CHAPTER-I
INTRODUCTION

The state of Bihar announced its irrigation policy in 1993 on the lines of national water policy, 1987, stating that farmer's organisations would be set up to take over the management of irrigation system. Participatory irrigation management thus became an official policy of the state government.

With agriculture being the backbone of rural economy in most developing countries, irrigation is not only a key input in determining agricultural production but is also considered to be instrumental in improving rural areas as a whole, including its quality of life primarily by generating employment. Hence, the quality and quantity of irrigation affecting agriculture in particular and rural development in general has been the object of study by a large number of scholars.

With people's participation becoming the central issue of our times, farmer's participation in water management has become the buzzword all over the world as well as India. It is increasingly being recognised that people today have an important urge to participate in the events and processes that shape their lives. And that farmers' involvement in water management will lead to greater efficiency and equity, much more than what the respective governments have been able to achieve.

Participation, in simple terms, means that people are closely involved in the economic, social, cultural and political processes that affect their lives. People may, in some cases, have complete and direct control over these processes, in other cases the control may be partial or indirect. The important thing is that, according to Human Development Report, UNDP, people have constant access to decision-making and power. Participation in this sense is an essential element of human development.¹
Importance or Broad Aim of the Study:

This study is an endeavour to empirically examine the concept of participatory development, broadly and the process of the implementation of Participatory Irrigation Management, (PIM) specifically. The academic reasons to study the process of PIM can be found in the changing trend in development thinking in recent times with the emphasis shifting from top-down development to bottom-up development. The question of equity and equity in the distribution of benefits from development has now become important variables. Another area of increasing interest is the relationship between development and social transformation. More and more students and practitioners of development are beginning to see a need for changes or transformation in the existing economic, social and political structures and relationships if development is to benefit all sections of the society. Thus, the present study is an attempt to analyse this changing trend, and the need for it.

Objective and Scope of the Study:

With people's participation becoming the buzzword in modern times, this study can broadly be said to be an attempt at public policy analysis. It is now increasingly being advocated that any attempt at formulation and implementation of a public policy needs to take into consideration the 'felt-needs' of the people for it to be a success. In this context, the study is an attempt to examine the development policy of the state of Bihar vis-à-vis participatory irrigation management from 1985-1997, with Sone and Kosi command areas being the core study area. With PIM now being recommended the world over as a solution for many problems, of designing and operating irrigation systems in a sustainable manner, it needs to be seen whether Bihar's attempt at people's participation is a reality or a rhetoric.

The government of Bihar, on the lines of National water policy, 1987, announced its irrigation policy in 1993, emphasising the need for farmer's
organisations to take over the management of irrigation systems. It needs to be examined whether efforts have been made to facilitate such an attempt by the state machinery to develop the principles of decentralisation at the grass roots level and enable the farmers to participate in the development process. And whether the officers themselves have been trained and prepared to facilitate people's participation.

With an ever increasing evidence all over the world that irrigation farmer's organisations have been very effective in the irrigation management process, both at project and farm levels, it will be interesting to examine whether the existing state machinery has failed to deliver and whether it is time to actively involve the farmers in the management process to make it a success. The broad yardstick, therefore, of the present study can be said to be the bottom-up approach.

Historically, in India and other countries, farmers have in the past played a great role in irrigation management. Even today in India there are systems and tanks serving significant areas of land which are owned and operated by farmers. For example, in the state of Himachal Pradesh about 70,000 ha are being irrigated by private or communal systems known as 'Khuls'. In Tamil Nadu, there are about 40,000 tanks irrigating about one million hectares. Of these, an estimated 50 percent are private or communal tanks. Farmers involvement in India ranges from 'outlet or pipe committees' in Andhra Pradesh, water co-operatives in Gujarat, the 'Phad' system in Maharashtra, the 'sttadar' system in Bihar and other localised attempts at various forms of farmer participation.

By the end of the fourth plan, the government of India realised that a) management of water in commands of major and medium irrigation projects offered the greatest scope for improved agricultural production; b) best results towards optimum production could not be obtained without an integrated and well coordinated approach to irrigated agriculture; c) there was imperative
need for efficient management of water, soil and the various inputs for achieving maximum productivity; and d) of improving utilization of irrigation potential, a number of polices and measures in the realm of irrigation and agricultural development was called for. In this background, decision was taken at the Government of India level in August 1973, to establish Command Area Development Authority of each command in an attempt to improve water management practices, particularly at and below the outlets. One of the important aspects of this package was the organisation of farmers groups to manage irrigation.

While participatory irrigation management now commands an almost universal appeal in India, the approach to it remains unclear, according to some experts. It is said that there is a lack of certainty on the extent of powers vested with the water user's associations and a general confusion on the nature of devolution of powers for water management.

In India, as per some scholars, the performance of PIM so far indicates that the lower levels of bureaucracy are reluctant to fully transfer powers and functions to the user associations. This is a major bottleneck in the successful working of these institutions. Such a reluctance to delegate powers and functions by stifling local initiative or not being enthusiastic about it, prevents the emergence and development of leadership at the grassroots - an essential prerequisite for the success of these institutions.

It is increasingly being recognised that working to obtain agreement with communities does not necessarily compromise project effectiveness. Dialogue with farmers and drawing on local knowledge systems is useful in identifying appropriate location specific solutions to resource management problems.

Thus, a drastic change in the methodology of water management on scientific lines and development of efficient distribution system with infrastructure is essential so that the limited quantity of water available from
the basin is put to use in such a manner that right quantity of water is made available to the cultivators at proper time so as to maximise the output of crop per unit of water.

Area of Study:

For the purpose of this study the field area chosen is the state of Bihar and the command areas identified are the Sone and Kosi areas.

Bihar being predominantly agricultural based economy with irrigation being the lifeline for farmers, makes an interesting study as far as participatory irrigation management is concerned, specially because over the years the state has shown a consistent gap in the potential created and potential utilised.

If the state government and the official machinery have failed to deliver, is it time for the people to take over. A search for an alternative system or alternative institutions is made when the existing institutions are unable to deliver.

Bihar also makes an interesting field study as it is considered a regressive and backward region. If at all the concept of PIM can make a huge difference it is in this state. As a hypothesis one can say that if farmer’s participation in water management will lead to equity in irrigation, then growth in cultivable land and agricultural production will see an increase too, leading to overall development of the state.

