



Evaluation Study on Accelerated Irrigation Benefits Programme (AIBP)

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**Programme Evaluation Organisation
Planning Commission
Government of India
New Delhi - 110001**

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(AIBP)



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Foreword

The Accelerated Irrigation Benefits Program (AIBP) was conceived in the year 1996 by the Government of India in order to provide financial assistance to the States to complete various on-going multi-purpose and irrigation projects in the country. It aimed to create irrigation potential of the projects and thereby extend irrigation to more areas.

Government of India has made massive investment in developing irrigation sources (major, medium and minor) in the country under AIBP since 1996. Two major issues - whether created irrigation potential had been fully utilized and what was the impact of AIBP scheme on the farmers livelihood - are critical for evaluating the programme. To assess the impact of the scheme, the Programme Evaluation Organization (PEO) of Planning Commission, initiated the present evaluation study on AIBP Scheme outsourcing it to Indian Institute of Management (IIM), Lucknow.

The present exercise has been carried out through sample survey in different states covering the selected irrigation projects. The study reveals substantial gap between potential created and utilizations in major irrigation programmes. Some of the prominent reasons behind the non-completion of the designed irrigation potential found in the evaluation study are; (a) problems in land acquisition, (b) law and order problem particularly in North-Eastern states, (c) construction of railway and road bridges in the command areas of the project, (d) labour problems and (e) lack of coordination among different departments of State Government.

Government from time to time conducts evaluation study to measure the efficacy of a programme and the PEO in Planning Commission is entrusted to provide key inputs into this process by undertaking systematic studies. I would like to compliment all the contributors for carrying out this exercise and finally bringing out the report.

(Montek Singh Ahluwalia)

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Preface

The Accelerated Irrigation Benefits Program (AIBP) was formulated in the year 1996 by the Government of India in order to provide financial assistance to States to complete various ongoing multipurpose and irrigation projects in the country so as to extend irrigation to more areas. Over a period of time, the scope of the programme has widened. Presently, Major, Medium and Extension, Renovation and Modernization (ERM) projects are eligible for Central Assistance under AIBP. The surface water minor irrigation schemes of Special Category States as well as such schemes satisfying specified criteria in Non-Special Category States are also eligible for Central Assistance under AIBP.

In March, 2005 in order to accelerate the provision of irrigation to drought prone areas and tribal area, the project providing irrigation benefits to such area were extended the same facility as allowable to the Special Category States. The Central Government has become much concerned about the status of the projects mainly which are in advanced stage of completion. Therefore the Programme Evaluation Organisation (PEO) of Planning Commission was entrusted to conduct an evaluation study on Accelerated Irrigation Benefits Program (AIBP).

The main objectives covered and the important issues discussed in the study are as follows:-

- to verify the potential creation reported by the State from the particular project by completing all the physical works on the ground,
- to ascertain how far the assets created under AIBP are maintained by the state authorities,
- to evaluate how the programme has assisted expediting the irrigation potential creation,
- to review the implementing process of AIBP,
- to *assess the* utilization of created potential by the beneficiaries of the command and whether the programme has helped in expanding in the net irrigated area in the command,
- to examine the quality of work done under the AIBP assisted projects,
- to evaluate whether rural economy has improved with the inception of the AIBP programme in the command,
- Shortcomings in the programme implementation and suggestions for improvement.

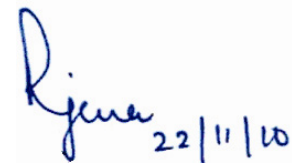
The proposed *exercise* has been carried out through sample survey in 10 different states covering 10 irrigation (4 Major, 4 Medium and 2 ERM) projects spread in 5 different zones of the country. In order to assess the impact of the programme, information have been collected from beneficiaries, non-beneficiaries farmers, knowledgeable persons and members from the Water Users Associations and through Focus Group Discussions (FGD) on sample basis.

It has been found in the evaluation study that there has been spectacular increase in the irrigated area but state governments are increasingly under severe financial constraints as they find it difficult to finance the recurring costs of irrigation and to collect economic water charges from the farmers. As a result, not only the sustainability of government run irrigation system is in danger, but also its impact on water use efficiency and equity has been dwindling over a period of time.

It has been realized from the evaluation study that if irrigation performance is to improve, a wide range of mutually supporting interventions will be needed which include improved agronomic, maintenance and irrigation management practices, system modernization and promotion of advanced irrigation technologies. Moreover, Institutional reforms including the restructuring of irrigation agencies, irrigation management transfer to the farmers and promotion of self-financing of irrigation schemes are also required.

The study received constant support and encouragement from Hon'ble Deputy Chairman, Planning Commission and Member Secretary, Planning Commission. The study was designed and conducted under the direction of Dr. R.C. Dey, Director, PEO with the assistance of Shri L.N. Meena, Shri Vipin Kumar, Economic Officers of PEO headquarters. The field investigation including data analysis and drafting of the report was done by IIM, Lucknow under my over all guidance. The help and assistance received from all the officers especially the efforts done by Prof. Sanjeev Kapoor, IIM, Lucknow in bringing the report to its present shape is gratefully acknowledged.

New Delhi
November, 2010



(R.A. Jena)
Adviser (PEO)

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Executive Summary

The AIBP was conceived in the year 1996 by the Government of India in order to provide financial assistance to States to complete various ongoing projects in the country so that envisaged irrigation potential of the project could be created and thereby extend irrigation to more areas. Government of India has made massive investment in developing irrigation sources (major, medium and minor) in the country under AIBP since 1996. At this juncture the major issues are two fold; first whether created irrigation potential has been fully utilized in the assisted projects or not, and secondly, and more importantly, what has been the impact of AIBP scheme on the farmers' livelihood? In order to fulfill this need, Planning Commission, Government of India initiated the present study on Evaluation of AIBP Scheme in India with the help of Indian Institute of Management (IIM), Lucknow.

The proposed exercise has been carried out through sample survey in different states covering the selected irrigation projects. Sample survey has been supplemented by participatory evaluation/assessment methods for which a set of participatory tools have been used. Data from each of the selected irrigation project was collected by the team of research staff and faculty members of IIM, Lucknow. The impact of AIBP on farmers' livelihood has been measured using two different methodologies. First, data was collected from the farmers using the structured questionnaire and secondly, the farmers' response on the various parameters was recorded using 5 point scale.

Irrigation Potential Created

It is disheartening to note that the gap between irrigation potential which was supposed to be created at design stage of the project and the one which has been created so far is highest in Dhansiri (v) project in Assam (62 percent). The progress of irrigation potential creation has also been quite slow in Yerrakalva (v) in Andhra Pradesh as well as in Bansagar (unit -1) (v) project in Madhya Pradesh. About one third of the designed irrigation potential has not been created in Shivnath Diversion (v) project, Chattisgarh and Gumti (v) project, Tripura.

Some of the prominent reasons behind the non-completion of the designed irrigation potential have been cited as follows:

- (a) Problem in land acquisition
- (b) Law and order problem particularly in North-Eastern states
- (c) Construction of railway and road bridges in the command areas of the project
- (d) Labour problems
- (e) Lack of coordination among different departments of State Government

Irrigation Potential Utilization

It is clear that the problem of utilization of irrigation potential is severe in major irrigation projects where the irrigation potential utilization has been found very low in Dhansiri (v) project, Assam(17%), Rajghat Dam, Uttar Pradesh (37%) and Bansagar (unit-1) (v), Madhya Pradesh (28%). On the other hand 100% irrigation potential utilization has been reported in all selected four medium irrigation projects.

The various factors responsible for gap between irrigation potential created and its utilization have been classified in the following categories as given in Chart 1.

Chart 1: Classification of Factors Responsible for Gap between IPC and IPU

Sl. No.	Category	Example
1.	Technical	<ul style="list-style-type: none">• Incomplete water distribution channels• Earthen distribution channels• Irregular de-silting of distribution channels• Non-availability of continuous and proper electric power
2.	Socio-political	<ul style="list-style-type: none">• Encroachment of field channels by farmers• Overuse of irrigation water• Destruction of water outlets
3.	Institutional	<ul style="list-style-type: none">• Non-existence of effective WUA• Low technical and managerial capacity of Irrigation Department staff
4.	Managerial	<ul style="list-style-type: none">• Lack of staff• Lack of fund for O&M• Low motivation of Irrigation Department Staff• Lack of supervision by Irrigation Department Staff
5.	Natural	<ul style="list-style-type: none">• Lack of rainfall• Decreased water level in the River
6.	Policy Level	<ul style="list-style-type: none">• Ineffective method for charging irrigation water cost based only on acreage system• Low administrative powers given to Irrigation Department Staff• Incorrect definition of irrigated area by not incorporating the number of irrigation• Lack of coordination between Irrigation Department, Revenue Department and CADA
7.	Agrarian	<ul style="list-style-type: none">• Change in demand of irrigation water due to change in cropping pattern in the command area• Increased demand of irrigation water due to use of chemical fertilizers and HYV seeds• Diversion of cultivable land for industrial and other purposes

(a) Social Issues

- Farmers of head reach of the canal over irrigated their fields, assuming that they may not get water for the following irrigation, this make canal water not to reach at the tail end of the main and minor canal and this area remains un-irrigated.
- Farmers at reservoir rim and those at idle reaches of canal systems lift water through pump and irrigate their fields located at higher levels and out of command area. This causes less availability of water for the tail end farms as well as damage to the canal, which results into increase in seepage and further loss of water on the way.
- Use of a large number of lift irrigation pumps submerged in the canal by farmers of idle reaches of canal obstruct the flow of canal water and reduces velocity of water and ultimately less supply and delay of water supply at the tail ends.
- Surrounding residents remove flag stones used for the lining of main canal for their domestic use. Frequent removal of flag stones causes severe damage to the main canal, and in turn high ration of seepage and less supply of water towards tail reaches.

(b) Technical Issues

- Because of weeds and siltation in the canal, water bearing capacity of canals is reducing.
- Non-provision of micro distribution (field channels and water course) network in original project plan led to inefficient use of canal water.
- Top bank level of entire canal section as exists, is lower than that designed, results in low discharge capacity of canal.
- Leakage of irrigation water through irrigation sluices reservoir basin causes less storage of water for irrigation.

(c) Management Issues

- Shortage of staff in irrigation department to maintain the canal system, leads continuous deterioration of canals.
- Lack of vehicles (four wheels) on the field for carry out regular patrolling during the irrigation season. Without four wheel vehicle it is very difficult to carry out the regular patrolling in the peak winter of Rabi season, to restrict wastage of water and damage of canal.
- According to the Irrigation Department, now responsibility of maintenance is given to the 'Water Users' Associations'. They have power to get the work done, with approval of irrigation department. WUAs had been given financial power,

without preparing them for performing their role. WUA members neither have technical knowledge, nor perception for the community work. If the Irrigation Department does not approve the canal work done by WUA, the members specially chairman make it political issue and get the approval forcefully done through local MLA or MP. Therefore, maintenance of canal work gets done without technical parameters, which leads to poor performance of canal system.

- There is lack of clarity of the role of WUA, to the staff of irrigation department as well as members of WUA. Irrigation staff members at the field level assume that Water Users' Association is only of twelve members, while they are only committee members. In reality WUA consists of all the farmers' of command area who use canal water. Usually irrigation staff members focus on participation of only committee members, while they should ensure participation of all the members, and try to empower them.

(d) Change in Land Use Pattern

- Cultivated area in the head reaches had been converted into urbanized residential area. This changed the focus of use of canal water from irrigation to domestic purpose. Indirect effect of this change is that tail end of these colonies also do not get water because of obstacle created in the minors by these colonies.
- Adoption of HYV wheat by farmers of command area, which requires more water. On the other hand water for kharif crop is not used at all

An exhaustive list of factors explaining the gap between IPC and IPU for sample irrigation projects in different States has been summarized in Chart 2 below:

Chart 2: Ranking/Prioritization of the Factors Responsible for Gap between IPC and IPU in Major Irrigation Projects

Sl.No.	Reason for Gap Between IPC and IPU	Rank
Supply Side Factors		
1.	Broken water outlets and minors	1
2.	Encroachment of area under field channels	6
3.	Non-maintenance of channels	2
4.	Diversion of cultivable land to other purposes within command area	10
5.	Diversion of water for other purposes	11
6.	Low water carrying capacity of distribution channels due to silting	3
7.	Seepage from unlined minor canals	8
8.	Insufficient availability of water	12
9.	Non-completion of construction of field channels as per design	4
Demand Side Factors		
10.	Change in cropping pattern	5
11.	Non-reporting of irrigated area by farmers/Irrigation Dept.	13
12.	Lack of awareness among farmers about use of water	9
13.	Over utilization of irrigation water by farmers	7

It is evident from Chart 2 that supply side factors have emerged more important for explaining the gap between IPC and IPU. Majority of these supply side factors are caused by lack of funds for operation and maintenance of irrigation projects. The only important demand side factor emerged in the analysis is change in cropping pattern by the farmers over time. As a result in many cases, the demand of irrigation water has increased as compared to what was planned at the time of inception of the project. The irrigation potential was calculated based on a particular cropping pattern in the command area of the project, as the demand of water is based on the nature of crop under cultivation. This parameter has changed over time. Based on market conditions for technological changes, cropping pattern has changed almost in all the places in favor of more water intensive crops. This has resulted in increased demand of irrigation water by the farmers. On the other hand, due to lack of effective control on the distribution of water, farmers located at head of the canal over irrigate the land leaving less water availability to the users at the tail end.

Quality of Assets under AIBP

The results of farmers' response on the maintenance of assets (water outlets and distribution channels) reveal that abysmally low percent of respondent feel the proper maintenance of water outlets and distribution channels in major irrigation projects. On the other hand maintenance of water outlets and distribution channels has been found by and large very good in medium irrigation projects and ERM projects.

Process of Project Implementation and Management

The responses of beneficiaries related to process of project implementation and management has been captured in the survey of the study. Water being a common property resource, cannot be distributed efficiently and equitably without a common agreed system among the users. Majority of the farmers in the command of medium irrigation projects responded that a proper system exist as far as distribution of water is concerned in their villages. The situation is not good in case of major irrigation projects of Uttar Pradesh and Madhya Pradesh where only 30 percent farmers responded positively about existence of proper system for distribution of water. Although water is not distributed by any standard system in these two projects, it is worthwhile to note that about 80 percent farmers were of the opinion that there exists equitable distribution of water in the villages. The same response was received in all the irrigation projects except the medium irrigation project in Chattisgarh. The response pattern is more or less similar among the beneficiary farmers located at different locations of the canal.

Payment of irrigation charges on time by the users is the most sensitive issue in the irrigation management across the country. Here also it has been observed that majority of the farmers do not pay irrigation charges on time in major irrigation projects of Uttar Pradesh, Karnataka, and Assam. The percentage of farmers making timely payment of irrigation charges is comparatively higher in medium irrigation projects and ERM projects. Surprisingly, more than 50% of the farmers in major irrigation projects are willing to pay extra charge for assured water supply. It clearly indicates that access to water is more important than the cost of it.

Impact of AIBP on Agricultural Development

The cropping intensity has been found higher among the beneficiaries' farms as compared to that of non-beneficiaries' farms in all the irrigation projects. The difference is more pronounced in the medium and ERM irrigation projects. This is quite obvious as availability of irrigation has increased the opportunities to the farmers for taking more crops in area. Subsequently, average annual income of the farmers has increased as evident from data on average annual income of beneficiary and non-beneficiary households. Here the increase in income is more among the beneficiary farmers of the command area in major irrigation projects.

Impact of AIBP on Socio-economic Development

The status of migration among the beneficiary and non-beneficiary farmer households across the different projects indicates that average duration of migration in a year is lower among the beneficiary households as compared to that of non-beneficiary households in all the irrigation projects. This is because of availability of irrigation water has increased on-farm involvement of the farming community.

The farmers' response on various parameters on socio-economic development indicates that AIBP has been successful in increasing literacy rate of the farming community in Karnataka and Andhra Pradesh. These are the two states where there has been increase in non-farm activities. Unfortunately, farmers from none of the state reported increase in health care services and decrease in disease outbreak. Increase in employment opportunities was reported in A.P. and Orissa. AIBP has failed to increase the credit availability to farmers in all the states. Moreover, there has been no impact in the visit of government officials to rural sector after AIBP.

Suggestions:

1. Enough budgets should be allocated for timely repair and maintenance of the canals.
2. High priority should be given to the task of lining of the whole canal system, including main medium and minor canals, along with a provision of appropriate slope. High quality technical work should be ensured in this regard. In addition, contractors and field staff of irrigation department should be trained to deliver technical work of a sound quality.
3. Since it is very difficult to stop farmers from lifting water, it is better to install a lift irrigation system on the bank of canals. In this way, farmers can be charged for the amount of water they collect. As per the suggestion of the officials of irrigation department, lift irrigation through the main canal should be legalized and that area should be converted into a command area. This would help eliminate the frequent damage to the canal undergone during lifting water by the farmers.
4. Restructuring of the WUA should be carried out. This should be followed by aggressive training for organizational development, leadership, maintenance of, financial and operational records, training in the basic technical components of canal

system and in the methods of monitoring technical work. Instead of vesting WUA with financial clout, it should be given a management and supervisory role, so that wastage of water can be prevented and equity in distribution of canal water can be ensured. WAU should be given enough power to monitor the construction and repair work of canals and if they do not find work done as per the norms, they should have power to get the modifications done. Field level irrigation officials should be given enough financial power, so that they can implement corrective measures in time to save the canal from further damage.

5. Physical safety of the field staff (sub engineer and field personnel) of the irrigation department should be ensured, by providing them appropriate police security, so that they are able to supervise the canal operation even during night and thus prevent wastage of water resulting from damage to canal during peak irrigation season.
6. There is a need to develop a mechanism for proper coordination between relevant government departments, such as the irrigation, agriculture, revenue and the land development department. Perhaps a committee consisting of representatives from the relevant departments can be formed, to look at the holistic development of the command area.
7. A policy needs to be formed to make farmers to adopt appropriate cropping pattern for optimum use of water. A balanced ratio has to be introduced between high, medium and low water consuming crops. This will help maximize the benefits of canal water and at the same time protect head reach land from water logging and ultimately prevent it from becoming infertile land. Some mechanism is needed to be developed to impose fine on the farmers who disproportionately grow high water consuming crops. Growing high water consuming crops continuously makes the land water logged and saline and ultimately makes it unsuitable for cultivation. It is in the interests of the farmers to adopt balanced cropping pattern. There are many examples in India where highly fertile agriculture land has turned infertile because of excess use of water and imbalance cropping pattern. Farmers need to make aware of this.
8. As of now, under AIBP programme there are constraints for providing funds towards construction of Field Irrigation Canal (FIC) net works. Funds are being provided for construction of main canal, distributaries, laterals and sub laterals. But the networking right from main canal up to the sub laterals does not meet the requirement towards the wet potential unless FIC network is put in place. As such it would be better, if AIBP assistance is extended even for construction of FIC net works so that the networking could be made through in full, wet potential could be achieved and the finished product in true sense could be realized.
9. The main constraint in implementation of AIBP scheme is land acquisition and Rehabilitation & Resettlement. Though the guidelines prescribe that land acquisition need be completed before the project proposals are approved under AIBP, this is not the case in some of the projects. Certain lands remain to be acquired after the project is taken up and it is expected that the lands can be acquired during the course of

execution of parts of the project. In many of the cases, the project is continued under AIBP even after the prescribed completion time of 4 years either as Normal AIBP or as Fast Track Programme. Thus the very objective of the Accelerated Irrigation Benefits Programme is undermined.

10. Expenditure incurred on the project is being considered on a year to year basis. If the expenditure incurred on a project during a current financial year is more than the programmed expenditure, the guidelines should be modified suitably to allow reimbursement of central share on expenditure thus incurred.

