture based, with more than 70 per cent of its population dependent on agriculture and ancillary activities. A total of 123,100 km² of land is cultivated in Karnataka constituting 25.3% of the total geographical area of the state. Most of the farmers are (about 70 per cent) are marginal and small land holders. On an average, 41.9 per cent are marginal farmers having below 1 hectare land, 27.4 % are small having 1-2 hectare land, 19.6% semi medium having 2-4 hectares 9.5 % medium farmers having 4-10 hectares and 1.7 % large farmers having more than 10 hectares. As per the 2011 census, the total population of the state amounts to 6,11,30,704 i.e. 5.05 % of India's population. Out of which the males constitute to about 3, 10, 57,742 and females to about 3,00,72,962. The literacy of the state is 55.98%. Population density is 319 per km sq. The sex ratio is 968 females to 1000 males. The State's population has grown by 15.7% during the last decade, while its population density has risen from 276 in 2001 to 319 in 2011, indicating an increase of about 15.6%. Per Capita State Income estimated at the current prices (2015-16) is Rs.145799. The composition of Gross State

Domestic Product (GSDP) of the state (2015-16) indicates that agriculture & allied activities contributes 12.3 per cent, industry sector 23.6 % and service sector 64.1 %. The following table show further details about Karnataka.

**KARNATAKA AT A GLANCE**

| Sl No | Item | Units | 2011 |
|---|---|---|---|
| 1 | Geographical Area | 000 sq.Km | 192 |
| | **Administrative Setup** | | |
| 2 | Revenue Divisions | No | 4 |
| 3 | Districts | do | 30 |
| 4 | Taluks | do | 176 |
| 5 | Inhabited Villages | do | 27397 |
| 6 | Uninhabited Villages | do | 1943 |
| 7 | Towns | do | 347 |
| | **Population as per Census** | | 2011 |
| 8 | Total | (in 000s) | 61095 |
| 9 | Males | do | 30967 |
| 10 | Females | do | 30128 |
| 11 | Rural | do | 37469 |
| 12 | Urban | do | 23626 |
| 13 | Scheduled Castes | do | 10475 |
| 14 | Scheduled Tribes | do | 4249 |
| 15 | Density of Population | per Sq.Km | 319 |
| 16 | Literacy Rate | Percentage | 75.40[c] |
| 17 | Sex Ratio | Females per 1000 Males | 973 |
| 18 | Urban Population | Percentage | 38.7 |
| | **State Income at Current Prices** | | 2015-16[g] |
| 19 | State Income at Current Prices | Rs. Crore | 1022729 |
| 20 | Primary Sector | do | 121340 |
| 21 | Secondary Sector | do | 214719 |
| 22 | Rertiary Sector | do | 598812 |
| 23 | Percapita Income | Rupees | 145799 |
| | **Agriculture** | | 2013-14 |
| 24 | Net Area Sown | 000 Ga | 9923 |
| 25 | Gross Cropped Area | do | 12267 |
| 26 | Gross Irrigated Area | do | 4112 |
| 27 | Gross Irrigated Area to Gross Cropped Area | Percentage | 33.52 |
| | **Agricultural Census** | | 2010-11 |
| 28 | No. of Operational Holdings | 000s | 7832 |
| 29 | Area of Operational Holdings | do | 12162 |
| 30 | Average size of Operational Holdings | Ha | 1.55 |
| | **Live Stock Census** | | 2012 |
| 31 | Total Live Stock | 000s | 27701 |
| 32 | Total Poultry | do | 53442 |
| | **Forest** | | 2014-15 |
| 33 | Forest Area | 000 Ha | 4335 |
| | **Banking** | | 2012-13# |
| 34 | Scheduled Commercial Banks | No | 7361 |
| 35 | Deposits | Rs. Crore | 4646394 |
| 36 | Advences | do | 3315402 |
| | **Education** | | 2015-15 |
| 37 | Perimary Schools | No | 60882 |
| 38 | Enrolment | 000s | 8345 |
| 39 | High Schools | No | 14930 |
| 40 | Enrolment | 000s | 1767 |
| | **Health** | | 2014-15 |
| 41 | Hospitals | No | 415 |
| 42 | Dispensaries | do | 672 |
| 43 | Bed per lakh population | do | 78 |
| | **Demographic Status** | | 2012 |
| 44 | Birth Rate | 000s | 18.5 |
| 45 | Death Rate | 000s | 7.1 |
| 46 | Infant Mortality Rate | Per 1000 Live Births | 32 |
| | **Transport** | | 2014-15 |
| 47 | Railway Route Length | Kms. | 3172 |
| 48 | Total Route Length | do | 231767 |
| 49 | Motor Vehicles | 000s | 106446 |
| | **Co-operation** | | 2014-15 |
| 50 | Primary Agricultural Credit Co-Operative Societies | No | 5351 |
| 51 | Membership | 000s | 6117 |
| 52 | Total No. of Co-Operativr Societies | No. | 39627 |
| 53 | Total Membership | 000s | 22399 |

*Source: Economic Survey of Karnataka, 2015-16*

**Table 3.1: Karnataka Compared with India**

| Sl No | Item | Unit | Karnataka | India |
|---|---|---|---|---|
| | **Population as per 2011 Census:** | | | |
| 1 | Total | 000s | 61095 | 1210570 |
| 2 | Males | do | 30967 | 623122 |
| 3 | Females | do | 30128 | 587448 |
| 4 | Rural Population | do | 37469 | 833463 |
| 5 | % Rural Population | | 61.3 | 68.8 |
| 6 | Urban Population | 000s | 23626 | 377106 |
| 7 | % Urban Population | | 38.7 | 31.2 |
| 8 | Sex Ratio | Females per 1000 Males | 973 | 943 |
| 9 | 2001-2011 Decadal Growth of Population | Percent | 15.6 | 17.7 |
| 10 | Literacy Rate | Percent | 75.4 | 73 |
| 11 | Population of SC/ST (2011 population Census) | 000s | 14724 | 305659 |
| 12 | Total Workers (2011 Census) | do | 27873 | 481743 |
| 13 | Geographical Area (2011 Census) | Lakh Sq.Kms. | 1.92 | 32.87 |
| 14 | Net Area Sown (2010-11) | 000 ha | 10523 | 141579 |
| 15 | GrossCropped Area (2010-11) | do | 13062 | 198969 |
| 16 | Gross Irrigated 2011-12 (P) | do | 4137 | 91530 |
| 17 | % of Gross Irrigated Area to Gross Cropped Area (2010-11) | | 31.67 | 46 |
| | **State /Nation Income at Current Prices (2015-16) 2011-12 Series** | | | |
| 18 | Gross Income | Rs. Crore | 1022729 | 13567192 |
| 19 | Net Income | do | 936045 | 12118824 |
| 20 | Gross per Capita Income | Rs. Crore | 159301 | 104520 |
| 21 | Net per capita Income | do | 145799 | 93231 |

*Source: Economic Survey of Karnataka, 2015-16*

As per 2011 Census about 3.74 crore people (i.e. 61.32 %) live in rural areas of the State, spread over 59,630 habitations. Rural Connectivity becomes a critical component in the socio-economic development of rural people. The total length of rural roads, as on March 2015, in Karnataka is 1,55,545 km, of which 58,184 km is asphalted, 21,493 km have macadam surface, and 75,866 km consists of mud roads.

Development of rural roads and their maintenance has been the responsibility of the Zilla Panchayats since 1987. Technical supervision of the roads at the state level, which was with the Public Works Department till the end of 1999, has been transferred to the Rural Development and Panchayat Raj Department from January 2000. In the State, improvement of roads and their maintenance is being taken up under Pradhan Manthri Gram Sadak Yojana (PMGSY), Mukhya Manthri Grameena Rasthe Abhivruddhi Yojane (CMGSY) & RIDF schemes. Thus, there is large scope for development of rural roads, which can reduce rural poverty and improve education and health of the people in Karnataka.

## 3.2 Profile of Selected Districts

As already mentioned, the districts which have implemented more number of RIDF rural road projects, in each administrative division, have been chosen for the study. The following paragraphs depict brief profile of the selected district and the need for improving the rural road connectivity. The importance of selected RIDF rural road projects in improving the livelihoods of rural people has also been presented.

**Bidar District**

The Bidar district is in the northernmost part of the Karnataka state. Geographically, it resembles the Crown of the State occupying its northeastern tip. It is bounded by Nizamabad and Medak districts of Telangana state on the eastern side, Latur and Osmanabad districts of Maharashtra state on the western side, Nanded district of Maharashtra state on the northern side and Gulbarga district on southern side. Bidar district is constituted by five talukas viz. Aurad, Basavakalyan, Bhalki, Bidar and Humnabad with Bidar being the headquarters of the district. According to the 2011 census Bidar district has a population of 1,700,018. Bidar district accounts for 2.84% of total area of the state and it is home for 2.78% of the total population in the state. The district has a population density of 312 inhabitants per square kilometre (810/sq mi). Its population growth rate over the decade 2001-2011 was 13.16%. Bidar has a sex ratio of 952 females for every 1000 males and a literacy rate of 71.01%.

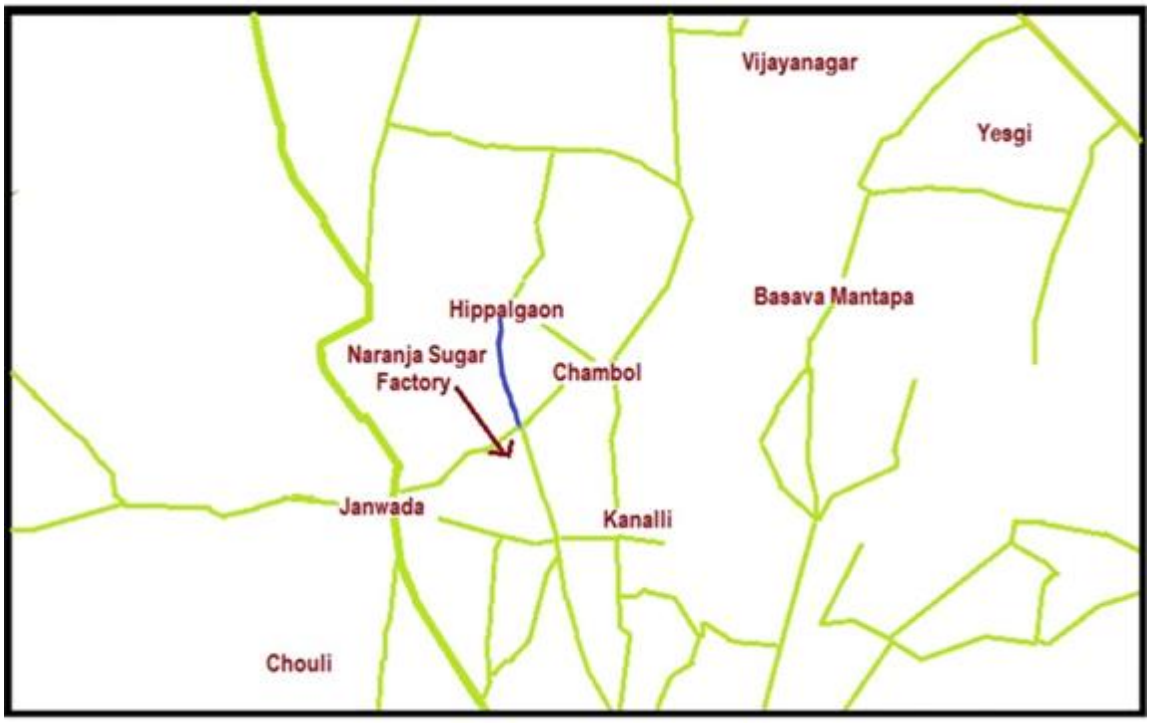
Agriculture is the main occupation in rural parts of the district. Greengram, Bengalgram, Blackgram, Paddy, Groundnut, Wheat, Redgram, Sugarcane and Chillies are other agricultural crops. Bidar district in Karnataka is one of the most backward districts in the State and occupies a low position in economic as well as human development. The district economy is predominantly an agricultural economy and 60% of population is employed in agriculture. Agriculture is mainly dry land agriculture as the area under irrigation is only 14% of the net area sown. Therefore, there is insecurity of income and employment in agriculture. The growth rate of economy is very low and the therefore, there is no significant increase in district income and per capita income. The district is classified as the most backward district as per the Report of the High Power Committee on Redressal of Regional Imbalances (2002). Four out of its five talukas have been classified as most backward talukas. Bidar district has a disadvantage of distance factor; therefore development of transport and communication facilities is very essential.

