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Research Paper

Irrigation Water Source for Agriculture

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ABSTRACT

Irrigation is a basic input for agricultural development. It provides insurance against inadequate, irregular and failure of rainfall. The use of irrigation water along with other inputs like high yielding varieties of seeds, chemical fertilizers, pesticides etc. ensures the process of modernization of agriculture. Consequently, irrigation envisages change in cropping pattern land use efficiency, increases in productivity and also change in the behaviour of the farmers as decision makers. Thus, we can say that, irrigation alone can provide fillip to produce more and there by it brings the green revolution at the doorsteps of the farmers. The irrigation water comes from three sources, wells, tanks, canals and lift irrigation of surface water of the rivers through the construction of major, medium, and minor irrigation projects.

It is a well-known fact that, irrigation projects mainly under major and medium categories have two basic issues. Firstly, irrigation potential created and secondly, the utilization of irrigation water. The irrigation potential cannot be fully utilized due to many reasons, i.e. technical, economic, social administrative, financial, environmental, etc. and under utilization of irrigation water posses a separate issue.

The term irrigation is generally understood as the conscious utilisation of diverse source of water to produce more of food, fibre and other commercial crops in scientific way. From this meaning of irrigation, the irrigation policy can be stated as, a policy of the State aiming at the optimal utilisation of water resource for irrigation. Further, irrigation policy is a part of economic policy with a major accent on the development of the primary sector. This irrigation policy holds good in the case of both the Central and State governments. Further, it addresses itself to the judicious use of total utilizable water resources for irrigation of both the central and the state governments.

As per the Encyclopedia of Britanica "Irrigation is the artificial application of water to land". Prehistoric tablets and carvings indicate that early civilizations developed along rivers that supplied irrigation water to the fields. Although, it is reasonably clear that the Egyptians used water from the Nile to irrigate adjacent fields as early as 5000 BC. It is possible that irrigation started when prehistoric man planted crops in low areas that trapped floodwater. From this may have emerged the idea of building a bank around an entire field so that floodwater could be strapped and permitted to soak into the soil This practice ultimately led to the development of basin irrigation.

The irrigation development in India can be explained as given in the Table No. 1 in terms of total expenditure actually incurred.

Table No. 1.1
Planwise Expenditure on Irrigation Projects.
(Rs. in Crores)

Period of Plans	Major and Medium	Minor	Total
First plan (1951-56)	376	76	452
Second plan (1956-61)	380	142	522
Third plan (1961-66)	587	328	915
Annual plans (1966-69)	434	326	760
Fourth plan (1969-74)	1237	513	1750
Fifth plan (1974-78)	2442	631	3073
Annual plans (1978-80)	2072	497	2569
Sixth plan (1980-85)	7369	284	7653
Seventh plan (1985-90)	11107	3543	14650
Eighth plan (1992-97)	21072	5331	26403
Ninth plan (1997-2002)	48574	2406	50980
Tenth Plan(2002-2007)	62677	7414	70091

Source: - Economic and Political Weekly, 12th December, 1987 and
planning commission, 2004.

By and large percentage utilisation of major and medium irrigation projects has been in the range of between 70 to 80% throughout the plan period. The following Table No.1.2 gives an idea about utilisation and under utilisation of irrigation water through the different projects in India.

Table No 1.2:
Utilisation and Underutilisation of Irrigation water.
(In million Ha)

Period Of Plans	Major & Medium			Minor			Total		
	P (m.ha)	U (m.ha)	% Utilisation	P (m.ha)	U (m.ha)	% Utilisation	P (m.ha)	U (m.ha)	% Utilisation
Pre-plan	**8.62**	**8.62**	**100.0**	**12.9**	**12.9**	**100.0**	**21.52**	**21.52**	**100.0**
First plan (1951-61)	2.5	1.3	51.5	1.2	1.2	100.0	3.7	2.5	67.6
Second plan (1956-61)	4.6	3.3	72.3	1.9	1.9	100.0	6.5	5.2	80.0
Third plan (1961-66)	6.9	5.5	79.7	4.1	4.1	100.0	11.1	9.6	87.3
Annual plan (1966-69)	8.4	7.0	84.0	6.1	6.1	100.0	14.5	13.1	90.3
Fourth plan (1969-74)	11.0	9.0	81.7	10.6	10.6	100.0	21.6	19.6	90.7
Fifth plan (1974-78)	15.1	11.5	76.3	14.4	14.4	100.0	29.5	25.9	87.8
Annual plan (1978-80)	16.9	12.9	76.5	17.1	17.1	100.0	34.0	30.0	83.2
Sixth plan (1980-85)	20.8	15.6	75.0	24.5	22.2	90.6	45.3	27.3	83.4
Seventh plan (1985-90)	23.71	18.15	76.7	33.81	30.48	90.2	57.52	57.52	84.5
Eighth plan (1992-97)	32.96	28.44	86.03	56.6	52.32	92.4	89.56	80.76	90.1
Ninth plan (1997-2000)	34.68	30.12	86.9	58.11	53.54	92.1	92.79	83.66	90.1