Chapter 1

Introduction and Study Methodology

Section 1: Background

The Accelerated Irrigation Benefits Program (AIBP) extends financial assistance to the States for creation of irrigation potential by completion of identified ongoing irrigation projects. A large number of irrigation projects could not be completed mainly because of financial constraints being faced by the State Governments. As a result of this, despite a huge investment having already been made on these projects, the country was not able to derive the desired benefits. This was a matter of grave concern for the Union Government and remedial measures for expeditious completion of some of the projects which were in advanced stage of completion became necessary. Developing irrigation requires a lot of financial and environmental cost to the society, and therefore, non-utilization of irrigation leads to wastage of precarious resources on the one hand, and loss of opportunity to increase the agricultural production, on the other. Accordingly, the AIBP was conceived in the year 1996 by the Government of India in order to provide financial assistance to States to complete various ongoing projects in the country so that envisaged irrigation potential of the project could be created and thereby extend irrigation to more areas.

Government of India has made massive investment in developing irrigation sources (major, medium and minor) in the country under AIBP since 1996. As per the information given in the website of Ministry of Water Resources (MoWR), Government of India (GOI), the State Governments have been provided an amount of Rs.37931.1732 crore as CLA/Grant under AIBP since inception of this program for 272 major/medium irrigation projects and 10236 surface minor irrigation schemes. After commencement of this Program, 110 major/medium projects and 6640 surface MI Schemes have so far been reported completed. An additional irrigation potential of 59.39 lakh ha has been created up to March 2009.

At this juncture the major issues are two fold; first whether created irrigation potential has been fully utilized in the assisted projects or not, and secondly, and more importantly, what has been the impact of AIBP scheme on the farmers livelihood? In this context, an analytical study to find out the present status of AIBP schemes in the country is required before rolling out the investment in the creation of new irrigation resources. The study to find out the reasons for the present situation (where we are not able to fully harness the already crated irrigation potential) would definitely pave the way for designing the new irrigation structures and its management in the future endeavors. In order to fulfill this need, Planning Commission, Government of India initiated the present study on Evaluation of AIBP Scheme in India with the help of Indian Institute of Management (IIM), Lucknow.

Section 2: Objectives of the Study

The study has been undertaken with the following objectives:

1. To verify the potential creation reported by the State from the particular project by completing all the physical works on the ground, i.e. to verify whether the potential creation proposed under MOU is actually achieved on the ground.
2. To ascertain how far the assets created under AIBP are maintained by the State authorities.
3. To evaluate how the program has assisted expediting the irrigation potential creation.
4. To review the implementing process of AIBP and to examine whether the States have provided matching share and released the fund to the project authorities as per stipulated time period mentioned in the guideline.
5. Whether the created potential is actually utilized by the beneficiaries of the command and has the program helped in expanding in the net irrigated area in the command i.e. extent of gross irrigated area vis-à-vis potential created.
6. To assess the quality of work done under the AIBP assisted project.
7. To evaluate whether any perceptible socio-economic development has occurred in the AIBP command (i.e. whether rural economy improved with the inception of the program)
8. Shortcomings in the program implementation and suggestions for improvement.

Section 3: Sample Coverage

The study covers 10 different States in such a way that all the five different zones of the country, East, West, North, South and North-East are represented by two States. The ten different States undertaken for the present study are given in Table 1.1.

Table 1.1: States Selected for the Study

Sl. No.	Zones	State	Criteria of Selection
1	East	Chattisgarh & Orissa	Percentage creation of potential against target up to 2005-06
2	West	Rajasthan & Madhya Pradesh	
3	North	Uttar Pradesh / Uttranchal & Jammu & Kashmir	
4	South	Karnataka & Andhra Pradesh	
5	North East	Assam & Tripura	

From each selected State, one project under AIBP has been selected for detailed investigation. The selected projects in different States are as shown in Table 1.2.

Table 1.2: List of Sample Projects

Sl. No.	Name of the States	Selected Project	Major, Medium, Extension, Renovation and Modernization (ERM)
1	Karnataka	Upper Krishana St 1	Major
2	Andhra Pradesh	Yerrakalva (v)	Medium
3	Uttar Pradesh / Uttranchal	Raighat Dam	Major
4	Jammu & Kashmir	New Pratap Canal	Medium
5	Chattisgarh	Shivnath Diversion (v) @	Medium
6	Orissa	Narai Barrage (IX)	ERM
7	Rajasthan	Jaismand (Modernization) VI @	ERM
8	Madhya Pradesh	Bansagar (Unit –I) (V)	Major
9	Assam	Dhansiri (v)	Major
10	Tripura	Gumti (v)	Medium

In Madhya Pradesh and Jammu & Kashmir, the originally selected sample project under AIBP could not be taken for impact evaluation purpose as both the projects, namely Omkareshwar (VIII) in Madhya Pradesh and Tral Lift in Jammu & Kashmir are still non-functional and no irrigation facility has been provided in the field. Accordingly, as per the advice of Planning Commission, the sample projects have been changed in these two States. The team has taken Bansagar (Unit –I) (V) project in Madhya Pradesh and Modernization of New Pratap Canal in Jammu & Kashmir.

Under each project, 16 villages have been selected from different pockets of the irrigated area covered by the project in such a way that 4 villages are very close to the project, 8 villages are from the middle and 4 villages are from the tail end of the project. Beside 4 villages are selected from the non-irrigated area (through this project) located at nearby places from the selected project. Therefore, a total of 20 villages have been selected from each State/project area for the evaluation purpose. The exact sample profile of the villages from the selected States has been presented in Table 1.3.

Table 1.3: Sample Profile of Villages across States

State	Command Area			Non-command Area	Total
	Head	Middle	Tail		
Andhra Pradesh	4	8	4	4	20
Assam	4	8	4	4	20
Chhattisgarh	3	9	4	4	20
Jammu & Kashmir	4	8	4	4	20
Madhya Pradesh	5	6	5	4	20
Orissa	5	9	2	0	16
Rajasthan	4	8	4	4	20
Tripura	3	9	4	4	20
Uttar Pradesh	6	6	4	4	20
Karnataka	4	8	4	4	20
Total	42	79	39	36	196

From each selected village, one water user association has been selected, if available. From each irrigated village, 10 beneficiary households and from each non-irrigated village, 10 farmers households have been selected. From each irrigated village, 2 non-beneficiary households have also been selected for the study. From each sample village one Focus Group Discussion has been conducted which consisted of 10 beneficiaries and also included members such as Sarpanch, Ward member, local knowledgeable persons, water user association, Scheduled Caste and Scheduled Tribe(if available) and other beneficiaries.

Section 4: Methodology

The proposed exercise has used a balanced menu of required research tools. Primarily it has been carried out through sample survey in different states covering the selected irrigation projects. As indicated, the primary data have been collected through structured questionnaire. Sample survey has been supplemented by participatory evaluation/assessment methods for which a set of participatory tools have been used.

Data from each of the selected irrigation project was collected (using the questionnaires as given in Appendix -2) by the team of research staff and faculty members of IIM, Lucknow. The data related to irrigation potential created (IPC) and irrigation potential utilized (IPU) and the various factors contributing the gap between the IPC and IPU was obtained from the respective office of the Chief Engineer of each project. Besides, discussion was carried out with the officials of each of the selected project to understand the qualitative factors responsible for defining the gap between IPC and IPU.

Primary data, based on questionnaires as given in Appendices 3 to 7, was collected by team of research staff and faculty members of IIM, Lucknow.

Altogether 7 questionnaires were developed to collect the information at various levels which are as follows:

Schedule 1: Format for State level secondary data collection on AIBP scheme

Schedule 2: Format for secondary data on Irrigation Project under AIBP Scheme

Schedule 3: Questionnaire for analysis of organizational and functional status of WUAs

Schedule 4: Questionnaire for farmer beneficiary survey

Schedule 5: Questionnaire for farmer non- beneficiary survey

Schedule 6: Checklist for Focus Group Discussions to be conducted at village level

Schedule 7: Format for collecting data on village profile

Section 5: Sources of Information

The required information was collected from the following sources:

- Interaction with officials of Irrigation Department in the respective States and in Govt. of India.
- Records maintained at the offices of Chief/Superintendent Engineer of selected irrigation projects.
- Use of other secondary information, published or unpublished reports about irrigation status in India and in different States.
- Focused group discussion with farmers, members of WUAs, and other village community members.
- Collection of data from farmers from command and non-command areas through structured questionnaire.
- Web sites of Central Water Commission and Ministry of Agriculture, Govt. of India.

The list of indicators and the possible sources through which information has been collected to fulfill each of the objectives of the study has been presented in Chart 1.1.

Chart 1.1: List of Indicators and Sources of Information

Objective	Indicator	Source	Approach
1. To verify whether the potential creation proposed under MOU is actually achieved on the ground	<ul style="list-style-type: none"> ▪ Irrigation potential proposed under MOU. ▪ Actual potential created ▪ Actual irrigated area 	<ul style="list-style-type: none"> ▪ Project report ▪ MOU ▪ Village profile 	<ul style="list-style-type: none"> ▪ Difference between command and actual irrigated area ▪ 10 comprehensive project schedules ▪ 160 village profiles ▪ All required data of project MOU etc.
2. Maintenance of assets under AIBP by state authorities	<ul style="list-style-type: none"> ▪ Maintenance work done in last two years ▪ Budget allocated for maintenance ▪ Formation of WUA ▪ Number of complains 	<ul style="list-style-type: none"> ▪ Physical & Financial data on maintenance ▪ Project report ▪ WUA ▪ Household survey 	<ul style="list-style-type: none"> ▪ Analysis of physical and financial progress ▪ Participation of WUA and Beneficiary in asset maintenance
3. Irrigated land in total command area before and after the project	<ul style="list-style-type: none"> ▪ Increase in irrigated area after the project ▪ Increase in agricultural production in the area 	<ul style="list-style-type: none"> ▪ Secondary data of command area before & after the project ▪ Change in irrigation & production through beneficiary survey 	<ul style="list-style-type: none"> ▪ Percentage change in irrigated area and agricultural production
4. Implementing process of AIBP and state fund disposal on the project	<ul style="list-style-type: none"> ▪ Expenditure by state as per MOU ▪ Gestation period and deviation in project completion ▪ Deviation in physical work plan as per MOU 	<ul style="list-style-type: none"> ▪ Budget report ▪ Annual progress report ▪ MOU ▪ Project implementation: target and achievement. 	<ul style="list-style-type: none"> ▪ Analysis of project data to find out deviation, if any

contd....

Chart 1.1: List of Indicators and Sources of Information (contd...)

Objective	Indicator	Source	Approach
5. Potential actually utilized by beneficiaries and expansion of net irrigated area in the command.	<ul style="list-style-type: none"> ▪ Change in gross irrigated area before and after the project ▪ Change in irrigated area reported by beneficiary before and after the project 	<ul style="list-style-type: none"> ▪ Secondary data available with the project office on irrigated area ▪ Beneficiary survey 	<ul style="list-style-type: none"> ▪ Percentage change in irrigated area before and after the project
6. To assess the quality of work done under AIBP	<ul style="list-style-type: none"> ▪ Excess / un-expected expenditure on O&M ▪ Number of complaints 	<ul style="list-style-type: none"> ▪ Project office ▪ WUA Survey ▪ Beneficiary survey 	<ul style="list-style-type: none"> ▪ Excess/ un-expected expenditure on O&M ▪ Stakeholders perception on quality of infrastructure
7. Socio-economic development in the AIBP command	<ul style="list-style-type: none"> ▪ Increase in agricultural production and productivity ▪ Change in cropping pattern and crop diversification ▪ Increase in cropping intensity ▪ Increase in annual income and expenditure ▪ Migration for employment ▪ Increase in sanitation, healthcare and drinking water facilities after the project 	<ul style="list-style-type: none"> ▪ Primary beneficiary and non-beneficiary survey 	<ul style="list-style-type: none"> ▪ Social Cost & Benefit Analysis ▪ Percentage changes in different indicators
8 Shortcomings in the program and suggestions for improvement.		<ul style="list-style-type: none"> ▪ Discussion with project officials ▪ WUA Survey ▪ Primary survey ▪ FGD ▪ Village Survey 	<ul style="list-style-type: none"> ▪ 1600 schedules with suggestions column ▪ 120 FGD in beneficiary villages ▪ Interaction with irrigation department officials

Chapter 2

Evaluation of Accelerated Irrigation Benefit Program (AIBP) in Uttar Pradesh

Section 1: State Level Overview

AIBP assistance has been provided to 18 irrigation projects since the year 1996 in the State. Out of these 18 projects, 11 are the major irrigation projects while 2 are medium irrigation projects (Table 2.1). There are 5 Extension, Renovation and Modernization (ERM) projects which have also been assisted under AIBP. Eleven projects have been completed till now and the remaining 7 projects are ongoing projects.

Table 2.1: Projects sanctioned under AIBP from 1996 to till date

Sl. No.	Category	Completed	Ongoing
1.	Major	6	5
2.	Medium	2	-
3.	Extension, Renovation and Modernization (ERM)	3	2
4.	Minor Irrigation	-	-
	Total	11	7

The year-wise irrigation potential created under AIBP assisted projects has been presented in Table 2.2. It can be seen that during the year 2008-09, irrigation potential of 328 thousand hectares was created under all the projects of AIBP.

Table 2.2: Irrigation Potential Created under AIBP Scheme

(Thousand hectare)

Sl. No.	Project	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09
1.	Major	55.35	26.73	74.55	103.30	196.32	50.40	256.75
2.	Medium	-	-	-	-	39.75	-	-
3.	Extension, Renovation and Modernization (ERM)	15.00	-	15.00	2.00	8.00	20.00	71.35
4.	Minor Irrigation	-	-	-	-	-	-	-
	Total	70.35	26.73	89.55	105.30	244.07	70.40	328.10

Section 2: Rajghat Canal Project

1. Background and Project Location

The Rajghat irrigation project was incepted in 1973, while the proper construction was started in April 1978 after formation of Betwa River Parishad. The Rajghat irrigation project is a major inter-state development with water from the Rajghat dam on the Betwa River being shared equally between Uttar Pradesh and Madhya Pradesh. Rajghat dam project spills across Betwa River, which is a tributary of Yamuna River. The Dam is situated on Lalitpur Chanderi road near village Kailwara of Distt. Lalitpur, Uttar Pradesh. River Betwa at the dam site flows from south to north along the boundary of Uttar Pradesh and Madhya Pradesh Left flank of the dam lies in the Madhya Pradesh while the right flank is situated in Uttar Pradesh

The projects located on the downstream are Matatila Dam Project, Dhukwan Dam and Parichha Dam. Thus, the Rajghat Dam project serves as mother storage for irrigation in Uttar Pradesh and Madhya Pradesh through a cascade of hydraulic structures in the downstream of River Betwa. Catchment area of Rajghat Dam is spread over 16317 sq. km., of which 673 sq. km. falls in Uttar Pradesh and rest of it (15644 sq. km.) is in Madhya Pradesh. There are 18 radial spillway gates and each of them measures 15 X 14.565 meters.

2. Irrigation Potential Designed and Created

Table 2.3 presents the irrigation potential designed and created across the rabi and kharif seasons. It shows that there is no gap for kharif season between designed and current potential irrigated area. However, there is a gap of 400 ha for rabi season which could not be created due to proposed construction of bridge for railway and on national highway.

Table 2.3: Irrigation Potential Designed and Created across the Seasons

Season	Potential Irrigated Area (ha)		
	Design Stage	At completion	Present
Kharif	16198	16198	16198
Rabi	122463	122063	122063
Total	138661	138261	138261

3. Funds received under AIBP

Table 2.4 presents year wise approved and release of fund both from central and state Governments. The figures clearly indicate that about two-third of the total AIBP fund under the project has been released by Central Government as compared to one third of State contribution. Total fund released of 18.37 crore in 2007-08 was least during the last five years (2003-04 to 2007-08).

Table 2.4: Year wise received AIBP fund

(Rs. Crore)

Year	Central Govt.	State Govt.	Total
2003-04	22.67 (71.56%)	9.01 (28.44%)	31.68
2004-05	25.50 (66.70%)	12.73 (33.30%)	38.23
2005-06	24.85 (67.29%)	12.08 (32.71%)	36.93
2006-07	36.80 (66.35%)	18.66 (33.65%)	55.46
2007-08	13.00 (70.76%)	5.37 (29.24%)	18.37
Total	122.822 (67.98%)	57.85 (32.02%)	180.67

Note: Figures in parenthesis indicate percent share of the total in the respective year

As reported, AIBP fund has been basically used for the construction and maintenance works of irrigation structures. Table 2.5 brings the year wise expenditure of AIBP fund during last five years.

Table 2.5: Year wise Expenditure of AIBP fund

(Rs. in Crore)

Year	Central Govt.	State Govt.	Total
2003-04	12.52	8.43	20.95
2004-05	8.30	12.62	20.92
2005-06	24.85	12.08	36.93
2006-07	36.79	18.66	55.45
2007-08	13.00	5.00	18.00
Total	95.46	56.79	152.25

4. Irrigation potential utilized

The project only provides irrigation for rabi season. Table 2.6 brings the year wise irrigation potential utilized during rabi season. It clearly shows a below satisfactorily performance of the project in terms of irrigation potential utilization, as it has been failed even to utilize half of the potential. The highest irrigation potential utilization is 45055 ha during 2008-09. The average irrigation utilization is to the tune of 28793 ha.

Table 2.6: Irrigation Potential Created and Actual Gross Irrigated Area

Year	Irrigation potential for Rabi (ha)	Actual gross irrigated Area (ha) (Rabi)	Irrigation potential utilized (%)
2002-03	122063	16372	13.41
2003-04	122063	21544	17.65
2004-05	122063	23326	19.11
2005-06	122063	31271	25.62
2006-07	122063	38935	31.90
2007-08	122063	25045	20.52
2008-09	122063	45055	36.91
Average	122063	28793	23.59

5. Reason for gap between Irrigation Potential Created & Utilization

(a) Inadequate Rainfall

The rainfall in the Bundelkhand region is always erratic and inadequate. As a result of which the water storage capacity of the project is not fully utilized. Against the expected average rainfall of 1000 mm, the average actual rainfall was 848.57 mm in the last seven years. There is difference of about 150 mm yearly which put dismal impact on performance of the project. Table 2.7 presents the monthly average rainfall during 2002-2009 in the catchments area of the project.

Table 2.7: Monthly Average Rainfall in the Catchments Area

Month/Year	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09
January	Nil	Nil	2.0	5.0	Nil	Nil	Nil
February	36	27	Nil	Nil	Nil	56	Nil
March	Nil	Nil	Nil	31	68	Nil	Nil
April	0.5	4.0	1.0	Nil	Nil	Nil	Nil
May	0.5	11	31	Nil	11	Nil	3.0
June	153	75	265	112	83	192	549
July	92	370	130	414	184	83	215
August	469	259	312	152	244	180	234
September	46	325	79	40	104	137	63
October	Nil	Nil	70	Nil	18	Nil	2.0
November	1.0	Nil	Nil	Nil	Nil	Nil	Nil
December	Nil	1.0	Nil	Nil	Nil	Nil	Nil

(b) Lack of Water Storage

The maximum storage capacity of the project is 76.69 TMC (thousand million cubic feet), however, it has never attained the maximum capacity. The average storage of water since 2002-03 is calculated to the tune of 66.39 TMC which is about 87 percent of the ideal capacity (Table 2.8).

Table 2.8: Years wise Actual Storage of Water (in TMC)

Year	Maximum capacity	Actual capacity	Percent of maximum Capacity (%)
2002-03	76.69	58.95	76.87
2003-04	76.69	71.65	93.43
2004-05	76.69	71.92	93.78
2005-06	76.69	69.27	90.32
2006-07	76.69	72.18	94.12
2007-08	76.69	49.41	64.43
2008-09	76.69	71.30	92.97
Average	76.69	66.36	86.56

(c) Lack of Pucca Canal/lining

The total length of the five canal system under the project is about 437.77 km of which 26 km (3.6%) has been lined/pucca. The total length of distributaries canals/drainage is 1492.51 km of which only 3.65 km is lined/pucca. The efficiency to run water in the canal system is still required to gain its full potential, as very little 3.6 percent of main canal is reported to be lined/pucca. Therefore, there are severe problems of water logging, seepage and other associated problems, that has resulted in non-utilization of the full project potential. Table 2.9 presents the summary of length of main canal, distributaries and minors in designed and at current stages.