Before looking for alternatives one needs to see as to what extent the existing institutions have been unable to perform and where have they fallen short of expectations. If one looks at the potential created and potential utilised under the CAD programme, it can be seen that Bihar has consistently fallen short of target since 1973-74, i.e., the beginning of the CAD programme. One can see that the PC was 1924.64 in 1992-93 and PU was
1364.60, with the gap being 560.04. In 1993-94, the PC was 1869.64 and PU was 1487.84 with the gap being 381.80. In 1994-95, the PC was 1925.78 and PU was 1342.26 with the gap being 583.52. ('000 ha). (See Appendix)

Physical achievement in respect of implementation of Warabandi under CAD programme also shows a constant lagging behind. In 1995-96 the target under Warabandi was 2.34 ha (unit = '000 ha) but the achievement was 0.00. The same pattern can be seen in 1996-97, with the target being 1.16 and the achievement being 0.00. In 1997-98 the target was 7.27 ha, in 1998-99 the target was 0.50 and in 1999-2000 the target was 1.00. But the achievement was 0.00 in all the years. (See Appendix). The same pattern can be seen as far as physical achievement in respect of construction of field channels and land levelling and shaping is concerned under the CAD programme. (See Appendix)

According to Surendar Mishra, inspite of the predominance of agriculture in the state economy, little changes have been initiated in the cropping pattern in the state, and Bihar was found to have an insignificant growth in the cultivable land over the years. The intensity of cropping was also poor and the average yield per acre was found to be comparatively lower than in other states.

The policy implication, the author further says, is that there should have been greater concentration on utilisation of the potential that has been created, instead of taking up new project for creation of additional potential. He says that the intention to utilise available potential fully is also not supported by the expenditure on development by command areas.

The 14 ongoing -10 major and 4 medium – schemes of irrigation department seem to have become a big drain on the state economy as after consuming about Rs. 1,600 crore, additional irrigation facility has been created in only 1.53 lakh hectares so far as against a target of 8.72 lakh hectares. While major schemes have remained under construction for the last
21 to 40 years, the medium schemes have already taken 4 to 29 years and is still to be completed. The Rs. 884.56 crore west Kosi canal project is under construction since 1962. The government has reportedly spent Rs. 425 crore on the West Kosi canal project which was supposed to generate, after completion, an additional irrigation potential of about 2.35 lakh hectares of land. It had generated irrigation potential in less than 23,000 hectares till 2000-2001.4

Thus, in Bihar, the process of non-performance and inaction has now been stemmed and reversed in every sector of development during the last, it can be said, 30-40 years, resulting in a political vacuum, administrative paralysis and economic stagnation.

Sone and Kosi command Areas were identified for field study as they are two of the most important projects in Bihar, south and north of the state. Both are two of the biggest projects in the state and affect the lives of vast number of farmers whose land lie in the respective commands.

Sone is one of the oldest projects of the state and covers ten district with a gross command area of 866.00 (’000 ha) and a culturable command area of 615.00 (’000 ha.). In fact Sone has a history of indigenous farmers organisation existing in the area but no such organisations are reported in Kosi area. Kosi command area has six districts under it with a gross command area of 7,45,000 ha and a CCA of 4,40,000 ha. An overview of Sone and Kosi has been given in chapter IV and v, outlining their structure, institutions, specific problems and so on.

If one looks at the PC and PU in respect of Sone project, one can find a big gap over the years, from 1974-75 to 1999-2000. In 1994-95, the PC was 746 and PU was 704 (in ’000 ha), in 1995 –96 the PC was 746 and PU was 641.73. In 1996-97, 1997-98, 1998-99 and 1999-2000, the PC was 746 but the PU was 660.90, 656.92, 636.02 and 570.88 respectively. (See Appendix)

As far as physical progress in Sone project is concerned regarding construction of field channel, land levelling and shaping, enforcement of
Warabandi and so on, again there is a difference between the target set and its achievement. (See Appendix)

The same pattern can be seen in Kosi project too, from the year 1974-75 to 2000-2001. From 1993-94 to 2000-2001, the PC was 392.00 ('000 ha) but the PU was 179.24, 179.24, 180.377, 190.30, 199.50, 205.60, 110.00 and 125.30 receptivity (See Appendix). In respect of physical progress under CAD programme regarding construction of field channel, land levelling and shaping, enforcement of Warabandi and so on, again like Sone CADA, one can see failure to achieve the target proposed. (See Appendix)

Bihar— A Background:
Bihar, the state which is in the gangetic plains, is a landlocked region bounded by Nepal on the north, on the south by Orissa, on the east by west Bengal and on the west by Madhya Pradesh and Uttar Pradesh. Starting from the Himalayan foothills in the north to Orissa in the south, Bihar suffers all the vicissitudes of changing season. While the northern position is almost entirely a level tract, the southern region is wooded and hilly. The most striking physical feature is that North Bihar is an extremely fertile strip of land – the land being watered by saryu, Gandak and Ganga. Southern Bihar which was wooded and hilly has rich storage of natural resources of mines, minerals in the country but a portion of which has now been carved out into a new state called Jharkhand. Inspite of large and diverse potential and all the bounties of nature bestowed on Bihar, it has remained a backward region of the country. It still remains in the stranglehold of non-development, characterised by unemployment, underemployment, disguised unemployment and poverty. This has manifested itself in organised violence and criminalisation of the state and sections of people on issues related to feudal identity such as religion, caste, parochialism, ethnicism, linguism etc. Bihar is thus, a product of uneven regional, economic and social development process.