**Road Projects Chosen for the Study: Bidar District**

**1. Road from Naranja Sugar Factory to Hippalgaon in Bidar Taluka of Bidar District**

The road from Naranja Sugar Factory to Hippalgaon (2.80 Km) in Bidar Taluka of Bidar District has helped to reduce the distance to be travelled from Hippalgaon to Bidar by 5 Km i.e. from 20 Kilometre to 15 Kilometre. The road would help around 5 thousand people in and around Hippalagaon to transport agriculture products to market centre and sugarcane to Naranja Sugar factory.

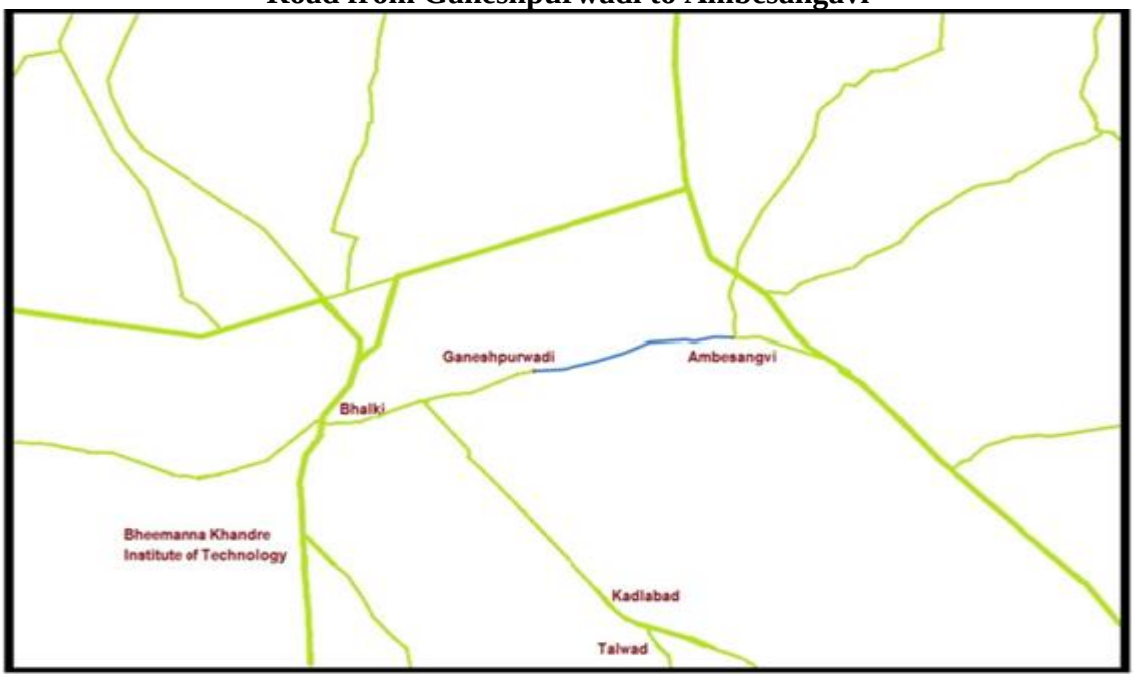
**Road from Naranja Sugar Factory to Hippalgaon**




**2. Road from Bhalki to Bhatambra via Anadwadi, Bhatambra to Bhatsangvi Village and Ganeshpurwadi to Ambesangvi Village in Balki Taluka of Bidar District**

The road from Bhalki to Bhatambra via Anadwadi, Bhatambra to Bhatsangvi Village and Ganeshpurwadi to Ambesangvi Village (3.0 Km) connects 14 villages to taluk head quarter and 3 marketing centres benefiting 0.48 lakh population of this region.

**Road from Ganeshpurwadi to Ambesangavi**




**Bagalkot District**

Bagalkot is a city situated in the northern part of the Indian state of Karnataka. Geographically, it is located at the co-ordinates 16.18°N 75.7°E and it lies at an average elevation of 533 meters above sea level. It is the head-quarters of Bagalkot district. It was previously under the administration of Bijapur district and in the year 1997, the new Bagalkot district has come into existence during 50 th year of India's independence. The bifurcated Bagalkot district consists of six blocks namely Badami, Bagalkot, Bilagi, Hunugund, Jamakhandi and Mudhol. The legendary Chalukya Dynasty once upon a time ruled Bagalkot District, in northern Karnataka. Occupying a distance of 6593 sq. km Bagalkot District is flanked by Bijapur district in the north and Gadag district in the south, Raichur district lies towards east of Bagalkot and Koppal district towards southeast along with Belgaum district towards west border the same.

Bagalkot has six taluks, 18 hobalis and 638 villages. Among them 623 are inhabited and 4 are uninhabitated villages in the district. Of the 6 taluks, two are categorised as "More Backward taluk" and one as "Most Backward Taluk" by Dr.Nanjundappa committee. The total

geographical area of the Bagalkot district is 6,58,877 hectares, of which 77.11 percent land is used for cultivation to grow the crops. About 2/3 of land holdings are marginal and small, which clearly reflects the poor condition of the cultivators of this region. Only 35 percent of the holdings are medium sized, a very meager proportion (1.18 percent) are large land holdings.

According to 2011 census, Bagalkot district has a population of 1,889,752. The population growth rate over the decade 2001 and 2011 is 14.46 percent. It is one of the ten fastest growing districts in Karnataka. The population density of Bagalkot is 288 persons per square kilometer. Scheduled Castes constitute about 17 percent and Scheduled Tribes about 5 percent of the total population. Bagalkot has a sex ratio of 989 females for every 1000 males. The overall literacy of the Bagalkot district as per 2011 census is 68.82 percent, which is higher than national levels (52 percent) but lower than the literacy rate of the state (75.36 percent). The male literacy is very high at 79.23 and female at a low rate of 58.40. Thus the gender gap in terms of literacy in the district is at 20.83 percent.

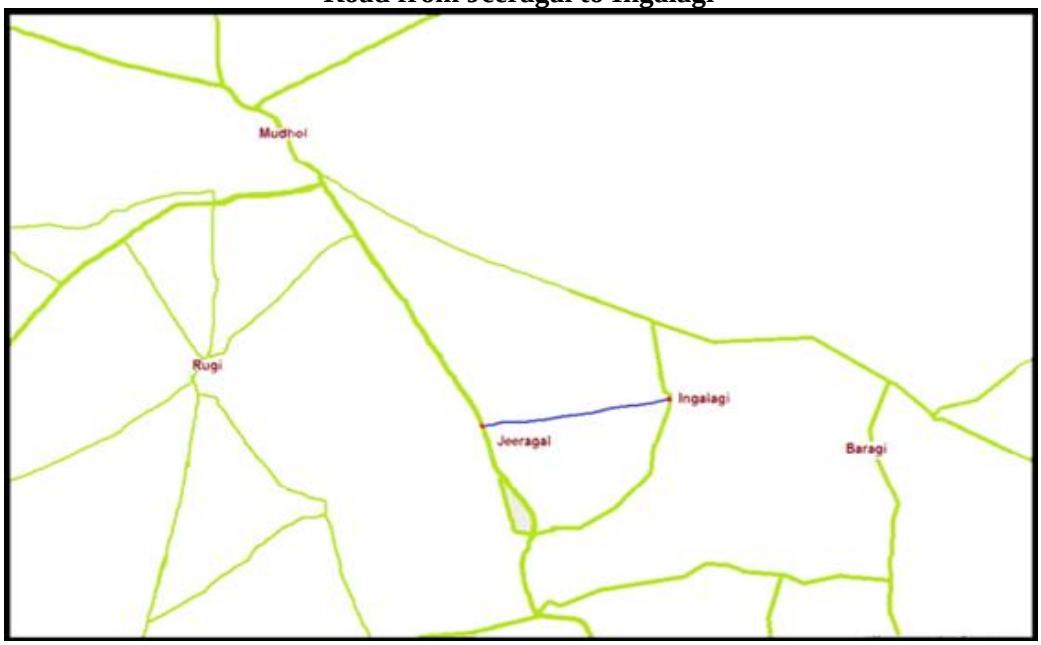
Cottage industries occupy a predominant position in Bagalkote. The district is popular for its silk and handloom industries. Ghataprabha River, Malaprabha River and Krishna River flow through the district. Koodalasangama lies at the point of confluence of rivers Krishna and Malaprabha. The Samadhi of 12th-century social reformist Basavanna, known for his crusade against caste exploitation, is located in Koodalasangama, a town in the taluk of Hungund. It is obvious that rural infrastructure, especially rural roads, would help in improving the agricultural, tourism and industrial development in the district.

**Road Projects Chosen for the Study: Bagalkot District**

**1. Road from Ingalagi to Jeragal (2.85 Km) in Mudhol Taluk of Bagalkot District**

The road from Ingalagi to Jeragal (2.85 Km) in Mudhol Taluk of Bagalkot District is an important road connecting Ingalagi Village to Jeeragal State Highway Aurad -Sadashivagad. It also connects State Highway No. 34 in the same taluk which is one of the major road in the district. Five villages and one State highway are connected through this road. The road is expected to provide communication to marketing centers, to the taluk head quarters i.e. Lokapur, Mudhol, Bagalkot, Belgaum and Hubli. All the five villages are on the banks of Ghataprabha River and the main crops grown are sugarcane and oil seeds. This road enhances connectivity among the villages and main centres of the taluk.

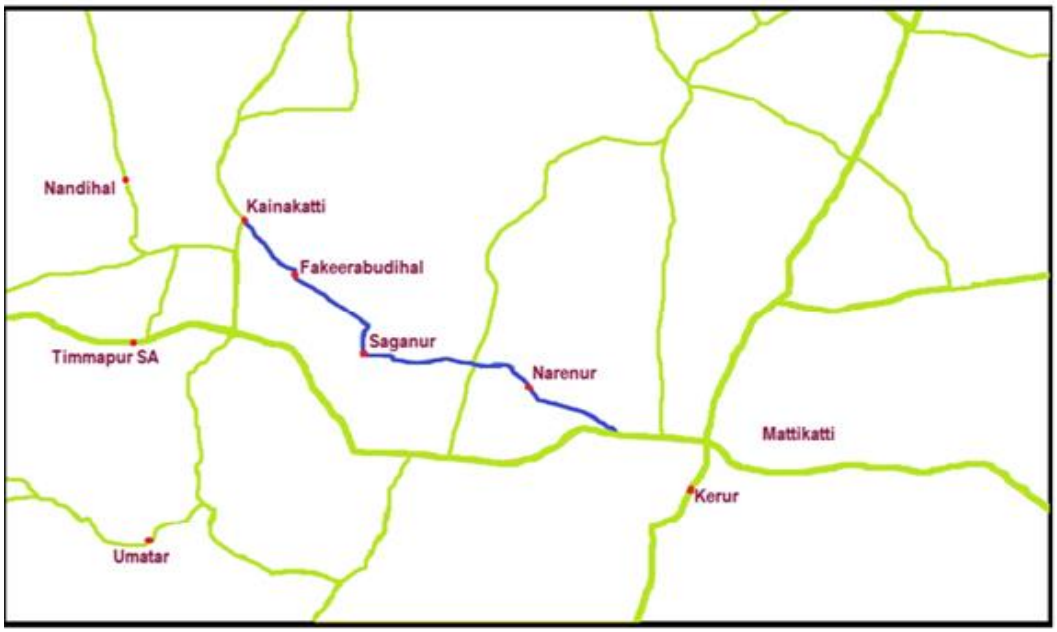
**Road from Jeeragal to Ingalagi**




## 2. Road from Narenur to Fakirbudihal, KainKatti road in Badami Taluka of Bagalkot District

The road from Narenur to Fakirbudihal, KainKatti road (13.0 Km) in Badami Taluka of Bagalkot District facilitates communication between Kerur, Narenur , Narenur Tanda , Saganur, Hosakoti and Kainkatti.

**Narenoor-Fakirbudhihal-Kainkatti road**



**Tumakur District**

Tumkur district is located in the southeastern portion of Karnataka state. It is bounded by Chitradurga district on northwestern side, Hassan district on western side, Mandya district on sourthern side, Bangalore on southeastern side, Kolar on eastern side and Andhar Pradesh on northeastern side. It has a geographical area of 10,598 sq km. The district has ten taluks, namely; Tumkur, Koratagere, Sira, Gubbi, Pavagada, Turuvekere, Kunigal, Madhugiri, Tiptur and Chikkanayakanahalli. The district has a population of 2,678,980 consisting of Hindus (90.10 %), Muslims (9.18 %), Christians (0.34 %) and Jains (0.19 %). The district ranked 4$^{th}$ plance in terms of population in Karnataka, after Bangaluru, Belgaum and Mysore. The district has a population desnity of 253 per square km. Its population growth rate over the decade 2001-2011 was 3.74 per cent. It has a sex ratio of 984 females for every 1000 males and a literacy rate of 75.14 per cent.