Table 2.9: Overview of length of canal, distributaries, minors and sub-minors in designed and current stage

Sl. No.	Parameters	Design Stage	At Completion	Present
1 (a)	Length of Main Canal (km)	437.77 km	437.77 km	437.77 km
1 (b)	Of which lined (km)	28.00 km (6.40%)	28.00 km (6.40%)	28.00 km (6.40%)
3 (a)	Length of Distributaries (km)	1492.51 km	1492.51 km	1492.51 km
3 (b)	Of which lined (km)	03.65 km (0.24%)	03.65 km (0.24%)	03.65 km (0.24%)
4 (a)	Length of Minors (km)	274.00 km	274.00 km	274.00 km
4 (b)	Of which lined (km)	-	-	-

(d) Status of Outlets

The farmers are desperately looking for construction of outlets as they are residing by the canal but are unable to get water for irrigation from the canal/minor. In some instances, the minors are already there but are not connected to the canals, as the outlets have not been constructed. The construction of many outlets under the project is ongoing and is expected to be completed by end of the year.

(e) Lack of Supportive Staff

Table 2.10 presents staffing pattern under the project in terms of required, sanctioned and current working positions. Against the total required 208 staff positions, only 142 positions have been sanctioned and presently only 128 people are working. Particularly, field level staff positions like Seech-Pal and Supervisor are quite lower than the actual requirement. It adversely affects performance of the project and thus widens the gap between effective utilization of the created irrigation potential.

Table 2.10: Status of Staff in the Project

Designation	Required	Sanctioned	Presently working
Executive Engineer	5	5	5
Assistant Engineer	25	25	25
Junior Engineer	74	74	63
Supervisor	25	9	9
Jiledar	3	3	2
Seech Pal	76	26	24
Total	208	142	128

Suggestions:

- Timely supply of irrigation water and ensure the match between the cropping patterns with the available water.
- Proper upstream controls should be put in place to make sure that sufficient quantity of water reaches the tail end farmers.
- Field level data should be collected on cropping pattern adopted and season-wise water requirements of crops.
- The Water Users' Associations should be made responsible for measuring the quantities of water released into the distributaries as well as at the pipe command level and disputes settlement if any.
- Need for strengthening coordination and communication amongst various departments and internal systems
- Regular visits of irrigation department employees/officers to ensure fair practices in water distribution and disputes settlement if any.
- There is a need to release sufficient funds for maintenance works in order to minimize the transmission losses and seepage.

Section 3: Impact of AIBP

1. Distribution of Sample and its Profile

According to sample selection methodology, 160 beneficiary respondents were contacted and responses were recorded from them (Table 2.11). The sample beneficiaries were selected from three locations of the selected canal, i.e. head (40), middle (80) and tail (40) of the Rajghat Canal Project. Thirty one non-beneficiaries from 16 selected villages of command area and 39 non-beneficiaries from 4 villages of non-command area were also selected for the analysis purpose.

Table 2.11: Distribution of Sample

Location in the Canal	No. of villages	Number of Beneficiaries/ non beneficiary
Beneficiary		
Head	4	40
Middle	8	80
Tail	4	40
Total	16	160
Non-beneficiary		
Command	16	31
Non-command	4	39
Total	20	70

2. Social Profile of the Sample

The data given in Table 2.12 indicate that beneficiaries sample from all the three different locations is dominated from OBC. In case of non-beneficiaries, the sample is not very skewed towards any single caste and Scheduled Caste (SC), OBC and general caste have sufficient representation. The proportion of Scheduled Tribe (ST) caste is negligible in the sample of beneficiaries as well as non-beneficiaries.

Table 2.12: Social Profile of Sample

Caste	Beneficiary								Non-beneficiary					
	Tail		Head		Middle		Total		Command		Non-command		Total	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%
General	2	5.0	3	7.5	20	25.0	25	15.6	4	12.9	13	33.3	17	24.3
Other Backward Class(OBC)	28	70.0	33	82.5	51	63.7	112	70.0	16	51.6	12	30.8	28	40.0
Scheduled Caste (SC)	10	25.0	4	10.0	8	10.0	22	13.8	11	35.5	13	33.3	24	34.3
Scheduled Tribe (ST)	0	0.0	0	0.0	1	1.3	1	0.6	0	0.0	1	2.6	1	1.4
Total	40	100.0	40	100.0	80	100.0	160	100.0	31	100.0	39	100.0	70	100.0

3. Land Holding Pattern

The land holding pattern of selected beneficiaries and non-beneficiaries has been presented in Table 2.13. The average size of land is quite high for the tail-end

beneficiaries. On an average the sample beneficiaries have 5 acres of land, whereas the corresponding figure for non-beneficiaries stands at 4.20 acres. Surprisingly the average size of un-irrigated land is quite low in case of non-beneficiaries as compared to that of beneficiaries.

Table 2.13: Land Holding Pattern of Sample

Description	Beneficiary				Non-beneficiary		
	Head	Middle	Tail	Total	Command	Non-command	Total
1. Average Size of Land (acre)	4.76	4.38	6.37	4.99	3.12	5.06	4.20
2. Average size of Irrigated Land (acre)	3.93	3.57	5.16	4.05	2.95	4.33	3.72
3. Average Size of Un-irrigated Land (acre)	1.17	1.00	2.38	2.75	0.24	0.73	0.51

4. Economic Status

Economic status of sample beneficiaries and non-beneficiaries has been captured in Table 2.14. The figures reveal that except the nature of house, both the beneficiaries and non-beneficiaries stand on the same platform of economic status. The striking picture is that all the farmers belonging to both the beneficiaries and non-beneficiaries are very poor based on the various indicators given in Table 2.14.

Table 2.14: Economic Status of Sample

	Beneficiary				Non-Beneficiary		
	Head	Middle	Tail	Total	Command	Non-command	Total
Type of House							
Pucca	18 (45.0)	28 (35.4)	9 (23.1)	55 (34.8)	8 (25.8)	6 (15.4)	14 (20.0)
Kaccha	7 (17.5)	33 (41.8)	19 (48.7)	59 (37.3)	19 (61.3)	26 (66.7)	45 (64.3)
Semi-Pucca	15 (37.5)	18 (22.8)	11 (28.2)	44 (27.8)	4 (12.9)	7 (17.9)	11 (15.7)
Total	40 (100.0)	79 (100.0)	39 (100.0)	158 (100.0)	31 (100.0)	39 (100.0)	70 (100.0)
Source of Drinking Water							
Owned hand-pump	2 (5.0)	5 (6.3)	2 (5.1)	9 (5.7)	3 (9.7)	1 (2.6)	4 (5.7)
Community hand-pump	18 (45.0)	50 (63.3)	29 (74.4)	97 (61.4)	19 (61.3)	23 (59.0)	42 (60.0)
Wells	20 (50.0)	24 (30.4)	8 (20.5)	52 (32.9)	9 (29.0)	13 (33.3)	22 (31.4)
Others	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	2 (5.1)	2 (2.9)
Total	40 (100.0)	79 (100.0)	39 (100.0)	158 (100.0)	31 (100.0)	39 (100.0)	70 (100.0)

Contd ...

Table 2.14: Economic Status of Sample (Contd...)

	Beneficiary				Non-Beneficiary		
	Head	Middle	Tail	Total	Command	Non-command	Total
Latrine Room in Home							
Yes	2 (5.3)	20 (25.3)	4 (10.3)	26 (16.7)	6 (19.4)	1 (2.6)	7 (10.1)
No	36 (94.7)	59 (74.7)	35 (89.7)	130 (83.3)	25 (80.6)	37 (97.4)	62 (89.9)
Total	38 (100.0)	79 (100.0)	39 (100.0)	156 (100.0)	31 (100.0)	38 (100.0)	69 (100.0)
Source of lighting in House							
No lighting	1 (2.5)	1 (1.3)	0 (0.0)	2 (1.3)	1 (3.2)	1 (2.6)	2 (2.9)
Kerosene	35 (87.5)	65 (82.3)	39 (100.0)	139 (88.0)	29 (93.6)	36 (94.8)	65 (94.2)
Electricity	3 (7.5)	5 (6.3)	0 (0.0)	8 (5.1)	0 (0.0)	0 (0.0)	0 (0.0)
Other	1 (2.5)	8 (10.1)	0 (0.0)	9 (5.6)	1 (3.2)	1 (2.6)	2 (2.9)
Total	40 (100.0)	79 (100.0)	39 (100.0)	158 (100.0)	31 (100.0)	38 (100.0)	69 (100.0)
Type of Cooking Fuel							
Leave/straw	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	1 (3.3)	0 (0.0)	1 (1.5)
Fire wood	38 (97.4)	78 (98.7)	38 (97.4)	154 (98.2)	29 (96.7)	38 (100.0)	67 (98.5)
Cool/ coke	0 (0.0)	0 (0.0)	1 (2.6)	1 (0.6)	0 (0.0)	0 (0.0)	0 (0.0)
Bio-gas	0 (0.0)	1 (1.3)	0 (0.0)	1 (0.6)	0 (0.0)	0 (0.0)	0 (0.0)
LPG	1 (2.6)	0 (0.0)	0 (0.0)	1 (0.6)	0 (0.0)	0 (0.0)	0 (0.0)
Total	39 (100.0)	79 (100.0)	39 (100.0)	157 (100.0)	30 (100.0)	38 (100.0)	68 (100.0)

5. Cropping Pattern

Table 2.15 elicits the observed cropping pattern among beneficiaries and non-beneficiaries farms. Wheat has emerged as the dominating crop in all cases. Among the beneficiaries, farmers located at tail end cultivate wheat on more than 55 percent of the area, as compared to their counterparts at head and middle levels who have allocated about one third of their cultivated land under the same crop. Area under paddy is negligible as the project provides water only in Rabi season. Crop diversification in terms on number of crops cultivated has been found more in the farms located at head and middle level as compared to those at the tail end. This may be due to the fact that farmers at tail end do not have access of sufficient water.

Table 2.15: Cropping Pattern for Sample Beneficiaries and Non-beneficiaries
(Percent area)

Crop	Beneficiary				Non-Beneficiary		
	Head	Middle	Tail	Total	Command	Non-command	Total
Wheat	33.0	35.0	57.0	42.0	41.1	41.7	41.4
Paddy	-	1.0	-	0.4	-	-	-
Maize	19.0	19.0	21.0	20.0	14.8	33.3	24.8
Gram	4.0	2.0	-	2.0	0.9	0.3	0.5
Soybean	6.0	5.0	-	3.0	3.4	0.3	1.7
Urad	16.0	17.0	10.0	14.0	12.6	15.5	14.2
Pea	13.0	12.0	01.0	09.0	8.0	1.1	4.3

The cropping intensity for beneficiaries and non-beneficiaries farmers has been reported in Table 2.16. In general, the cropping intensity is quite higher for beneficiaries compared to the same for non-beneficiaries in non-command areas. This shows that the project has really helped farmers in increasing the number of crops in the command area due to availability of water. There is not much of variation in intensity of crops, among beneficiaries at different locations as it varies between 161.2% and 179.4%.

Table 2.16: Cropping Intensity for Sample Farmers

Description	Beneficiary				Non-Beneficiary		
	Head	Middle	Tail	Total	Command	Non-command	Total
Net Cropped Area (acre)	204.45	340.5	250.25	795.2	98.7	197.3	296.0
Gross Cropped Area (acre)	329.65	578.5	448.9	1357.05	168.9	268.8	437.7
Cropping Intensity (%)	161.2	169.9	179.4	170.7	171.1	136.2	147.9

6. Productivity of Major Crops

Productivity of major crops as shown in Table 2.17 clearly brings out the difference in agricultural conditions between beneficiaries and non-beneficiaries. The productivity is quite higher in case of beneficiaries' farms compared to the same for non-beneficiaries in non-command areas. However, the productivity in head and middle end of the command area is much higher than in tail end, showing that the farmers located at the tail end are not getting enough irrigation water to increase their farm productivity compared to the upstream end of the project.

Table 2.17: Productivity of Major Crops

(Quintal per acre)

Crop	Beneficiary				Non-Beneficiary		
	Head	Middle	Tail	Total	Command	Non-command	Total
Wheat	9.1	7.1	5.0	6.8	9.9	4.3	7.0
Maize	5.0	4.5	4.1	4.5	4.6	4.1	4.5
Gram	4.1	4.0	6.7	4.4	3.9	1.0	2.9
Pea	6.3	6.2	5.3	6.2	4.1	5.0	4.3

7. Income of the Sample Households

Majority of the farmers, whether beneficiary or non-beneficiary, fall under the annual income range of Rs. 25,000 to 50,000 (Table 2.18). The only exception is beneficiary farmers located at tail end of the command where about one-third farmers' annual income turned around out to be Rs. 25,000 to Rs. 50,000. The analysis clearly indicates the subsistence nature of agriculture in this area. Hardly 10% of the sample farmers are able to earn an income of more that Rs. 1.0 lacs per annum.

Table 2.18: Total Income of the Household

Income	Beneficiary				Non-Beneficiary		
	Head	Middle	Tail	Total	Command	Non-command	Total
Rs. 10,000 to Rs. 25,000	4 (10.0)	6 (07.5)	4 (10.0)	14 (08.8)	3 (10.34)	7 (17.9)	10 (14.71)
Rs. 25,000 to Rs. 50,000	18 (45.0)	33 (41.3)	15 (37.5)	66 (41.3)	9 (31.03)	21 (53.9)	30 (44.11)
Rs. 50,000 to Rs. 1,00,000	17 (42.5)	31 (38.8)	15 (37.5)	63 (39.3)	16 (55.18)	9 (23.1)	25 (36.76)
Rs. 1,00,000 to Rs. 2,00,000	1 (02.5)	10 (12.5)	6 (15.0)	17 (10.6)	1 (3.45)	2 (5.1)	3 (4.42)
Total	40 (100.0)	80 (100.0)	40 (100.0)	160 (100.0)	29 (100.0)	39 (100.0)	68 (100.0)

Note: Figures in parentheses indicate percent of total.

8. Status of Migration

The analysis given in Table 2.19 clearly brings that migration has reduced in the beneficiary of the project under AIBP. The average duration of migration per farmer turned out only 61 days in a year for the farmers located at head end whereas the corresponding figure for middle end farmers has been found to be 57 days. The migration is rampant for the non-beneficiaries from non-command area as they are out for about 6 months due to non-availability of agricultural work at their farms. The season of migration has been observed during Rabi in most of the cases in all the categories of sample farmers.

The percent number of households reporting migration has been low in the beneficiary farmers as compared to non-beneficiaries of non-command areas. However, there is no difference in terms of frequency of migration across all the categories of farmers.

Table 2.19: Status of Migration

	Beneficiary								Non-beneficiary					
	Tail		Head		Middle		Total		Command		Non-command		Total	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%
% of households reported migration		12.5		17.5		12.5		13.8		9.7		23.1		17.1
No. of Person Migrated from a Household														
One person	5	100.0	7	100.0	7	70.0	19	86.4	3	100.0	8	88.9	11	91.7
2-3 person	0	0.0		0.0	2	20.0	2	9.1	0	0.0	1	11.1	1	8.3
>3 person	0	0.0		0.0	1	10.0	1	4.5		0.0		0.0		0.0
Total	5	100.0	7	100.0	10	100.0	22	100.0	3	100.0	9	100.0	12	100.0
No. of Times Migrated by a Person (in a year)														
One time (one crop season)	3	60.0	4	57.1	4	40.0	11	50.0	1	50.0	4	50.0	5	50.0
Two times (two crop season)	1	20.0	0	0.0	3	30.0	4	18.2	0	0.0	3	37.5	3	30.0
Three and/or more times (all crop season)	1	20.0	3	42.9	3	30.0	7	31.8	1	50.0	1	12.5	2	20.0
Total	5	100.0	7	100.0	10	100.0	22	100.0	2	100.0	8	100.0	10	100.0
Average no. of times	2.6		8.4		1.8		4.1		1.7		2.4		2.3	
Reason of Migration														
Employment	5	100.0	7	100.0	10	100.0	22	100.0	1	50.0	7	77.8	8	72.7
Others		0.0		0.0		0.0	0.0		1	50.0	2	22.2	3	27.3
Total	5	100.0	7	100.0	10	100.0	22	100.0	2	100.0	9	100.0	11	100.0
Migration Season														
Rabi	2	50.0	4	57.1	2	50.0	8	53.3	2	66.7	1	11.1	3	25.0
Kharif	1	25.0	1	14.3	0	0.0	2	13.3	1	33.3	3	33.3	4	33.3
Zaid	0	0.0	2	28.6	2	50.0	4	26.7	0	0.0	5	55.6	5	41.7
All	1	25.0	0	0.0	0	0.0	1	6.7		0.0		0.0		0.0
Total	4	100.0	7	100.0	4	100.0	15	100.0	3	100.0	9	100.0	12	100.0
Duration of Migration by a Person (in a year)														
<120 days	3	60.0	6	85.7	8	80.0	17	77.3	3	100.0	6	66.7	9	75.0
120-240 days	2	40.0	1	14.3	2	20.0	5	22.7	0	0.0	1	11.1	1	8.3
>240 days		0.0		0.0		0.0	0.0		0	0.0	2	22.2	2	16.7
Total	5	100.0	7	100.0	10	100.0	22	100.0	3	100.0	9	100.0	12	100.0
Average duration of migration (days)	104.0		61.4		57.2		69.2		60.3		159.4		134.7	

9. Quality of Assets Created under AIBP

The response of the sample farmers on various parameters related to quality of assets created under AIBP has been tabulated in Table 2.20. Hardly 7 percent of the beneficiaries are in favor of properly maintenance of water outlets and the response is more or less uniform across the farmers located at the different ends of the canal. Majority of the farmers don't complain for maintenance of the same. Not a single respondent told that water outlets have been cemented. The response related to proper maintenance of distribution channels has been also very poor as all the farmers subscribed to the poor maintenance of distribution channels.

Table 2.20: Quality of Assets Created under AIBP

(Percentage of respondents)

Description		Head	Middle	Tail	Total	Chi-Square	Sig.
Properly maintenance of water outlets	Yes	10.0	9.3	0.0	7.2	3.833	0.147
	No	90.0	90.7	100.0	92.8		
	Total	100.0	100.0	100.0	100.0		
Complains for maintenance of water outlets in last one year	Yes	24.3	25.7	33.3	27.2	0.925	0.630
	No	75.7	74.3	66.7	72.8		
	Total	100.0	100.0	100.0	100.0		
Cemented water outlets in the village	Yes	0.0	0.0	0.0	0.0		
	No	100.0	100.0	100.0	100.0		
	Total	100.0	100.0	100.0	100.0		
Properly maintenance of distribution channels in the village	Yes	0.0	0.0	5.4	1.3	6.299	0.043
	No	100.0	100.0	94.6	98.7		
	Total	100.0	100.0	100.0	100.0		
Complains for maintenance of water distribution channels in last one year	Yes	22.5	24.0	27.0	24.3	0.223	0.894
	No	77.5	76.0	73.0	75.7		
	Total	100.0	100.0	100.0	100.0		
Lined water distribution channels in the village	Yes	0.0	0.0	0.0	0.0		
	No	100.0	100.0	100.0	100.0		
	Total	100.0	100.0	100.0	100.0		

The same response was observed during the ranking by the farmers about the quality of irrigation structure in the village (Table 2.21). According to beneficiaries of all locations, the condition of water outlets, water distribution channels and the canal infrastructure in the village is poor.

Table 2.21: Ranking of the Farmers about Quality of Irrigation Structure*

Description	Head	Middle	Tail	Total
Condition of water outlets in the village	4.4	4.4	4.5	4.4
Condition of water distribution channels in the village	4.3	4.4	4.5	4.4
Condition of canal infrastructure in the village	4.2	4.5	4.5	4.4

*very good-1,....,very poor-5

10. Overall Impact Assessment of AIBP

The overall impact of AIBP scheme on agricultural and socio-economic development of the farmers has been captured through 5 point scale response of the sample beneficiaries (Table 2.22). Majority of the farmers agreed that there has been increase in irrigated area and total agricultural production. However, farmers do not believe that there has been substantial decline in the cost of agricultural production due to AIBP scheme. Overall there is an agreement that there has been an increase in annual income of the farmers. Because of increase irrigation facility the value of the land has increased as per the opinion of respondents. Simultaneously the migration to the cities has been reduced and on farm employment opportunities have increased. There has been increased crop rotation. The disturbing trend is that the majority of the respondents do not agree that there has been increase in the visit of the government officials after the AIBP.