According to May 2003 report in India Today, Bihar seems to be caught in a time warp. Its social indicators are said to be appalling. According to the report, the literacy level is 47.5 percent against the national average of 65.2
percent. The whole of Bihar is said to generate just 80 MW of power despite its installed generation capacity of 530 MW. These are just few of the social indicators. As per the report, the problem is that instead of addressing such issues, politicians prefer to play the blame game, perfecting the art of passing the buck into a science. It is felt that the state has surpassed its own record in regression.\(^5\)

In 1951 Bihar had an area of 70,330 sq. miles with a population of 40.22 million. After reorganisation of states in November 1956, the area was reduced to 67,130 sq. miles with a population of 38.78 million. The state accounted for roughly one-twentieth of the total area and one tenth of the total population of the country. The population of Bihar which was 699.15 lakh in 1981 (10.22 percent of all India), increased to 863.74 lakh in 1991 (10.21 percent of all India). The annual rate of growth of population in Bihar (and Jharkhand) between 1981 and 1991 was 2.1 percent per annum (all India 2.2 per cent per annum). Rural population in Bihar was 750 lakh, 12 percent of all India rural population. Birth rate during 1989-91 was 32.6 percent per 1000 in Bihar (all-India 29.9) and death rate 10.8 (all-India 10.1). Density was 402 persons per sq. km. in Bihar in 1981 (all India 208) and in 1991 it was 497 in Bihar and 257 in all India.\(^6\)

Consolidation of holdings – consolidation of holdings is an important programme of land reforms. Through consolidation it is possible to bring together fragments and increase the size of plots. By bringing together far flung tiny plots and consolidating them into compact plots cultivation can be facilitated.

In Bihar, consolidation has proceeded at a very slow pace. The programme has been under execution for more than 30-35 years but only about 15-20% of the cultivable land has been consolidated. The land records are not up to date with the result that much preparatory work is required. Even where consolidation is said to be complete, delivery of possession on the
basis of revised maps has not been given. Thus, the programme has not conferred much benefit to the farmers or boosted agricultural production.\textsuperscript{7}

Neglect of the region – Since 1981, there has been increase in the share in total population for agricultural labourers and decline in non-farm employment. Census report of 1991 reveals that there was substantial decline in employment compared to 1961; in manufacturing (less by 296,000 or 21%), transport and communications (53,000 or 14%), allied agricultural activities (69,000 or 40%), construction (6,000) and mining and quarrying (11,000). Bihar was the only state in the country, where the percentage of persons employed in the primary sector increased and confirmed fears about stagnation of the state economy.\textsuperscript{6}

The gross domestic product of the state at current prices in 1989-90 was Rs. 22,773 crores, of which the share of primary sector was 44.1%, compared to about 30% for all India, secondary sector 26.7% and tertiary sector 29.2%. Thus, development of agriculture is crucial for development of the state.\textsuperscript{9}

Table 1.1

Bihar Economy during the Period 1990-91 to 1996-97: Its Statistical Profile- General

<table>
<thead>
<tr>
<th>Administrative units: 1994</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Divisions</td>
<td>13</td>
</tr>
<tr>
<td>Districts</td>
<td>55</td>
</tr>
<tr>
<td>Sub-divisions</td>
<td>129</td>
</tr>
<tr>
<td>Community development Blocks</td>
<td>727</td>
</tr>
<tr>
<td>Panchayats: 1992</td>
<td>11,969</td>
</tr>
<tr>
<td>Population: 1991 (unless otherwise mentioned)</td>
<td></td>
</tr>
<tr>
<td>---------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>Total population ('000s)</td>
<td>86,374</td>
</tr>
<tr>
<td></td>
<td>(8,41,303)*</td>
</tr>
<tr>
<td>Decennial growth rate (1981-91) (percent)</td>
<td>23.5</td>
</tr>
<tr>
<td></td>
<td>(23.8)*</td>
</tr>
<tr>
<td>Number of workers (million)</td>
<td>27.8</td>
</tr>
<tr>
<td>Density (number of persons per sq. Km.)</td>
<td>497</td>
</tr>
<tr>
<td></td>
<td>(274)*</td>
</tr>
<tr>
<td>Density; Rural</td>
<td>303</td>
</tr>
<tr>
<td>Density; Urban</td>
<td>441</td>
</tr>
<tr>
<td>Rural population</td>
<td>7,50,21,453</td>
</tr>
<tr>
<td></td>
<td>(628.7 million)*</td>
</tr>
<tr>
<td>Urban population</td>
<td>1,13,53,012</td>
</tr>
<tr>
<td></td>
<td>(217.6 million)*</td>
</tr>
<tr>
<td>Percentage shares:</td>
<td></td>
</tr>
<tr>
<td>Rural population</td>
<td>86.86</td>
</tr>
<tr>
<td>Urban population</td>
<td>13.14</td>
</tr>
<tr>
<td>Number of working persons</td>
<td>2,56,19,038</td>
</tr>
<tr>
<td>% of agricultural labourers</td>
<td>37.1</td>
</tr>
<tr>
<td>to total workers</td>
<td>(26.0)*</td>
</tr>
<tr>
<td>Number of villages</td>
<td>77,694</td>
</tr>
<tr>
<td>Population projections:</td>
<td></td>
</tr>
<tr>
<td>1995</td>
<td>9,49,06,600</td>
</tr>
<tr>
<td>1999</td>
<td>16,27,44,600</td>
</tr>
<tr>
<td>2000</td>
<td>10,47,38,200</td>
</tr>
</tbody>
</table>
Table 1.3
Agriculture: 1992-93

<table>
<thead>
<tr>
<th>Total geographical area (lakh hectares – ha)</th>
<th>173.30</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total cropped area (lakh ha)</td>
<td>93.58</td>
</tr>
<tr>
<td>Net cropped area (lakh ha)</td>
<td>71.63</td>
</tr>
<tr>
<td>Intensity of cropping</td>
<td>1.13</td>
</tr>
<tr>
<td>Area under food grains (lakh ha)</td>
<td>85.53</td>
</tr>
<tr>
<td>Yield of food grains: 1991-92 (quintals per ha)</td>
<td>11.7(13.7)</td>
</tr>
<tr>
<td>Yield of food grains: 1992-93 (quintals per ha)</td>
<td>11.1 (14.4)</td>
</tr>
</tbody>
</table>

Food grains production ('000 tonnes):

<table>
<thead>
<tr>
<th></th>
<th>1990-91</th>
<th>1991-92</th>
<th>93-94</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total food grains</td>
<td>12,258.9</td>
<td>10,638.4</td>
<td>12,776.1</td>
</tr>
<tr>
<td>94-95</td>
<td>12,971.0</td>
<td>13,069.3</td>
<td></td>
</tr>
</tbody>
</table>

Percentage share in All-India food grain production: (Total food grains):

Average of period from 1991-92 to 1994-95 - 6.3.

