CHAPTER - VIII
SUMMING UP AND POLICY IMPLICATION

In this chapter an attempt has been made to recapitulate and highlight the major findings of the previous chapters and to point out relevant policy implication.

1.1 For the impact study of irrigation under Mahi Right Bank Project, the data are collected by interviewing 160 respondents, 96 from the project area and 64 from the controlled area, belonging to four talukas of district namely: Thasra, Nadiad, Matar and Borsad. The 1988-89 is the year chosen for the investigation of 160 households of both command and controlled areas. The data collected are with reference to cropping pattern, input used, crop production and productivity of both command and controlled areas.
1.2 Out of the seven talukas of Mahi command area, villages of three talukas have 100 per cent irrigation facility. Thus they have not been taken into account in the present study. In rest of the talukas, stratified purposive random sampling has been used for the selection of the sample villages. For the study of indirect primary benefits, land less labourers and artisans have also been chosen in the present study.

2.3 The theory of cost benefit analysis has been traced out in U.S.A. The practical aspects and document of cost benefit analysis can be found from the introduction of Flood Control Act of 1936. India is a leading country, among the developing nations in the use of cost benefit technique, which was tried in the field of irrigation, nuclear power, approval of Family Planning, television system and in the evaluation of management system. The cost benefit analysis was put in place of rate of return criteria after the report of Dr. D.R. Gadgil, although the importance of the rate of return was also considered to prove the project viable.

2.4 Forms and problems related to the cost benefit analysis have been discussed by many authors such as Steiner, Eckstein, Marglin, Feldstein, Haveman etc. They have suggested that costs and benefits are time stream of consumption forgone and achieved by project, but they have followed different method for measuring them.
For deciding the desirability of any project, three major criteria are suggested. They are:
(1) to compare difference between benefits and costs,
(2) to compare the rate of return on investment and
(3) to compare the ratio of benefits to costs.
The Planning Commission of India has recommended the last criteria and rejected the first two in the calculation of desirability of any project.

2.5 A basis of comparision in the analysis of the project with cost benefit criteria can be done in either of the two ways: (1) 'With and Without' project situation and (2) 'Before and After project' situation. The former is used in India. The principal advantages of the varient of with-without situation is that, it duly eliminates the influence of changes other than that of irrigation. Thus, the problem of price adjustment have not to be tackled,nor one have to worry unduly about weather differences. It also eliminates the effects of any other development that may have taken place since the commencement of irrigation project.

2.6 A number of problems are involved in measuring costs as well as benefits in cost-benefit theory. They are: selecting appropriate price, assumption of rate of interest, estimation of risk and uncertainty, estimation of project life, calculation of depreciation etc.
The classification of cost and benefits can be made into two parts i.e., primary cost (or associated cost and project cost) and secondary cost. Similarly, benefit is defined as primary benefit and secondary benefit.

In the cost benefit theory, the most difficult problems are (i) selection of price level, and (ii) choice of rate of interest. The price level reflects the exchange value of goods and services and it should take into account the variation in their availability in relation to demand. It is recommended that current prices be used for costs to be incurred in near future and average long run prices to be used for all other costs as well as benefits. The choice of interest rate for the evaluation of a public project is perhaps the most difficult in this field. Two kinds of rate are suggested for this: (1) Rate of return on private investment and (2) Interest on government borrowing bond. Government borrowing rate is popular and accepted generally because it is the cost of government's financial investment and also because it can be regarded as the 'Risk free rate of interest'. The rate of discount or social rate of time preference can also be accepted instead of rate of interest, but there are some difficulties in social rate of time preference. First, how to determine it? and another difficulty with this is that different rate of interest would be used in public agencies and private sector.
3.9 Ever since independence, both the Centre and State have been pursuing a progressive irrigation development policy. It has resulted in the development of irrigation potential substantially both in the Centre and the State. Total irrigation potential of the Centre has increased from 26.25 million hectares at the end of the First Plan to 78.12 million hectares at the end of the Seventh Plan in India. Out of the total, the share of M & M projects was 31.52 million hectares and that of minor irrigation was 46.60 million hectares at the end of the Seventh Plan of India. This was made possible by spending Rs. 61.56 thousand crore on irrigation. The amount spent on M & M projects was Rs. 48.45 thousands crore while Rs. 13.10 thousands crore was spent on minor irrigation during the 40 years of planning in India. The country has several major and multipurpose irrigation projects like Bhakra Nangal, Nagarjun Sagar, Tungbhadra Hirakund, etc. In addition it has millions of minor irrigation projects to its credit. In the case of Gujarat, total irrigation potential was 6.50 lakh hectares in the First Plan which increased to 36.19 lakh hectares at the end of the Seventh Plan of Gujarat. The share of M & M irrigation was 11.96 lakh hectares and that of minor irrigation was 24.23 lakh hectares at the end of the Seventh Plan of Gujarat. The utilisation of irrigation potential was 70.89 lakh hectares, of which 27.77 lakh hectares
were utilised from M & M projects and 43.12 lakh hectares were utilised from minor irrigation projects at the end of the Seventh Plan of Gujarat. This was the result of investment of Rs. 3.24 thousands crore during different five years plans of Gujarat, in which Rs. 2.58 thousands crore were spent on M & M irrigation projects and expenditure incurred on minor irrigation was Rs. 0.65 thousands crore at the end of the Eighth Plan period of Gujarat. The state has several major and multi-purpose projects; were Mahi Kadana, Dantiwada, Kakrapar, Machchu etc. The progress in the field/area of irrigation would have been much more impressive if more emphasis would have been placed on the minor irrigation projects in the irrigation policy of the state.