Table 2.22: Overall Impact Assessment*

	Total	Head	Middle	Tail	F	Sig.
Socio-economic Development						
Increase in literacy rate	3.19	3.38	3.23	2.95	3.173	0.045
Increase in non-farm activities	3.31	3.36	3.20	3.48	2.404	0.094
Increase in healthcare services	3.18	2.98	3.21	3.33	1.747	0.178
Decrease in diseases outbreak	3.34	3.58	3.26	3.25	2.605	0.077
Increase in forestation/number of trees	3.16	3.15	3.14	3.20	0.075	0.928
Increase in employment opportunities	3.06	3.18	3.11	2.83	1.640	0.197
Increase in the visits of government officials	3.55	3.58	3.47	3.68	1.063	0.348
Increase in credit availability	3.34	3.38	3.33	3.33	0.059	0.943
Decrease in pollution	3.14	3.25	3.03	3.25	2.447	0.090
Increase in value of land	2.19	2.25	2.14	2.23	0.463	0.630
Decrease in migration to cities	3.09	3.23	2.99	3.15	1.330	0.267
Agricultural Development						
Increase in irrigated area	2.30	2.33	2.26	2.33	0.220	0.803
Increase in total production	2.51	2.45	2.56	2.48	0.509	0.602
Decline in cost of production	3.04	3.40	2.79	3.18	9.319	0.000
Increase in annual income	3.08	3.05	3.15	2.98	0.683	0.507
Ease in availability of agricultural equipments	3.24	3.20	3.22	3.33	0.485	0.616
Ease in agriculture activities	3.07	3.10	3.04	3.10	0.100	0.904
Increase in crop rotation	3.08	3.15	3.01	3.15	0.769	0.465
Decrease in land erosion	3.37	3.60	3.23	3.43	3.869	0.023
Increase in the quality of agricultural produce	2.73	2.75	2.66	2.83	0.448	0.640

*strongly agree-1,....., strongly disagree-5

Section 4: Process of Implementation of Project

The responses of beneficiaries related to process of project implementation and management has been captured in Table 2.23. Water being a common property resource, cannot be distributed efficiently and equitably without a common agreed

system among the users. Only about one fourth of the farmers responded that a proper system exist as far as distribution of water is concerned in their villages. Although water is not distributed by any standard system, it is worthwhile to note that about 75 percent farmers were of the opinion that there it equitable distribution of water in the villages. The same response was further supported when majority of farmers said that there had been no influence in the distribution of water in the villages. The response pattern is more or less similar among the beneficiary farmers located at different locations of the canal.

Majority of the farmers at feels that they cannot get help from the irrigation department whenever they ask for the same. More than 20% of the farmers know the availability of the water when the water flows in the canal. The direct information from the irrigation department is not a common practice and the role of Water Users Association has also been found negligible in the communication process of availability of water.

Payment of irrigation charges on time by the users is the most sensitive issue in the irrigation management across the country. Here also it has been observed that about 70% farmers do not pay irrigation charges on time. However, more than 60% of the farmers are willing to pay extra charge for assured water supply. It indicates that access to water is more important then the cost of it.

Table 2.23: Beneficiary’s Response on Process of Project Management

	Tail		Head		Middle		Total	
	N	%	N	%	N	%	N	%
Beneficiary response on proper system existence for water distribution	10	24.4	19	45.2	17	21.0	46	28.0
Beneficiary agreeing equitable distribution of water	30	75.0	35	87.5	62	77.5	127	79.4
Beneficiary disagreeing any group influence on the water distribution	31	77.5	37	92.5	71	88.8	139	86.9
Beneficiary response on non-support from Irrigation department	32	78.0	29	72.5	57	70.4	118	72.8
Beneficiary comes to know only when water flows in the canal	13	31.7	14	34.1	14	16.1	41	24.3
Beneficiary acquire information about water release through community announcement	3	7.3	7	17.1	22	25.3	32	18.9
Beneficiary acquire direct information from irrigation department through their employees	7	17.1	12	29.3	15	17.2	34	20.1
Beneficiary response on timely payment of irrigation charges	13	32.5	12	31.6	20	25.3	45	28.7
Beneficiary willingness to pay extra charges for assured water supply	23	60.5	18	50.0	54	70.1	95	62.9

Chapter 3

Evaluation of Accelerated Irrigation Benefit Program (AIBP) in Karnataka

Section 1: State Level Overview

AIBP assistance has been provided to 8 irrigation projects since the year 1996 in the State. Out of these 6 are the major irrigation projects while 2 are medium irrigation projects that have received the AIBP funds (Table 3.1). No project has been completed till now and all the funded projects are still under implementation.

Table 3.1: Projects sanctioned under AIBP from 1996 to till date

Sl.No.	Category	Completed	Ongoing
1.	Major	-	6
2.	Medium	-	2
3.	Extension, Renovation and Modernization (ERM)	-	-
4.	Minor Irrigation	-	-
	Total	-	8

The year-wise irrigation potential created under AIBP assisted projects has been presented in Table 3.2. It can be seen that during the year 2008-09, irrigation potential of 54 thousand hectares was created under AIBP as compared to 420 thousand hectares in the projects other than AIBP (Table 3.3).

Table 3.2: Irrigation Potential Created under AIBP Scheme

(Lakh Hectare)

Sl. No.	Project	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09
1.	Major	0.55	0.58	0.46	0.41	0.80	0.067	0.052
2.	Medium	0.03	-	0.01	0.03	0.02	0.007	0.002
3.	Extension, Renovation and Modernization (ERM)	-	-	-	-	-	-	-
4.	Minor Irrigation	-	-	-	-	-	-	-
	Total	0.58	0.58	0.47	0.44	0.82	0.074	0.054

Table 3.3: Irrigation Potential Created other than AIBP Scheme

(in Lakh Hectare)

Sl. No.	Project	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09
1.	Major	0.0704	0.1021	0.2800	0.3877	0.3806	0.3651	0.4200
2.	Medium							
3.	Extension, Renovation and Modernization (ERM)	-	-	-	-	-	-	-
4.	Minor Irrigation	-	-	-	-	-	-	-
	Total	0.0704	0.1021	0.2800	0.3877	0.3806	0.3651	0.4200

The total cumulative assistance to all AIBP projects has been of the tune of Rs. 3376.58 crores (Table 3.4). Out of these, the central assistance has been about three fourth, while the remaining funds have been contributed by State Government.

Table 3.4: Budget for AIBP since 2002-03 to till date

(Rs. Crore)					
Sl. No.	Project	Source	Approved	Received	Expenditure
1.	Major	Central	2823.14	2436.09	2436.09
		State	-	736.81	736.81
2.	Medium	Central	86.25	63.31	63.31
		State	-	140.37	140.37
3.	Extension, Renovation and Modernization (ERM)	Central	-	-	-
		State	-	-	-
4.	Minor irrigation	Central	-	-	-
		State	-	-	-
	Total	Central	2909.39	2499.40	2499.40
		State		877.18	877.18

Section 2: The Upper Krishna Stage – I Major Irrigation Project

The Upper Krishna Stage – I Major Irrigation Project is located at the construction of Dam across Krishna River near the village Almatti of Bagewadi Taluk in Bijapur District and another dam across the river Krishna, at Narayanapur (down stream of Almatti dam) near Bachihal and Siddapur villages in Muddebihal talu of Bijapur district of Karnataka State. The salient features of the project have been presented in Table 3.5.

Table 3.5: Salient Features of Upper Krishna Stage – I Major Irrigation Project

Sl. No.	Item	Features	
		Narayanpur Dam	Almatti Dam
1.	Location	Longitude 76°-21'-00 E	75°-53'-15" E
		Latitude 16°-10'-00 N	16°-19'-00" N
2.	Hydrology		
(i)	Catchment area	47850 Sq. Km	35925 Sq. Km
(ii)	Average Annual Rainfall	Varying from 635 cm at Gnats to about 50 cm. average at dam site.	Same as shown in case of Narayanpur Dam
(iii)	75% dependable yield after deducting upstream utilization	10920 MCM} Stage-I (386.27 TMC} 8043 MCM} State-II (284 TMC)}	10680 MCM} Stage-I (377.27 TMC} 9535 MCM} Stage-II (336.77 TMC)}
3.	Reservoir		
(i)	Top level of Dam	Masonry portion 495.75 M Earthen Dam portion 496.75 M	Right flank (Masonry) 523.80 (Stage-I) 528.756 M (Stage-II)
(ii)			Left Bank (Earthen Dam) 523.80 M (Stage-I) 528.756 M (Stage-II)

Contd ...

Table 3.5: Salient Features of Upper Krishna Stage – I Major Irrigation Project (Contd ...)

Sl. No.	Item	Features	
		Narayanpur Dam	Almatti Dam
(ii)	Gross Storage	1071.55 MCM (37.836 TMC)	1196 MCM (Stage-I) (42.238 TMC) 3485.698 MCM (Stage-II) (123.43 TMC)
(iii)	Live Storage	868.55 MCM (30.671 TMC)	861 MCM (Stage-I) (30.415 TMC) 2985.440 MCM (Stage-II) (105.43 TMC)
(iv)	Dead Storage	203 MCM (7.165 TMC)	335.00 M. Cum (11.823 TMC)
(v)	Maximum Water Level	492.252 M	512.256 M (Stage-I) 519.600 M (Stage-II)
(vi)	Full Reservoir Level	492.252 M	512.256 M (Stage-I) 519.600 M (Stage-II)
(vii)	Dead Storage Level	481.564 M	504.744 M
(viii)	Water Spread	132 Sq. Km	181 Sq. Km (Stage-I) 490 Sq. Km (Stage-II)
(ix)	Lowest River Bed Level	469.940 M	488.948 M
4.	Dam		
(a)	Length of concrete spillway dam	459 M	486.50 M
(b)	Length of earthen dam including dykes	9616.30 M	402 M
(c)	Length of masonry (non-overflow) dam	562.22 M	676.33 M
(d)	Total length of dam including dykes	10637.52 M	1564.83 M
(e)	Top width of dam	7.50 M (10.00 M in Power Dam)	7.50 M (10.00 m in Power Dam)
(f)	Crest Level	480.252 M	509.016 M
(g)	Max. height of dam		
	Narayanpur Dam (from lowest foundation level EL 466.032 M)	29.720 M	
	Almatti Dam (from lowest foundation level EL 447.000 M)		51.756 M
(h)	Gate height	12 M	3.2 m (Stage-I) 10.584 M (Stage-II)
(i)	Design Flood	37945 Cumecs	31007 Cumecs
(j)	No. and size of crest gates	30 Nos. of 15 m X 12 m (Radial Type)	26 Nos. of 15 m X 3.2 m (Radial Type) – Stage-I 26 Nos. of 1.5 m X 10.584 m (Radial Type) – Stage-II
(k)	No. and size of river sluice	4 Nos. of 1.5 m X 2.5 m	6 Nos. of 1.5 m X 3.1 m

Contd ...

Table 3.5: Salient Features of Upper Krishna Stage – I Major Irrigation Project (Contd ...)

Sl. No.	Item	Features			
		Narayanpur Dam		Almatti Dam	
5.	Details of Submergence				
(a)	Area of submergence	13,206 ha	24,230 ha (Stage-I) 48,787 ha (Stage-II including Stage-I)		
(b)	Villages affected	43 Nos.	136 Nos. (Stage-I) 22 Nos. (Stage-II)		
(c)	Population affected	50,000	2,70,000 (Stage-I) 80,000 (Stage-II)		
6.	Irrigation aspects				
	Stage-I G.C.A C.C.A Annual Irrigation Intensity of Irrigation	5,27,000 ha 4,08,703 ha 4,41,398 ha 108%	22,000 ha 16,200 ha 17,496 ha 108%		
	Stage-II G.C.A C.C.A Annual Irrigation	1,98,600 ha 1,46,135 ha 1,68,055 ha	69,400 ha 50,989 ha 58,633 ha		
7.	Details of Canals – Stage-I				
	Name of Canal	Length (km)	Discharge at head (in Cumecs)	CCA (ha.)	Ultimate Potential (ha.)
(i)	Narayanpur L.B.C.	78	235.020	47223	51000
(ii)	Shahpur branch canal	76	104.000	122120	131890
(iii)	Mudbal branch canal	50.80	32.435	51000	55080
(iv)	Indi branch canal	172	83.420	131260	141760
(v)	Jewargi branch canal	86.36	36.320	57100	61668
(vi)	Almatti L.B.C.	77.64 (against full length of 105 km)	11.640	16200	17496
			Total	424903	458894
	Stage-II				
(i)	Almatti L.B.C. Extension	27.36 (77.64 to 105 km)	2.24	4,035	4,640
(ii)	Mulwad Lift Irrigation Scheme	106	17.14	30,850	35,478
(iii)	Almatti Right Bank Canal	121	8.94	16,100	18,515
(iv)	Narayanpur Right Bank Canal	95	58.30	84,000	96,600
(v)	Indi Lift scheme from NLBC	97	23.28	41,900	23,270
(vi)	Rampur Lift Irrigation scheme	37	11.24	20,235	23,270
			Total	1,97,120	2,26,688

Section 3: Analysis of Indi Branch Canal

In Stage-I, out of the six canals, Indi Branch Canal is the longest, with an irrigation potential of 1.31Lakh hectares, of the total 4.25 Lakh hectares. Indi Branch Canal which starts at Kembhavi, gets its water from 77th km. point of Narayanpur Left Bank Canal (NLBC). At 77th km. Point of NLBC, there is a tri-junction of canals, viz., Indi Branch Canal, Jewargi Branch Canal and Shahapur Branch Canal. Indi Branch Canal (IBC) starts near Kembhavi, Surpur taluk, Gulbarga district and passes through four talukas, comprising two each in Gulbarga and Bijapur.

1. Salient Features of Indi Branch Canal

- a) Off take point : 77.520 Km of NLBC (Tri-junction)
- b) Length : 172.00 Kms.
- c) Hydraulic Particulars : (i) Head Water : 83.48 cumecs (2943 Cusecs)
 : (ii) Bed Width : 12.40 m.
 : (iii) F.S.D : 4.00 m.
 : (iv) Side Slope: 1:1
 : (v) Bed Fall : 1 in 7400
 : (vi) Velocity = 1.27 mtr/sec.
- d) (i) Irrigable Command Area (ICA) : 131260 ha
 (ii) Talukas benefited

District	ICA	No. Of Villages Benefited	Notified area as on Kharif 06-07
1. Gulbarga District	1790 Ha	4	1808.00
a) Shorapur Taluk	1790 Ha	4	1808.00
b) Jewargi Taluk	29041Ha	33	26644.00
Total	30831Ha	37	28452.00
2. Bijapur District			
a) Sindagi Taluk	47160 Ha	60	44830.56
b) Indi Taluka	53269 Ha	56	48748.68
Total	100429 Ha	116	93579.24
Grand Total	131260 Ha	153	122031.24

- e) Number of Distributaries : 55 No.s (D-1 to D-46)
- f) Utilization of water in T.M.C. : 35.284 T.M.C.

2. Present Stage of Indi Branch Canal Works (Stage-I, Phase-II & III)

A. MAIN CANAL 0.00 TO 172.00 Km.:

a) Earth work	i) Km. 0.00 to 64.00 (Stage-I, Phase-II)	Completed
	ii) Km. 64.00 to 172.00 (Stage-I, Phase-III)	Completed
b) Lining	i) Km. 0.00 to 64.00	Completed
	ii) Km. 64.00 to 172.00	Completed
c) Structure	IBC Km.0.00 to 64.00	All Structure completed [106(86+20)]
	IBC Km. 64.00 to 172.00	Out of 225 Structure 224 Are completed, balance 1 CD i.e. CTC at Km. 112.005 of IBC

B. DISTRIBUTARIES

a) IBC Dy. No1 to13 taken up under Stage-I, Phase-II of W.B. Assistance Programme	Completed
b) IBC Dy. No. 14 to 16	Completed

C. Laterals

a) Laterals under Dy. Nos. 1 to 13	Completed
b) Laterals under Dy. Nos. 14 to 24	Completed
c) Laterals under Dy. Nos. 25 to 37	Completed
d) Laterals under Dy. Nos. 38 to 46	Completed

D. F.I.C. WORKS:

a) FIC works under Dy. No.1 to 13	Completed
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FIC works are taken up under CADA Funds

b) FIC works under Dy. No.14 to 46	Works are completed
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3. Potential Irrigated Area and Actual Irrigated Area

The potential and actual irrigated areas across different seasons have been shown in Tables 3.6 and 3.7, respectively. It is seen that so far 90 percent of potential which was conceived at the design stage has been created.

Table 3.6: Irrigated Potential Created Across Seasons in Indi Branch Canal

Season	Potential Irrigated Area (hectare)		
	Design Stage	At completion	Present
Kharif	40580	36710	36710 (90.00)
Rabi	24701	22345	22345 ((90.00)
Other	15879	14365	14365 ((90.00)
Total	81160	73420	73420 ((90.00)

Note: Figures in parentheses indicate percent of potential irrigated area at design stage.

The potential irrigated area has varied in different crops as farmers have used the water for crops of other season. The total actual irrigated area is less as compared to potential created both in Kharif and other seasons. Contrary, during the Rabi season, actual irrigated area has been found more than the potential created (Table 3.7).

Table 3.7: Actual Irrigated Area Across Seasons in Indi Branch Canal

Year	Actual Gross Irrigated Area (hectare)		
	Kharif	Rabi	Other
2004-05	26802 (73.00)	28108	8100 (56.38)
2005-06	23451 (63.88)	28669	8200 (57.08)
2006-07	22328 (60.82)	28475	8000 (55.70)
2007-08	21940 (60.00)	28830	7900 (55.00)
2008-09	23384 (63.70)	30238	8030 (56.00)

Note: Figures in parentheses indicate percent of present irrigated potential area.

4. Possible Reasons for Gap in Irrigation Potential Creation and its Utilization

The irrigation potential has been lost due to change in cropping pattern and unauthorized utilization of water by farmers by using unauthorized pumping sets (Table 3.8).

Table 3.8: Reasons for Gap between Irrigation Potential Creation and its Utilization

Sl. No.	Factor	Approximate loss in Irrigation Potential Created
1.	Change in cropping pattern then envisaged in the project design	5 % (Sugarcane)
2.	Less water inflow received in the dam	-
3.	Change in water allocation for non irrigation purpose (for example drinking water, industrial purpose or environmental purposes)	-

Contd ...

Table 3.8: Reasons for Gap between Irrigation Potential Creation and its Utilization (Contd...)

Sl. No.	Factor	Approximate loss in Irrigation Potential Created
4.	Condition of the main canal & distribution system is not hydro logically fit	-
5.	Non existence/improper maintained water distribution and field channels	-
6.	Loss of command area due to urbanization or soil salinity or water logging)	-
7.	Unauthorized utilization of water by farmers	10 % by unauthorized Pumps
8.	Encroachment of area under field channels	-
9.	Any other (please specify)	**6898 Ha

- **1) Achieving wet potential for an extent of 6898Ha is still pending, out of which FIC works over an area of 602Ha are now being taken and would be completed by end of March -09.
- 2) It is not being possible to achieve over an extent of 5500Ha owing to the lands being situated at higher levels.
- 3) 796Ha of land not being traceable.

5. Head Water Discharge

The designed discharge of IBC is 83.48 cubic meter per second. The figures given in Table 3.9 indicate that the discharge has always been much below the discharge capacity. The canal mostly remains closed during May – July.

Table 3.9: Head Water Discharge in Indi Branch Canal
(cubic meter per second)

Month/ Year	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09
January	46.31	51.60	58.70	62.00	73.21	68.28	68.58
February	43.78	56.60	54.08	63.07	71.96	73.21	71.96
March	38.25	54.37	57.53	61.69	68.28	63.43	68.28
April	30.42	27.25	41.80	54.00	61.50	65.84	61.05
May	Nil	Nil	Nil	Nil	Nil	Nil	Nil
June	Nil	Nil	Nil	Nil	Nil	Nil	Nil
July	20.47	Nil	Nil	Nil	65.84	Nil	58.70
August	28.99	45.50	43.54	49.54	73.21	65.84	63.43
September	33.74	53.30	54.88	40.10	70.72	56.87	61.05
October	25.23	41.60	49.50	43.50	77.49	68.43	67.06
November	26.67	58.40	65.57	79.50	68.02	75.93	75.70
December	30.26	58.20	65.80	58.90	65.84	73.21	68.28

6. Status of Outlets for Water Distribution:

All the outlets of IBC are in proper condition as shown in Table 3.10.