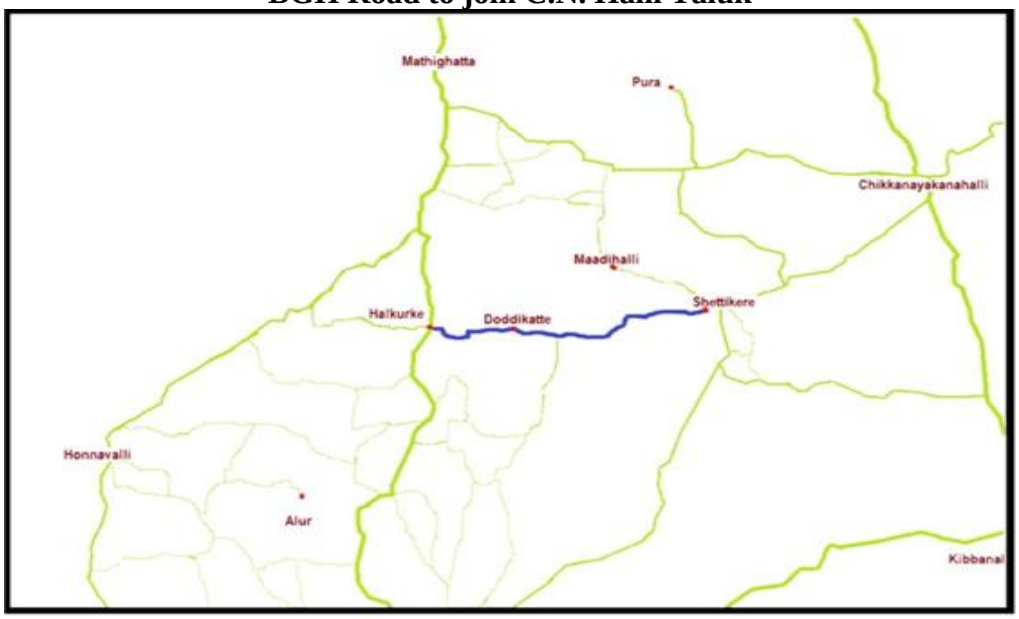
Agriculture is the main occupation and farmers grow Coconut, Paddy, Groundnut and Ragi crops. The district is known for the production of Coconut, is called as 'Kalpataru Nadu'. There are 571 villages in the district. The district is about 70 km from the state capital, Bangaluru and two national highways pass through the district (NH 4 and NH 48). It has also a railway route length of about 100 km. There is a large demand for construction/improvement of rural roads in the district.

**Road Projects Chosen for the Study: Tumakur District**

**1. Road connecting BGH Road to C. N. Halli taluk border road in Tiptur Taluka of Tumkur District**

The road connecting BGH Road to C. N. Halli taluk border road is expected to benefit 7 villages, namely, Bhommennahalli Tandya, H. Mudenahalli, H. Muddenahalli Tandya, Halkurike, Halkurike Amanikere, Halkurike Kaval and Doddikatte. This road is also expected to be helpful in connecting rural places to Tiptur and C. N. Halli taluk, especially for marketing purpose.

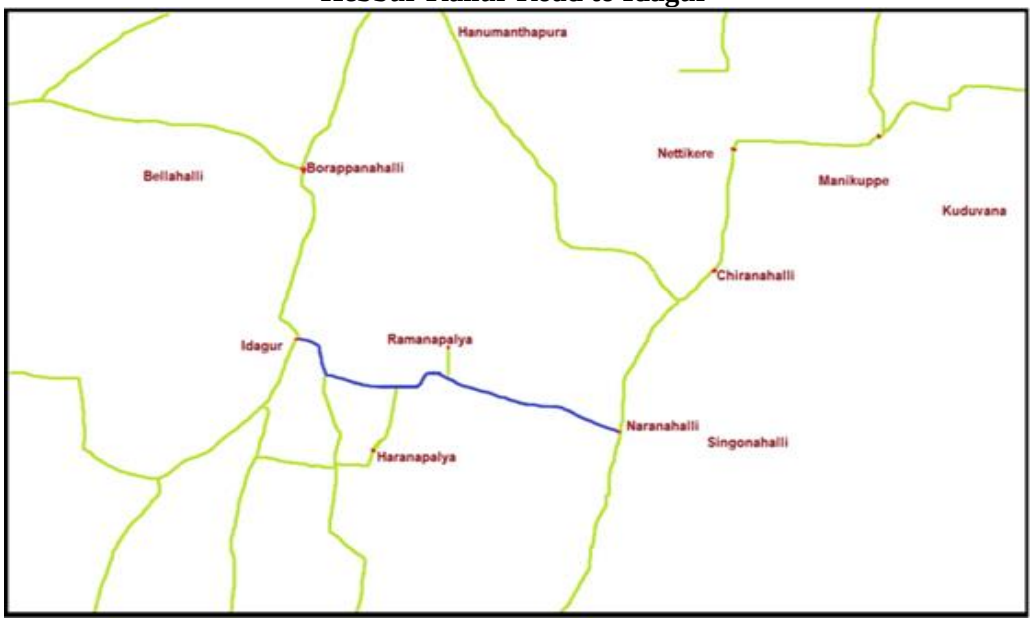
**BGH Road to join C.N. Halli Taluk**




## 2. Road from Hubbur Kallur road to Idagur in Gubbi Taluka of Tumkur District

The road from Hubbur Kallur road to Idagur Via, Manikuppe, Cheeranahally, Naranahally is expected to benefit 6 villages, namely; Manikuppe, Cheeranahally, Naranahally, Ramanpalya, Haranapalya and Idagur and helps to connect these villages to Gubbi, Hebbur and Kallur (Marketing centres). Villagers from Abbanakuppe and Naranahalli will get direct connecting road to Igagur Gram Panchayat.

**Hebbur Kallur Road to Idagur**



**Mysore District**

Mysore district is situated on the southern part of Karnataka state. It is 140 kms away from the State Capital Bangaluru. Mysore is the historical and tourist center. The district consists of seven taluks, namely, H.D.Kote, Hunsur, K.R.Nagar, Nanjangud, Periyapatna, T. Narasipura and Mysore. The district has 1216 villages and 235 Gram Panchayats. The district has a population of 29, 94,744 (2011) and having population density of 437 inhabitants per square kilometer. There are 982 females for every 1000 males and a literacy rate of 72.56 per cent. Agriculture is the main occupation of the people and it is highly dependent on the rainfall. The rivers Kaveri and Kabini provide the irrigation for agriculture. Some of the important crops grown in the district are; Paddy, Ragi, Sugarcane, Sunflower, Tur, Cotton and Grams. Silk is the major horticulture crop. The district is known for Mysore silk sarees. The district is known for its traditional industrial activities, such as agarbathi (incense sticks), silk reeling, handloom and silk weaving and crafts like the inlaid works. Rearing silk worms is one of the major cottage industries of the district, and thus it stands first in the area of sericulture. Mysore district is well served by a large network of roads connecting all the taluks and important trading centres outside the district. Efforts have also been made to improve the rural connectivity but still it needs to be strengthened. Following paragraphs depict how the selected RIDF rural road would help the rural households.

**Road Projects Chosen for the Study: Mysore District**

**1. Road from Rattanahalli to Kallur Naganahall in Mysore Taluka of Mysore District**

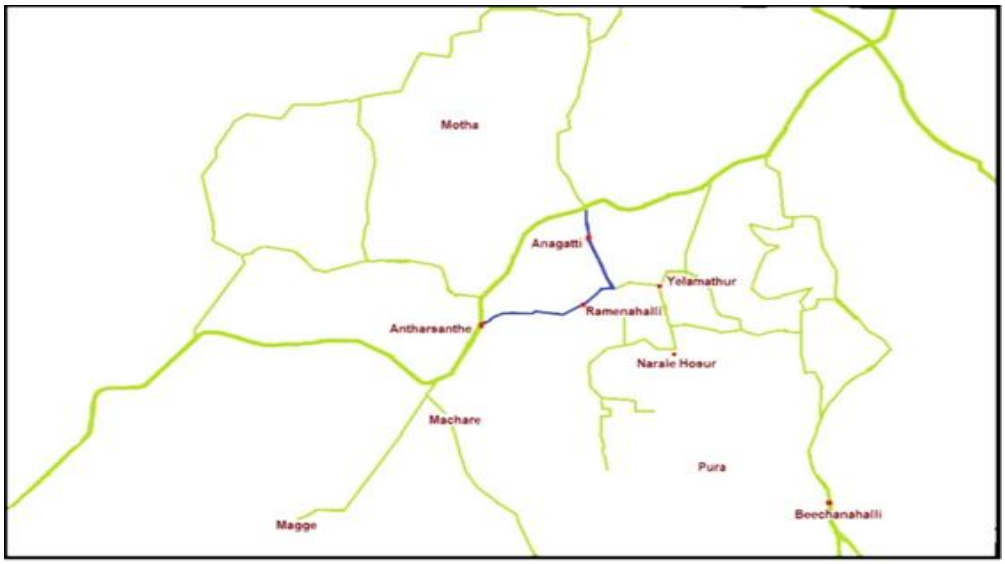
The road from Rattanahalli to Kallur Naganahalli via Gungral Chatra connects Rattanahalli, Gungral Chatra, Kallur Naganahalli villages in Mysore taluk and is expected to benefit population of 5,659.

**Road from Rattanahalli-K.Naganahalli**


## 2. Road from M M Road to Ramenahalli in H D Kote Taluka of Mysore District

H D Kote Taluk is considered as one of the backward taluka in the district. The road from Mysore - Mananthavady Road to Ramenahalli- Narale Hosur Road via Anagatti connects surrounding villages Narale Hosur, Ramenahalli, Anagatti, Yalemattur, Jeeyara and Pura to nearer Gram Panchayat villages like Nuralakuppe and Antharsanthe. People from these villages used to travel to taluk head quarter i.e. H.D.Kote via Antharsanthe using the road Mysure - Mananthavady Road and up to Antharsanthe, the villagers used to walk, which would be done away by this RIDF supported road.

**Road from M.B.G road to Kattehundi**



The expected benefits from RIDF rural road projects are different in developed taluks and less developed taluks. In less developed taluks, these roads are mainly expected to connect the villages to major roads which may result in improving education and health of the people. In developed taluks, these are expected to improve the transportation of agricultural products and improving trade and business.

RIDF supported roads always aim at connecting the gaps that exist from out of the major road net-works. Thus, the last mile connectivity provided through RIDF supported roads helps people, farmers, students and activities across different sectors. Both economic and social benefits are the positive externalities that would flow from RIDF initiatives.

# CHAPTER 4
# OBSERVATIONS OF THE STUDY

In this chapter, consolidated observations of the study on process of implementation of the projects, physical and financial progress, and operational and maintenance aspects have been presented. Individual project wise details are furnished in chapter 6.

To:

Date: 28th May 2014

Shri. S. Chikkamadu
Honorable Member of Legislative Assembly (MLA),
Heggadadevanakote Constitution,
Heggadadevanakote

From:
Important persons and Villagers,
Shrirana Hundi Village,
Kasaba Hobili,
Heggadadevanakote Taluk.

Respected Sir,
**Subject: Regarding Construction of Road to our Village.**

In concern with above said subject, we the villagers from Shrirana Hundi request you to construction a road to our village. In our village there are around 1000 population is existed and there is no bus facility is available and most of the public from our village will suffering from it. From the Shrirana Hundi bus stop to reach our village it takes 2 kilometers. In this connection we request you to construct a road connecting Shrirana Hundi Hosur Keri to Shrirana Hundi Goudera Beedi vai Shrirana Hundi Gate up to Kunte Gouder's House.

Thanking You,

Yours Faithfully
Shrirana Hundi Villagers

## 4.1 PROCESS OF IMPLEMENTATION OF RIDF PROJECTS

### Identification of Projects

Demand for rural road projects usually comes from villagers through the people representatives (MLAs). State government prepares proposals and submits to NABARD for sanction. If projects are technically feasible and economically viable, sanction is accorded, by the specially constituted sanctioning committee.

Sanction of Projects: The projects pertaining to eligible sectors under each RIDF tranche are submitted by the State Governments through their Finance Department to NABARD's Regional Offices (ROs). The project proposals are appraised by the Regional Office with the help of Consultants by conducting desk and field appraisal. Appraisal reports submitted by the Regional Offices are then scrutinized by State Projects Department at Head Office before placing the same before Project Sanctioning Committee (PSC) for consideration of sanction.

The Finance Department of the State Government acts as Nodal Department for operationalsing RIDF. The project proposals are routed through the Finance Department only and no proposals are accepted directly from any other Department of the State Government. All other related items of work like submission of applications under sanctioned projects, release of loan, execution of documents, repayment of loans, etc., are attended to by the Finance Department of the State Government.

**Release of Funds:** Mobilisation advance / Start up advance @ 20% of the RIDF Loan sanctioned under the projects is released to the State Governments on conveying acceptance of the terms & conditions of sanction by the State Government, before incurring expenditure on the projects for procurement and supply of materials, etc. Loans are released on reimbursement basis against the actual expenditure incurred in execution of sanctioned projects. RIDF loans are released to the State Governments by Regional Offices of NABARD.