3.10 From the given tables in Chapter III, it is clearly shown that during the Five Year Plans of India and the State, the biggest single melody in M & M Sectors right from the beginning has been the continued tendency to start more and more projects, thin spreading of resources and consequent time and cost over run. Though, all the plans, without exception, gave priority to complete the on-going schemes, the addition of new schemes continued unabated. Due to such tendency, the potential hectares have increased leaving the utilisation of potential far behind in the different Five Year Plans.
3.11 Canal irrigation is widely practiced in the command area of the MRBC project, which has covered seven talukas of the district and the area has become prosperous due to this project. Besides canal, well and tank irrigation are also very common in all the talukas of the district. As a whole, the net irrigated area of the district is 216.79 thousands hectares and the area irrigated more than once is found to be Rs.72.53 thousands hectares.

4.12 The work on the Wanakbori project was started in 1948 and was completed and started providing water to the farmers of the command area. Since 1958, although the work of branch construction continued till 1977. The Wanakbori project was approved during the First Five Year Plan of Bombay State with the cost of Rs. 4.25 crores. The latest estimation of the dam is Rs.41.48 crores, as revised in 1977. The project has provided water to 151.94 thousands hectares of the command area during 1988-89, while the potential created by the same year was found to be 578.42 thousands hectares.

5.13 An important aspect of any project is its financial performance. In most of the studies the rate of return criterion is used for judging the financial performance of irrigation projects. All the standard studies regarding investment in irrigation projects have dealt with the problem of financial appraisal of investment in irrigation projects. The rate of return criterion was
selected in place of cost benefit analysis because the report of the committee of direction for evaluation studies on benefits of irrigation projects under the Chairmanship of Dr. D.R. Gadgil recommended the benefit cost criterion instead of financial criterion for sanctioning irrigation project. Afterwards the performance of the rate of return criterion was underlined by some writers because the performance of different irrigation were unsatisfactory in the irrigation sector. The National Commission on Agriculture also observed that "At the time of considering a new project for sanction, its financial return should be carefully examined and if found remunerative steps should be initiated to make the project financially viable."

5.14 The financial performance of MRBC project shows that the project which started with 0.06 per cent returns in 1958-59 increased to 0.81 per cent returns in 1964-65. It was 0.88 per cent, a little higher during the year 1963-64 but the net return of the project has not increased steadily. The growth of rate of return should have increased as potential created increase during each year of the project, but it did not, because as potential created increased, utilisation of created potential remained poor during each year. And due to the lack of development of utilisation, the income from water charges remained poor. However, the actual financial return of the project from 1986-87 to 1988-89
shows that project was not even able to recover the maintenance and operating cost of the project and when interest charges are added, project suffered heavy loss. The rate of loss varied between 3.62 per cent to 9.10 per cent during the three years from 1986-87 to 1988-89.

The problems of making any irrigation project financially viable is an important issue and have received good deal of attention. The operational efficiency including financial efficiency of the project needs to be improved since it is far from satisfactory in India especially in Gujarat. For making a project financially viable, water rate should be increased from present level, because from 1981 the present water rates have not been revised. Irrigation Commission (1972) has dealt with this problem, and it has suggested ways for improving the viability of the project. They are: (1) stress should be put on utilisation of potential created, (2) water management should be improved for optimum use of water, and (3) water rate should be fixed again.