Table 3.10: Status of Outlets in Indi Branch Canal

Sl. No.	Name of the branch canal	Total Outlets			Closed outlets	Damaged outlets	Outlets in proper condition
		Design stage	At completion	At present			
1.	Indi Branch Canal	37	37	37	-	-	37

7. Expenditure from AIBP Funds

The AIBP assistance has been used for expansion of irrigation system (Table 3.11).

Table 3.11: Expenditure Pattern from AIBP

(Rs. Lakh)

Year	Salary & compensation for regular staff	Wage bill for contractual staff	Travel conveyance and stationeries	Other recurring office expenses	Capital expenditure	
					Expansion of irrigation system	Creation of other assets
2002-03	-	-	-	-	37.80	-
2003-04	-	-	-	-	14.47	-
2004-05	-	-	-	-	10.86	-
2005-06	-	-	-	-	7.69	-
2006-07	-	-	-	-	3.40	-
2007-08	-	-	-	-	2.85	-
2008-09	-	-	-	-	1.26	-

8. Staffing pattern

There is shortage of staff almost at every level barring Chief Engineer, Technical Assistant and some clerical levels. However at functional level there is acute shortage of employees. At senior level there are no Superintending Engineer, Deputy Chief Engineer and Design Engineer. At middle level there is shortage of 43 Assistant Engineers, however, only two posts of Junior Engineer are vacant. Even at lowest levels there is shortage of employees. The sanctioned posts of First Div. Assistants and First Div. Revenue Assistants, is 36 and 16 respectively against which there are 22 First Div. Assistants and 6 First Div. Revenue Assistants.

9. Constraints in Implementation of AIBP Scheme

As of now, under AIBP programme there are constraints for providing funds towards construction of Field Irrigation Canal (FIC) net works. Funds are being provided for construction of main canal, distributaries, laterals and sub laterals. But the networking right from main canal up to the sub laterals does not meet the requirement towards the wet potential unless FIC network is put in place. As such it would be better, if AIBP assistance is extended even for construction of FIC net works so that the networking could be made through in full, wet potential could be achieved and the finished product in true sense could be realized.

10. Suggestions for Implementation of AIBP Scheme

- IBC main canal in the embankment reaches has developed slips on considerable No. of location which require strengtheing / restoration for which funds under AIBP are requested.
- Babaleshwar tank and Ramanahalli tank from an integral part of IBC which requires modernization/ remodeling, in terms of Bound strengthening/ restoration improvement to waste weir tailing of canal etc., for which necessary funds under AIBP are requested.

- More manpower is necessary for operational purposes, like generating and operating gates, which KBJNL need to deploy.
- There exists acute problem of water-logging; this has to be given prime importance. In this regard the activities taken up by CADA needs to be accelerated.
- It has to be ensured that there is no illegal / unauthorized tapping of water from canals. Even if the legal connection is being used for this Illegal tapping of canal the power connection should be cancelled. Also there should be better watch for checking the illegal tapping of water.
- The officials and office bearers of KBJNL must be provided proper security for better water management.
- Political will is required to ensure maintenance of law and order.
- It should be ensured that no wells exist within 200 mts and if there are any pipe feeding such wells should be removed immediately.
- The distributaries, laterals and the FICs should be kept in proper conditions, which is the major responsibility of WUSs. KBJNL should ensure not to hand over such distributaries, laterals or the FICs which are incomplete in respect of civil works.
- There should be a cell at KBJNL consisting officers of Agriculture and Horticulture department, Police, Revenue department, office bearers of WUSs etc. to ensure the levy and collection of water charges.

Section 4: Impact of AIBP

1. Distribution of Sample and its Profile

As per the methodology of the study, sample of beneficiaries and non-beneficiaries was taken both from command and non-command area of the project. The distribution of the sample across the head, middle and tail location of the canal has been presented in Table 3.12. A total of 160 beneficiaries were selected from 17 villages in the command area of the project. A total of 72 non-beneficiaries were also interviewed both from command and non-command area of the project.

Table 3.12 : Distribution of Sample Beneficiary & Non-Beneficiary

Location in the Canal	No. of villages	Number of Beneficiaries/ Non-Beneficiary
Beneficiary		
Head	5	40
Middle	8	80
Tail	4	40
Total	17	160
Non-Beneficiary		
Command	16	32
Non-command	4	40
Total	20	72

2. Social Profile of Sample

Caste wise distribution of sample beneficiaries and non-beneficiaries has been presented in Table 3.13. It is evident from the data that majority of beneficiaries as well as non-beneficiaries belong to OBC. A sample of general caste ranks second contributing about 16% of total sample.

Table 3.13: Social Profile of Sample Beneficiaries

Caste	Beneficiary								Non-Beneficiary					
	Tail		Head		Middle		Total		Command		Non-command		Total	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%
General	2	5.0	3	7.5	20	25.0	25	15.6	2	6.5	9	23.1	11	15.7
Other Backward Class (OBC)	28	70.0	33	82.5	51	63.8	112	70.0	22	71.0	21	53.8	43	61.4
Scheduled Caste (SC)	10	25.0	4	10.0	8	10.0	22	13.8	6	19.4	4	10.3	10	14.3
Scheduled Tribe (ST)	0	0.0	0	0.0	1	1.3	1	0.6	1	3.2	5	12.8	6	8.6
Total	40	100.0	40	100.0	80	100.0	160	100.0	31	100.0	39	100.0	70	100.0

3. Land Holding Pattern

Table 3.14 depicts the land holding pattern of sample beneficiaries and non-beneficiaries. The sample consists of mostly medium farmers under beneficiaries and non-beneficiaries of non-command area. Contrarily, non-beneficiaries of command area are marginal farmers having land less than 1 acre. It indicates that small and marginal farmers in the command area do not have access to irrigation water from the project. The beneficiary farmers have significant area under irrigation (about 94%). Once again the non-beneficiaries farmers from command area have only 62 per cent of their total land under irrigation.

Table 3.14: Land Holding Pattern of Sample

Description	Beneficiary				Non-Beneficiary		
	Head	Middle	Tail	Total	Command	Non-command	Total
1. Average Size of Agricultural Land (acre)	9.99	8.19	11.35	9.43	0.70	8.95	5.28
2. Average size of Irrigated Land (acre)	9.41	7.48	9.47	8.46	0.29	8.08	4.62
3. Percentage irrigated area	95.23	94.87	89.00	93.49	61.4	93.0	90.1

4. Economic Status of Sample

The profile of the sample in terms of economic indicator can be seen from the figures given in Table 3.15. Half of the sample farmers do not have pucca house. Majority of them use community hand pump for drinking water. 90% of beneficiaries and non-beneficiaries do not toilets in their house. However, electricity as a source of light in the home has been found in majority of farmer household. About 80-90% farmers use fire-wood for cooking purpose. It is apparent from the above description that sample belongs to low income strata as far as the 5 indicators are concerned.

Table 3.15 : Economic Status of Sample Beneficiaries

	Beneficiary								Non-Beneficiary					
	Head		Middle		Tail		Total		Command		Non-command		Total	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Type of house														
Pacca	10	25.0	17	21.3	6	15.0	33	20.6	3	9.4	2	5.0	5	6.9
Kaccha	15	37.5	40	50.0	22	55.0	77	48.1	18	56.2	24	60.0	42	58.4
Semi-Pacca	15	37.5	23	28.7	12	30.0	50	31.3	11	34.4	14	35.0	25	34.7
Total	40	100.0	80	100.0	40	100.0	160	100.0	32	100.0	40	100.0	72	100.0
Source of drinking Water														
Tap water	2	5.0	0	0.0	0	0.0	2	1.3	1	3.1	0	0.0	1	1.4
Owned hand-pump	4	10.0	2	2.5	5	12.5	11	6.9	0	0.0	2	5.0	2	2.7
Community hand-pump	24	60.0	69	86.2	24	60.0	117	73.1	26	81.2	36	90.0	62	86.1
Wells	6	15.0	3	3.8	0	0.0	9	5.6	2	6.3	2	5.0	4	5.6
Others	4	10.0	6	7.5	11	27.5	21	13.1	3	9.4	0	0.0	3	4.2
Total	40	100.0	80	100.0	40	100.0	160	100.0	32	100.0	40	100.0	72	100.0
Latrine room in home														
Yes	8	20.0	6	7.5	7	17.5	21	13.1	3	9.7	3	7.5	6	8.5
No	32	80.0	74	92.5	33	82.5	139	86.9	28	90.3	37	92.5	65	91.5
Total	40	100.0	80	100.0	40	100.0	160	100.0	31	100.0	40	100.0	71	100.0
Source of lighting in house														
No lighting	0	0.0	0	0.0	0	0.0	0	0.0	2	6.5	0	0.0	2	2.8
Kerosene	0	0.0	9	11.3	2	5.0	11	6.9	4	12.9	11	27.5	15	21.2
Electricity	29	72.5	68	85.0	36	90.0	133	83.1	24	77.4	26	65.0	50	70.4
Other	11	27.5	3	3.7	2	5.0	16	10.0	1	3.2	3	7.5	4	5.6
Total	40	100.0	80	100.0	40	100.0	160	100.0	31	100.0	40	100.0	71	100.0
Type of cooking fuel														
Fire wood	37	92.5	70	87.4	35	87.5	142	88.7	28	90.3	37	92.5	65	91.5
Cool/ coke	0	0.0	3	3.8	0	0.0	3	1.9	0	0.0	0	0.0	0	0.0
Bio-gas	0	0.0	1	1.3	0	0.0	1	0.6	0	0.0	0	0.0	0	0.0
LPG	3	7.5	6	7.5	5	12.5	14	8.8	3	9.7	3	7.5	6	8.5
Total	40	100.0	80	100.0	40	100.0	160	100.0	31	100.0	40	100.0	71	100.0

5. Cropping Pattern

Sugarcane, Arhar and Wheat are the three important crops for beneficiaries farmers irrespective of their location in the command of the canal (Table 3.16). Cotton which requires a heavy dose of irrigation finds significant place only in beneficiary farmers located at the head end. Taking the clue from the table 3.14 where the percent irrigated area in case of non-beneficiaries from the command area is less, it is also clear from the data in Table 3.16 that these farmers have taken gram (a less water intensive crop) on 84% of their land. Thus, the cropping pattern has been based on the accessibility to irrigation water.

The cropping intensity across the beneficiaries and non-beneficiaries farmers has been calculated and the same has been reproduced in Table 3.17. The cropping intensities are highest among the beneficiaries who are located at head end while the lowest for the tail enders. Surprisingly, cropping intensity for non-beneficiaries from the command area is more as compared to the beneficiaries. Overall there is no significant difference in the cropping intensity figure between the beneficiaries and non-beneficiaries.

Table 3.16: Cropping Pattern of Sample Farmers

(Percent area)

Crop	Beneficiary				Non-Beneficiary		
	Head	Middle	Tail	Total	Command	Non-command	Total
Wheat	10.3	28.6	24.2	22.5	4.0	11.4	5.7
Arhar	30.6	21.8	22.5	24.4	4.7	31.0	10.7
Gram	1.7	7.9	1.4	4.5	83.8	2.5	65.1
Maize	7.0	10.4	3.5	7.7	0.7	9.2	2.6
Mustard	3.1	3.2	3.5	3.2	0.7	4.2	1.5
Sugarcane	39.7	27.6	43.0	34.9	5.6	28.8	11.0
Cotton	7.6	0.5	2.0	2.8	-	-	-

Table 3.17 : Cropping Intensity

Description	Beneficiary				Non-Beneficiary		
	Head	Middle	Tail	Total	Command	Non-command	Total
Net Cropped Area (acre)	399.5	655.5	453.9	1508.9	22.4	358.1	380.5
Gross Cropped Area (acre)	479.0	642.8	369.2	1491.0	27.0	398.1	425.1
Cropping Intensity (%)	119.9	98.1	81.3	98.8	120.5	111.2	111.7

6. Total Income of the Sample Household

Majority of the farmers, whether beneficiary or non-beneficiary, fall under the annual income range of Rs.50,000 to 1.0 lac. The only exception is beneficiary farmers located at tail end of the command where about one-third farmers' annual income turned around out to be Rs. 25,000 to Rs. 50,000. The analysis clearly indicates the

subsistence nature of agriculture in this area. Hardly 10% of the sample farmers are able to earn an income of more than Rs. 2.0 lacs per annum.

Table 3.18 : Total Income of the Household

Income	Beneficiary								Non-Beneficiary					
	Head		Middle		Tail		Total		Command		Non-command		Total	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Below Rs. 10000	0	0.0	0	0.0	0	0.0	0	0.0	2	6.3	0	0.0	2	2.8
Rs. 10,000 to Rs. 25,000	1	2.5	1	1.3	1	2.5	3	1.9	2	6.3	2	5.0	4	5.6
Rs. 25,000 to Rs. 50,000	6	15.0	30	37.4	13	32.5	49	30.5	12	37.4	11	27.5	23	31.9
Rs. 50,000 to Rs. 1,00,000	19	47.5	27	33.7	10	25.0	56	35.0	12	37.5	22	55.0	34	47.2
Rs. 1,00,000 to Rs. 2,00,000	10	25.0	15	18.8	5	12.5	30	18.8	1	3.1	2	5.0	3	4.2
Rs.2,00,000 and above	4	10.0	7	8.8	11	27.5	22	13.8	3	9.4	3	7.5	6	8.3
Total	40	100.0	80	100.0	40	100.0	160	100.0	32	100.0	40	100.0	72	100.0

7. Status of Migration

The analysis given in Table 3.19 clearly brings that migration has reduced in the beneficiary of the project under AIBP. The average duration of migration per farmer turned out only 10 days in a year for the farmers located at head end whereas the corresponding figure for middle end farmers has been found to be 147 days. The migration is rampant for the non-beneficiaries as they are out for 6 months due to non-availability of agricultural work at their farms. The season of migration has been observed during Rabi in all the categories of sample farmers.

The percent number of households reporting migration has been low in the beneficiary farmers from the head point of the canal command. The migration is quite frequent among the beneficiary households located at head as compared to those situated at middle level of the canal command. The average number of times of migration for non-beneficiary farmers turned out to be only 1 which indicates that these farmers had been migrating at a stretch but for a much longer period of time. This indicates the non-availability of sufficient on farm agricultural works for these households due to lack of irrigation water.

Table 3.19: Status of Migration

	Beneficiary								Non-beneficiary					
	Total		Head		Middle		Tail		Command		Non-command		Total	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%
% of households reported migration		3.8		2.5		6.3		0.0		3.1		0.0		1.4
No. of Person Migrated from a Household														
One person	6	100.0	1	100.0	5	100.0			1	100.0			1	100.0
2-3 person		0.0		0.0		0.0				0.0				0.0
>3 person		0.0		0.0		0.0				0.0				0.0
Total	6	100.0	1	100.0	5	100.0			1	100.0			1	100.0
No. of times Migrated by a Person (in a year)														
One time (one crop season)	3	50.0	0	0.0	3	60.0			1	100.0			1	100.0
Two times (two crop season)	1	16.7	0	0.0	1	20.0				0.0				0.0
Three and/or more times (all crop season)	2	33.3	1	100.0	1	20.0				0.0				0.0
Total	6	100.0	1	100.0	5	100.0			1	100.0			1	100.0
Average no. of times	3.5		10.0		2.2				1.0				1.0	
Reason of Migration														
Employment	4	80.0			4	80.0			1	100.0			1	100.0
Others	1	20.0			1	20.0				0.0				0.0
Total	5	100.0			5	100.0			1	100.0			1	100.0
Migration Season														
Rabi	4	100.0	1	100.0	3	100.0			1	100.0			1	100.0
Kharif		0.0		0.0		0.0				0.0				0.0
Zaid		0.0		0.0		0.0				0.0				0.0
All		0.0		0.0		0.0				0.0				0.0
Total	4	100.0	1	100.0	3	100.0			1	100.0			1	100.0
Duration of Migration by a Person (in a year)														
<120 days	3	50.0	1	100.0	2	40.0				0.0				0.0
120-240 days	2	33.3	0	0.0	2	40.0			1	100.0			1	100.0
>240 days	1	16.7	0	0.0	1	20.0				0.0				0.0
Total	6	100.0	1	100.0	5	100.0			1	100.0			1	100.0
Average duration of migration (days)	124.2		10.0		147.0				180.0				180.0	

8. Quality of Assets Created under AIBP

The response of the sample farmers on various parameters related to quality of assets created under AIBP has been tabulated in Table 3.20. About 50% of the beneficiaries are in favour of properly maintenance of water outlets although the response is not uniform across the farmers located at the different ends of the canal. Majority of the farmers at head end believe about the proper maintenance of water outlets whereas the responses of the tail-enders are quite contrary to this. About 70% respondents told that water outlets have been cemented. The response related to proper maintenance of distribution channels has been also found to be quite different across the farmers located at different ends. Only 18% farmers at the tail ends subscribed to the adequate maintenance of distribution channels. Three-fourth of all the respondents were of the opinion that water distribution channels have been lined in the command area.

Table 3.20: Quality of Assets Created under AIBP

Description		Head	Middle	Tail	Total	Chi-Square	Sig.
Properly maintenance of water outlets	Yes	71.8	40.0	25.6	44.3	18.050	0.000
	No	28.2	60.0	74.4	55.7		
	Total	100.0	100.0	100.0	100.0		
Complains for maintenance of water outlets in last one year	Yes	26.3	53.2	76.9	52.6	19.792	0.000
	No	73.7	46.8	23.1	47.4		
	Total	100.0	100.0	100.0	100.0		
Cemented water outlets in the village	Yes	94.9	66.3	56.4	70.9	15.665	0.000
	No	5.1	33.7	43.6	29.1		
	Total	100.0	100.0	100.0	100.0		
Properly maintenance of distribution channels in the village	Yes	71.8	42.5	17.9	43.7	23.074	0.000
	No	28.2	57.5	82.1	56.3		
	Total	100.0	100.0	100.0	100.0		
Complains for maintenance of water distribution channels in last one year	Yes	30.8	53.7	79.5	54.4	18.690	0.000
	No	69.2	46.3	20.5	45.6		
	Total	100.0	100.0	100.0	100.0		
Lined water distribution channels in the village	Yes	84.6	68.4	76.9	74.5	3.794	0.150
	No	15.4	31.6	23.1	25.5		
	Total	100.0	100.0	100.0	100.0		

The response of the farmers related to condition of water distribution structure was also taken on a 5-point scale which shows the average condition (with a score of 3) of all the water distribution structures in the village (Table 3.21). The same observations were made in the focus group discussion with the farmers in the selected villages. The major response in the focus group discussion was that the water does not reach to all the areas in the villages and the condition of the field channel needs to be improved.

Table 3.21: Condition of Water Distribution Structure*

Description	Head	Middle	Tail	Total
Condition of water outlets in the village	2.5	3.2	3.8	3.2
Condition of water distribution channels in the village	2.6	3.3	3.9	3.3
Condition of canal infrastructure in the village	2.3	3.2	3.9	3.1

*very good-1,...,very poor-5

9. Overall Impact Assessment of AIBP

The overall impact of AIBP scheme on agricultural and socio-economic development of the farmers has been captured through 5 point scale response of the sample beneficiaries (Table 3.22). Majority of the farmers agreed that there has been increase in irrigated area and total agricultural production. However, farmers do not believe that there has been substantial decline in the cost of agricultural production due to AIBP scheme. Overall there is an agreement that there has been an increase in annual income of the farmers. Because of increased irrigation facility the value of the land has increased as per the opinion of respondents. Simultaneously the migration to the cities has reduced and on-farm employment opportunities have increased. There has been increased crop rotation. The disturbing trend is the majority of the respondents do not agree that there has been increase in the visit of the government officials after the AIBP.