**Rate of Interest on Loans:** The State Government will be required to pay interest as decided by Reserve Bank of India, on loans disbursed under various tranches. The current rate of interest is 6.50%.

**Repayment period of loans:** Each drawal by the State Government would be treated as a separate loan and would be repayable in 7 years inclusive of a grace period of 2 years, i.e., each drawal would be required to be repaid in 05 equal annual installments after the grace period of 2 years. Interest will be payable during grace period.

The implementing agency should maintain following instructions.

- The projects shall be executed and completed within a period of 6 months from the date of agreement**.**
- The road works including the cross drainage works shall be executed as per the technical specifications prescribed by the Ministry of Road Transport and Highway/Indian Roads Congress. The roads must have proper drainage facilities.
- The roads and bridges constructed under this programme shall be of very high standard, requiring no major repairs at least for three (3) years after completion of

construction. The contractors shall have to give guarantee for 3 years for maintenance.

- The executing agency shall keep a record of the work at three stages- beginning, middle and final, by taking photographs from fixed benchmarks and produce them for all inspections and the same should also be uploaded in departmental website from time to time.
- The executing agency shall ensure that effective quality control is exercised by way of periodical tests on materials, concrete and finished works as per Ministry of Road Transport and Highway (MORTH)/Indian Road Congress (IRC) standards through the adequate technical personnel available at the quality control divisions and also by way of periodical inspection by the Superintending Engineers.
- As the works under this programme are subject to audit by the office of the Comptroller & Auditor General of India, the well-established accounting system of works shall be followed. The audit statements shall be submitted at the end of the financial year together with the auditor's reports.

In Karnataka, Public Works Department (PWD) and Panchayat Raj and Engineering Department (PRED) have been implementing the RIDF rural roads. All the necessary steps have been taken to ensure quality and timely completion of the projects. There are two level monitoring Committees to ensure the same. At the state level, implementation of RIDF projects has been monitored by a Level Committee (HPC) under the Chairmanship of Chief Secretary, of the State Govt. and comprising heads of all implementing Departments and NABARD. At the district level, the District Level Review Committees with the Chief Executive Officer, Zilla Panchayat as Chairman, representative from NABARD and officials concerned from the implementing Departments as Members, will review the progress of the projects.

## 4.2 Quality of Assets Created

To ensure the quality of work, the implementing agencies (PWD and PRED) have built their own internal system. They are; in-house quality control at the level of the executing agencies whereas the second tier provides for quality monitoring through independent State Quality Monitors (SQM). Monitoring by independent National Quality Monitors (NQM)

constitutes the third tier of this arrangement. The Quality Control on Rural Roads is exercised as follows:

## 1. Quality Control Tests on Materials

All materials before incorporation in the work shall be tested by the Contractor for the tests indicated under 'Tests to be carried out Prior to Construction'. The tests shall be carried out from each source identified by the Contractor. The test samples shall be representative of the material available from the source. Any change/variation in the quality of material with depth of strata shall be reported. Important tests like the Moisture-Density relationship (Proctor Compaction), Aggregate Impact Value, Plasticity Index, CBR and any other tests specified by the Engineer shall invariably be carried out in the presence of a representative of the Engineer, who will not be below the rank of Junior Engineer. The test results shall form the basis for approval of the source and the material for incorporation in the work and shall be approved by the Engineer. For manufactured items, however, such as concrete pipes, elastomeric bearings etc, a test certificate obtained by the Manufacturer from an approved Test House shall be accepted.

## 2. Quality Control Tests During Construction

During execution of the work, quality control for workmanship and ensuring conformance to specifications shall be exercised on the basis of the tests indicated under 'Field Quality Control Tests During Construction'. The tests shall be carried out by the Contractor independently or in the presence of Employer's representative, normally a Junior Engineer, when available at site or where association of the Employer's representative in test is prescribed. The Junior Engineer shall record the results in his own handwriting. The Contractor shall be fully responsible for all the tests carried out for the work. The Assistant Engineer/Executive Engineer

during their site visits shall have a few tests carried out in their presence and sign the Quality Control Register.

### 3. Stage Passing

Supervisory officers of the level of AE and EE shall exercise quality control checks and certify the work of various stages on the basis of tests and their frequencies indicated under 'Quality Control Checks'. The officer certifying the work at various stages as prescribed shall be responsible for the quality and quantity of the work certified by him. Random Checks and Simple/Hand-Feel Tests are also in practice to monitor the quality of works. The reports of the inspecting officer / quality control tests and compliance thereto shall be retained on record by the Project Implementing Division. These reports shall be made available to NABARD whenever required.

A High Level Committee (HPC) under the Chairmanship of Chief Secretary, of the State Govt. and comprising Heads of all implementing Departments and NABARD shall review the progress of the project at quarterly intervals. Further, the District Level Review Committees with the Chief Executive Officer, Zilla Panchayat as Chairman, representative from NABARD and officials concerned from the implementing Departments as Members, will review the progress of the projects at the district level. The State Govt. shall undertake periodical monitoring and concurrent/ex-post evaluation of the project by an independent third party agency, to evaluate the project on the various parameters. A typical flow chart for quality assurance checks during the construction of rural roads is given as an illustration in Figure 1.1.

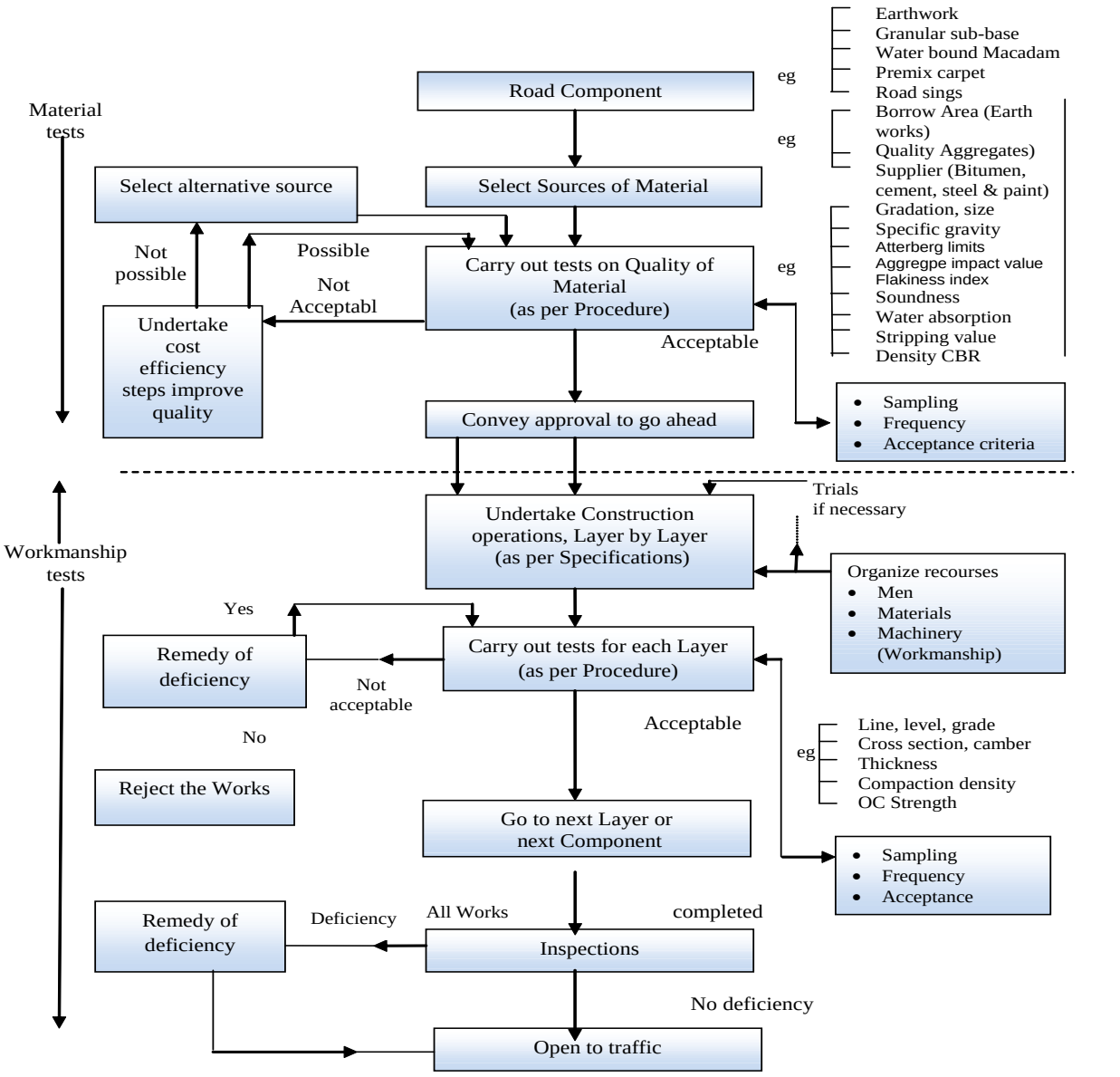



Figure 101: Typical flow Chart for Quality in Road Works

Notes:

1. Field units shall maintain proper quality control records in the prescribed formats
2. In addition to the quality control exercised by the PIU as described above, additional quality monitoring checks will be carried out by second and third tiers.

http://pmgsy.nic.in/downloads/QAHVolI.pdf

Discussion with the engineers, villagers and the personal observation of the research team in all the selected project influential area reveals that all efforts have been made to construct good quality of roads by the implementing agencies.

## 4.3 FINANCIAL PROGRESS OF THE PROJECTS

Financial progress of selected projects shows that all the projects have been completed within the estimated costs. The actual cost of projects was less than estimated projects in 6 projects i.e. savings. For all the projects, the entire sanctioned NABARD loan has been released and savings have accrued to state government. Savings have accrued mainly due to tender premiums and in project 'road from BGH Road to join C.N. Halli Taluk' savings are mainly due to non execution of some works (like drainage facility) and tender premiums.

## 4.4 PHYSICAL PROGRESS OF THE PROJECTS

Physical progress of the selected projects in Karnataka reveals that all of the projects took some time to initiate the work after obtaining the administrative approval. But all the projects, except two, have completed the work within the stipulated time. The projects, 'road from BGH Road to join C.N. Halli Taluk' and 'road from Hebbur Kallur Road to Idagur' took more time i.e. 2 years & 5 months and 4 months respectively, mainly on account of tendering agency. The length of the road varies from 2.85 Km to 6.4 Km across the selected roads.

## 4.5 BEST PRACTICES BY DEPARTMENT

Provision of drainage on both side of the road has been made for all the selected roads apart from constructing good quality rural roads and their timely completion.

## 4.6 PROFILE OF SELECTED HOUSEHOLDS

The profile of the households, such as social composition, farm size, ownership and type of house, electrification, toilet facility and type of ration card has been presented below. Table 4.1and table 4.2 show profile of households in influential and non-influential area of the road respectively. Table 4.1 reveals that on an average, 98.8 per cent of the households belong to Hindu, 1.0 per cent belongs to Muslim community and 0.3 per cent to the religion of

Christianity. The overall percentage of the SC is 20.8 per cent, ST is 5.0 per cent, OBC is 33.3 per cent, Minorities is 1.3 per cent and others is 39.8 per cent. This shows that about 60 per cent of the households belong to weaker sections that belong to SC, ST, OBC and Minorities in the selected command areas. The ownership of the house reveals that 98.5 per cent of households are having their own house and 1.6 per cent reside in rented houses and other type of arrangements. If we look at the type of the house, 50.8 per cent households live in Semi-Pucca house, 14.3 per cent in Pucca house, 32.8 per cent in Kuchcha and remaining 2.3 per cent households live in huts. Majority of the households have electricity facility, among the surveyed households, 97.0 per cent have electricity facility and 3.0 per cent have no electricity facility. The overall percentage for the toilet facility in households gives a clear picture of the condition that exists in the area they reside. The households having their own toilet facility are 37.3 per cent, those using common toilet are 1.3 per cent, and 61.5 per cent households have no toilet facility. The data pertaining to type of ration card holdings shows that on an average 7.3 per cent of households have 'Above Poverty Line (APL) cards and remaining 92.7 per cent of households have different types of 'Below Poverty Line (BPL)' cards. Type of farmers according to farm size reveals that around 86 per cent of the households are marginal and small farmers and remaining 14 per cent are medium and large farmers.

Table 4.2 also depicts the same pattern of profile of non-command area households as in case of command area households with slight differences. But the comparison of profile of these two shows that the command area farmers are slightly better off compared to non-command households. The percentage of households having toilets and households having 'APL'cards are high in case of command area households.