Source: As given in K.N. Prasad, 1997.10

*Figures in brackets indicate all - India figures, unless otherwise disclosed.

Irrigation:

Bihar has a good network of rivers in all her agro-climate zones and most of them have sources in the Himalayan regions and they have large catchments...
extending over the glacial regions. The rivers of south Bihar and Chotanagpur are rainfed and mostly flashy. Rainfall is found to be neither adequate nor evenly distributed between months and years. It is found to be varying even between the regions during the same month or year. The forest area which is said to be an important factor in determining the extent and pattern of rainfall in any region, is found to be inadequate, evenly distributed as between natural regions and also declining over years. The analysis of the nature of soil in the state shows that majority of groups of soil in the state are such that the fertility could be improved with proper irrigation support.

According to Surendar Mishra, inspite of the predominance of agriculture in the state economy, little changes have been initiated in the cropping pattern in the state. Bihar was found to have an insignificant growth in the cultivable land over the years. The area of cultivable waste land, however, was found to be increasing. The intensity of cropping was also poor and the average yield per acre was found to be comparatively lower than other states. All these highlighted the importance of augmenting the irrigational facilities in Bihar.11

Progress of irrigation has been slow in Bihar despite huge investment. A sizeable proportion of its water resources remains to be utilised. There have stemmed shortfalls in both potential creation and potential utilisation, be it a major or a medium or a minor scheme.

According to K. N. Prasad, the fact that vast areas of the state are stricken by drought and attendant distress so often goes to prove that claims of the government about progress registered by its irrigation schemes amount to nothing. Cultivation, he says, in large part of the state is still dependent on rainfall. Moreover, past records show that a poor kharif crop is seldom followed by a good rabi crop because the soil has little moisture at the time of rabi sowing; the reservoirs are dry; and even the rivers carry less water because of poor snow formation.12
The four command area development agencies (CADA) – Sone, Gandak, Kosi and kiul strive for the integrated development of their respective areas based on full utilisation of the irrigation potential created, conjunctive use of ground and surface water, proper soil and water management, land development and animal husbandry. But according to the author, full benefits of irrigat in the command areas have not so far been reaped and are yet to accrue and the gap between the potential created and potential utilised has continued to be large, the actual utilisation being between 30 and 66 percent of the total potential created.13

The irrigation components of the Kosi, Gandak and Sone command areas were completed by the end of the sixth plan but the drainage components of the Gandak and Kosi command area could not be completed owing to the paucity of resources. The Kosi, Gandak and Sone command areas being barrage systems suffer from the problem of timely supply of water owing to the fluctuating flow of water at the source and excessive seepage occurring during conveyance. Moreover, they generally subserve the kharif crop, to the neglect of rabi and 'garma' crops.14

The Kosi and Gandak schemes were designed chiefly to remove the scourge of floods in north Bihar and provide assured irrigation at times of need. They have, according to K.N. Prasad, largely failed on account of the faulty execution of the project plans and alarming levels of corruption obtaining in the contractor-engineer – politician nexus.15

Since the Third Plan, Bihar has been allocating 25% to 33% of the total plan outlay on irrigation, compared to only 10% at the All-India level. Massive investment over irrigation has, therefore been the king pin in the development strategy of the state. During seventh plan, as per statistics given by Abhimanyu Singh, Bihar’s outlay on major and medium irrigation projects at Rs. 1332 crores was highest in the country after Maharashtra. In contrast
Bihar spent only Rs. 28 crores on command area development. This was much less than that of Uttar Pradesh, Maharashtra and Madhya Pradesh. At the end of 1984-85 available irrigation potential of major and medium irrigation project in Bihar was 28.8 lakh hectares, whereas utilisation was only 21.76 lakh hectares or 75.6% of the potential. Utilisation was lower than the all-India level of 83% as well as that of 81% for U.P.\textsuperscript{16}

According to Abhimanyu Singh, there is no consistency in the figures for irrigation being reported for Bihar. The potential created was reduced from 28.8 lakh hectares at the end of the sixth plan to 27.15 lakh hectares at the end of seventh plan as it was said to be an overestimate, though investment of funds had taken place as per earlier estimate. The potential which could be was reported to be 24.25 lakh hectares but actual irrigation was only 21.48 lakh hectares. This was 5.67 lakh hectares less than the potential created for which huge public investments have been incurred. In 1991-92 the area irrigated further declined to 18.85 lakh hectares.\textsuperscript{17}

The intention to utilise available potential fully is also not supported by the expenditure on development by command areas. Bihar’s outlay was Rs. 28 crores, which was only 2% of its outlay on major and medium irrigation schemes, compared to 14% for all-India during seventh Plan. The case for lion share of plan allocation for irrigation, the author says, has been based on the assumption that in Bihar only 44.3% of the ultimate potential (65 lakh hectares) has been covered by major and medium irrigation schemes, which is lower than the average for all-India at 52.2% and therefore larger investment is required in irrigation to bring the state at par with all-India levels.\textsuperscript{18}
Table 1.4

Irrigation: Statistical Profile of Bihar

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Net irrigated area as % NCA: 1991-92</td>
<td>43.5</td>
<td>(34.5)</td>
</tr>
<tr>
<td>Total potential created upto 1993-94: Minor (million ha)</td>
<td>5.4</td>
<td>(53.4)</td>
</tr>
<tr>
<td>Medium and major (million ha)</td>
<td>2.8(32.1)</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>8.2 (85.5)</td>
<td></td>
</tr>
<tr>
<td>Increase in irrigation potential utilised (lakh ha)</td>
<td>21.48</td>
<td></td>
</tr>
<tr>
<td>Total irrigated area (million ha) 1992-93</td>
<td>3.344</td>
<td></td>
</tr>
<tr>
<td>Irrigated area under food grains (million ha)</td>
<td>3.854</td>
<td></td>
</tr>
<tr>
<td>Intensity of irrigation (92-93)</td>
<td>1.23</td>
<td></td>
</tr>
<tr>
<td>Increase in assured irrigation area: 93-94 (lakh ha)</td>
<td>0.275</td>
<td></td>
</tr>
</tbody>
</table>