P = Potential i.e. Capacity, U = Utilisation, i.e. Gross irrigated area

Source: Unutilised Irrigation Capacity. By B.D. Dhavan Financial

Express 1990 Dec. & Irrigation Status report in Maharashtra – 2003.

The First Five Year Plan had emphasis on irrigation and industry. However, not much effort was made in the irrigation front. The emphasis in the Second Plan was on agriculture along with irrigation. It was from the Third Plan onwards that adequate emphasis was given for the development of irrigation in the country. From the following table it could be seen that till the end of the Seventh Plan (1985-90) an amount of Rs. 14650.00 crores has been spent of which Rs. 11107.00 crores has been on major and medium projects only.

Table No. 1.3:
Magnitude and Composition of Investment in irrigation and flood control sector through plan period.
(Rs in Crores)

Period of Plans	Major & Medium	Minor Irrigation Projects			CAD	Flood	Total
		Public Irrigation	Institutional Finance Sector	Total			
First (1951-56)	380	66	Neg	66	-	13.77	459.77
Second(1956-61)	380	142	19.15	161.15	-	49.15	590.30
Third (1961-66)	581	328	115.29	443.29	-	86.00	1110.29
Annual(1966-69)	434	326	234.74	560.74	-	43.61	1038.35
Fourth(1969-74)	1237	513	661.06	1174.06	-	171.78	2582.84
Fifth (1974-78)	2442	631	780.24	1411.24	122.49	298.61	4274.34
Annual(1978-80)	2056	497	490.40	987.40	88.20	228.47	3360.07
Sixth (1980-85)	7516	1802	1437.55	3239.55	520.78	596.07	11872.40
Seventh(1985-90)	11107	3115	3311.91	6426.91	1427.64	941.58	19903.13
Eighth (1992-97)	21072	6408	5331	11739.36	2146	1692.68	36649.83
Total	47205	13828	12381.34	26209.07	4305.11	4121.72	81841.32

Source: The Eighth Five-Year Plan 1992-97 Vol II Planning Commission

The remaining amount has been spent on minor irrigation, command area development, and flood control, with the above investment, the development of irrigation potential through plan period upto the end of the seventh plan is given in the following table no. 1.4

Table No. 1.4
Plan wise Irrigation Potential Created and its Utilisation
(Area in M-Ha)

Period Of Plan	Major/Medium Irrigation		Minor Irrigation		Total Irrigation		Gross Irrigation area as per land utilisation statistics
	Potential	Utilisation	Potential	Utilisation	Potential	Utilisation	
Pre-plan	9.70	9.70	12.90	12.90	22.60	22.60	22.56
First (1951-56)	12.19	11.00	14.06	14.06	26.25	25.06	25.64
Second (1956-61)	14.33	13.30	14.79	14.75	29.12	28.05	27.98
Third (1961-66)	16.57	15.20	17.00	17.00	33.57	32.20	30.90
Annual (1966-69)	18.10	16.80	19.00	19.00	37.10	35.80	35.43
Fourth (1969-74)	20.71	18.70	23.50	23.50	44.21	42.20	40.28
Fifth (1974-78)	24.72	21.20	27.30	27.30	52.02	45.50	46.08
Annual (1978-80)	26.61	22.70	30.00	30.00	56.61	52.70	49.21
Sixth (1980-85)	30.01	25.33	37.52	35.25	67.53	60.58	54.67
Seventh (1985-90)	31.52	27.77	46.83	43.53	78.35	71.03	62.50
Eighth (1992-97)	32.96	30.09	56.60	52.32	89.56	83.22	64.30
Ninth (1997-02)	34.99	32.50	59.38	54.23	94.37	86.73	65.50

Source: Report of Working Group on Eighth Five Year Plan.