Table 3.22: Overall Impact Assessment of AIBP*

	Head	Middle	Tail	Total	F	Sig
Agricultural Development						
Increase in irrigated area	1.5	1.8	2.2	1.8	6.052	0.003
Increase in total production	1.6	2.1	2.7	2.1	17.327	0.000
Decline in cost of production	3.3	3.0	3.7	3.3	5.220	0.006
Increase in the quality of agricultural produce	2.2	2.9	3.0	2.7	5.658	0.004
Ease in availability of agricultural equipments	2.8	2.9	3.2	2.9	3.705	0.027
Ease in agriculture activities	2.9	3.2	3.5	3.2	5.414	0.005
Increase in the visits of government officials	2.9	3.2	3.4	3.2	3.268	0.041
Decrease in land erosion	3.0	3.4	3.5	3.4	3.887	0.023
Socio-economic Development						
Increase in literacy rate	3.3	3.3	3.7	3.4	2.014	0.137
Increase in non-farm activities	3.3	3.2	3.7	3.4	4.151	0.018
Increase in annual income	1.9	2.0	2.4	2.1	1.902	0.153
Increase in healthcare services	3.2	3.5	3.6	3.5	2.232	0.111
Decrease in diseases outbreak	3.4	3.4	3.4	3.4	0.013	0.987
Increase in forestation/number of trees	2.9	3.1	3.2	3.1	1.241	0.292
Increase in employment opportunities	2.3	2.7	3.1	2.7	4.089	0.019
Increase in crop rotation	1.5	1.8	2.1	1.8	4.765	0.010
Increase in credit availability	2.6	3.0	3.4	3.0	7.273	0.001
Decrease in pollution	2.9	3.1	3.5	3.2	4.118	0.018
Increase in value of land	1.7	2.2	2.4	2.1	5.319	0.006
Decrease in migration to cities	1.8	2.5	2.7	2.4	8.463	0.000

**strongly agree-1,....., strongly disagree-5

Section 5: Process of Implementation of Project

The responses of beneficiaries related to process of project implementation and management has been captured in Table 3.23. Water being a common property resource, cannot be distributed efficiently and equitably without a common agreed system among the users. About 50% of the farmers responded that no system exist as far as distribution of water is concerned in their villages. Although water is not distributed by any standard system, it is worthwhile to note that about 94% farmers were of the opinion that there it equitable distribution of water in the villages. The same response was further supported when about 98% farmers said that there had been no influence in the distribution of water in the villages. The response pattern is more or less similar among the beneficiary farmers located at different locations of the canal.

Majority of the farmers at head and middle end of the canal feel that they can get help from the irrigation department whenever they ask for the same. However, more than 50% of the farmers located at the tail end feel that irrigation department does not provide any help to them. More than 50% of the farmers know the availability of the water when the water flows in the canal. The direct information from the irrigation department is not a common practice and the role of Water Users Association has also been found negligible in the communication process of availability of water.

Payment of irrigation charges on time by the users is the most sensitive issue in the irrigation management across the country. Here also it has been observed that about 90% farmers do not pay irrigation charges on time. However, 50% of the farmers are willing to pay extra charge for assured water supply. This figure is as high as 65% for the farmers who are located at the tail end. It indicates that access to water is more important then the cost of it.

Table 3.23: Beneficiary's Response on Process of Project Management

	Head		Middle		Tail		Total	
	N	%	N	%	N	%	N	%
Beneficiary response on proper system existence for water distribution	24	60.0	40	50.0	15	38.5	79	49.7
Beneficiary agreeing equitable distribution of water	39	97.5	76	95.0	34	87.2	149	93.7
Beneficiary disagreeing any group influence on the water distribution	39	97.5	77	96.3	39	100.0	155	97.5
Beneficiary response on support from Irrigation management system when ask/complain	29	72.5	60	75.0	18	46.2	107	67.3
Beneficiary comes to know only when water flows in the canal	20	50.0	38	48.1	25	64.1	83	52.5
Beneficiary acquire information about water release through gram panchayat	0	0.0	8	10.1	6	15.4	14	8.9
Beneficiary response on timely payment of irrigation charges	1	4.0	2	4.3	3	8.1	6	5.5
Beneficiary willingness to pay extra charges for assured water supply	8	44.4	18	42.9	18	64.3	44	50.0

Chapter 4

Evaluation of Accelerated Irrigation Benefit Program (AIBP) in Andhra Pradesh

Section 1: State Level Overview

The Government of India has extended AIBP grant to 123 irrigation projects in Andhra Pradesh since 1996 (Table 4.1). Out of major and medium irrigation projects, 11 projects were taken up prior to 2004-05 and 22 projects have been included under AIBP since 2005-06. Out of 22 projects, 15 projects are covered under PMRP and the rest 7 projects are under normal AIBP. Under the minor irrigation category, 67 projects are surface irrigation and 23 schemes belong to lift irrigation.

Table 4.1: Projects sanctioned under AIBP from 1996

Sl.No.	Category	Completed	Ongoing	Total
1.	Major	NA	NA	16
2.	Medium	NA	NA	17
3.	Extension, Renovation and Modernization (ERM)	-	-	-
4.	Minor Irrigation	-	90	90
	Total	11	112	123

The contemplated irrigation potential under AIBP in respect of 22 major and medium irrigation projects is 12, 20,899 hectares against which an IP of 2,14,307 hectares has been created up to March, 2009. The minor irrigation schemes have been designed to create an irrigation potential of 38,536 hectares.

Central Assistance received so far on the 33 Major & Medium Irrigation project is Rs. 4358.62 crores. For the 11 projects (before 2004-05), the CA received is 981.45 crores and for the rest 22 projects (after 2004-05) the CA received is Rs. 3377.19 crores. Against the eligible CA of 5669.01 crores in respect of the above 22 projects, the balance Central Assistance to be claimed works out to Rs.2291.84 cr. For minor irrigation schemes, the Government of India has so far released Rs. 258.66crores.

Constraints in Implementation of AIBP Schemes

The main constraint in implementation of AIBP scheme is land acquisition and Rehabilitation & Resettlement. Though the guidelines prescribe that land acquisition need be completed before the project proposals are approved under AIBP, this is not the case in some of the projects. Certain lands remain to be acquired after the project is taken up and it is expected that the lands can be acquired during the course of execution of parts of the project. In many of the cases, the project is continued under AIBP even after the prescribed completion time of 4 years either as Normal AIBP or as Fast Track Programme. Thus the very objective of the Accelerated Irrigation Benefits Programme is undermined. The reasons for delayed land acquisition are manifold. Some of them are as under:

-
1. Resistance from the land holders to part with the lands. Sometimes the owners are approaching courts to halt the process.
 2. Legal problems arising due to delayed project implementation.
 3. Sometimes the land owners are demanding changes to canal alignment where the alignment is bisecting their lands.

Suggestions for Implementation of AIBP Scheme

1. Need for procedural simplification for inclusion under AIBP and release of CLA/grant.
2. Enhancement of Central Assistance to at least 50% of the project cost in view of the financial burden on the State Government in achievement of the contemplated Irrigation Potential under Bharat Nirman.
3. Expenditure incurred on the project is being considered on a year to year basis. We are of the view that cumulative expenditure incurred as on the date of submission of CA proposal should be considered.
4. If the expenditure incurred on a project during a current financial year is more than the programmed expenditure, the guidelines should be modified suitably to allow reimbursement of central share on expenditure thus incurred.
5. Separate units for R&R and Land acquisition have to be formed for completion of the project as per schedule.
6. There is a need to develop centre-state co-ordination and interdepartmental co-ordination in strict implementation of the strategy.
7. As per AIBP norms, the quantities for different items of works have to be estimated and the year wise progress is reviewed with reference to these quantities. A separate system needs to be evolved for EPC turnkey system.

Section 2: Yerracalva Reservoir Project

1. Introduction

The Yerracalva Reservoir Project started in 1976 is a medium irrigation project comprising an Earth Dam formed across the river Yerracalva near Konguvarigudem village Jangareddigudem Block of West Godavari District in Andhra Pradesh. The Yerracalva River falls into Upputeru and finally empties into Bay of Bengal near Mogultur of West Godavari District. The ayacut proposed to be irrigated by this project is 9,996 hectares benefiting 22 villages in Jangareddigudem, Kamavarapukota, Dwaraka Tirumala, Nallajerla and Tadepalligudem Blocks of West Godavari Districts. Besides this flood moderation is provided for safeguarding the fertile lands of about 8,094 hectares between Anantapalli and Nandamuru Aqueduct on both flanks of the rivers.

2. Main Components of Yerracalva Reservoir Project

- a) Earthen Dam for length of 2.73.
- b) Spillway Regulators with Hoist Bridge with 4 vents of size 12m x 5m.

- c) Left and Right Head Sluices at km .40 and km 2.20 of Earth Dam respectively
- d) Excavation of Left Main Canal (LMC) for a length of 7.59 km and Right Main Canal (RMC) for length of 45.60 km including their distributaries network and CM and CD works.

3. Irrigation Potential Created before AIBP

The irrigation potential contemplated under this project is 9,996 ha. The total ayacut of 2023 hectares under LMC has been brought under irrigation out of total ayacut of 7,973 hectares and under RMC an ayacut of 1,012 hectares has been brought under irrigation. Thus the total ayacut has been under irrigation are 3035ha/7500 acres against 9996ha/24700 acres.

4. Completed Works of the Project before AIBP

- i) Earth Dam : Completed 1988
- ii) Spillway Regulator including Hoist
bridge with 4 vents of size 12m x 5m. : Completed 1988
- iii) Left and right head sluices At Km
0.40 and 2.20 of earth Dam Respectively : Completed 1988
- iv) Left main canal system Excavation of LMC
from km 0.00 to 7.59 along with
distributory system completed
- v) Right Main Canal System Excavation of
RMC from km 0.00 to 45.60 includint CM &
CD works are Completed.

5. Components Proposed under AIBP

Brief description of the components of the project proposed under AIBP is as follows:

- i) Excavation of balance distributaries of LMC and excavation of balance RMC of about 30 km. including its distributaries system.
- ii) Repairs to the protection works in downstream of Spillway Regulator near Drop no. 1 in surplus course.
- iii) Providing 2nd tire gates of 4 Nos. to Spillway Regulator for increasing the storage capacity from FRL+81.025 MWL+83.50m.

6. Creation of new Irrigation Potential Under AIBP

The contemplated ayacut under this project is 24.700 acres (9.996 ha) and extent of 5.000 acres (2,023ha) on left main canal and 2500 acres (1012 ha) up to 2.180 km of Right main canal was provided irrigation facilities prior to AIBP assistance. The balance ayacut of 17200 acres (6961 ha) as be projected to create I.P under A.I.B.P funds.

7. Physical Progress of AIBP Components up to February, 2009

Stage of works on various components is as follow:

i) Head works and canals

The progress of construction of Head works and canals is as follows:

a) Head works

Repairs and restoration works:

- i) Providing W.B.M road on earth dam.. : Completed
- ii) Downstream protection works below Drop no.1 : Completed
- iii) Providing 2nd tier Gates to Spill way Regulator : Completed

b) Main Canal

- i) Right Main canal from km 0.00 to 45.60 including CM &CD works completed.
- ii) The LMC from km 0.00 to km 7.59 TE was completed prior to AIBP assistance.
Cc Lining to LMC from km 0.00 to km 7.59 is proposed and completed with a cost of 4.30 crores.

c) Distributaries, Minors & Field Channels

- i) Left main canal and its distributory system is completed
- ii) The Right main canal is having 50 off takes in which 44 Nos. are completed the balance 6 off takes are 32 L Major, 43 L Major, 44 L Major, 49 L Major and 50 TE Major distributaries is in progress and 45 L Major of the agency is settled to be taken up.
- iii) Land Acquisition

The land acquisition is being looked after by Special Tahsildar, Land Acquisition Unit Jangareaddigudem.

- a) Foreshore: The land acquisition involved in dam and foreshore of this project up to FRL+81.05 M is 1,953 ha. For which land compensation was already paid for increasing storage capacity of the reservoir up to MWL +83.50 m. additional land acquisition of 810 ha is proposed under AIBP and acquired.
- iv) Rehabilitation & Resettlement
No rehabilitation & resettlement cases are pending in this project.
- v) Irrigation Potential

The irrigation potential contemplated under this project is 9996 ha. The total ayacut of 2023 has under LMC has been brought under Irrigation. The proposed ayacut under Right Main canal is 7973 ha. Out of which 1012 ha, is

brought under irrigation. Thus, total irrigation potential created also far is 3535 ha prior to AIBP. The balance ayacut of 17200 acres (6961 ha) has been projected to created IP under AIBP funds. The total IP created up to 3/05 is (3036+3040) 6076 and balance of 3920 is programmed to created IP by end of 6/2009 and ayacut of 3913ha. Additional tagged ayacut are programmed to create IP by end of 12/2009.

The status of physical properties of the irrigation system has been presented in Table 4.2.

Table 4.2: Status of Physical Properties of the Project

Sl. No.	Parameters	Design Stage		At Completion		Present		Remarks
		LMC	RMC	LMC	RMC	LMC	RMC	
1	Length of Main Canal (km)	7.59	45.6	7.59	45.6	-	-	
	Of which lined (km)	7.59	-	7.59	-	-	-	
2	Length of Branch Canal (km)	-	-	-	-	-	-	
	Of which lined (km)	-	-	-	-	-	-	
3	Length of Distributaries (km)	18.65	74.45	18.65	55	-	19.45	Work is in progress
	Of which lined (km)	-	-	-	-	-	-	
4	Length of Minors (km)	8.3	38.35	8.3	18.5	-	19.85	Work is in progress
	Of which lined (km)	-	-	-	-	-	-	
5	Length of Sub-Minors (km)	-	2.55	-	1.53	-	1.02	Work is in progress
	Of which lined (km)	-	-	-	-	-	-	

8. Financial Progress of AIBP Components

The amount received for the project under AIBP has been shown in Table 4.3.

Table 4.3: Amount received for the project under AIBP

(Rs Crores)

Year	Central Govt.	State Govt.	Total	Remarks
2001-01	2.17	-	2.17	Under A.I.B.P
2001-02	NA	NA	0.616	Under A.I.B.P
2002-03	7.886	3.9	11.786	Under A.I.B.P
2003-04	12.568	4.3	16.868	Under A.I.B.P
2004-05	4.086	8.594	12.68	Under A.I.B.P
2005-06	-	10.155	10.155	Under A.I.B.P
Total	26.71	26.949	53.659	Under A.I.B.P
2006-07	-	6.719	6.719	State Plan
2007-08	-	7.432	7.432	State Plan
2008-09	-	2.160	2.160	State Plan
Total	26.71	43.260	69.970	

9. Command area (Potential Irrigated Area):

The potential irrigated area of the project at the design stage as well as the present stage has been presented in Table 4.4. The reason behind the gap between design and present irrigation potential area is due to non completion of Left Main Canal (LMC) and Right Main Canal (RMC). Irrigation Department is planning to complete the construction work till March/June 2010. The main reason behind the delay of the project is land acquisition from the farmers.

Table 4.4: Potential Irrigated Area

(Acres)

Season	Potential Irrigated Area	
	Design Stage	Present
Kharif	24700	15000
Rabi	-	9000
Total	24700	24000

10. Actual Gross Irrigated Area

The actual gross irrigated area as given in Table 4.5 indicates nearly full utilization of the project capacity.

Table 4.5: Gross Irrigated Area by the Project

(Acres)

Year	Actual Gross Irrigated Area		
	Kharif	Rabi	Other
2002-03	7500	6500	-
2003-04	9000	7000	-
2004-05	9500	8735	-
2005-06	12000	10000	-
2006-07	12000	9000	-
2007-08	15000	9000	-
2008-09	15000	8735	-

11. Status of Outlets for Water Distribution

It is worthwhile to note that all the outlets for water distribution are in proper condition (Table 4.6).

Table 4.6: Status of Outlets for Water Distribution

Sl. No.	Name of the branch canal	Total Outlets			Closed outlets	Damaged outlets	Outlets in proper condition
		Design stage	At completion	At present			
1.	Left Main Canal	17	17	17	-	-	17
2.	Right Main Canal	50	50	50	-	-	50
	Total	67	67	67	-	-	67

Section 3: Impact Analysis of AIBP

1. Sample Distribution and its Profile

The sample consisted of 160 beneficiary farmers from 11 villages of the command area of the project (Table 4.7). The beneficiary farmers were selected from three different locations of the canal, namely from Head (50), Middle (60) and tail (50). Thirty two non-beneficiaries from 16 selected villages of command area and 40 non-beneficiaries from 4 villages of non-command area were also contacted and their responses were recorded.

Table 4.7: Distribution of Sample

Location in the Canal	No. of villages	Number of Beneficiaries/ non beneficiary
Beneficiary		
Head	5	50
Middle	6	60
Tail	5	50
Total	16	160
Non-beneficiary		
Command	16	32
Non-command	4	40
Total	20	72

2. Social Profile of Sample

The social profile of sample beneficiaries is dominated by General category caste (Table 4.8). On the other hand, OBCs dominate the sample profile of non-beneficiaries, particularly those selected from non-command area.

Table 4.8: Social Profile of Sample

Caste	Beneficiary								Non-beneficiary					
	Head		Middle		Tail		Total		Command		Non-command		Total	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%
General	30	60.0	26	43.3	33	66.0	89	55.6	18	56.3	12	30.0	30	41.7
Other Backward Class (OBC)	10	20.0	23	38.3	12	24.0	45	28.2	13	40.6	28	70.0	41	56.9
Scheduled Caste (SC)	10	20.0	10	16.7	5	10.0	25	15.6	1	3.1	0	0.0	1	1.4
Scheduled Tribe (ST)	0	0.0	1	1.7	0	0.0	1	0.6	0	0.0	0	0.0	0	0.0
Total	50	100.0	60	100.0	50	100.0	160	100.0	32	100.0	40	100.0	72	100.0

3. Land Holding Pattern

Average operational landholding of beneficiaries is larger than that of non-beneficiaries (Table 4.9). Percentage irrigated land of overall beneficiaries is a little higher than overall non-beneficiaries. Among beneficiaries, percentage irrigated land holding is almost similar at all locations. The total operational land holding belonging to non-beneficiaries of non-command area is irrigated whereas percentage of irrigated land belonging to non-beneficiaries of command area is lesser.

Table 4.9: Land Holding Pattern of Sample Farmers

Description	Beneficiary				Non-beneficiary		
	Head	Middle	Tail	Total	Command	Non-command	Total
1. Average Size of operational land (acre)	6.04	4.79	5.76	5.48	4.31	4.24	4.27
2. Average size of Irrigated Land (acre)	6.00	4.77	5.76	5.46	3.71	4.24	4.01
3. Percentage irrigated area	99.67	99.31	100.00	99.64	87.8	100.0	94.7

4. Economic Status of Sample Farmers

The various parameters related to economic status of sample farmers as given in Table 4.10 suggest that sample farmers belong to quite prosperous strata. About 50 percent of beneficiary as well as non-beneficiary farmers have pucca house. Majority of them have electricity in their houses. Tap water and community hand pump are two major source of drinking water. About 60 percent use toilets at home. As far as type of cooking fuel is concerned, about 30 percent of beneficiary farmers and 20 percent of non-beneficiary farmers use LPG.

Table 4.10: Economic Status of Sample Farmers

	Beneficiary								Non-Beneficiary					
	Head		Middle		Tail		Total		Command		Non-command		Total	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Type of House														
Pacca	27	54.0	27	45.0	29	58.0	83	51.9	20	62.5	13	32.5	33	45.8
Kaccha	15	30.0	19	31.7	10	20.0	44	27.5	3	9.4	10	25.0	13	18.1
Semi-Pacca	8	16.0	14	23.3	11	22.0	33	20.6	9	28.1	17	42.5	26	36.1
Total	50	100.0	60	100.0	50	100.0	160	100.0	32	100.0	40	100.0	72	100.0
Source of Drinking Water														
Tap Water	24	48.0	31	51.7	23	46.0	78	48.7	17	53.1	25	62.5	42	58.3
Owned hand-pump	2	4.0	3	5.0	5	10.0	10	6.3	2	6.3	1	2.5	3	4.2
Community hand-pump	24	48.0	26	43.3	22	44.0	72	45.0	13	40.6	14	35.0	27	37.5
Wells	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Others	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	50	100.0	60	100.0	50	100.0	160	100.0	32	100.0	40	100.0	72	100.0

Contd ...