**Table 4.1: Profile of Households -Road Influencial Area (% of HHs)**

| Particulars | Road from Ingalagi Jeeragal | Narenoor-Fakirbudhihal-Kainkatti road | Road from Naranja Sugar Factory to Hippalgaon | Road from Ganeshpurwadi to Ambesangavi | Road from Rattanahalli-K.Naganahalli | Road from M.B.G road to Kattehundi | BGH Road to join C.N. Halli Taluk | Hebbur Kallur Road to Idagur | Count |
|---|---|---|---|---|---|---|---|---|---|
| ***Households by Reglion*** | | | | | | | | | |
| Hindu | 100.0 | 100.0 | 90.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 98.8 |
| Muslim | 0.0 | 0.0 | 8.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.0 |
| Christain | 0.0 | 0.0 | 2.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.3 |
| Group Total | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |
| ***Households by Caste*** | | | | | | | | | |
| ST | 2.0 | 4.0 | 2.0 | 0.0 | 26.0 | 6.0 | 0.0 | 0.0 | 5.0 |
| SC | 0.0 | 58.0 | 30.0 | 18.0 | 6.0 | 12.0 | 8.0 | 34.0 | 20.8 |
| OBC | 60.0 | 16.0 | 22.0 | 48.0 | 36.0 | 16.0 | 56.0 | 12.0 | 33.3 |
| Minority | 0.0 | 0.0 | 10.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.3 |
| Others | 38.0 | 22.0 | 36.0 | 34.0 | 32.0 | 66.0 | 36.0 | 54.0 | 39.8 |
| Total | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |
| ***Households by Ownership of House*** | | | | | | | | | |
| Own House | 98.0 | 100.0 | 100.0 | 94.0 | 100.0 | 100.0 | 100.0 | 96.0 | 98.5 |
| Rented | 2.0 | 0.0 | 0.0 | 4.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.8 |
| Others | 0.0 | 0.0 | 0.0 | 2.0 | 0.0 | 0.0 | 0.0 | 4.0 | 0.8 |
| Total | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |
| ***Households by Type of House*** | | | | | | | | | |
| Hut | 0.0 | 0.0 | 2.0 | 4.0 | 4.0 | 0.0 | 4.0 | 4.0 | 2.3 |
| Kutcha | 34.0 | 32.0 | 26.0 | 38.0 | 38.0 | 18.0 | 50.0 | 26.0 | 32.8 |
| Semi Pucca | 50.0 | 46.0 | 48.0 | 58.0 | 54.0 | 40.0 | 40.0 | 70.0 | 50.8 |
| Pucca | 16.0 | 22.0 | 24.0 | 0.0 | 4.0 | 42.0 | 6.0 | 0.0 | 14.3 |
| Total | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |
| ***Households by Electrification of House*** | | | | | | | | | |
| Yes | 100.0 | 100.0 | 100.0 | 98.0 | 90.0 | 100.0 | 100.0 | 88.0 | 97.0 |
| No | 0.0 | 0.0 | 0.0 | 2.0 | 10.0 | 0.0 | 0.0 | 12.0 | 3.0 |
| Total | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |
| ***Holdsholds by Toilet fecility of House*** | | | | | | | | | |
| Own | 12.0 | 4.0 | 16.0 | 42.0 | 78.0 | 48.0 | 56.0 | 42.0 | 37.3 |
| Common | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 6.0 | 2.0 | 1.0 |
| Public | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 2.0 | 0.0 | 0.3 |
| 4 | 88.0 | 96.0 | 84.0 | 58.0 | 22.0 | 52.0 | 36.0 | 56.0 | 61.5 |
| Total | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |
| ***Households by Type of Ration card*** | | | | | | | | | |
| APL | 2.0 | 2.0 | 4.0 | 0.0 | 12.0 | 0.0 | 28.0 | 10.0 | 7.3 |
| BPL | 90.0 | 92.0 | 90.0 | 70.0 | 66.0 | 84.0 | 52.0 | 68.0 | 76.5 |
| Akshaya | 0.0 | 0.0 | 0.0 | 6.0 | 0.0 | 0.0 | 6.0 | 0.0 | 1.5 |
| Antyoday | 0.0 | 0.0 | 2.0 | 12.0 | 8.0 | 2.0 | 0.0 | 8.0 | 4.0 |
| No Cards | 8.0 | 6.0 | 4.0 | 12.0 | 14.0 | 14.0 | 14.0 | 14.0 | 10.8 |
| Total | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |
| ***Households by Farm Size*** | | | | | | | | | |
| Marginal | 20.5 | 41.5 | 46.7 | 72.5 | 45.9 | 37.0 | 58.5 | 64.1 | 47.7 |
| Small | 40.9 | 48.8 | 37.8 | 22.5 | 43.2 | 45.7 | 34.1 | 33.3 | 38.4 |
| Medium | 20.5 | 7.3 | 4.4 | 2.5 | 5.4 | 15.2 | 7.3 | 2.6 | 8.4 |
| Large | 18.2 | 2.4 | 11.1 | 2.5 | 5.4 | 2.2 | 0.0 | 0.0 | 5.4 |
| Total | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |

**Table 4.2: Profile of Households - Non Influencial Area (% of HHs)**

| Particulars | Road from Ingalagi Jeeragal | Narenoor-Fakirbudhihal-Kainkatti road | Road from Naranja Sugar Factory to Hippalgaon | Road from Ganeshpurwadi to Ambesangavi | Road from Rattanahalli-K.Naganahalli | Road from M.B.G road to Kattehundi | BGH Road to join C.N. Halli Taluk | Hebbur Kallur Road to Idagur | Total |
|---|---|---|---|---|---|---|---|---|---|
| ***Households by Reglion*** | | | | | | | | | |
| Hindu | 100.0 | 90.0 | 86.0 | 96.0 | 98.0 | 98.0 | 100.0 | 100.0 | 96.0 |
| Muslim | 0.0 | 10.0 | 14.0 | 2.0 | 2.0 | 2.0 | 0.0 | 0.0 | 3.8 |
| Christain | 0.0 | 0.0 | 0.0 | 2.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.3 |
| Total | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |
| ***Households by Caste*** | | | | | | | | | |
| ST | 2.0 | 0.0 | 10.0 | 0.0 | 0.0 | 0.0 | 2.0 | 4.0 | 2.3 |
| SC | 16.0 | 14.0 | 6.0 | 4.0 | 16.0 | 8.0 | 16.0 | 4.0 | 10.5 |
| OBC | 26.0 | 20.0 | 8.0 | 66.0 | 54.0 | 16.0 | 64.0 | 68.0 | 40.3 |
| Minority | 0.0 | 10.0 | 14.0 | 4.0 | 2.0 | 2.0 | 0.0 | 0.0 | 4.0 |
| Others | 56.0 | 56.0 | 62.0 | 26.0 | 28.0 | 74.0 | 18.0 | 24.0 | 43.0 |
| Total | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |
| ***Households by Ownership of House*** | | | | | | | | | |
| Own House | 100.0 | 100.0 | 100.0 | 96.0 | 100.0 | 100.0 | 100.0 | 100.0 | 99.5 |
| Rented | 0.0 | 0.0 | 0.0 | 4.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.5 |
| Total | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |
| ***Households by Type of House*** | | | | | | | | | |
| Hut | 0.0 | 0.0 | 4.0 | 14.0 | 0.0 | 0.0 | 2.0 | 0.0 | 2.5 |
| Kutcha | 2.0 | 0.0 | 10.0 | 58.0 | 48.0 | 4.0 | 48.0 | 48.0 | 27.3 |
| Semi Pucca | 78.0 | 76.0 | 42.0 | 26.0 | 52.0 | 46.0 | 48.0 | 48.0 | 52.0 |
| Pucca | 20.0 | 24.0 | 44.0 | 2.0 | 0.0 | 50.0 | 2.0 | 4.0 | 18.3 |
| Total | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |
| ***Households by Electrification of House*** | | | | | | | | | |
| Yes | 100.0 | 100.0 | 100.0 | 90.0 | 100.0 | 100.0 | 98.0 | 98.0 | 98.3 |
| No | 0.0 | 0.0 | 0.0 | 10.0 | 0.0 | 0.0 | 2.0 | 2.0 | 1.8 |
| Total | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |
| ***Holdsholds by Toilet fecility of House*** | | | | | | | | | |
| Own | 20.0 | 8.0 | 28.0 | 4.0 | 58.0 | 62.0 | 38.0 | 36.0 | 31.8 |
| Common | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 2.0 | 2.0 | 0.5 |
| Public | 2.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.3 |
| No Toilets | 78.0 | 92.0 | 72.0 | 96.0 | 42.0 | 38.0 | 60.0 | 62.0 | 67.5 |
| Total | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |
| ***Households by Type of Ration Card*** | | | | | | | | | |
| APL | 0.0 | 0.0 | 18.0 | 4.0 | 4.0 | 10.0 | 6.0 | 8.0 | 6.3 |
| BPL | 70.0 | 94.0 | 70.0 | 86.0 | 80.0 | 76.0 | 94.0 | 82.0 | 81.5 |
| Akshaya | 0.0 | 0.0 | 0.0 | 4.0 | 2.0 | 2.0 | 0.0 | 0.0 | 1.0 |
| Antyoday | 2.0 | 0.0 | 2.0 | 4.0 | 2.0 | 0.0 | 0.0 | 2.0 | 1.5 |
| No Cards | 28.0 | 6.0 | 10.0 | 2.0 | 12.0 | 12.0 | 0.0 | 8.0 | 9.8 |
| Total | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |
| ***Households by Farm Size*** | | | | | | | | | |
| Marginal | 20.4 | 44.0 | 42.6 | 72.5 | 64.1 | 34.0 | 66.7 | 34.0 | 45.7 |
| Small | 30.6 | 50.0 | 29.8 | 17.5 | 28.2 | 44.0 | 25.6 | 53.2 | 35.7 |
| Medium | 26.5 | 6.0 | 23.4 | 10.0 | 7.7 | 14.0 | 7.7 | 12.8 | 13.9 |
| Large | 22.4 | 0.0 | 4.3 | 0.0 | 0.0 | 8.0 | 0.0 | 0.0 | 4.7 |
| Total | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |

# CHAPTER 5
# IMPACT OF RIDF PROJECTS

In this chapter, overall impact of the selected RIDF rural projects, namely social benefits, economic benefits and benefits to banking sector has been discussed. Individual project wise details are furnished in chapter 6.

## 5.1 SOCIAL BENEFITS TO STAKEHOLDERS

In this section, the benefits of selected RIDF roads on education, health, living standard, and social & political interaction have been discussed.

### 5.1.1 EDUCATION

In recent years, rural households emphasize educating their children because they see the kinds of jobs and incomes that educated people can acquire. Roads and educational programs are now creating significant opportunities for rural people to send their children to school. Table 5.1 shows mode of travel to school before and after the construction of RIDF road. It reveals that student travelling by bus and auto has increased from 5.9 per cent to 32.1 and 1.4 per cent to 1.8 per cent respectively. At the same time student travelling by tempo and bike has reduced. On the whole improvement of road has facilitated better and safe mode of travel.

**Table 5.1: Changes in Mode of Travel to School: Overall**

| Period | Bus | Tempo | Bike | Cycle | Auto | Walk |
|---|---|---|---|---|---|---|
| Before Project | 5.9 | 25.1 | 6.8 | 2.3 | 1.4 | 58.4 |
| After Project | 32.1 | 22.9 | 0.5 | 2.3 | 1.8 | 40.4 |

- Reduction in time in reaching schools and changes in the mode of travel has resulted in reduction in absenteeism of students as well as of teachers. The study reveals that due to improvement of roads 47 per cent households felt that absenteeism of children has reduced. Average days of absenteeism from school has reduced from 7.8 days to 2.3 days in a year.

- The percentage of households reporting teachers remaining absent for many days during the year has reduced from 64.1 per cent to 4.0 per cent. This shows that teachers' absenteeism has reduced with the improvement of roads in Karnataka.

- Timely availability of school materials like notebooks, pens, pencils, etc is very important in learning process. Households reporting timely availability of school articles have increased from 4.1 per cent to 89.5 per cent. Thus, improvement of roads has improved the availability of school articles in the village at right time. school articles has also improved.

Thus, improvement of roads has helped the students in reducing the distance to be travelled and time to reach the school and this has in turn resulted in reduced absenteeism of children and teachers. Availability of

### 5.1.2 HEALTH SERVICES

Healthcare needs of individuals living in rural areas are different from those in urban areas, and rural areas often suffer from a lack of access to healthcare. Improvement of rural roads can significantly improve the access to healthcare by connecting nearby towns where health facilities, such as health centres and dispensaries, are available. Better roads also help the health personnel to work efficiently and attend to more number of persons by increasing their area of operation. More efficient and qualified doctors are also attracted to work in the rural areas with the good connection of roads. The study reveals that almost all the households in the selected project areas depend on the specified road for health care facilities before and after improvement of the road.