The development of irrigation in India after independence has been massive. The aggregate irrigation potential created at the end of the 6th Five Year Plan was about 68 million hectares. Irrigation potential is created when water is made available for release from outlet points. However, the lack of creation of infrastructure needed to take the waters to irrigators has resulted in under utilization of the created potential. Experience with the completed major and medium irrigation projects shows that they contained no provision for taking water from the outlet in the last distributory to the farmer's fields. Thus, a wide gap emerged between the irrigation potential created and what was actually utilized. Consequently, 25 percent (5.2 mh out of 20.8 mh) of the potential created between 1951 and 1985 under major irrigation projects remained unutilized at the end of the 6th plan.

The 7th Five Year Plan has rightly emphasized the significance of managerial aspects of irrigation and the involvement of beneficiaries in the systems of irrigation prevalent in India from time immemorial. The tanks in South India, the Phad system of irrigation in Maharashtra, and other rivers and stream diversion schemes in the hills of North India, show that people have actively participated in harnessing and distributing water by setting up ingenious social systems. The people have employed staff in the form of guards, watermen and supervisors for the operation and smooth functioning of irrigation system.

It is seen from Tables 1.3 and 1.4 that since inception of the First Plan upto the end of the Seventh Plan, an amount of Rs. 14650.00 crores has been spent on major, medium and minor irrigation, CADA and flood control and the potential created is 78.35 million ha. The expenditure during the above period on irrigation alone was Rs. 11107.00 crores. Under the major and medium irrigation projects the cost per hectare has steadily increased from First Plan to Fourth Plan from Rs. 452.00 to Rs. 1750.00 From the Fifth plan onwards, rate of increase of cost per hectare has been very high from Rs. 6,395 per hectare during Fifth plan to Rs. 3073.00 crores during the sixth plan and this cost was the highest at Rs. 1437.55 crores during the Seventh Plan (1985-90).

Under minor irrigation, the cost per hectare has increased steadily from Rs. 161.15 crores during the Second Plan to Rs. 6426.91 crores during the Seventh Plan. When compared to major and medium irrigation projects, the cost per hectare is comparatively low under minor irrigation. The reason for this may be due to the short period in which these projects are completed and as such the impact of the cost escalation factor is minimum.

It may be noted that the data relating to cost per hectare under major medium and minor irrigation projects, based on the average investment over more than three decades from First Plan to the Seventh plan are not rational and do not merit cognizance. The cost per hector is only to impress upon the fact that it has steadily increased from plan to plan, whether under major and medium irrigation or under minor irrigation. Since, First plan upto Eighth Plan, the total investment on irrigation is Rs. 81841.32 crores, which has created a potential to the extent of 5,31,29,000 hectare. The average cost per hector has been Rs. 7,837 only. The cost per hectare has increased steadily from plan to plan and it was Rs. 11734.36 crores during the Seventh Plan. These figures do not reflect the true picture as the cost per hectare under minor irrigation is quite low when compared to the cost per hectare under major and medium irrigation projects. The following Table no.1.5 provides details about the Maharashtra and India comparative Plan provisions, expenditure during the Seventh plan, 1990-91 and 1991-92 Annual Plans and the targets set for the Eighth Plan.

Table No. 1.5
The Outlays and Expenditure of Major and Medium irrigation Projects in India and Maharashtra State.
(Rs. In Lakhs)

State And Nation	Seventh Plan				1990 – 91			1991 – 92			Eighth Plan	
	Plan Provision	%Of state outlay to total outlay	Actual expenditure	%of col 5 to 3	Plan Provision	Actual expenditure	%of col 8 to 7	Plan Provision	Actual expenditure	%of col 11 to 10	VIII plan outlay	1992-97 %of allocation on of states
1	2	3	4	5	6	7	8	9	10	11	12	13
Mharashtra	132000	11.42	156187	118.32	31000	35266.01	113.63	25000	37390	149.56	2191.92	9.59
India	1155656	100.00	1110709	96.11	268201	260430.78	97.10	310334	280681	90.44	228667	100.00

Source: - Irrigation Status Report in Maharashtra year 2004

The above table provides details about the comparative plan provisions, expenditure, between Maharashtra State and India; during the Seventh Plan, 1990-91 and 1991-92, Annual plans and the targets set for the Eighth plan. During the Seventh Plan India's actual expenditure on major and medium irrigation was Rs. 11,10, 708.51 lakhs out of a plan provision of Rs. 11,55,656 lakhs which forms 96.11 percent of the provision made. The Maharashtra State performance in the Seventh plan in terms of percentages is contained in the above table. The allocation is seen during this plan period in Maharashtra is Rs. 1,32,000 lakhs. The percentage of allocations to the total allocations in the Seventh Plan of Maharashtra 11.42

1.2 The Present Research Work

When we come at the micro level of an individual irrigation project, both utilisation and under utilisation of irrigation potential becomes the matter of great consideration which has the value of research and policy implications. With this in mind, the researcher has selected the topic of research entitled. "The Pattern And Extent Of Utilisation Of Irrigation Potential Of Bhima (Ujjani) Project In Solapur District."