Table 4.10: Economic Status of Sample Farmers (Contd ...)

	Beneficiary								Non-Beneficiary					
	Head		Middle		Tail		Total		Command		Non-command		Total	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Latrine Room in Home														
Yes	39	79.6	43	71.7	29	59.2	111	70.3	20	64.5	23	57.5	43	60.6
No	10	20.4	17	28.3	20	40.8	47	29.7	11	35.5	17	42.5	28	39.4
Total	49	100.0	60	100.0	49	100.0	158	100.0	31	100.0	40	100.0	71	100.0
Source of Lighting in House														
No lighting	0	0.0	0	0.0	2	4.1	2	1.3	0	0	0	0	0	0
Kerosene	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Electricity	48	98.0	56	93.3	45	91.8	149	94.3	31	96.9	19	47.5	50	69.4
Other	1	2.0	4	6.7	2	4.1	7	4.4	1	3.1	21	52.5	22	30.6
Total	49	100.0	60	100.0	49	100.0	158	100.0	32	100.0	40	100.0	72	100.0
Type of Cooking Fuel														
Leave/straw	0	0.0	1	1.7	2	4.2	3	1.9	0	0	0	0	0	0
Fire wood	32	65.4	31	52.5	28	58.2	91	58.3	22	68.8	30	75.0	52	72.2
Cool/ coke	3	6.1	1	1.7	0	0.0	4	2.6	1	3.1	0	0.0	1	1.4
Kerosene	1	2.0	2	3.4	0	0.0	3	1.9	0	0	0	0	0	0
Bio-gas	5	10.2	4	6.8	3	6.3	12	7.7	1	3.1	1	2.5	2	2.8
LPG	8	16.3	20	33.9	15	31.3	43	27.6	7	21.9	9	22.5	16	22.2
Electricity	0	0	0	0	0	0	0	0	1	3.1	0	0.0	1	1.4
Others	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	49	100.0	59	100.0	48	100.0	156	100.0	32	100.0	40	100.0	72	100.0

5. Cropping Pattern

The cropping pattern has been found quite divergent not only between beneficiary and non-beneficiary farmers but also across the beneficiary farmers located at different end of the canal (Table 4.11). While the beneficiary farmers cultivate paddy on 93 percent of their land, the same figure stand at 26 and 18 percent for the beneficiary farmers of head and tail end, respectively. For non-beneficiaries, paddy is also a major crop occupying about 60 percent of cultivated land. Arhar is cultivated only by the beneficiary farmers from head end, whereas mustard has significant area (73 percent) in the cropped land of tail side farmers. Maize is not a significant crop for beneficiary farmers, but it occupies a substantial area of non-beneficiary farmers' land.

Table 4.11: Cropping Pattern

(Percent area)

Crop	Beneficiary				Non-Beneficiary		
	Head	Middle	Tail	Total	Command	Non-command	Total
Paddy	26.4	93.0	18.7	46.0	63.5	56.2	59.2
Arhar	67.7	0.0	0.0	22.6	-	-	-
Maize	5.8	5.7	6.1	5.9	33.2	43.1	39.1
Mustard	0.0	0.1	73.7	24.6	-	-	-
Sugarcane	0.0	0.7	1.5	0.7	2.7	-	1.1

Overall cropping intensity in beneficiaries' area is 173.1% (Table 4.12). The cropping intensity is highest for the beneficiaries at head 180.2% followed by beneficiaries at middle and tail. Overall cropping intensity is 139.5% in the non-beneficiary farmers' area. Among non-beneficiaries, the cropping intensity is more in command area as compared to that of non-command area. There is not much of variation in intensity of crops, among beneficiaries at different locations and it varies between 166.3% and 180.2%.

Table 4.12: Cropping Intensity

Description	Beneficiary				Non-Beneficiary		
	Head	Middle	Tail	Total	Command	Non-command	Total
Net Cropped Area (acre)	302.0	287.3	288.0	877.3	137.8	169.7	307.5
Gross Cropped Area (acre)	544.1	495.4	479.1	1518.6	208.0	220.9	428.9
Cropping Intensity (%)	180.2	172.4	166.3	173.1	151.0	130.2	139.5

6. Productivity of Major Crops

A quick glance of productivity figures of selected crops given in Table 4.13 indicates that there is no significant difference in the productivity of paddy and maize across different categories of sample farmers.

Table 4.13: Productivity of Major Crops

(Quintal per acre)

Crop	Beneficiary				Non-Beneficiary		
	Head	Middle	Tail	Total	Command	Non-command	Total
Paddy	23.6	25.8	22.5	23.9	23.8	28.1	26.2
Maize	27.8	25.0	21.7	23.0	20.4	21.5	21.1

7. Total Income of the Households

Most of beneficiaries (48.1%) have an income between Rs. 25000 and Rs 1 lac, whereas 65.2% non beneficiaries fall in these groups. 37% of the beneficiaries have an income of more than 2 lac Rupees, whereas 9.7% of non-beneficiaries area also have income above two lac Rupees. In the income group 1 lac to 2 lac Rupees, there are 25.6% beneficiaries and non-beneficiaries (18.1%). In the income group Rs. 10000 to 25000 there are few beneficiaries which is almost half of non-beneficiaries who fall in this group. This shows that beneficiaries are comparatively in higher income groups as compared to non-beneficiaries (Table 4.14).

Table 4.14: Total Income of the Households

Income	Beneficiary								Non-Beneficiary					
	Head		Middle		Tail		Total		Command		Non-Command		Total	
Rs. 10,000 to Rs. 25,000	1	2.0	3	5.0	1	2.0	5	3.1	4	12.5	1	2.5	5	6.9
Rs. 25,000 to Rs. 50,000	8	16.0	8	13.3	12	24.0	28	17.5	10	31.3	14	35.0	24	33.4
Rs. 50,000 to Rs. 1,00,000	14	28.0	19	31.7	16	32.0	49	30.7	9	28.1	14	35.0	23	31.9
Rs. 1,00,000 to Rs. 2,00,000	14	28.0	14	23.3	13	26.0	41	25.6	4	12.5	9	22.5	13	18.1
Rs.2,00,000 and above	13	26.0	16	26.7	8	16.0	37	23.1	5	15.6	2	5.0	7	9.7
Total	50	100.0	60	100.0	50	100.0	160	100.0	32	100.0	40	100.0	72	100.0

8. Status of Migration:

None of the non-beneficiary respondents reported migration. Among beneficiaries, no household respondent migrated from middle end of the canal. The analysis given in Table 4.15 clearly brings that the average duration of migration per farmer turned out 58 days in a year for the farmers located at head end whereas the corresponding figure for tail end farmers has been found to be 128 days. The season of migration has been observed during all the seasons in both the categories of sample farmers.

Table 4.15: Status of Migration among Sample Farmers

	Beneficiary								Non-beneficiary					
	Head		Middle		Tail		Total		Command		Non-command		Total	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%
% of households reported migration		10.0		0.0		6.0		5.0	-	-	-	-	-	-
No. of person migrated from a household														
One person	4	80.0			3	100.0	7	87.5						
2-3 person	1	20.0			0	0.0	1	12.5						
>3 person		0.0				0.0		0.0						
Total	5	100.0			3	100.0	8	100.0						
No. of times migrated by a person (in a year)														
One time (one crop season)	0	0.0			1	33.3	1	12.5						
Two times (two crop season)	1	20.0			2	66.7	3	37.5						
Three and/or more times (all crop season)	4	80.0			0	0.0	4	50.0						
Total	5	100.0			3	100.0	8	100.0						

Contd ...

Table 4.15: Status of Migration among Sample Farmers (Contd ...)

	Beneficiary								Non-beneficiary					
	Head		Middle		Tail		Total		Command		Non-command		Total	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Average no. of times	3.2				1.7		2.6							
Reason of migration														
Employment	5	100.0			3	100.0	8	100.0						
Others		0.0				0.0		0.0						
Total	5	100.0			3	100.0	8	100.0						
Migration season														
Rabi	1	25.0			1	50.0	2	33.3						
Kharif	3	75.0			0	0.0	3	50.0						
Zaid	0	0.0			1	50.0	1	16.7						
All														
Total	4	100.0			2	100.0	6	100.0						
Duration of migration by a person (in a year)														
<120 days	3	75.0			2	66.7	5	71.4						
120-240 days	1	25.0			0	0.0	1	14.3						
>240 days	0	0.0			1	33.3	1	14.3						
Total	4	100.0			3	100.0	7	100.0						
Average duration of migration (days)	58.0				128.3		84.4		-	-	-	-	-	-

9. Quality of Assets Created under AIBP

Most of respondent beneficiaries express that the water outlets are properly maintained. But 68.9% of them say they complained for improper maintenance in last one year. Almost all beneficiaries say that water outlets in the village are not cemented. Regarding proper maintenance of distribution channels in the village, most of the beneficiaries say that the maintenance is proper. Overall 73.4% beneficiaries say that complains for maintenance of water distribution channels were made in last one year. More than half of respondents say that water distribution channels are lined but 41.7% of beneficiaries say that, the water distribution channels in the village are not lined (Table 4.16).

The responses are quite similar at all locations, except regarding lining of water distribution channels where statistically strong significant difference ($p = 0.001$) is there. Also there is significant difference ($p = 0.035$) in responses regarding complains for maintenance of water distribution channels in last one year.

Table 4.16: Quality of Assets Created under AIBP

(Percentage of respondents)

Description		Head	Middle	Tail	Total	Chi-Square	Sig.
Properly maintenance of water outlets	Yes	87.0	82.1	81.3	83.3	0.642	0.725
	No	13.0	17.9	18.7	16.7		
	Total	100.0	100.0	100.0	100.0		
Complains for maintenance of water outlets in last one year	Yes	60.9	75.0	69.6	68.9	2.367	0.306
	No	39.1	25.0	30.4	31.1		
	Total	100.0	100.0	100.0	100.0		
Cemented water outlets in the village	Yes	0.0	3.3	4.0	2.5	1.915	0.384
	No	100.0	96.7	96.0	97.5		
	Total	100.0	100.0	100.0	100.0		
Properly maintenance of distribution channels in the village	Yes	85.7	93.3	89.8	89.9	1.721	0.423
	No	14.3	6.7	10.2	10.1		
	Total	100.0	100.0	100.0	100.0		
Complains for maintenance of water distribution channels in last one year	Yes	62.5	84.5	70.8	73.4	6.728	0.035
	No	37.5	15.5	29.2	26.6		
	Total	100	100	100	100.0		
Lined water distribution channels in the village	Yes	66.7	38.6	73.5	58.3	15.034	0.001
	No	33.3	61.4	26.5	41.7		
	Total	100.0	100.0	100.0	100.0		

10. Overall Impact Assessment of AIBP

The beneficiaries agree that there has been increase in the irrigated area and also agree that there has been rise in the quantity as well as quantity of produce (Table 4.17). The income of beneficiaries has increased. The migration in search of employment has also decreased. The value of the land has increased according to beneficiaries at all the locations. The beneficiaries disagree on the points that there is any decline in the cost of production and also that there is increase in crop rotation. In beneficiaries' opinion there had been no reduction in pollution or outbreak of diseases.

Table 4.17: Overall Impact Assessment of AIBP

	Head	Middle	Tail	Total	F	Sig.
	Mean	Mean	Mean	Mean		
Agricultural Development						
Increase in irrigated area	1.84	2.15	1.96	1.99	1.890	0.154
Increase in total production	1.74	1.73	1.80	1.76	0.267	0.766
Decline in cost of production	3.12	3.68	3.22	3.36	7.747	0.001
Ease in availability of agricultural equipments	2.46	2.48	2.52	2.49	0.109	0.897
Ease in agriculture activities	2.32	2.47	2.32	2.38	1.010	0.367
Increase in the quality of agricultural produce	2.06	2.05	2.06	2.06	0.020	0.980

Contd ...

Table 4.17: Overall Impact Assessment of AIBP (Contd ...)

	Head	Middle	Tail	Total	F	Sig.
	Mean	Mean	Mean	Mean		
Increase in the visits of government officials	2.66	2.61	2.68	2.65	0.132	0.876
Decrease in land erosion	2.44	2.48	2.44	2.46	0.079	0.924
Socio-economic Development						
Increase in literacy rate	2.38	2.17	2.58	2.36	6.305	0.002
Increase in annual income	2.02	1.95	2.06	2.01	0.826	0.439
Increase in non-farm activities	2.58	2.68	2.80	2.69	1.110	0.332
Increase in healthcare services	2.60	2.20	2.66	2.47	5.753	0.004
Decrease in diseases outbreak	3.10	3.15	3.18	3.14	0.158	0.854
Increase in forestation/number of trees	2.46	2.78	2.43	2.57	2.983	0.054
Increase in employment opportunities	2.52	2.54	2.46	2.51	0.157	0.855
Increase in crop rotation	2.98	3.14	3.16	3.10	0.983	0.377
Increase in credit availability	2.32	2.02	2.68	2.32	12.417	0.000
Decrease in pollution	3.32	3.66	3.26	3.43	5.217	0.006
Increase in value of land	2.00	2.03	2.00	2.01	0.209	0.812
Decrease in migration to cities	2.10	2.02	2.04	2.05	0.871	0.420

Section 4: Process of Implementation of Project

The responses of beneficiaries related to process of project implementation and management has been captured in Table 4.18. Water being a common property resource, cannot be distributed efficiently and equitably without a common agreed system among the users. Majority of the farmers responded that proper system exists as far as distribution of water is concerned in their villages. As a result about 96% farmers are of the opinion that there it equitable distribution of water in the villages. The response pattern is more or less similar among the beneficiary farmers located at different locations of the canal.

Majority of the farmers at head and middle end of the canal feels that they can get help from the irrigation department whenever they ask for the same. However, more than 50% of the farmers located at the tail end feel that irrigation department does not provide any help to them. More than 30% of the farmers know the availability of the water when the water flows in the canal. The direct information from the irrigation department is not a common practice and the role of Water Users Association has also been found negligible in the communication process of availability of water. However, the role of gram panchyat is well appreciated by farmers.

Payment of irrigation charges on time by the users is the most sensitive issue in the irrigation management across the country. However, it is worthwhile that about 90% farmers pay irrigation charges on time. However, only 50% of the farmers are willing to

pay extra charge for assured water supply. This figure is the highest for the farmers who are located at the tail end. It indicates that access to water is more important than the cost of it.

Table 4.18: Farmers' Response on Process of Project Management

	Head		Middle		Tail		Total	
	N	%	N	%	N	%	N	%
Beneficiary response on proper system existence for water distribution	37	74.0	60	96.8	35	70.0	132	81.5
Beneficiary agreeing equitable distribution of water	48	96.0	59	98.3	48	96.0	155	96.9
Beneficiary disagreeing any group influence on the water distribution	29	60.4	31	52.5	23	46.0	83	52.9
Beneficiary response on support from Irrigation management system when ask/complain	33	64.7	54	88.5	32	61.5	119	72.6
Beneficiary comes to know only when water flows in the canal	17	33.3	2	3.3	19	38.0	38	23.6
Beneficiary acquire information about water release through gram panchayat	15	29.4	25	41.7	13	26.0	53	32.9
Beneficiary response on timely payment of irrigation charges	45	90.0	53	88.3	45	90.0	143	89.4
Beneficiary willingness to pay extra charges for assured water supply	23	47.9	17	28.3	27	55.1	67	42.7

Chapter 5

Evaluation of Accelerated Irrigation Benefit Program (AIBP) in Orissa

Section 1: State Level Overview

A total of 99 irrigation projects have received financial assistance under AIBP since the year 1996 in the State. Out of these, 26 projects have been completed and the remaining 73 are ongoing stage. It is clear from the Table 5.1 that funds have been given mostly for minor irrigation projects.

Table 5.1: No. of Projects sanctioned under AIBP from 1996

Sl. No.	Category	Completed	Ongoing
1.	Major	1	7
2.	Medium	1	4
3.	Extension, Renovation and Modernization (ERM)	5	0
4.	Minor Irrigation	19	62
	Total	26	73

The irrigation potential created and gross area irrigated by the projects under AIBP has been shown in Tables 5.2 and 5.3, respectively. It can be seen that gross area irrigated is very less as compared to that of irrigation potential created in the recent years.

Table 5.2: Irrigation Potential Created under AIBP Schemes

(Lakh Hectare)

Sl. No.	Project	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09
1.	Major	1.751	9.251	9.314	3.835	4.605	21.512	10.731
2.	Medium	0.5	0.75	0	0	0	0	0
3.	Extension, Renovation and Modernization (ERM)	5.688	27.584	11.678	1.085	0.45	0	0
4.	Minor Irrigation	1.1	3.15	1.305	0.663	0.554	0.452	1.26
	Total	9.039	40.735	22.297	5.583	5.609	21.964	11.991

Table 5.3: Gross Area Irrigated by AIBP Schemes

(Lakh Hectare)

Sl. No.	Project	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09
1.	Major	5.328	1.751	9.251	9.314	3.835	0	0
2.	Medium	0.7	0.5	0.75	0	0	0	0
3.	Extension, Renovation and Modernization (ERM)	0.598	5.698	27.584	11.678	1.085	0.45	0
4.	Minor Irrigation	1.1	1.1	3.15	1.305	0.663	0.554	0.452
	Total	7.726	9.049	40.735	22.297	5.583	1.004	0.452

Central Assistance released by Government of India under AIBP from 2002-03 to 2009-10 has been provided in Table 5.4. A total assistance of Rs. 2194 crores has been given to

State so far. Out of this, about 85 percent of funds have been provided for major irrigation projects.

Table 5.4: Central assistance under AIBP since 1996

(Rs. crores)

Sl. No.	Project	Funds Received
1.	Major	1884.1244
2.	Medium	205.1516
3.	Extension, Renovation and Modernization	54.5340
4.	Minor	50.5097
	Total	2194.3197

stipulated guidelines. Till the year 2005-06, all the work of project was completed and its work was started.

Table 5.5: Budget Provision and Expenditure incurred on Naraj Barrage Project
(Rs. Crore)

Sl. No	Year	Schemes			
		WRCP(under World Bank Funding)	AIBP Budget Provision	State Fund	AIBP Expenditure
1	Prior to 1995-96	-		01.5535	
2	1995-96	01.0972	-	-	-
3	1996-97	18.1136	-	-	-
4	1997-98	41.2790	-	-	-
5	1998-99	32.8470	-	-	-
6	1999-2000	32.2245	-	-	-
7	2000-01	30.3907	-	-	-
8	2001-02	09.2581	n. a	-	06.4780
10	2002-03	04.8543	20.000	-	15.0160
11	2003-04	02.9034	17.000	-	09.2210
12	2004-05	02.9233	05.000	-	03.6760
13	2005-06		04.248	-	04.1290
	Total	175.8911	46.248	01.5535	38.5200

3. Water Users' Association (WUA) structure in Orissa State

There are 25 irrigation divisions in Orissa state, out of which 2 irrigation divisions were selected for study purpose namely, Puri and Prachi division. In Puri irrigation division, the Sakhi Gopal branch canal and in Prachi irrigation division the Pratapnagari & Niali irrigation sub-divisions were selected/ surveyed which fell in delta stage-2, where the main role of Naraj Barrage is to control the flood.

As for as the structure of WUA in Orissa state is concerned, a perusal of Table 5.6 reveals that there are 103 WUAs in selected canal / irrigation sub- divisions, out of which 10 WUAs exist in selected villages. The pani panchayats (WUA) formed by an Act of Govt. of Orissa, looks after the overall management of water resources, equi-distribution of water among the farmers and maintenance of minor canals etc. The WUAs have their own elected body, elected for 3 years and they are selected by the farmers who are member of WUA. Annual General Body meeting of WUA held once in a year and the governing body meeting once in every month. The HYV of seeds being procured from the seed corporation by some WUAs and are directly provided to the cultivators for better farming as per their demand. The water tariff collected through the Revenue Department had certain administrative difficulties. The WUA is playing a crucial role between the Govt. and farmers to solve disputes if any among the farmers.