Source: K.N. Prasad, 1997.19

Table 1.5

Source Wise Area Irrigated in Bihar

<table>
<thead>
<tr>
<th>Name of source</th>
<th>Year 1989-90</th>
<th>Year 1990-91</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Canal</td>
<td>1472949</td>
<td>1411412</td>
</tr>
<tr>
<td>2. Tanks</td>
<td>116307</td>
<td>139996</td>
</tr>
<tr>
<td>3. Tube wells</td>
<td>1624321</td>
<td>1753927</td>
</tr>
<tr>
<td>4. Other wells</td>
<td>139594</td>
<td>153581</td>
</tr>
<tr>
<td>5. Lift irrigation</td>
<td>9770</td>
<td>37598</td>
</tr>
<tr>
<td>6. Others</td>
<td>759364</td>
<td>695941</td>
</tr>
</tbody>
</table>

Source: Agriculture department (statistics as given in Abhimanyu Singh, 1997).20
### Table 1.6

**Irrigation Coverage Through Major and Medium Irrigation Projects**

*(Bihar)*

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Year</th>
<th>Potential created</th>
<th>Potential utilised</th>
<th>Area irrigated as per irrigation department</th>
<th>Area irrigated as per Directorate of statistics and evaluation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Kharif</td>
<td>Rabi</td>
</tr>
<tr>
<td>1</td>
<td>By the end of IVth plan 1984-85</td>
<td>2879</td>
<td>2176</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>2</td>
<td>1988-89</td>
<td>-</td>
<td>-</td>
<td>1472</td>
<td>500</td>
</tr>
<tr>
<td>3</td>
<td>1989-90</td>
<td>2715</td>
<td>2425 (2525)*</td>
<td>1552</td>
<td>596</td>
</tr>
<tr>
<td></td>
<td>By the end of Vth plan</td>
<td>15</td>
<td>-</td>
<td>1560</td>
<td>548</td>
</tr>
<tr>
<td>4</td>
<td>1990-91</td>
<td>20</td>
<td>-</td>
<td>1323</td>
<td>562</td>
</tr>
</tbody>
</table>

(Unit: In Thousand hectares)

(*2525 is the figure reported to planning commission*)

Source: Complied from data reported by Major irrigation department/directorate of statistics.²¹

It can be said that creating irrigation potential cannot be an end itself. The utility of irrigation schemes is to be judged by the benefits actually accruing to the cultivators through irrigation for raising agricultural production.

We can say that the nexus between over - population, unemployment, tiny holdings, low-productivity, poverty, poor health, illiteracy and poor infrastructural support in Bihar is close and are naturally reinforcing factors. They constitute what Gunnar Myrdal appropriately described as a process of circular and cumulative causation in which low incomes lead to low levels of
living (income plus poor health, education etc.) which keeps productivity low; which in turn perpetuates low incomes and so on.

Bihar- Command Area Development and PIM:

According to the guidelines of Government of Bihar, the Bihar State Irrigation Policy, 1993, gives adequate stress on involving the farmers in the management of irrigation system. As per the guidelines for implementing PIM, Water Resources Department, Government of Bihar, 2002, PIM would focus at improving the management of the infrastructures created by the government together with the defacto ownership of the system by the farmers by creating awareness and realisation of collective responsibility in them and generating social cohesion leading to optimisation of benefits out of irrigated agriculture. It envisages CADA to play an important role in the implementation of PIM. As per the guidelines, to facilitate the process, the organisations would be: state and farmer organisations.

State Organisations:

(i) State Level Steering Committee – Headed by the chief secretary/development commissioner, this committee is expected to guide the programme at policy level and coordinate the activities of the concerned departments, like Minor irrigation, Command Area Development Agency, Finance, Water Resources Department, Agriculture etc. The secretaries of concerned departments, farmer representative, NGOs and suitable expert involved in PIM are said to be members of this committee.\(^{22}\)

(ii) PIM Cell in Water Resources Department – The cell is said to comprise of engineers of different levels from Water Resources Department, Government of Bihar and is to be headed by a superintending
engineer. This cell is expected to work exclusively for promotion and implementation of PIM programme in the state and work under direct control of Secretary, Water Resources Department and be the secretariat of the state level steering committee.23

(iii) PIM Advisory Committee – This committee is to comprise of farmer representatives, NGOs, experts and other involved in PIM work and is to advise the PIM cell for proper implementation of the programme and also to the state level steering committee on important issues relating to PIM.24

(iv) PIM Unit at Chief Engineer Level – The chief engineer, all superintending engineers concerned with PIM, all executive engineers in whose jurisdiction PIM is being implemented and local NGOs plus representatives of farmers of NGOs plus representatives of farmers of PIM area identified in the chief engineer’s jurisdiction are to be members of this unit. This unit would identify system for implementing PIM programme, select members of field implementation team for each system, in which PIM is to be implemented and any other work like training for farmer’s organization etc.25

(v) Field Implementation Team – For each distributary or sub-distributary or Minor, in which PIM is to be implemented there is to be a one field implementation team whose members would be executive engineer concerned (team leader), assistant engineer concerned, Junior engineer concerned and local consultants from allied disciplines like agriculture, economics etc. This team would be exclusively responsible for implementing PIM programme in the field as per the implementation schedule (action plan) finalized by PIM unit at chief engineer level / PIM cell.26
Farmer's organization: The farmer's organization comprises of village irrigation committee and system level committee.

(i) Village Irrigation Committee - It is the lower area at the village level. Every water-user of the village shall be a member of this committee and its executive committee shall comprise of 5 to 11 members out of the total members. This committee shall be responsible for the proper management of irrigation through all the out-lets within the village, in accordance with the decisions taken by the system level committee. The village irrigation committee is meant to be an informal organization. 27

(ii) System Level Committee - System stands for distributory, sub-distributory or Minor, where the PIM programme has been taken up. Where the system taken is distributory, it will be a distributory level committee, when it is sub-distributory, it will be a sub-distributory level committee and similarly where it is minor, it will be Minor level committee, the system level committee is deemed to be responsible for overall management of irrigation related activities under its command and to be an umbrella organization for all the village level committee. It is expected to establish strong linkages with allied departments/agencies, outside/within the command to promote the interest of farmers. The chairperson of the village level committees shall be the members of the general body of system level committee. 28

According to the Bihar governments guidelines, PIM is to be implemented in the following phases; preparation phase, organisation phase, capability building phase, confidence building phase i.e., turn over of system to farmer's organisation and post turn over phase. 29

The officers of water resource department and CADA are to work in coordination to ensure effective development of command area. And the
CADA offices are to take cooperation of VIC in implementation of on-farm-development works.