Objectives and Methodology of Present Study

The present work has the following objectives:
1) To study the organizational structure and the development administration of the construction of Bhima project in Solapur district.
2) To find out the extent of irrigation potential and its utilization
3) To study the impact of irrigation potential on the pattern and composition of land utilization in command area of the project.
4) To analyse the causes of under utilisation of irrigation potential in the command area of the project.
5) To suggest some remedies for optimum utilisation of irrigation under the study.

Methodology

The present research study covers the catchments area of the Bhima (Ujjani) irrigation project in Pandharpur taluka of Solapur district. The Pandharpur taluka area selected for the research work as it is having maximum irrigation facilities in the district According to census conducted in June 1996, the total area under irrigation in Pandharpur taluka was 33,622 hectares and the population of this taluka in 1995 was 3,13,743 out of this the population of Pandharpur city was 73,710. The total area of the taluka is 1,28,092 hectares, out of the area under crop is 79,500 hectares. This shows that 62.06 per cent of the total is cultivated area. The total number of villages in this taluka is 95 and these areas divided in to 7 circles, out of which 52 village's area irrigation (54.74%) by left (41%) and right (11%) canals of Bhima (Ujjani) Project.
Out of 95 villages 10 villages have been covered for the present study and 201 families in 10 villages were selected on the basis of proportionate random sample method.
The families covered four categories of the farmers' i.e. Marginal farmers, small farmers, Medium farmers and large farmers. The command area comes under the scarcity zone of the state and is largely known as the rabbi jowar tract. The project area under study is more or less homogenous in nature with regard to the cropping pattern, rainfall, soil type etc.

Sample Design

The problem of introduction if irrigation in different phases in the command area and the technical problems of the irrigation department in supplying the canal water in all three seasons i.e. , Kharif rabbi and summer was brought to the notice of the credit specialist, Monitoring and Evaluation cell, Irrigation Department, Mumbai. The authorities were consulted in the matter of the sampling of villages. Among the benefited villages in the Bhima command ten villages were selected by simple random method. The sample farmers were selected by classifying them in to the different size groups of holding. The following size groups were formulated as follows.

Size Groups	Area of Land Holding	
I	Below 1 hectares	Marginal farmers
II	Above 1 to 2 hectares	Small farmers
III	Above 2 to 4 hectares	Medium farmers
IV	Above 4 hectares	Large farmers

A list of the farmers / household was prepared with the help of the village Revenue officer. After listing the farmers a total sample of 201 holding i.e a sample of 120 irrigation and 81 non-irrigated farmers was randomly selected giving due representation to each size of holding. The details of the number of farmers and selected villages of Pandharpur taluka are listed below.

Table No.1.6
Selected farmers and villages of Pandharpur Taluka

Name Of Villages	Size groups of holding								Total	
	I		II		III		IV			
	Irrigated	Non-irrigated	Irrigated	Non-irrigated	Irrigated	Non-irrigated	Irrigated	Non-irrigated	Irrigated	Non-irrigated
Karote	03	03	03	03	03	00	03	00	12	06
Shevate	03	03	03	03	03	00	03	00	12	06
Nandure	03	03	03	03	03	03	03	00	12	09
Devde	03	00	03	03	03	00	03	03	12	06
Mendhapur	03	03	03	03	03	00	03	00	12	06
Chincholi	03	03	03	03	03	00	03	00	12	06
Shegaon	03	03	03	03	03	03	03	03	12	12
Ishwar-vathar	03	03	03	03	03	03	03	00	12	09
Pargaon	03	03	03	03	03	03	03	00	12	09
Shelve	03	03	03	03	03	03	03	03	12	12
Total	30	27	30	30	30	15	30	9	120	81

Source: - Compiled by Researcher

Data Collection.

The data were collected by personal interview method. The sample farmers were contacted personally for collecting the information. Two types of data have been used for the study.

Primary Data

Primary data collected by the sample survey on the basis of schedule.

Secondary Data

Secondary data were collected from the Government Report, Research Reports, and Booklets Office of Tahasildar in the Pandharpur Taluka, Sub- division CADA office in Pandharpur, Sub-division of Bhima Development Department, Solapur part II. Main Division office of CADA Solapur & Circle office Solapur etc.