- As result of improvement of road, the numbers of visits by the households to the nearby health centres has increased from 8 to 12. This reveals that rural people were not able to travel by bad road during illness and after the improvement of roads people are able to travel safely to nearby towns to get health facilities.

- Mode of travel to nearby health centre or hospital using the RIDF road reveals that earlier, most of the households used to walk to hospital in the absence of better road

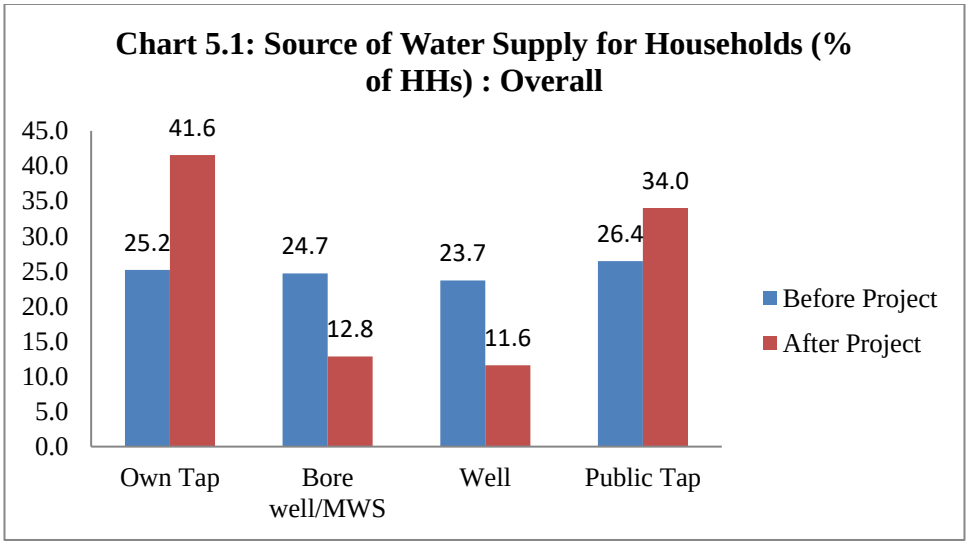
and only about 12 per cent travelled by tractor, bike, bicycle and auto. After improvement of roads, proportion of households who used to walk has reduced drastically i.e. 35.8 percent to 12.2 per cent. Now rural households are using mainly bus, tempo and auto to visit health centres.

- The proportion of households feeling difficulty in reaching nearby hospital has also reduced from 74.5 per cent to 12.7 per cent.
- Opinion of households regarding visits of health providers to villages shows that on an average 80.3 per cent of households feel that visits of health providers have increased, 18.7 per cent feel that there has been no change in number of visits and remaining 1 per cent feel that number of visits have decreased after improvement of roads. Thus, improvement of the roads has resulted in more number of visits of health staff.
- Absenteeism of health service providers in the villages shows that proportion of households reporting 'more absent' has reduced from 67.5 per cent to 13.0 per cent after improvement of roads. This shows that absenteeism of health personnel has reduced significantly after improvement of roads.
- Availability of medical services has also improved in the villages with the improvement of roads. Proportion of households reporting availability of medical services has increased from8.1 per cent to 86.2 per cent.
- Higher incomes potentially allow households to increase their health and medical expenditure. Due to increased income from the RIDF rural road projects, the affordability of households has increased. On an average, household health expenditure has increased from Rs. 410 to Rs.643 per year. This means that households are now able to spend on health/afford health facilities which they were not able to do earlier.

### 5.1.3 WATER SUPPLY

There has been lot of improvement in the status of water supply after the implementation of RIDF rural road projects.this is mainly due to increased income of the households and speedy

implementation of water supply projects in the villages. The study shows (Chart 5.1) that percentage of households having their own tap increased from 31.1 per cent to 43.1 per cent. At the same time, percentage of households depending on public sources, such as borewell, Mini Water Supply (MWS) and Public tap has declined from 61.3 per cent to 41.1 per cent. Households depending on wells have also declined from 7.6 to 5.8.

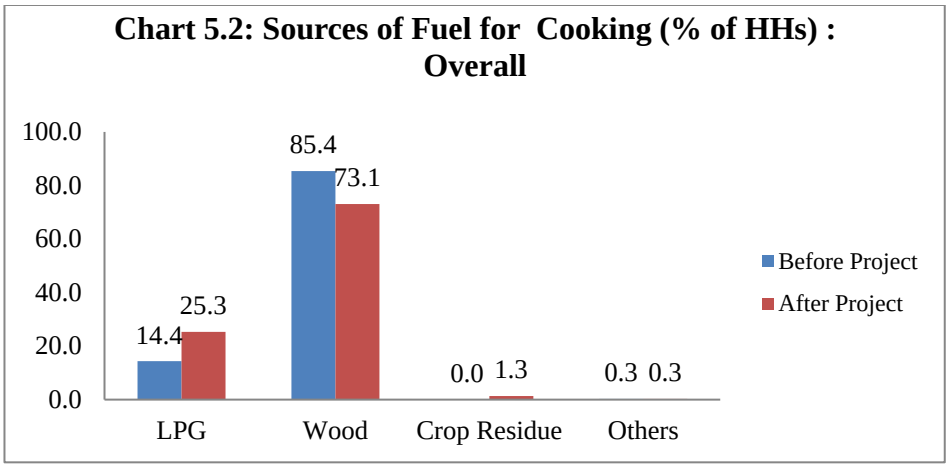



### 5.1.4 TOILET FACILITY

After the road improvement, the percentage of households having their own toilet has increased from 37.6 per cent to 53.3 per cent.

### 5.1.5 FUEL FOR COOKING

Households in selected project areas traditionally use firewood and crop residues for cooking. But after the implementation of RIDF rural road projects, households have started using LPG. Chart 5.2 shows percentage of households using different sources of fuel for cooking. It shows that proportion of households using LPG has increased from 18.4 to 24.7 per cent. Though the use of firewood and crop residues has declined, their use in rural areas is still high. On an average 66.4 per cent of households use firewood and 8.9 per cent use crop residues for cooking purpose. Observations in non-command area indicate that the proportion of use of LPG is very less compared to command areas




### 5.1.6 HOUSEHOLD ASSETS

There has been a large increase in the proportion of assets of the selected households after the implementation of RIDF rural road projects. There has been increase in both agricultural implements (tractors, sewing machine, insect pump and bullock cart) and consumer durable goods (motor cycle, cycle, TV, refrigerator, land phone, sewing machine, electric fan, cooking gas, and grinder/mixer). But the increase in consumer goods is more pronounced than agricultural implements.

### 5.1.7 SOCIAL INTERACTION

Households might not only learn from their own experimentation, but also from others. Increased social interaction could lead to increased information and awareness. Rural people can learn and exchange their views with relatives and friends.

- After the improvement of roads, number of visits of households to nearby cities or towns for social purpose like marriages, attending funerals and Jatras have increased from 4 to 6.

- The number of visits to nearby cities or town by the household members reveals that female visits have increased from 1.9 to 2.9 (i.e. 57.6 Percent), male visits increased from 2.8 to 4.4 (i.e. 58.0 per cent) and children visits increased from 1.4 to 2.7 (i.e. 89.8 percent). This shows that children's visits have increased substantially.

- With the improvement of roads, households' number of visits to different villages and cities have increased from 4 to 6 in a month. Visits of children have increased substantially compared to elderly male and female members.

### 5.1.8 Political Participation

Improved roads can also have an effect on household participation in community and political organizations. Increased participation of rural people in community and political organizations can make their voices heard and their rights protected.

- The study reveals that 82.8 percent of the households agreed that transportation facilities aided to influence political activities in village and 81.9 per cent of households have reported that their political participation has increased after construction of road.

- As a result of increasing political activities in the village, household participation has also increased. The average numbers of Days of household participation in political activities have increased from 2.0 to 3.3 days during a month.

- The proportion of households having membership in community and political organizations has increased from 6.3 percent to 36.5 percent after construction of road. It indicates that improvement of road can lead to social and political integration of rural people.

## 5.2 Economic Benefits: Quantitative and Qualitative

Economic benefits of RIDF rural road projects, namely quantitative and qualitative benefits have been presented in this section.

### 5.2.1Traffic Intensity

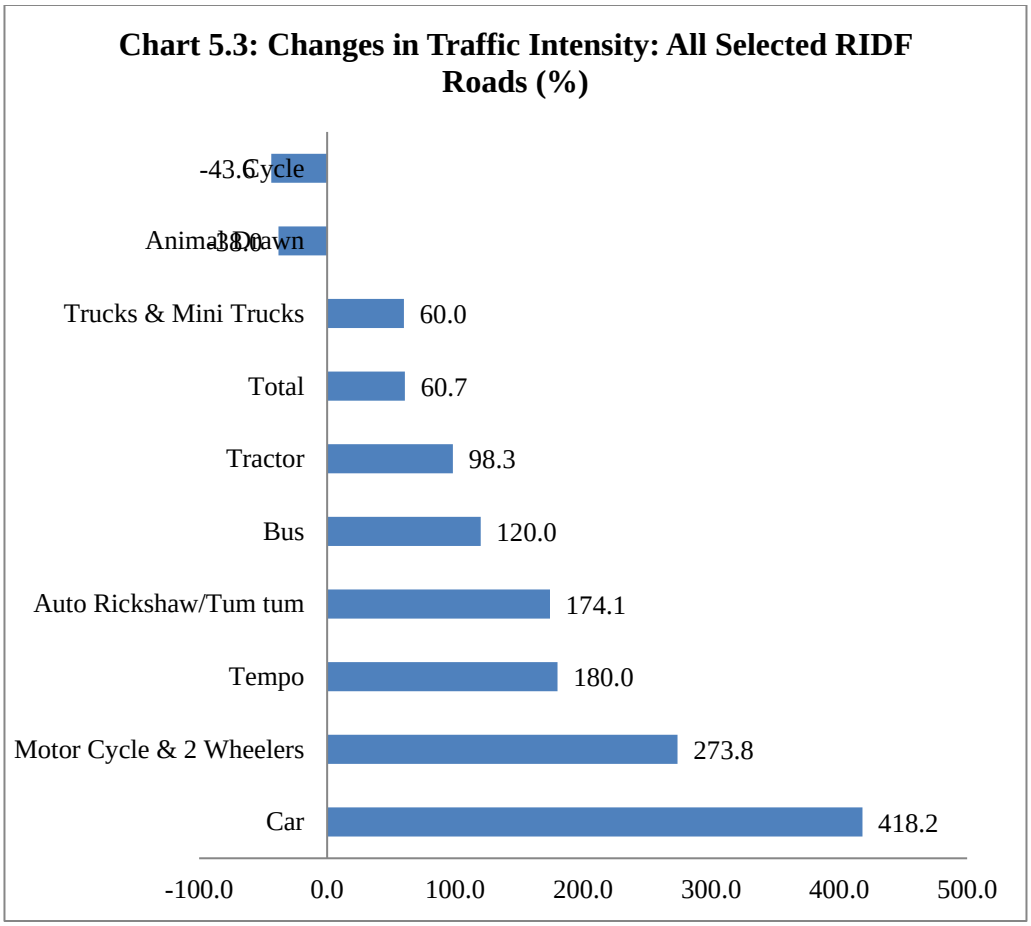
Based on the traffic survey and FGD with vehicle owners and village leaders, the movement of vehicles on the selected RIDF roads has been estimated. Table 5.2 shows changes in the pattern of traffic on the selected RIDF rural roads. It reveals that after the improvement of roads, traffic intensity has increased from 810 PCR to 1301 PCR. Chart 5.3 shows proportion of

changes in pattern of traffic intensity after construction/improvement of roads (All Projects). This shows that after improvement of roads, on an average the traffic intensity has registered 60.7 per cent increase. Movement of cars, two wheelers, tempo, auto/tum tum, buses and tractor has increased significantly but the movement of animal drawn vehicles and cycles has declined after improvement of roads.