Bihar government guidelines feels that for success of PIM promotion programme in the state, close monitoring and evaluation (internal, external, participatory) of the impact of the programme in imperative. In order to build up associations on proper lines and establish good tradition which may provide sound footings of other organisations likely to come up in future, timely and accurate monitoring of performances of such organisations during pre and post turnover periods by the water resource departments and CADA and other outside agencies is deemed necessary. Purpose of the monitoring would be to identify the weaknesses in time with a view to guide and train the farmers organisations at the right time. The field officer is also expected to monitor its activities regularly.¹³

At the meeting of the state secretaries-in-charge of CAD programme / commissioners / administrators and project directors of command area development authorities held in New Delhi on 7th and 8th June, 2001, the Secretary, Command Area Development, Government of Bihar made the following observations in his presentation:

(i) There were five on-going CAD projects, out of which North-Koel project would be implemented by Bihar and Jharkhand.

(ii) During most part of the ninth plan, a major part of the fund was spent. Con-staff only for wants of funds for CAD activities. However, since the year 2000, the field activities had picked up and the entire unspent balance was utilised.

(iii) An area of 3800 ha suffering from water logging was reclaimed. State government has made another proposal for 185 new schemes for reclamation of waterlogged areas.

(iv) Adaptive trials and demonstration on aromatic plants be allowed under CDAD programme during tenth plan.
(v) An area of 2.4 lakh ha was suffering from the problem of alkalinity in the commands of CAD projects. Therefore, reclamation of alkali lands to be included under CAD programme.

(vi) Shallow tube-wells may be allowed under the programme for conjunctive use of surface and ground water.

(vii) In the on-going projects field channels covering 14,000 km length had been constructed and another 13,000 km was still required to be covered.

(viii) Impact evaluation of CAD programme showed good results in the Sone command. The wheat yield had gone up from 1.7 ton to 2.2 ton per hectare.

(ix) Under Bihar Irrigation Act, relevant rules and regulation for participatory irrigation management were framed. An area of 2.17 lakh ha on forty distributaries to be covered under PIM by the end of tenth plan. 31

Review of Literature:

Review of literature is considered an important aspect of research work as it helps in understanding specific problems and draw some hypotheses. Keeping this in view, literature connected with the problem in hand has been reviewed, gleaning it from various sources viz., books, journals etc.

The impact of irrigation has been studied by several social scientists in different parts of world and India. The studies are of different nature (cross-sectional and longitudinal) and at different levels; at macro level or at micro level i.e. at village level. The ultimate aim is to bring out the impact of irrigation on various factors or aspects of development.

An early beginning was made by Epstein, way back in 1954 -56 in Mandya district of Karnataka state. She had selected two villages representing the wet and dry nature of irrigation. She visited these villages
again in 1971. She analysed the caste system, class dominance etc. between these two villages—over time. However, the impact of irrigation is brought out as a salient feature, in the background. Irrigation had increased considerably the productivity of land and facilitated growing of cash crops, thus raising the prices of wet lands by 330%. It raised the levels of income and standard of living. Canal irrigation had reduced dependency of farmers or risks like uncertain and scarce rainfall. In the wet village unilinear nature of economic growth was observed where agriculture remained the dominant economic pursuit, while the dry village developed into a kind of servicing centre for neighbouring irrigated villages and its economy got diversified.

Cantor, 1967, conceptualised a simplified modern canal irrigation system in an ideal situation, should provide efficient means of irrigation. Dastane, 1969, highlighted the changes in the concepts of irrigation after the introduction of H.Y.V. and brought out the implication of productive irrigation as opposed to a protective one. He emphasised the need for use of concepts of evapo-transpiration and rainfall for determining the irrigation needs and drainage needs. C. Clark, 1971, besides expressing a similar view also identified the variables which affected agricultural production after the introduction of irrigation. He gave a methodology for working out gross and net returns to irrigation implicitly assuming that the inputs other than irrigation do not contribute more or less than their cost to agricultural output.

B.D. Dhawan, 1984 and 1988, clarified the misconceptions of the role of irrigation over cropping intensity yield, area and output and stability. In the Indian context, given the nature of the available secondary data on agriculture and irrigation from government sources, he dealt with the modifications needed in the conventional procedures in assessing irrigation impact through a differencing of irrigated and un-irrigated magnitudes on a farm parameters like aggregate crop yield and labour use per unit of crop area.
In ‘Irrigation in India’s Agricultural Development’, B.D. Dhawan, 1988, offers discussion of the conceptual problems; a priori expectations about the irrigation impact on different attributes of a farm economy; and the methodological frame adopted in the empirical investigations is presented by him. He also deals with productivity and income impact of irrigation and discusses the empirical issue of stability impact of irrigation. He takes up the equity question and does a recapitulation of the empirical findings, along with policy implications.36

Chris Barrow, 1987, introduces the reader to the role of water in developing countries agriculture, examining the potential for improving moisture availability, especially for small holders and those cultivating crops in different environments. He considers the difficulties of water resource management in developing countries and focuses on the environment, bureaucratic and socio-economic problems encountered. He provides an introduction to the methods of irrigation and rainfed cultivation, to the allocation and distribution of water supplies and to the impacts generated when supplies are developed to improve agriculture.37

Niranjan Pant, 1992, conducting his study on one of the minors Sharda Sahayak project in U.P. revealed that the farmers with low socio-economic status, who concentrate in the tail reaches of the minor, are the worst sufferers in terms of accessibility of canal water. Another finding of the study was that on farm development activities carried out by the CADA do not seem to have made any improvement either in irrigation utilisation or agricultural development.38

Ashok K. Mitra, 1996, reveals that paucity of resources and poor performance of existing major and medium irrigation systems are two main problems faced by the irrigation section in India. However making available adequate investible resources alone cannot bring about desired changes in the efficiency of the system. A simultaneous reform at institutional level would
provide an appropriate organisational structure for optimum utilisation of finances as well as water supply as per the argument.  