Analysis of Data

The data was scrutinized compiled and tabulated by the help of computer. The simple mathematical tools were applied for calculating average growth rate and percentages.

Limitations of the study

1) The study was of the nature of rapid survey and the researcher collected the data for complete agricultural year 1997-98 by personal interview method.

2) The ignorance illiteracy and memory bias of the respondent of the selected farmers to provide correct past information on different points in the survey may be the major limitation to arrive at correct inferences with out any errors.

3) Generally the tendency is to over estimate the expenditure and the income and production.

4) The information on the cost incurred on different crops and the yields of different crops could not be easily and accurately obtained because of the lack of proper record, illiteracy and consequent lack of accounting and also the apathy due to the poverty.

5) It is very difficult to collect the secondary data from Bhima Vikas Department. II and soil survey office Solapur. In CADA office the related table clerks did not give Solapur necessary Co-operation.

Review of Literature

Review of literature is essential to carry out the study in depth-

Kanwar Sain (1920) refers to the increased return to the cultivator from irrigation in the farm of increase in land values and additional income from farm products. He had suggested that a part of the increased land values due to irrigation need to be crediting irrigation projects with part of the increased land values must have later on, resulted in present day betterment levy.

Gadgil's D.R.Study (1948) cross-sectional one covering two irrigation villages from the Godavari and Pravara canals, and two nonirrigated villages from the adjacent area, is first of its kind in Maharashtra evolving a systematic methodology to inquire in to the direct and indirect benefits of irrigation. In the introductory note he refers to the nature and scope of earlier studies and points out that no systematic efforts at exploitation of the area under command had been made and the government had adopted an attitude of complete laissezfaire towards farming community. Therefore, progress had been uneven and not very rapid. This he attributes, though not explicity, to lack of administrative planning to support irrigated agricultural programs to help traditional farmers exploiting benefits from irrigation.

Economic returns from irrigation have been classified into two categories i.e direct and indirect returns. The direct benefits include cultivation of high value crops leading to higher production, income and employment potential. On the other hand indirect benefits give rise to demand for labour, accessories and materials leading to economic activities relating to production, trading and transportation.

Sovani and Rath (1960) studied on Hirakud dam in Orissa. He pointed out that to provide a systematic theoretical base for projecting economic benefits of an irrigation project. The objective was to assess benefits which might occur in future because of the construction of irrigation project. The results based on assumptions may be far from reality in view of the diversity of resource spectrum in a project. Their assumption of 20-21 years for maturity of benefits from an irrigation project needs to be taken with caution in view of modern farm technology. The view that farmers will not switch over from traditional cropping patterns lacks empirical support.

Divakar Jha (1967) studied in Tribeni Canal in Champaran district of Bihar. He pointed out that, the most important aspect of irrigation among others, as revealed by the study, is the removal of instability of agricultural production and thereby protects people from the hazards of drought and flood. Assured production in irrigated villages as brought out by the study seems to create confidence in people to invest in purchase of lands when available for sale. Many have borrowed money for this purpose in irrigated villages and in nonirrigated villages it is conspicuously absent. The study, however, is silent on factors contributing to such behaviour of people.

Shri Patil R.G. , Suryavanshi and Kapse P.M. (1980)

`The complain was made by the farmers in Ghod irrigation project about the irrigation charges. This was revealed by the study made by Patil. R.G, Surgavanshi.S.D and Kapase P.M (1980). An investigating in to the socio-economic conditions in Ghod irrigation project area. He pointed out that on an average 23% sample cultivators felt that irrigation charges were high and the proportion of respondent was higher in smaller size groups. It is therefore necessary that the interest of small farmers be safeguarded.

The important reasons for non-utilisation of available canal water and not bringing additional area under irrigation were ultimately supply of water, lack of capital, availability of well irrigation, delay in the sanctions, improper distributaries, elevated or salty lands, defaulter members non co-operation of officials, etc. It is necessary to develop proper report with cultivators and solve their difficulties, so that the irrigation potential available can be fully utilized for increasing production. It has been already mentioned that the infrastructural facilities,are unsatisfactory in the command area. The important developmental activities in respect of input supply, dairy development credit and marketing, transport and communication, electricity, education, processing, industries, drinking water facilities, medical aid etc, need to be developed in the command area.