The indirect benefits of the projects have resulted in the form of intensive utilisation of family labours on own farm as well as increased opportunity of wage-paid employments. The data collected from sample farmers reveal that average number of work days per workers on own farms is higher in the command area than that of
the controlled area. It is 108 days in the command area and only 57 days in the controlled area also the wage-income per worker is significantly higher (Rs.1562) in the command area as compared to the controlled area (Rs.1055.50).

6.17 Field observation indicates that irrigation has induced the farmers in the command area to utilise their land efficiency. The absence of fallow land and high percentage of sown area indicate that land in kharif season in the command area is efficiently used. Out of the total command area of 271.32 hectares only 2.61 hectares are current fallow, while in the controlled area, out of total cultivated area of 169.60 hectares area of 169.60 hectares, 19.33 hectares are under current fallow. In the controlled area high percentage of fallow land both in the kharif and rabi season, shows that existing land is not fully utilised. In the command area, area under current fallow, in the rabi season is found to be higher than that of kharif season. It is 65.40 per cent in the rabi season while 0.97 per cent in the kharif season. The reason for higher percentage of current fallow in rabi season is that because in the kharif season the area is under long duration crops like plantain, tobacco, and paddy. More than 60 per cent of the land is engaged in these three crops. This proves that irrigation helps farmers of the command area to use their land more intensively.
6.18 One of the direct effects of irrigation is on the cropping pattern of the farmers of command area. Cropping pattern has tilted in favour of cereals in the command area compared to the controlled area.

The command area of the project is found to be cereals oriented especially paddy. Out of the total kharif crop area, about 181.18 hectares i.e., 91.79 per cent is under paddy, followed by bajri with 15.74 hectares i.e., 7.97 per cent of total cropped area. Among the cash crops, tobacco is a major crop of kharif season in the command area. Out of the total cash crop area of 70.41 hectares, tobacco occupies 57.08 hectares i.e., 81.06 per cent of total cash crops area. Pulses are very insignificant crop in the command area. While in the controlled area, in kharif season, bajri is the most prominent crop with 52.47 hectares (65.24%). Among pulses, tur is the most important crop and covers 14.75 hectares of the total pulses area. Among the cash crops, in the kharif season, caster is the most important crop, out of the total cash crop area of controlled region, 20.88 hectares have been covered under caster.

In the command area in the rabi season only one cereals i.e., wheat, is grown which covers 50.45 hectares and among pulses chana is grown in 0.92 hectares. In the case of cash crop, tobacco is the most important crop.
which covered 0.00 hectares. Pulses as crop are not grown in the rabi season while among cash crop, rai is the only cash crop which is grown in 1.61 hectares only. It is thus an insignificant crop for the area. In the command area during the hot weather, bajri is the most dominating crop with 57.33 hectares of cropped area under it.

6.19 In the command area cereals have been encouraged in all size-groups of holdings which is very significant with 69.60 per cent, 69.65 per cent, 79.10 per cent and 78.22 per cent respectively for big, medium, small and marginal farmers. On the contrary in the controlled area cereals contribute 48.33 per cent, 60.48 per cent, 71.58 per cent and 80.25 per cent of total cropped area in the corresponding size groups. Majority of the cultivated area of the command region is found under cereals which shows that the region is cereals oriented.

6.20 Irrigation brings many direct and indirect effects on the farming and agricultural activity in the command area. The impact on cropping intensity leads the farmers to use their land more than one season during the year in the command area. The cropping intensity in the command area is 166.19 per cent while 97.34 per cent is in the controlled area. Moisture of the land encourages more than one season crop during the year.
and that leads to higher cropping intensity in the region. The moisture in the land is possible only through the irrigation facility. Thus absence of irrigation facility in the controlled area is the prime reason for low cropping intensity.

7.21 Field observation indicates that gross farm output is 3.54 times higher than that of controlled area. Gross farm output in the command area is Rs. 15.60 thousands as against only Rs. 4.67 thousands in the controlled area. Gross farm output, in all the farm size groups is found to be higher in the command area compared to the controlled area. On the other hand 'Fodder produced' and also opportunity of hiring out 'workstock' is found to be higher in the controlled area compared to the command area.