**Table 5.2: Comparison of Traffic Intensity: All Selected RIDF Roads**

| Type of Vehicles | Total Number of Vehicles Per Day (24 Hours) | | Passenger Car Units (P.C.U) Per Day (24 Hours) | |
|---|---|---|---|---|
| | After Project | Before Project | After Project | Before Project |
| Car | 114 | 22 | 114 | 22 |
| Jeep | 0 | 0 | 0 | 0 |
| Tempo | 82 | 30 | 154 | 55 |
| Tractor | 115 | 58 | 115 | 58 |
| Bus | 9 | 4 | 22 | 10 |
| Trucks & Mini Trucks | 24 | 15 | 72 | 45 |
| Motor Cycle & 2 Wheelers | 679 | 177 | 349.5 | 93.5 |
| Auto Rickshaw/Tumtum | 211 | 84 | 196 | 71.5 |
| Cycle | 62 | 110 | 31 | 55 |
| Animal Drawn | 31 | 50 | 248 | 400 |
| Total | 1327 | 550 | 1301.5 | 810 |

*Note: Recommended PCU Factors recommended by Indian Road Congress Manual, 2001 for Various Types of Vehicles on Rural Roads: Car=1, Jeep=1, Tempo=2, Tractor=1, Bus=3, Truck and Mini Trucks=3, Motor Cycle & 2 Wheelers=0.5, Auto Rickshaw/Tum tum=1, Cycle=0.5 and Animal Drawn=8*




### 5.2.2 Economic Viability of Projects

Table 5.3 shows that all the selected projects have been found economically viable in terms of benefit cost ratio, net present value and internal rate of return. Only 3 projects showed internal rate of return less than the rate of interest (namely, Improvement to Road from Ingalagi Jeeragal, Improvements to road from Naranja Sugar Factory to Hippalgaon and Improvements to road from M.M.road to Ramenahalli - Nerale Hosur road via Anagatti). The payback period of selected projects varies from 3 years to 10 years. The detailed methodology of estimating the economic viability has been presented in chapter 6.

**Table 5.3: Viability of Selected RIDF Rural Road Projects in Karnataka**

| Taluk | Name of the Project | Benefit/Cost (B/C) Ratio | Internal Rate of Return (IRR) % | Payback Period (Years) |
|---|---|---|---|---|
| Mudhol | Improvement to Road from Ingalagi Jeeragal | 1.03 | 1.03 | 8 Years |
| Badami | Improvements from Narenoor-Fakirbudhihal-Kainkatti road | 1.78 | 25.41 | 6 Years |
| Bidar | Improvements to road from Naranja Sugar Factory to Hippalgaon | 1.12 | 3.78 | 8 Years |
| Bhalki | Improvements to Road from Ganeshpurwadi to Ambesangavi Village | 1.32 | 0.70 | 8 Years |
| Mysore | Improvements to Rattanahalli-K.Naganahalli road via Gungral Chatra | 1.86 | 25.46 | 5 Years |
| H D Kote | Improvements to road from M.M.road to Ramenahalli - Nerale Hosur road via Anagatti | 1.07 | 2.50 | 10 Years |
| Tiptur | Improvements to road from BGH Road to join C.N. Halli Taluk border via Muddanahalli, Halkurike, Doddikatte Road | 2.46 | 33.09 | 3 Years |
| Gubbi | Impts.to road from Hebbur kallur Road to Idagur Via, Manikuppe, Cheeranahally, Naranahally | 2.87 | 38.33 | 3 Years |

### 5.2.3 EMPLOYMENT AND INCOME: CONSTRUCTION STAGE

Out of the 8 selected projects, households in only 4 project influential areas are reported to have obtained employment during the construction/improvement of rural roads. Usually the construction/improvement of roads is given to contractor who employs his own laborers. Only in some cases the contractors take villagers for work. Therefore, in our sample projects, only 3 percent of the households got 35 days of employment in 4 selected projects.

### 5.2.4 INDUCED EMPLOYMENT AND INCOME

- The study reveals that on an average, 32.3 per cent of the households are able to increase their income in the sample villages due to improvement of rural road.
- On an average the household income has increased from Rs. 5675 to Rs. 8640 i.e. 52 per cent increase from previous income level.
- Due to improvement of roads, following types of employment opportunities are gained by the beneficiaries. They are;

- Employment in Petty business has been reported from Road from 5 project areas (namely, Ingalagi Jeeragal, Narenoor-Fakirbudhihal-Kainkatti road, Road from Naranja Sugar Factory to Hippalgaon, Road from Ganeshpurwadi to Ambesangavi and Road from Rattanahalli-K.Naganahalli).

- Employment in profession and other rural works like blacksmith, carpenter, tailor and painter has been reported from Road from 6 project areas (namely,Road from Ingalagi Jeeragal, Narenoor-Fakirbudhihal-Kainkatti road, Road from Naranja Sugar Factory to Hippalgaon, Road from Ganeshpurwadi to Ambesangavi, Road from Rattanahalli-K.Naganahalli and Road from M.B.G road to Kattehundi)

### 5.2.5 MARKETING OF HOUSEHOLD ITEMS

The proportion of households using the road for the purchasing their household need after the improvement of road has increased from 53 per cent to 95.5 per cent. Thus, RIDF has helped rural households to get household items at reasonable price.

- The roads have helped to reduce the distance to be travelled to market for 36.5 per cent of households.

- On an average time required to reach the market has been reduced from 40.4 minutes to 28.8 minutes.

- After the improvement of roads, people can move easily to nearby towns. On an average, the number of visits of households has increased from 4.1 visits to 6.8 during a month.

- On an average 78.9 per cent of the households are purchasing more number of products and 81.3 per cent are purchasing more quantity of products from the nearby cities after the improvement of road. Thus, people are getting more variety and good qualities of products at a reasonable price.

- As a result of increase in number of products and quantity of products purchased from the market, the total value of products purchased from the market has also increased from Rs1542 to Rs.2332.

- Improvement of roads has led to better transportation facility. Now the local shop owners are able to bring variety of products to the shop for selling. This can help in meeting the needs of the households. On an average, 73.9 per cent of households have reported that availability of goods in the villages has increased after the road improvement.

With the improvement of roads, rural households are able to move to nearby cities easily to purchase household items. The visits have increased from 4.1 to 6.8 during a month and the volume of purchase has also increased. Now the local shop owners are also able to bring variety of products to the shop for sale in the villages.

### 5.2.6 Marketing of Agricultural Products

Road accessibility is considered to be one of the major factors influencing rural households' access to and participation in markets. As a result of cheap and easy availability of transport facility, particularly after road improvement, farmers prefer to take their produce to markets in order to get higher prices. In the absence of good road, the farmers were compelled to sell their produce to middlemen in villages. The study reveals that there has been significant improvement in the proportion of households using road after improvement i.e. 38.5 per cent to 78.5 per cent.

- Improvement of roads has also reduced the time required to reach the agricultural market in the nearby town. On an average 73.0 per cent of the households reported reduced time. The time taken to reach agricultural market has reduced from 45.3 minutes to 35.0 minutes.

- Easy accessibility to agricultural market has induced the households to sell their produce in regulated markets. On an average, 76.6 per cent of the households have increased their selling in agricultural market due to improvement of roads. The value of agricultural produce sold in market increased from Rs.67804 to Rs.84021.

- Frequency of visits to market has also increased due to improvement of roads. Now, even small and marginal farmers frequently visit market to purchase inputs and take their produce to market by tractors, tempo, etc. On an average 80.1 per cent of households increased their visit to market and the actual number increased from 10.0 to 14.5 during a year.

- Improvement of roads has helped to reduce distance to market. As a result of this, quantity of sale in regulated markets has increased.

### 5.2.7 AGRICULTURAL ACTIVITIES

The provision of rural roads improves the access to markets for better quality inputs and information to villagers. Identification of sources of supply of inputs and transportation of these inputs also becomes easier after the connectivity is improved. The study reveals that due to increased transportation facility, farmers are able to purchase HYV seeds and other agricultural implements from the nearby cities. This has also helped mobility of labour from one village/habitation to other for continuous work and better wage. This has helped agricultural families to get labourers easily. The wage rate of agricultural workers has increased from Rs.157 to Rs.246.

- Improved all weather road can also help the extension workers to visit the village to impart knowledge to farmers. About 74 per cent of households feel that after improvement of road, visits of extension workers have increased.

- Improvement of rural roads provides for better flow of inputs and outputs from the farms and it gives an opportunity to the farmers to adopt a more beneficial cropping pattern. The traditional cropping techniques and profiles are shifted to better options. About 56 per cent of households reported change in the crop pattern after implementation of road project.

- Easy and faster transportation facilities through improved road helped farmers to get required inputs at reasonable cost and hence farmers are slowly diversifying

their cropping pattern. After project, visits of agricultural extension workers have also increased. Wages of increased agricultural labours from Rs.157 to Rs. 246.

## 5.3 Benefits to Banking Sector

Financial inclusion means providing effective access to credit, savings (defined to include current accounts), payments, and insurance services from formal institutions. Access to finance by the rural households, especially poor and vulnerable groups is a prerequisite for poverty reduction and social cohesion. Financial inclusion has become one of the developmental goals of our nation. The objective of financial inclusion is to extend the scope of activities of the organized financial system to include within its ambit people with low incomes. In rural areas, apart from other factors, low incomes and lack of savings are the main reasons for not having access to institutional finance. It seems that after the implementation of RIDF rural road projects the credit absorption capacities of farmers have increased. As a result of this, banking business after implementation of RIDF projects has increased. Chart 5.4 shows extent of change in bank business after implementation of rural road projects in selected project command areas.

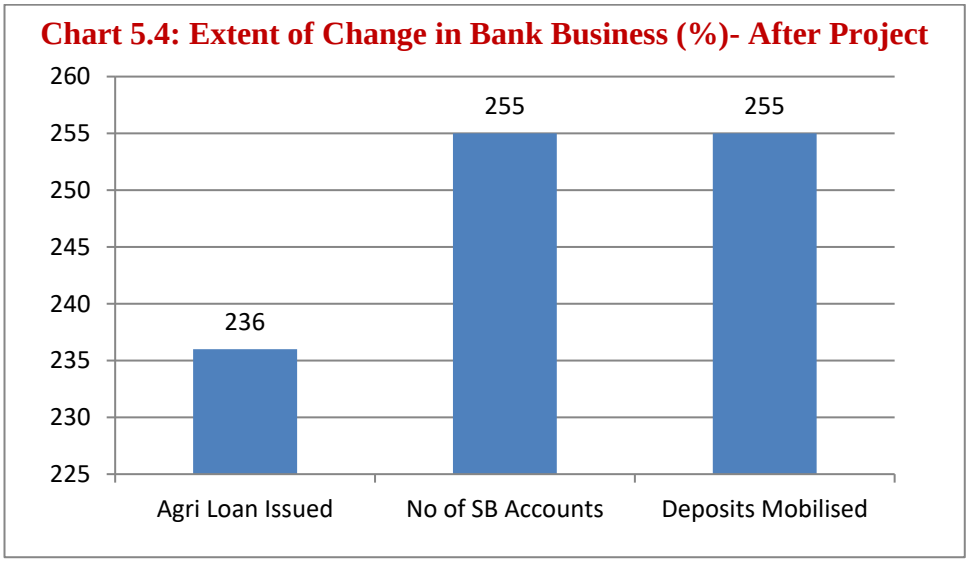



Table 5.4 shows changes in bank business after implementation of selected RIDF rural road projects in Karnataka.

**Table 5.4: Changes in Bank Business in Selected RIDF Road Projects-After Project**

| Name of the Project | Name of Branch and Location | No of villages covered | | Agri Loan issued (in Lakhs) | | | No of Total Accounts | | | No of SB Accounts | | | Deposits mobilized (Rs in Lakhs) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | efore Project | fter Project | efore Project | fter Project | Change | efore Project | fter Project | Change | efore Project | fter Project | Change | efore Project | fter Project | Change |
| Road from Ingalagi to Jeeragal, Mudhol Taluk | Centeral Bank of India and State Bank of Mysore, Mudhol | | | 0 | 10 | 83 | 0 | 14 | 85 | 0 | 39 | 48 | 6 | 2 | 62 |
| Road from Ganeshpurwadi to Ambesangavi, Bhalki Taluk | Pragati Krishna Paltan Sahakari Sangha , Ambesangavim, Bhalki | | | 2 | 60 | 19 | 0 | 0 | 67 | 90 | 48 | 15 | 5 | 2.74 | 71 |
| Road from Rattanahalli to K.Naganahalli, in Mysore Taluk | Canara Bank, Elwala Branch and Gungralchatra Branch, Mysore | 5 | 0 | 0 | 5 | 83 | 80 | 70 | 61 | 75 | 50 | 43 | 0 | 10 | 50 |
| Road from M.M.road to Ramenahalli - Nerale Hosur road, in H. D. Kote Taluk | Cauvery Gr. Bank, Anthrasanthe, H D Kote | | | 1 | 1 | 0 | 2 | 8 | 0 | 1 | 8 | 10 | 2 | 9 | 3 |
| | Total | 5 | 0 | 23 | 26 | 36 | 82 | 82 | 42 | 26 | 595 | 55 | 23 | 14 | 55 |

After implementation of RIDF projects, the proportion of households having SB accounts has increased from 73.5 per cent to 88.5.