Efficient management of an irrigation system is a pre-requisite to the proper utilisation of irrigation command. The public canal system having considerably more extensive commands than the other systems, require efficient management involving coordination of various activities such as regulation of reservoirs, operation of canals, branches, distributaries to ensure timely supply and introduction of rotation and Warabandi system etc. In general, irrigation water management studies have thrown light on various aspects like equitable water distribution and the role of social organisation for ensuring equity and management skills required for reducing the gestation lag of minor irrigation etc.

One of the first studies which suggested that "water management for the HYVs has transformed irrigation from being protective to productive in orientation and thus from being extensive to intensive in character", was that of J.S. Kanwar, 1969. J.K. Anagol, 1969, focussed on the problems of gestation lag of major irrigation projects through a case study on Tungabhadra project. Robert Wade, 1975, in one his earlier works, gave an account of the linkage between irrigation bureaucracy and the pattern of distribution of irrigation benefits. Wade, 1978 and 1980, also pointed out the glaring gaps between project planning and implementation in his numerous works on water management in India.

Debate on major versus minor irrigation also witnessed many participants. (B.D. Dhawan, 1989; A. Mitra, 1989; R.R. Iyer, 1989; J. Jariath, 1989, among others). One of the balanced view seemed to be of Iyer who argued that one cannot say ‘no’ to large dams and reservoirs on environmental grounds, nor can one, having regard to projections of demand and availability, accept the view that there is no need for such projects. Encouragement has to be given to extensive local water harvesting and
undertake other measures to reduce run off and improve water retention of the soil. At the same time, considering heavy financial, human, social and environmental costs of large dam projects, one has to be highly selective and extremely cautious regarding approvals to such projects.

V.S. Vyas, 1994, identified four major weaknesses of Indian agriculture: preponderance of low value agriculture, high cost benefit ratio, inefficient use of natural resources and deterioration of the self-help institutions. He felt that a competitive political environment encourages securing of short-run gains at times even at the cost of long term sustainable growth. However, the biggest asset of the country, according to the author, is an “alert and responsive peasantry having sound commonsense, which has proved time and again that given the opportunities, it can respond more than adequately.” The policy makers have to be as much sensitive to the political reality as to the economic and technical opportunities.

While all of the past literature finds great scope for raising the performance of large irrigation systems in developing countries, most of the studies find irrigation bureaucracy to be the principal source of under-performance and explore ways to get these bureaucracies ‘debureaucratised’ – which is and has repeatedly proved to be contradiction in terms. The study by Norman Uphoff et al., 1991, falls in this genre of contributions on improving the performance of irrigation systems. “Increasing attention has been focussed on how the participation of farmers in irrigation management can improve the efficiency, equity and overall performance of irrigation systems in developing countries. A crucial factor in performance that has received less attention is the structure and performance of irrigation agencies that are responsible for managing many or most of these systems in the third world” – this is the central focus of their work.

As per T.K. Jayaraman, 1981, in any irrigation system, the institutional arrangements prevalent or proposed to be developed are a prime focus of...
attention. While the bureaucratic organisation assumes the responsibility of operation and maintenance of the system up to the government outlet, the command area under the latter along with its network of field channels and drains and control structures become the responsibility of the farmers for operation and maintenance. This is the most critical area since under or over-irrigation due to lack of maintenance of community owned items will affect per hectare and generally the performance of the system. The author in his paper in 1981 discusses formal and informal farmer’s organisation to deal with the problems at the terminal level of maintenance distribution of water and resolution of disputes.50

Robert Wade, 1981, was of the view that there was far more autonomous voluntary group action for economic ends in the Indian countryside than was generally thought to be the case. It existed because of a tightly individualistic assessment of mutual interest. Where the benefits are in the form of collective goods and where the continued supply of the collective goods would be put at risk if many were to withdraw, than in many ecological conditions there is a good chance that an organisation will be created and sustained by autonomous action. He says that if acceleration of agricultural growth requires better land development, careful water management, contour bunding and so on, then an attempt to understand the principles on which existing patterns of group action in the countryside are based should have high priority.51

Irrigation projects consistently fail to meet their projected performance in hydrologic, agronomic or economic terms. Too often, the state bureaucracy seeking to develop irrigation, places the blame for such failures on the project beneficiaries – farmers. Citing problems such as fee non-payment, water theft and taking of irrigation water out of turn, analysts fail to examine the broader institutional and organisational factors that shape the behaviours of farmers. Moreover, little emphasis is given to the lack of accountability of irrigation agency bureaucrats. Bradley W. Parlin and Mark W. Lusk in their work
'Farmer participation and irrigation organisation', 1991, explored the organisational and institutional factors that lead to poor project performance but more important it identifies those managerial factors that have repeatedly been shown to project success. Taking rational choice theory as its starting point, they elaborate a perspective that can be used to democratise, decentralize and privatise irrigation organisations. They use case studies from all over the world to illustrate the interrelationship between project performance, irrigation organisation and farmer participation.52

The efficient use of water resources is essential for increasing food production. However, due to complex nature of irrigation, which often involves a very large number of people, the key question is how to organise for optimum efficiency. Clarence Maloney and K.V. Raju, 1994, explored the ways in which even small farmers can organise themselves to manage irrigation. The authors covered a large range of issues including methods of field distribution; environmental aspects and ways to set up farmer’s organisations for water management. They also provided a comparative analysis of irrigation polices in India, Nepal, Sri Lanka and other countries and examples of successful farmer’s organisations for irrigation in India. Maintaining that efforts to increase irrigation efficiency have so far been mostly technical, the authors wage that irrigation is in reality a social process which requires right social organisation of the users as well as truly multidisplinary management. They presented case studies to show that where farmers form associations for water management generally work together with government agencies, they can grow more with better equity and with higher recovery of irrigation costs.53

Rakesh Hooja, in his paper in 1997 discussed participatory irrigation management, the most widely accepted organisation innovation, holding great promise through improved water management and better irrigation system management. Drawing elaborately on his personal experience in command area development in a water – deficit state like Rajasthan, he delineates on
the strategy and approach that could possibly be adopted with advantage for setting up and promoting water - user's association.\textsuperscript{54}

Rakesh Hooja again in his article, 'Administering water in India in 2050 AD' spells out future needs of management of water resources in India, with brief reference to water becoming a commodity of critical importance in the next fifty years. Visualising fuller people's participation to transform it into a joint endeavour, he spells out supportive structural arrangements to promote greater interaction and coordination between different concerned agencies and User's Associations, newer role of irrigation departments, requisite technical as well as social organisational skills of functionaries, etc.\textsuperscript{55}