In the case of input used in the farm, per hectare input cost is found to be higher in the command area than that of the controlled area. In the command area in the case of cereals, per hectare cost is found to be Rs. 3,619.15 which is 1.53 times higher than that of the controlled area. The analysis of input structure shows that there is substantial change in the inputs used with the availability of canal irrigation and this led the farmers of command area to use high breed seeds and fertiliser in their fields.
Like the cereals, input cost is also found to be higher in the case of cash crops and the pulses in the command area than the controlled area. Total farm inputs in the command area is 2.70 times higher in the case of cash crops than that of controlled area, while for pulses it is 1.25 times higher in the command area than that of controlled area. Taking all three types of crops i.e., cereals, cash crops and pulses together, the analysis shows that total input expenditure is much higher in the command area than that of controlled area. Again in the command area amongst the different types of crops i.e., cereals, pulses and cash crops. The input expenditure on cash crops is much higher compared to that of cereals and pulses. The same is true in the case of controlled area i.e., the input expenditure on cash crops is much higher than that of cereals and pulses. The difference between command and controlled area is due to the fact that in command area the cash crops grown are plantain and tobacco, which need much higher inputs cost than the cash crops of cassava and cotton of controlled area. Thus, the percentage difference in respect of input expenditure is much higher in the command area as compared to controlled area when all the crops are taken together as also when they are taken individually viz., cereals, pulses and cash crops wise.
Like gross farm output of controlled area, net farm output in the command area is also higher than that of controlled area. In the command area per hectare output is 8.58 times higher as compared to the controlled area. In absolute terms, per household income in the command area is Rs. 23 thousands while in the controlled area it is only Rs. 03 thousand. In the case of income from all the sources taken together, command area is much better off as compared to the controlled area. The income from cultivation is 7.56 times higher and income from agricultural labour is 0.85 times higher in the command area as against controlled area. From the percentage point of view the total income from cultivation is 80.80 per cent followed by service sector with 10.57 per cent, while in the controlled area income from cultivation is 41.26 per cent, followed by 23.17 per cent in the service sector. The analysis reveals that command area whose total income is much higher compared to the controlled area depends upon cultivation as the most important source of income (80.80 per cent of total income) whereas in the controlled area, though cultivation is most important source of income (41.26 per cent of total income) the dependence on it as a source of income is very much less as compared to the command area.
The benefit cost ratio is generally used to prove the feasibility of any project. Ex-Ante benefit cost ratio, helps guiding the extent to which the project will compensate the cost, if it is built up in a particular place, while Ex-Post benefit cost ratio is important in two ways, viz., (1) such evaluation would help to appraise whether the project has yielded the expected result so that in case of deviation, necessary correction may be applied in the case of similar ongoing and future projects and (2) this may be more important since such evaluation will provide the necessary empirical data for acceptance or selection of public sector projects, which are very often undertaken to achieve important 'merit want' goals like self sufficiency, reduction of regional disparity and generation of employment.

In the case of MRBC project, direct primary benefit and direct primary cost have been used to judge the feasibility of the project. Direct primary benefit of the command area has been calculated with additional farm output increase as a result of canal irrigation. These benefits have been calculated on gross cropped area of the study period and secondly on irrigation potential created by the project. Benefit-cost calculation on actual irrigated area shows the actual B/C ratio the project gives and benefit cost ratio shows maximum B/C ratio the project can give. The maximum
B/C ratio will be achieved whenever the project irrigates the total potential created in the command area. The actual benefit cost ratio for the year 1988-89 works out to be 2.5:1 while the maximum benefit cost ratio comes to 2.76:1 on gross irrigable hectares. The project which was not viable from financial point of view, has proved to be economically feasible. That is why, the decision pertaining to the appraisal of any project should be taken from the economical point of view, along with the financial point of view.

POLICY IMPLICATION:

1. It is noted in Chapter III the irrigation potential created under M & M irrigation projects in India and the State, is not fully utilised. The problem seems to be acute in the case of M & M projects than that of minor irrigation projects. In Gujarat the situation of utilisation of created potential is very poor when compared with India. The study done on four major irrigation projects of Gujarat has shown that the low rate of utilisation of irrigation potential is due to the fact that the catchment area of the projects fall in the low rainfall zone of Saurashtra and North Gujarat regions. Also under utilisation may be due to the facts that huge water wastage takes place at farm level, absence of knowledge of scientific use of water and over use of water with poor operating and maintenance
cost of canal in the M & M irrigation projects etc. The wastage of water should be reduced by giving training to the farmers in water management technique. Volumetric system has also been suggested by National Commission on Agriculture for Scientific Use of Water. Also farmers' participation in Water Management is an important factor to reduce the over use of water at farm level. Apart from this government should organise a special programme to reduce the gap between utilisation and potential created. A zone-wise or state-wise causes and trends should be studied separately. For this, a special committee to be created and full administrative and financial power should be entrusted to it. Fourth Five Year Plan and onwards in India, some organisations were established to look after the utilisation part of created potentials. The organisations were: (1) Water Utilisation Cell, for reducing gap between utilisation and created potential and (2) Ayacut Development Programme better utilisation of created potentials. But looking to the performances it was felt that the two organisations did not deliver goods to Ayacutdar because the officials of the programmes neither had full administrative powers nor financial powers to implement them. Due to this, the programme failed and in place of this programme, Command Area Development Programme was started in the Fifth Plan Period and it is still continuing. In Gujarat, no such programmes were set up for
utilisation of potential. Frequent changes in the programmes and its policy would naturally not bring uniformity in the objectives in their work as also handicap smooth running of the programme. Also financial and administrative power should be given to an agency which can do the work with ease. Under utilisation of potential is an acute problem in Gujarat and establishing an utilisation cell in Gujarat is a dire necessity.