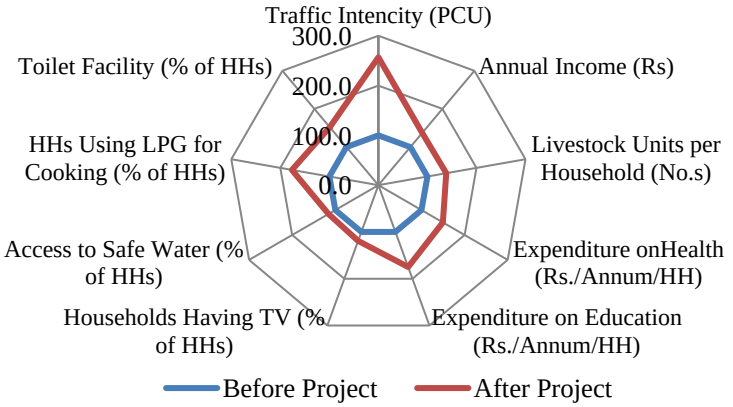
- This indicates that still many households are not getting the benefits of financial institutions. The financial institutions must make strong efforts to remove the barriers to financial inclusion by providing necessary information, co-operation and necessary assistance to villagers in project implemented area.

On the whole, after implementation of RIDF road projects, banking business has improved in terms of agricultural credit lending, increasing the number of SB accounts and deposits.

## 5.4 Overall Impact

Impact of all the eight selected RIDF rural road projects has been presented using the approach 'before and after' the project in graph 5.5. It can be observed from the graph that there has been significant improvement in traffic intensity, use of LPG for cooking, annual income, expenditure on health and education and construction of toilets. The impact seems to be very little as far as use of safe drinking water and owing TV in the house.

**Graph 5.5: Impact of RIDF Road All Projects**




The overall impact of all the selected RIDF rural roads has been calculated using the Double Difference method based on some of the important indicators. Table 5.5 presents the overall impact of selected projects in Karnataka. It can noted from the table that there has been significant improvement in household income, education, health and other indicators. It can be observed that the impact on construction of toilets is not significant.

**Table 5.5: Impact of RIDF Road Project in All Projects (Double Difference Method)**

| Particular | Percentage Change | | Difference (Beneficiary over Non-Beneficiary) |
|---|---|---|---|
| | Beneficiary | Non-Beneficiary | |
| **Household Income** | 36.7 | 15.7 | 21.1 |
| **Impact on Education** | | | |
| Mode of Travel to School | | | |
| Bus | 26.2 | 6.5 | 19.7 |
| Tempo | -2.2 | 1.8 | -4.0 |
| Two Wheeler | -6.4 | 0 | -6.4 |
| Cycle | 0.0 | 3.7 | -3.7 |
| Auto | 0.5 | -0.4 | 0.9 |
| Walk | -18.1 | -11.6 | -6.5 |
| HH reporting Absenteeism of Children (%) | -5.5 | -0.5 | -5.0 |
| Households Reporting Absenteeism of Teachers (%)-Many Days | -60.1 | -7.7 | -52.4 |
| Households Reporting School Articles -in time (%) | 85.4 | 10.4 | 75.0 |
| Expenditure on Education | 940.2 | 358.2 | 582.0 |
| **Impact on Health** | | | |
| Changes in Household Visit to Health Centers | 50.0 | 11.1 | 38.9 |
| Opinion about the road in reaching the hospital | -61.8 | 3.3 | -65.1 |
| Opinion of households about availability of medical services-Good | 78.1 | 4.2 | 73.9 |
| Health | 49.6 | 28.7 | 20.8 |
| **Impact on Agriculture** | | | |
| Households Reporting decline in Time Required to Reach Market | -11.6 | -2.1 | -9.5 |
| No. of Visits to Market | 71.1 | 19.6 | 51.5 |
| Value of Products Purchased from Market | 51.2 | 18.0 | 33.3 |
| Visits to Agricultural Market | 45.0 | 12.9 | 32.1 |
| Wage per day | 57.1 | 40.1 | 17.0 |
| **Impact on Social interaction** | | | |
| No. of Household Visits to Nearby Cities/Towns | 50.0 | 20.0 | 30.0 |
| No. of Participations in Social Activities | 52.7 | 20.4 | 32.3 |
| Average No. of Days of Household Participation in Political Activities | 65.0 | 5.9 | 59.1 |
| Household Membership in Community/Political Organization | 30.2 | 3.2 | 27.0 |
| **Impact on Slandered of Living** | | | |
| Drinking Water | 91.4 | 2.0 | 89.4 |
| Fuel Facility (LPG) | 11.0 | -74.7 | 85.7 |
| Toilet Facility | 20.7 | 12.1 | 8.6 |

## 5.5 Major Findings Of The Study

- NABARD under RIDF has been playing major role in financing rural road projects in Karnataka. For rural roads, NABARD has sanctioned a total of Rs.398526.94 lakhs for 8770 rural road projects i.e. 27.66 per cent of total number of projects. The share of RIDF loan for rural road projects is significant though it varies from year to year. On an average 55.49 per cent of the loan has been sanctioned to rural road projects. This implies that the State Government had given due importance to road projects.

- **Physical Progress of the Projects:** Physical progress of the selected projects in Karnataka reveals that all of the projects to sometime to initiate the work after obtaining the administrative approval. But all the projects, except two, have completed the work within the stipulated time. The projects, 'road from BGH Road to join C.N. Halli Taluk' and 'road from Hebbur Kallur Road to Idagur' took more time i.e. 2 years & 5 months and 4 months respectively, mainly on account of tendering agency. The length of the road varies from 2.85 Km to 6.4 Km across the selected roads.

- **Financial Progress of the Projects:** Financial progress of selected projects shows that all the projects have been completed within the estimated costs. The actual cost of projects was less than estimated projects in 6 projects i.e. savings. For all the projects, the entire sanctioned NABARD loan has been released and savings have accrued to state government. Savings have accrued mainly due to tender premiums and in project 'road from BGH Road to join C.N. Halli Taluk' savings are mainly due to non execution of some works (like drainage facility) and tender premiums.

- **Quality of Assets Created:** Discussion with the engineers, villagers and the personal observation of the research team in all the selected project influential area reveal that all efforts have been made to construct good quality of roads by the implementing agencies.

- **Process of Implementation of RIDF Projects:** Demand for project, comes from villagers through the people representatives (MLAs). State government prepares proposals and submits to NABARD for sanction. If projects are technically feasible and economically viable, sanction accorded, by the specially constituted sanctioning committee.

- **Changes in Pattern of Movement of Vehicles:** On an average the traffic intensity has registered 60.7 per cent increase. Movement of cars, two wheelers, tempo, auto/tum tum, buses, tractor and have increased significantly but the movement of animal drawn vehicles and cycles have declined after improvement of roads.

- Economic Viability of Projects: All the selected projects have been found economically viable in terms of benefit cost ratio, net present value and internal rate of return. Only 3 projects showed internal rate of return less than the rate of interest.

**Impact on Employment and Income of Households**

The study reveals that on an average, 32.3 per cent of the households are able to increase their income in the sample villages. Proportion of households reporting increase in their income is varied across the sample projects and it varies from 18 per cent to 62 per cent. On an average the household income has increased from Rs. 5675 to Rs. 8640 i.e. 52 per cent increase from previous income level. The percentage change in income varies from 35 per cent in 'BGH Road to join C.N. Halli Taluk' to 79 per cent in 'Road from Naranja Sugar Factory to Hippalgaon'. This shows that RIDF rural roads have helped the rural households to increase their income significantly. Following type of employment opportunities are gained by the beneficiaries after road improvement.

- ❖ Employment in Petty business has been reported from Road from 5 project areas (namely, Ingalagi Jeeragal, Narenoor-Fakirbudhihal-Kainkatti road, Road from Naranja Sugar Factory to Hippalgaon, Road from Ganeshpurwadi to Ambesangavi and Road from Rattanahalli-K.Naganahalli).

- Employment in profession and other rural works like blacksmith, carpenter, tailor and painter has been reported from Road from 6 project areas (namely,Road from Ingalagi Jeeragal, Narenoor-Fakirbudhihal-Kainkatti road, Road from Naranja Sugar Factory to Hippalgaon, Road from Ganeshpurwadi to Ambesangavi, Road from Rattanahalli-K.Naganahalli and

**Employment and Income during Construction Stage**

Out of the 8 selected projects, households in only 4 project influential areas reported to get employment during the construction/improvement of rural roads. Usually the construction/improvement of roads are given to contractor who employs his own laborers. Only in some cases the contractors take villagers for work. Therefore, in our sample projects, only 3 percent of the households have reported to get employment during the construction/improvement of road and they earned Rs.7792.

**Impact of Rural Road on Education**

- Use of the specified road by the school going children for education purpose increased from 20.8 per cent to 56.0 per cent.
- On an average, 12.5 per cent of households reported distance to school has reduced and 31.0 per cent reported reduced time.
- Proportion of students travelling by bus and auto has increased from 5.9 per cent to 32.1 and 1.4 per cent to 1.8 per cent. At the same time students travelling by tempo and bike have reduced. On the whole improvement of road has facilitated better and safe mode of travel.
- Due to improvement of roads 47 per cent households felt reduced absenteeism. Average days of absent from school have reduced from 7.8 days to 2.3 days in a year.

- The households reporting teachers remaining absent for many days during the year has reduced from 64.1 per cent to 4.0 per cent. This shows that teachers' absenteeism has reduced with the improvement of roads in Karnataka.

- Timely availability of school materials like notebooks, pens, pencils, etc are very important in learning process. Before the project only 4.1 per cent of households reported timely availability school articles but this has increased to 89.5 per cent after the project. Thus, improvement of roads has improved the availability of school articles in the village at right time.

**Impact of Rural Road on Health**

- Around 95 per cent of the households in the selected project areas depend on the same road for getting health care facilities.

- Total number of visits of households to the health centres has increased after improvement of roads from 8 visits to 12 visits. This reveals that rural people were not able to travel by bad road during the illness and after the improvement of roads people are able to safely travel to nearby towns to get health facilities.

- Most of the households used to walk to hospital in the absence of better road and only about 12 per cent travelled by tractor, bike, bicycle and auto. After improvement of roads, proportion of households used to walk has reduced drastically i.e. 35.8 percent to 12.2 per cent. Now rural households are using mainly bus, tempo and auto to visit health centres.

- With the improvement of road, proportion of households feeling difficulty in reaching nearby hospital has reduced from 74.5 per cent to 12.7 per cent.

- Improvements of the roads have resulted in more number of visits of health staff to the village. On an average 80.3 per cent of households feel that visits of health providers have increased.

- Proportion of households reporting 'more absent' has reduced from 67.5 per cent to 13.0 per cent after improvement of roads. This shows that absenteeism of health personnel has reduced significantly after improvement of roads.

**Impact of Rural Road on Marketing of Household Items**

- The proportion of households using the road marketing of household items after the improvement of road has increased from 53 per cent to 95.5 per cent.
- RIDF roads have helped to reduce the distance for 36.5 per cent of households.
- On an average time required to reach the market has reduced from 40.4 minutes to 28.8 minutes.
- Number of visits of households to market has increased from 4.1 visits to 6.8 during a month.
- The total value of products purchased from the market, using the road, has also increased from Rs1542 to Rs.2332 during a month.

**Impact of Rural Road on Marketing of Agricultural Products**

- Proportion of households using road for agricultural marketing increased from 38.5 per cent to 78.5 per cent.
- On an average, 76.6 per cent of the households have increased their selling in agricultural market due to improvement of roads.
- On an average 80.1 per cent of households increased their visit to market and the actual number increased from 10.0 to 14.5 during a year.

**Impact of Rural Road on Agricultural Activities in Village**

- Majority of household feel that after improvement of road, visits of extension workers have increased.

- Improvements of rural roads provide for better flow of inputs and outputs from the farms and it gives an opportunity to the farmers to adopt a more beneficial cropping pattern

- About 56.5 per cent of household changed their cropping pattern to get the benefit of better accessibility of roads.

- Wages of agricultural labours increased from Rs.157 to Rs. 246 per day.

**Social Interaction**

- Number of visits of households to nearby cities or towns for social purpose like marriages, attending funerals and Jatras has increased from 4 to 6 after improvement of roads.

- Female members' visits have increased from 1.9 to 2.9 (i.e. 57.6 Percent), male visits increased from 2.8 to 4.4 (i.e. 58.0 per cent) and children visits increased from 1.4 to 2.7 (i.e. 89.8 percent). This shows that children's visits have increased substantially after the road improvement.

- Household visits for funeral, wedding and festivals have increased from 3.5 to 5.4, 4.9 to 7.4 and 2.8 to 4.3 per cent respectively.

**Impact of Road on Political Participation**

- About 83 percent of the households agreed that transportation facilities aided to influence political activities in village and 81.9 per cent of household have reported that their political participation has increased after construction of road.

- No. of Days of household participation in political activities has increased from 2.0 days to 3.3 days during a month.

Membership of households (in community and political organizations) has increased from 6.3 percent to 36.5 percent after construction of road. It indicates that improvement of road can lead to social and political integration of rural people.