According to Shashi L Kollavalli and Johan Kerr, community participation is accepted widely as being necessary for sustainable development of watersheds. Their study, 'Mainstreaming Participatory Watershed Development' based on a survey of 36 project villages in five states suggests that there is no shared understanding of the meaning of participation or the means of effectively operationalising it. The paper finds that, organising communities to give them collective voice, giving them opportunities to make critical decisions on what the projects will do and making them share a portion of the costs are essential aspects of implementation process to enhance community participation. In their opinion a realistic strategy must also seek to change the capabilities and incentives of government bureaucracies themselves by creating situations in which it is in their best interest to work with communities.\textsuperscript{56}

An enabling environment for ushering in water sector reforms was conceived by Arun Kumar in his article 'Water Sector Reforms - A Framework for Collective Action'. The article opens the discussion with a brief outline of National Water Policy, captures some of the most sapient features of Indian water scenario and then presents the policy options in undertaking a multidimensional reforms process ranging from participatory irrigation
management to integrated water resource management to institutional reorganisation of irrigation agencies to adoption of next techniques and technology.\textsuperscript{57}

C.H. Hanumantha Rao in his article ‘Sustainable Use of Water for Irrigation in Indian Agriculture’ opines that given the technology and public policy, institutions concerning water use hold the key to raising water productivity by building the vast gap that exists between knowledge and its application. He feels that water institutions are a relatively new and challenging area of interdisciplinary research for social scientists.\textsuperscript{58}

Despite the government’s repeated assertions in recent years on the need for a decentralised, people-oriented and demand driven water management, they have not been converted into implementable solutions according to Videhi Upadhyay. In the article ‘Water management and Village Groups’, the author asserts that while policy initiatives exist with regard to water user associations, watershed associations and legal strategies are a much needed prerequisite in order to evolve satisfactory working relationships between local bodies, institutions and networks of formal and informal village groups engaged in water management.\textsuperscript{59}

According to Niranjan Pant, all over the world farmer’s organisation have been very effective in irrigation management, both at project and farm levels. In his in article in 1998, ‘Indigenous Irrigation in South Bihar’, he says that the ‘ahar-pyne’ system in South Bihar was / is one such indigenous irrigation system in India, which successfully galvanised the local farming community in large numbers and ensured equitable distribution of water among cultivators.\textsuperscript{60}

Thus, the above review indicates that many attempts have been made to evaluate the impact of irrigation, farmer’s organisation and people’s participation on agricultural and social development.
Research Questions:

Some of the broad research questions are:

1. The trend of irrigation development in command areas;
   a) Potential created and utilised. Is there a gap, if so, why.
   b) Modernization of canals, maintenance problem, achievement of CAD work, etc.

2. Relationship between beneficiaries and the irrigation bureaucracy;
   a) Role and efficiency of bureaucracy,
   b) Level of official encouragement.

3. Farmer's involvement in management or the extent of farmer participation;
   a) Existence of Kisan samitis or farmer's organisation,
   b) Whether they are active or not. Their powers and functions,
   c) Government initiative and political will towards farmers organisation

4. Has the existing state machinery and command area development agency failed to deliver the goods;
   a) Are farmers satisfied with the amount and availability of water,
   b) Is the progress of on-farm development works satisfactory,
   c) Is there a resentment among farmers as far as head reach and tail reach farmers are concerned,
   d) Is the government being able to collect water rates or revenue adequately and on time.

5. If the existing machinery has constantly failed to achieve its targets, is it time for farmers to take over the regulation and management of water.

6. Official's grievances against beneficiaries, if any.

7. Will PIM lead to;
a) Better irrigation management
b) Conflict resolution among farmers,
c) Equity and efficiency,
d) Better revenue collection.

8. Is there a gap between policy decisions and its execution as far as PIM is concerned in Bihar and the two CADAs.

Methodology:

Both primary and secondary sources were utilised for the collection of data for the present study. As the region selected was geographically big and population in them widely scattered, it was not possible to survey the entire region, because of time and resources.

This study is an empirical study. Selection of sample was done on the basis of stratified random sampling. A few individuals belonging to a population was selected for the purpose of investigation. The selected individuals formed the sample and while selecting the sample, following facts were considered: a) the size of the sample, b) the definition of population and c) the representativeness of the sample. It was taken into consideration that the only difference between the population and the sample should be in their size and except for that, the sample is exactly similar to the population in all its characteristics. The sample size was decided in the field in such a manner that it was small enough to afford and large enough to detect meaningful relationships.

The bulk of the data was collected by distributing questionnaire to the selected sample or respondents. To elicit frank responses from them, they were assured that the survey was confidential. Two sets of questionnaires were devised, one for the officials and the other for farmers.
At time some questions were left unanswered or not well answered by both officials and farmers. And at other times some were not keen to answer long and open-ended questions as they required both time and thought. Informal conversations with various people both official and non-official gave a lot of insight into the various aspects of the issues related with PIM.

The analytical background of this study is based on secondary sources, i.e., books, articles and so on. Government reports and unpublished government documents have been used.

At the very initial stage of this study, the information relating to various aspects of the projects, viz., its history, objectives, design features, etc. were obtained from project reports, annual reports of CADA and water resources department and from discussions with officers and farmers.
ENDNOTES

5 Ahmad, Farzand, May 19, 2003, Bihar: The last and the least, India Today, p. 41.
6 Prasad, K.N., 1997, Bihar Economy: Through the Plans, New Delhi, Northern Book Centre, pp. 35 and 560.
8 Ibid, p. 4.
9 Ibid.
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15 Ibid.
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21 Ibid.
22 Guidelines for Implementing Participatory Irrigation Management (Draft), 2000, Water Resources Department, Government of Bihar, p. 4.
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24 Ibid.
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26 Ibid, p. 5.
27 Ibid.
28 Ibid.
29 Ibid.
37 Dhawan, B.D., 1988, Irrigation in India's Agricultural Development, New Delhi, Sage Publications.
53 Maloney, Clarence and K.V. Raju, 1994, Managing Irrigation Together: Practice and policy in India, New Delhi, Sage Publications.