2. In the years to come the MRBC project should be made 'productive' from the financial point of view. Though the financial point of view. Though the project is in operation for 40 years it is running in loss and hardly covers the M & O costs incurred during the year. A committee appointed by the Planning Commission under the Chairmanship of Nitin Desai has favoured 9 per cent internal rate of return in general and 7 per cent for drought prone and chronically food prone area of the region. However, the MRBC project has hardly returned 0.88 per cent in early years of construction, and during 1988-89 it was running in loss. For making the project financially viable water rates should be raised from present level without affecting the utilisation of water to the fields. Low water rate is an important factor for lower income from the project and it is very true in the case of Wanakbori irrigation project. Another very common project faced in the case of Mahi Right Bank Canal Project is under
Statement showing sub soil water table during pre-monsoon and post-monsoon period from 1957-58 and 1975-76 onwards

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utilisation of the created potential. In the case of MRBC project, the major cause of under utilisation is the project faced at farm level in the acquisition of land from the farmer. In some cases it is found that branch canal and distributory canals are ready but field channels for conveying the water is not ready. Farmers should be convinced in this regard and water channels should be prepared as early as possible by acquiring the land from farmers.

3. In the MRBC, with the advancement of irrigation facilities where parentals and paddy crops are predominant, the problems of water logging is found to be rather acute. The water logged hectarages during 1958-59 were 3,37,040 during pre-monsoon period and was 2,93,860 hectares during post-monsoon period. The hectares under water-logging were reduced during the period 1975-76 to 1986-87, in both the seasons i.e., pre-monsoon and post-monsoon, but during 1988-89 it was again 3,37,040 hectares in both the seasons. The villages affected due to water logging were only 06 villages in 1975-76 which increased to 97 villages in 1988-89.

The sample farmers have also complained about high water logging in the region. Therefore pits are to be dug in water logged area to accumulate water and than it is to be pumped to far off area. Alternatively water drainage system should be made effective to stop water logged hectarage.
4. The branch canals and to some extent the main canal need to be repaired, because the pacca canals have been damaged in many places and somewhere big leakages are found in the canals which cause water logging to this area. A proper maintenance of the canal, therefore, is need to avoid the water logging and wastage of water in the region.

5. In short, water resources development, farmer's educational programme, sound and dependable infra-structural facility, canal construction, co-ordination of all the development measures, strengthening the working of C.A.D.A. etc., have significant bearing on the policy of farming and its execution. In other words, all these measures should be undertaken by the State Government to see that the functioning of irrigation projects relies its objectives and the farmers in the command area extend their cooperation to the Government Programmes and personnel for sake of their own amelioration.
NOTES AND REFERENCES

1. Gujarat had set up inter-departmental water rates review Board in 1976. The State Government seriously considered it. The revision of rates which came into effect from 1981 was based largely on such recommendation. Therefore, water rates structure was revised again and revised rates were to come into force from kharif of 1983. However, revised rates could not be implemented as it was politically inexpedient.

See Gujarat Economics Conference Paper, p. 70.

2. A study on Financial Working on four major projects of Gujarat has been done by Patel Himmat.


3. See Different Five Year Plans of India.
   - For Water Utilisation Cell - Fourth Plan of India
   - For Ayucut Development Programme, Annual Plan and Fifth Plan of India.
   - Command Area Development Programme, Fifth Five Year Plan of India.
4. In Gujarat different agencies are working for different aspects of water management in case of canal irrigation. The State Public Works Department (PWD) is engaged in the creation of irrigation potentials and maintenance of the distributory network. For efficient utilisation of the created potentials, the Agriculture Department and the Panchayati Raj Institutions are supposed to share the load and responsibilities.

5. The State Government has prepared a master plan for Mahi project (the present project) in which 2.13 lakh hectares will be benefitted and the length of the drainage is estimated to be 1750 km of which by March, 1990, 1.85 lakh hectares have been covered with an expenditure of Rs. 18.50 crore. The Master Plan is to spend Rs. 30.94 crore.