Dr. Jugale (1980) studied the impact of two lift irrigation schemes in Kolhapur district (Panchaganga Lift irrigation, Krishna Lift irrigation schemes) He found that during the year 1968-69 the food crops occupied about 19.22(%) percent, while the cash crops occupied 8.6(%) percent of the cropped area. However, in the year 1981-82 i.e after implementation of the irrigation project, the areas under cash crops increased to 19.19(%) percent, while the area under food crops declined to 25.31(%) percent. Sugarcane was the main cash crop after irrigation. The area under sugarcane from 8.43 per cent in 1968-69 to 18.63 percent in 1981-82.

The average income per family increased from Rs

2700/- to Rs 4300/- the literacy percentage also increased from 42(%) percent in 1960 to 60(%) percent in 1987. The use of tractor ploughing increased to a considerable extent.

The study made by Patil.A.R (1983) Masuda in Ajmer district shows that lift irrigation scheme has helped the small farmers in terms of bringing more area under irrigation, increasing cropping intensity and increasing crop productivity per acre. The per acre productivity of various kharif and rabbi crops increased during the post investment period.

Dhavan.B.D. (1986) is of the opinion that the problem of timely irrigation is basically important in the public irrigation system. Other problems of irrigation are lack of channel supervision by an irrigator, absence of field channels that connect the individual fields, surface runoff of irrigation water because of lack of field leveling and the problem of over irrigation.

The study made by Anandmoy Sen (1986) shows the lift irrigation schemes in Birbhum district in West Bengal. He found that the revenue from irrigation water did not cover even the maintenance cost of the scheme. The performance was very poor because of energy shortages and partly because of reduced flow in the river during summer.

Pawar. C.T (1989) studied the impact of irrigation a regional perspective (Upper Krishna Basin). He concluded that the influence of increased irrigation facilities on major inputs used in agriculture. It is observed that use of mechanical and biochemical inputs has increased in irrigation tracts. The wooden ploughs are replaced by iron ploughs and oil engines by electric pumps. The adoption of tractor has increased to a considerable extent, which is commensurate with the extent of irrigation facilities and increasing in area under sugarcane in the region. However, use of traditional implements prevails, as small farmers cannot afford to purchase these expensive implements and high rate of hiring them are not within the reach of these farmers. The significant correlation is noted in case of biological inputs like fertilizers pesticides and HYV seeds and irrigated area. The use of such inputs is insignificant in areas where seasonal and non-assured nature of water supply prevails. He found that the influence of irrigation on land uses is assessed by considering the changes in land use categories and cropping pattern in general and irrigated cropping pattern in particular. It is observed that the area under forest is about 16.02 per cent (in 1981-85) showing slight decrease as comparatively in 1951-55 area under forest is about 16.25 per cent (Upper Krishna Basin). The follow land and other uncultivated lands have decreased whereas net area sown, occupying largest share, has increased. The cultivated land of the region occupies 66.82% of the total geographical area, which is significantly high (80%) in the eastern part and low (40%) in the western part of the region.

M. Venkata Redy (1990) studied on impart and development of irrigation system. He pointed out that the shortcomings of canal design to ensure protective irrigation. Even so, this issue calls for further research to identify the design constraints on water distribution strategies and consequent production differentials in a given command area.

Deo, (1979) Lift Irrigation Scheme in Maharasthra in his study pointed out that the cultivators under the schemes had no participation in the technical and financial policy formation and decisions. The longer time taken for full utilisation of irrigation water was due to delay in land levelling and making it suitable for irrigated farming. This work was prolonged over a period of 5 to 7 years, instead of 4 years. Despite the willingness of the farmers to hire the necessary machinery from the state government or from the neighbouring villages for land development, it was not available. Few farmers did not allow the water distributaries to pass through their fields, while some farmers did not bother to irrigate their lands in the beginning because, they had more lands in the neighbouring villages. Hurried and inadequate formulation of lift irrigation schemes with whatever finance was immediately available resulted in prolonging period of construction.

Murthi (1984), edited in his study- The impact of one lift irrigation scheme in Himachal Pradesh that the wheat played an important role in the cropping pattern accounting for 33.49(%)percent and 36.09(%) percent of the total cropped area of the irrigated farms i.e. about 31 percentage as against only 18 percent of the total cropped area on nonirrigated farms, respectively.

Rao.V.K.R.V (1974-75) studied the characteristics of canal irrigation in Bellary in Karnataka (Karnataka state) district particularly Tungabhadra command areas. His findings of the current study underlined three characteristic features of growth and change which have been brought about by the introduction of canal irrigation in the villages.

A) The process of growth and change varies in effects from one category of village to another, depending on the nature and extent of the irrigated area.

B) The relative dimension of the effects produced by growth and change as a result of the impact of the canal irrigation within the villages is greater for the large farm households than for the small ones.

C) The relative magnitude of such effects across the villages is, by and large, greater for all categories of farm households in the perennial villages than for those in the wet and DCW villages. This implies that the farm households in the perennial villages reap larger benefits of growth and change from the introduction of canal irrigation in the wet and DCW villages. However, the concentration ratio for the distribution of income shows that the benefits of development from irrigation are less diffused in the perennial villages than in the wet and DCW villages.

In five the impact of canal irrigation in various aspects on the farm and household economy of the villages is very revealing in respect of the uneven distribution of benefits and the evolution of agrarian capitalism.

Shivaram (1978), pointed out that tube wells and lift irrigation do not give the optimum results unless field-channels are completed. He found that in most of the tube-wells and lift irrigation work, the field channels were incomplete and land levelling for best use of water was still to be done.

Irrigation Potential

Expansion of Irrgation facilities, along with consolidation of the existing systems, has been the main part of the strategy for increasing production of food-grains. With sustained and systematic development of irrigation the irrigation potential through major, medium and minor irrigation projects has increased from 22.6 million hectare (mha) in 1951, when the process of planning began in India, to about 95.40 mha at the end of Ninth plan. Plan wise irrigation potential created and utilized though major, medium and minor irrigation projects in the country is given in table 1.7

Table No. 1.7
Plan wise Of Irrigation Potential Created And Its Utilizations

Plan Period	Potential created (Mha.)	Potential utilized (Mha.)	% Percentage utilized
Pre-plan period	22.60	22.60	100
First Plan (1951-56)	26.26	25.04	95.35
Second Plan (1956-61	29.08	27.80	95.59
Third Plan (1961-66)	33.57	32.17	95.82
Annual Plan (1966-69)	37.10	35.75	96.36
Fourth Plan (1969-74)	44.20	41.89	94.77
Fifth Plan (1974-78)	52.20	48.46	92.83
Annual Plan (1978-80)	56.61	52.64	92.98
Sixth Plan (1980-85)	65.22	58.82	90.18
Seventh Plan (1985-90)	76.53	`68.59	89.62
Annual Plan (1990-92)	81.09	72.85	89.83
Eighth Plan (1992-97)	86.25	77.21	89.68
Ninth Plan (1997-2002)	95.40	85.41	89.52

Source :- Planing commission of India year 2004.

Minor Irrigation:-

All Ground water and Surface Water Schemes having a culturable command Area (CCA) up to 2,000 hectares individually are classified as minor Irrigation Schemes. The development of ground water is mostly done through individual and cooperative efforts of the farmers, with the help of institutional finance and though own savings. Surface Minor irrigation Schemes are generally funded from the public sector outlay. Irrigation Potential created and utilized under Minor Irrigation during the various plan periods is given in table 26.5.

TABLE No. 1.8
Planwaise Irrigation Potential Created And Utilized Under Minor Irrigation Projects.
(In million hectares)

Period	Potential created (Mha)	Potential utilised (Mha)
Up to 1951 (pre-plan Period)	12.90	12.90
First Plan (1951-56)	14.06	14.06
Second plan (1956-61)	14.75	14.75
Third Plan (1961-66)	17.00	17.00
Annual Plan (1966-69)	19.00	19.00
Fourth Plan (1969-74)	23.50	23.50
Fifth Plan (1974-78)	27.30	27.30
Annual Plans (1978-80)	30.00	30.00
Sixth Plan (1980-85)	35.52	35.52
Seventh Plan (1985-90)	46.61	43.12
Annual Plan (1990-92)	50.35	46.54
Eighth Plan (1992-97)	56.60	52.32
Annual Plan (1997-98)	57.62	53.05
Annual Plan (1998-99)	58.79	53.78
Annual Plan (1999-2000)	59.38	54.23
Annual Plan (2000-2001)	67.22	52.04
Annual Plan (2001-2002)	68.37	52.89

Source :- Planning commission of India year 2004.

Major And Medium Irrigation Projects

Irrigation projects with a culturable command area (CCA) between 2,000 and 10,000 hectares are classified as medium projects and those with CCA of more than 10,000 hectares as major projects. The expenditure incurred on major and medium projects and the irrigation potential created during these various plan periods are given in table 1.7 At the beginning of the Tenth plan, there were 159 major projects with a spillover cost of Rs. 58,344 crore, 242 medium projects with a spillover cost of Rs. 4,465 crore and 89 extension, Renovation and modernisation projects with a spillover cost of Rs. 8,253 crore.

Table No. -1.9
Planwise Expenditure And Potential Created In Major & Medium Irrigation Projects.

Period Of plans	Outlay| expenditure (Rs. Crore)	Potential created (mha)	Cumulative (mha)
Pre-plan Period	NA	9.70	9.70
First Plan (1951-56)	376	2.50	12.20
Second Plan (1956-61)	380	2.13	14.33
Third Plan (1961-66)	576	2.24	16.57
Annual Plans (1966-69)	430	1.53	18.10
Fourth Plan (1969-74)	1,242	2.60	20.70
Fifth Plan (1974-78)	2,516	4.02	24.72
Annual Plan (1978-80)	2,079	1.89	26.61
Sixth Plan (1980-85)	7,369	1.09	27.70
Seventh Plan (1985-90)	11,107	2.22	29.92
Annual Plan (1990-92)	5,459	0.82	30.74
Eighth Plan (1992-97)	20,669	2.22	32.96
Ninth Plan (1997-2002)	48,574	2.04	34.99

Source:- Planning commission. of India year 2004

Water Storage Position in Major, Medium and Minor Irrigation Projects in Maharashtra Year 2005.
(Live Storage Mm3)

Sr.No.	Region.	Projected Live Storage (Mm3)	No. of Projects	% Perce-ntage	Water Storage Position in 2003	% Perce-ntage	Water Storage Position in 2004	% Perc-entage
1	2	3	4	5	6	7	8	9
A	**Major Projects**							
1	Konkan	2	177	97	167	94	177	100
2	Marathwada	8	4735	80	1515	32	2288	48
3	Nagpur	14	2489	86	2125	85	421	17
4	Amrawati	7	1173	85	886	76	542	46
5	Nasik	15	2659	95	1713	64	2609	98
6	Pune	26	7469	97	4755	64	7130	95
	Total	**72**	**18702**	**90**	**11161**	**60**	**13167**	**70**
B	**Medium Projects.**							
1	Konkan	2	63	100	63	100	63	100
2	Marathwada	54	635	74	341	54	208	33
3	Nagpur	38	510	83	347	68	163	32
4	Amrawati	21	586	73	335	57	71	12
5	Nasik	29	534	90	534	100	534	100
6	Pune	51	1103	65	460	42	650	59
	Total	**195**	**3431**	**75**	**2080**	**61**	**1689**	**49**
C	**Minor Projects.**							
1	Konkan	100	274	87	204	74	232	85
2	Marathwada	423	858	86	437	51	228	27
3	Nagpur	307	452	77	281	62	109	24
4	Amrawati	303	701	75	374	53	138	20
5	Nasik	276	550	63	464	84	411	75
6	Pune	411	887	50	167	19	424	48
	Total	**1830**	**3722**	**71**	**1927**	**52**	**1542**	**41**
D	**Total of All Projects. (Major, Medium & Minor)**							
1	Konkan	114	514	92	434	84	472	92
2	Marathwada	485	6228	80	2293	37	2724	44
3	Nagpur	359	3421	85	2753	80	693	20
4	Amrawati	331	2460	80	1595	65	751	31
5	Nasik	320	3743	90	2711	72	3554	95
6	Pune	488	9459	89	5382	57	8204	87
	Total	**2097**	**25855**	**86**	**15168**	**59**	**16398**	**63**
E	**Other Dames**	**14**	**5636**	**88**	**4354**	**77**	**4621**	**82**
	Total Maharashra (D + E)	**2111**	**31491**	**86**	**19522**	**62**	**21019**	**67**

Source. :- Water Resources Department Government of Maharashtra, 2005.

Region wise And Year wise Water storage Position Of Major Project's In Maharashtra From – Year 2000 To 2005.

Sr.No.	Region of Maharashtra.	2000	2001	2002	2003	2004	2005	% 2005
1	2	3	4	5	6	7	8	9
1	Konkan Total	174	175	175	167	177	172	97
2	Marathwada Total	3431	2514	2411	1515	2288	3800	80
3	Nagpur Total	894	1115	1561	2125	421	2182	86
4	Amrawati Total	617	568	880	886	542	1001	85
5	Nasik Total	1584	1923	1645	1713	2609	2524	95
6	Pune Total	4575	5615	4985	4755	7130	7258	97
	Total of Major Projects.	**11275**	**11910**	**11657**	**11161**	**13167**	**16907**	**90**

Source. :- Water Resources Department Government of Maharashtra, 2005.