The office bearers of Pani Panchyats (WUA) have been provided short-term training by Water and Land Management Institute (WALMI). The WUAs receive Rs. 100/- per hectare of minor and sub-minor canals under their jurisdiction as grant from Water Resource Department every year. It has ascertained that the old-field channels constructed by Common Area Development Agency (CADA) long years ago have been

ruined at present, which causes difficulties for supply of water for irrigation to the tail point and require immediate restoration. As reported by the various WUA President, the sub-minor canals require concrete lining in both the sides by which the supply of water would be made available to the tail end of the canal. Provision of improved market, training, restoration/renovation of old water channels already destroyed due to poor maintenance, constitute the demand of the farmers.

Table 5.6: Delineation List of Water User Association (Pani Panchayat) under Selected Canal/Irrigation Sub-Divisions

Sl. No.	Name of Canal/ Irrigation Sub-Division	No. of Outlets (Chak Committee)	Total No. of Villages	Total No. of WUA	Total Irrigated Area (Ha.)	No. of Villages Survey/ Selected	No. of WUA exist in Selected Villages
1.	Pratap Nagari Irrigation Sub-Division	826	219	23	9583.49	4	4
2.	Niali Canal Sub-Division	1206	209	24	10554.99	8	2
3.	Sakhi Gopal Branch Canal	1791	562	56	26769.338	4	4
	Total	3823	990	103	46907.818	16	10

4. Role of Naraj Barrage

Tables 5.7 and 5.8 present the year wise water discharge in Naraj Railway Bridge which is sub-divided in to Kathjori, Mahanadi and Birpura River, before and after the operation of Naraj Barrage. A close examination of data reveals that prior to year 2008, the maximum water discharge was observed in the year 1982 which created severe flood situation that pose immediate attention of Irrigation Department and Govt. to construct a suitable measure to control this excess water discharge to overcome the situation. Consequently, the construction of Naraj Barrage was started in the year 1993 and completed in 2005-2006. However, the funding of loan to Naraj Barrage under AIBP was started in the year 2001-02 and total of Rs.38.52 crores were released upto 2005-06.

From Tables 5.7 and 5.8, it can also be observed that the magnitude of water discharge from Naraj Railway Bridge was about the same in the year 1982 and 2008. The level of water discharge in case of Kathjori river decreased from 57.96% in year 1982 to 54.72% (3.24%) in the year 2008, but the level of water discharge in Mahanadi river considerably increased from 34.88% to 44.47% (about 10.00%) in the same years.

Further, if we compare the average of total percentage change in water discharge before (1973-97) and after (2006-08) the operation of Naraj Barrage, the same situation was observed ie. the level of water discharge in Kathjori river has decreased from 55.79% to 50.30% (5.49%) and the level of water discharge in Mahanadi river has increased from 35.75% to 50.70% (14.95) . So we conclude that the operation of Naraj Barrage plays the dual role (1) to control the flood in delta stage-2 and (2) to divert the excess water from Kathjori to Mahanadi River, which is subsequently used for irrigation purpose in delta stage-1.

Table 5.7: Discharge of water before Operation of Naraj Barrage

Year	Discharge at Naraj Railway Bridge	Kathjori Discharge (Recorded)	Mahanadi NH Discharge	Birpura NH Discharge
1973	926973 (100.00)	603427 (65.10)	293585 (31.67)	30585 (3.30)
1974	762100 (100.00)	467112 (61.29)	271130 (35.58)	24407 (3.20)
1975	817517 (100.00)	513092 (62.76)	271530 (33.21)	33422 (4.09)
1976	933402 (100.00)	625217 (66.98)	278343 (29.82)	28795 (3.08)
1977	934708 (100.00)	572668 (61.27)	331374 (35.45)	31315 (3.35)
1978	984192 (100.00)	602050 (61.17)	354808 (36.05)	27772 (2.82)
1979	625729 (100.00)	431020 (68.88)	204889 (32.74)	17872 (2.86)
1980	1227476 (100.00)	694999 (56.62)	461031 (37.56)	21935 (1.79)
1982	1584574 (100.00)	918473 (57.96)	552758 (34.88)	109873 (6.93)
1983	886108 (100.00)	647183 (73.04)	203228 (22.93)	31273 (3.53)
1984	825888 (100.00)	481979 (58.36)	310392 (37.58)	33570 (4.060)
1985	890523 (100.00)	393790 (44.22)	344135 (38.64)	49655 (5.58)
1986	900413 (100.00)	514893 (57.18)	349420 (38.81)	38913 (4.32)
1987	346595 (100.00)	208924 (60.28)	122564 (35.36)	26587 (7.67)
1988	316150 (100.00)	181201 (57.31)	105260 (33.29)	23157 (7.32)
1989	231805 (100.00)	115206 (49.70)	96914 (41.81)	19685 (8.49)
1990	728398 (100.00)	345670 (47.46)	261150 (35.85)	34458 (4.73)
1991	1166549 (100.00)	514195 (44.08)	477248 (40.91)	48143 (4.13)
1992	1208608 (100.00)	463112 (38.32)	589002 (48.73)	58902 (4.87)
1993	814638 (100.00)	353012 (43.33)	340000 (41.74)	27000 (3.31)
1994	1115264 (100.00)	669158 (60.00)	408767 (36.65)	37450 (3.36)
1995	945732 (100.00)	438305 (46.35)	340210 (35.97)	68922 (7.29)
1996	466686 (100.00)	210416 (45.09)	98041 (21.01)	9051 (1.94)
1997	852168 (100.00)	445666 (52.30)	356095 (41.79)	51104 (6.00)
	Total Percentage	55.79 %	35.75 %	4.50 %

Table 5.8: Discharge of water after operation of Naraj Barrage

Year	Discharge at Naraj Railway Bridge	Kathjori Discharge (Recorded)	Mahanadi NH Discharge	Birpura NH Discharge
2006	1283338 (100.00)	607126 (47.31)	696127 (54.24)	71450 (5.57)
2007	742631 (100.00)	363001 (48.88)	397076 (53.46)	19722 (2.66)
2008	1581288 (100.00)	865344 (54.72)	703221 (44.47)	69406 (4.39)
	Total Percentage	50.30%	50.70 %	04.20 %

5. Positive Impact of Naraj Barrage

- a. Ensure irrigation water to 206,000 ha. of fertile land in Delta Stage -1 command area of the Mahanadi Delta, which is otherwise vulnerable to disruption in any point of time.
- b. Providing flood protection and silt reduction loading to 160,000 ha. in the Delta Stage-2 area.
- c. Ensuring regulation of flood in the Kuakhai arm to its safe bank full capacity up to a flood of 28,300 meter³ /second in the Mahanadi at the head of the delta (i.e.Naraj).
- d. Providing a management tool for the management of Lake Chilika .Up to a flood of 28,300 m³ /s at the Naraj Barrage, the freshwater and the sediment inflow in to Lake Chilika can be regulated. The operational rules of the Naraj barrage have to be developed in such a manner that intelligent operation of the Naraj Barrage will result in to the conservation of this unique ecosystem with respect to salinity gradient and the sediment loading rates. It should be noticed, that only around 50% of the freshwater inflow into Lake Chilika comes from the Mahanadi River; the rest originates from the small rivulets around the lake. Also the salinity gradient is further determined by the width and depth of the mouth of Lake Chilika to the sea.
- e. In case the Naraj weir is not replaced by the new Naraj Barrage and the old weir collapses, there will be no irrigation water in Delta Stage-I (most of the water will flow through the Kathjori branch) and there will be extensive long term flooding Delta Stage-II are and there will flow too much freshwater and sediment to Lake Chilika, which will cause the break down of the Chilika Lake ecosystem.
- f. Providing an alternative communication link from Cuttack to Bhubaneswar the state capital and reduce traffic congestion in the National Highway No.5.

6. Farmer's Perceptions about Naraj Barrage

During the survey of farmers in 16 selected villages, it was ascertained that the construction of Naraj Barrage has controlled the overall flood situation in delta stage-II and there by yield/income of the farmers has been increased. Besides this, the villagers have developed a sense of security during rainy season as the occurrence of frequent flood has been minimized; otherwise before the construction of Naraj Barrage, the

majority of villagers were temporarily migrated to other areas or settled on upland near by their village during rainy season. It may also be noted that Naraj Barrage has provided indirect irrigation benefit to Delta Stage-I covering 2.06 hectares by means of two other canals namely Kendrapara and Taladana situated in the lower stream of Naraj Barrage, emerging from Zobra Anicut covering the undivided Cuttack district of Orissa.

In addition to above the following points were also observed:

- a. The percentage of household dependent on agriculture in villages is 79.38%.
- b. The people in majority of selected villages participated in maintenance of canal.
- c. Irrigation department is doing maintenance work proactively only in 1 village whereas in rest of 15 villages they do maintenance work only after getting the complaints of the farmers.
- d. The methods of distribution of water are top to lower, rotation, turn by turn and need based.
- e. The farmers of 11 and 5 villages reported equitable and non equitable distribution of water, respectively.
- f. With respect to maintenance of the irrigation facility being done regularly by irrigation department; the farmers in 11 villages responded it is done after complain; in 2 villages it is regularly done and in 3 villages it is done after several complaints.
- g. WUAs and Gram Panchayat take required security measures of the canal and its associated infrastructure in 13 and 3 villages, respectively.
- h. Farmers in 9 villages responded increase in irrigated area after the operation of project.
- i. There is increase in productivity in 10 villages mainly for paddy crop and in 6 villages there is no change in productivity for any crop.
- j. In 6 villages changes in cropping pattern is observed and the new crops are vegetables, black gram, moong, betel leaves and rabi paddy ; where as in 10 villages there is no change in cropping pattern.
- k. The farmers of 9 villages reported increase in per acre cost of irrigation whereas in 7 villages this was decrease.
- l. 12 out of 16 villages face the problem of water logging.
- m. The WUAs are functional in 15 villages. Farmers of 14 villages are aware whereas in 2 villages they are not aware about the functions and responsibilities of WUA.
- n. The functioning of WUAs in 14 villages is active where as in 2 villages they are dormant.
- o. Water disputes among farmers are mainly solved by members of WUAs.

Section 3 : Impact of AIBP

1. Distribution of Sample

As the sample project is basically designed for flood protection, the survey was conducted only for beneficiary farmers. Accordingly a total of 160 beneficiary farmers from 16 villages were contacted to elicit the impact of AIBP. 25% of the farmers were selected each from head and tail end of the command while 50% were selected from the middle end (Table 5.9).

Table 5.9: Distribution of Sample

Location in the Canal	No. of villages	Number of Beneficiaries
Beneficiary		
Head	4	40
Middle	8	80
Tail	4	40
Total	16	160

2. Social Profile of the Sample

40% of the farmers are from General Caste at head and tail end, whereas OBC constitutes about 64% at the middle end of the canal (Table 5.10).

Table 5.10: Social Profile of Sample Beneficiaries

Caste	Beneficiary							
	Head		Middle		Tail		Total	
	N	%	N	%	N	%	N	%
General	16.00	40.0	26.00	32.5	17.000	42.5	59	36.8
Other Backward Class (OBC)	19.00	47.5	51.00	63.7	17.000	42.5	87	54.4
Scheduled Caste (SC)	5.00	12.5	3.00	3.8	6.000	15.0	14	8.8
Scheduled Tribe (ST)	-	-	-	-	-	-	-	-
Total	40.00	100.0	80.00	100.0	40.000	100.0	160	100.0

3. Land Holding Pattern

All the farmers of the sample belongs to small and marginal category as the average size of holding turn out to be little more than 2.0 acres (Table 5.11). The outstanding feature is that about 93% of the area is irrigated.

Table 5.11 : Land Holding Pattern of Sample Beneficiaries

Description	Beneficiary			
	Head	Middle	Tail	Total
1. Average Size of operational land (acre)	2.51	2.05	3.10	2.43
2. Average size of Irrigated Land (acre)	2.46	1.80	2.83	2.22
3. Percentage irrigated area	97.93	88.47	95.39	92.89

4. Economic Status

The data on various parameters related to economic status of sample beneficiaries has been presented in Table 5.12. It is evident that the farmers located at head and middle end are relatively better of then their counterparts at tail end. More than 50% of the farmers at the tail end live in Kachha house. Hand pump, whether owned or community has been found the major source of drinking water in all the categories of sample farmers. Majority of the farmers use Kerosene for lighting in the house and firewood as cooking fuel.

Table 5.12: Economic Status of Sample Beneficiaries

	Beneficiary							
	Head		Middle		Tail		Total	
	N	%	N	%	N	%	N	%
Type of House								
Pacca	18	46.2	38	47.5	6	15.0	62	39.0
Kaccha	11	28.2	26	32.5	21	52.5	58	36.5
Semi-Pacca	10	25.6	16	20.0	13	32.5	39	24.5
Total	39	100.0	80	100.0	40	100.0	159	100.0
Source of Drinking Water								
Tap water	1	2.6	0	0.0	1	2.5	2	1.3
Owned hand-pump	19	50.0	36	45.6	18	45.0	73	46.5
Community hand-pump	12	31.6	43	54.4	18	45.0	73	46.5
Wells	4	10.5	0	0.0	1	2.5	5	3.2
Others	2	5.3	0	0.0	2	5.0	4	2.5
Total	38	100.0	79	100.0	40	100.0	157	100.0
Latrine Room in Home								
Yes	15	38.5	16	20.0	17	42.5	48	30.2
No	24	61.5	64	80.0	23	57.5	111	69.8
Total	39	100.0	80	100.0	40	100.0	159	100.0
Source of Lighting in House								
No lighting	0	0.0	1	1.3	1	2.5	2	1.3
Kerosene	12	31.6	33	41.2	13	32.5	58	36.7
Electricity	6	15.8	9	11.3	6	15.0	21	13.3
Other	20	52.6	37	46.2	20	50.0	77	48.7
Total	38	100.0	80	100.0	40	100.0	158	100.0
Type of Cooking Fuel								
Leave/straw	8	20.5	27	35.1	8	21.1	43	27.9
Fire wood	26	66.7	35	45.4	29	76.3	90	58.5
Cool/ coke	1	2.6	1	1.3	0	0.0	2	1.3
Kerosene	0	0.0	5	6.5	0	0.0	5	3.2
Bio-gas	0	0.0	5	6.5	0	0.0	5	3.2
LPG	4	10.2	4	5.2	1	2.6	9	5.9
Total	39	100.0	77	100.0	38	100.0	154	100.0

5. Cropping Pattern

Similar to the pattern of the state of Orissa, paddy is the most important crop occupying more than 50% of the total cropped area. Vegetables are next important crops for the farmers at head end while farmers of middle and tail ends have taken Arhar as the next important crop (Table 5.13).

Table 5.13 : Cropping Pattern

(Percent area)

Crop	Beneficiary			
	Head	Middle	Tail	Total
Wheat	1.0	0.4	1.3	0.9
Paddy	51.0	39.4	66.6	53.3
Arhar	0.0	29.0	21.5	21.3
Gram	8.6	15.7	1.9	8.5
Potato	1.9	0.2	0.0	0.4
Vegetables	29.2	1.1	6.4	7.7
Moong	8.3	7.4	0.0	4.2
Urad	0.0	2.6	0.0	1.1
Peanut	0.0	4.2	2.2	2.7

Although the cropping intensity has been found good (nearly 200%) among the all farmers, it is the highest for the farmers located at middle end of the canal (Table 5.14).

Table 5.14 : Cropping Intensity

Description	Beneficiary			
	Head	Middle	Tail	Total
Net Cropped Area (acre)	100.4	164.1	123.8	388.3
Gross Cropped Area (acre)	187.0	368.6	213.4	769.0
Cropping Intensity (%)	186.3	224.6	172.4	198.0

6. Productivity of Major Crops

The productivity in terms of quintal/acre for the major crop (paddy) has been found more or less same among all the three categories of the farmers. The productivity of potato which is a cash crop, is maximum for the farmers of head end while the lowest for the farmers at the middle (Table 5.15).

Table 5.15 : Productivity of Major Crops

(Quintal per acre)

Crop	Beneficiary			
	Head	Middle	Tail	Total
Wheat	-	4.5	-	4.5
Paddy	11.1	11.9	12.7	12.0
Gram	3.2	3.4	10.0	3.4
Potato	34.0	16.7	28.0	32.6
Vegetables	2.6		0.4	1.0
Moong	1.0	1.0	4.0	1.3

7. Total Income of the Household

Majority of the farmers falls under income range of Rs.25000 – 50000 per annum, which indicates the substance nature of farming (Table 5.16). About one-fourth of the sample farmers earn between Rs.10000 – 25000 per annum. It has been shown in the table 5.11 that area is irrigated, but a meager income of the farmers indicates that they are not able to sell the product at reasonable price.

Table 5.16 : Total Income of the Household

Income	Beneficiary							
	Head		Middle		Tail		Total	
	N	%	N	%	N	%	N	%
Below Rs. 10000	0	0.0	2	2.5	0	0.0	2	1.3
Rs. 10,000 to Rs. 25,000	7	17.5	25	31.2	8	20.0	40	25.0
Rs. 25,000 to Rs. 50,000	17	42.5	28	35.0	17	42.5	62	38.7
Rs. 50,000 to Rs. 1,00,000	10	25.0	13	16.2	12	30.0	35	21.8
Rs. 1,00,000 to Rs. 2,00,000	4	10.0	9	11.3	2	5.0	15	9.4
Rs.2,00,000 and above	2	5.0	3	3.8	1	2.5	6	3.8
Total	40	100.0	80	100.0	40	100.0	160	100.0

8. Status of Migration

The figures given in table 5.17 indicate a rampant migration among the farmers. The average duration of migration turn out to be 160 days in a year. This migration is for seeking employment in all the seasons. It is disheartening to note that about 40% of the household reported migration and the figure is maximum for the middle end farmers.

Table 5.17 : Status of Migration

	Beneficiary							
	Head		Middle		Tail		Total	
	N	%	N	%	N	%	N	%
% of households reported migration		35.0		47.5		30.0		40.0
No. of Person Migrated from a Household								
One person	9	64.3	27	71.1	9	75.0	45	70.3
2-3 person	4	28.6	10	26.3	3	25.0	17	26.6
>3 person	1	7.1	1	2.6	0	0.0	2	3.1
Total	14	100.0	38	100.0	12	100.0	64	100.0
No. of times Migrated by a Person (in a year)								
One time (one crop season)	5	41.7	19	50.0	8	66.7	32	51.6

Contd ...

Table 5.17 : Status of Migration (Contd...)

	Beneficiary							
	Head		Middle		Tail		Total	
	N	%	N	%	N	%	N	%
Two times (two crop season)	1	8.3	5	13.2	1	8.3	7	11.3
Three and/or more times (all crop season)	6	50.0	14	36.8	3	25.0	23	37.1
Total	12	100.0	38	100.0	12	100.0	62	100.0
Average no. of times	2.7		3.7		2.4		3.2	
Reason of Migration								
Employment	14	100.0	34	97.1	10	83.3	58	95.1
Others	0	0.0	1	2.9	2	16.7	3	4.9
Total	14	100.0	35	100.0	12	100.0	61	100.0
Migration season								
Rabi	0	0.0	5	31.3	0	0.0	5	18.6
Kharif	1	33.4	5	31.3	4	50.0	10	37.0
Zaid	1	33.3	1	6.1	2	25.0	4	14.8
All	1	33.3	5	31.3	2	25.0	8	29.6
Total	3	100.0	16	100.0	8	100.0	27	100.0
Duration of Migration by a Person (in a year)								
<120 days	8	80.0	13	38.2	6	54.5	27	49.1
120-240 days	0	0.0	4	11.8	1	9.1	5	9.1
>240 days	2	20.0	17	50.0	4	36.4	23	41.8
Total	10	100.0	34	100.0	11	100.0	55	100.0
Average duration of migration (days)	62.0		195.2		161.8		159.8	

9. Overall Impact

The impact of AIBP on agricultural development has been found satisfactorily in terms of increase in irrigated area, production and annual income. The other positive impact has been found in terms of increase in the visit of government officials to the farmers. Employment opportunities have been increased and the value of agricultural land has also shot up (Table 5.18). On contrary, respondents do not agree that migration has reduced, decrees in out break of diseases as well as decreasing pollution.

Table 5.18 : Overall Impact Assessment*

	Head	Middle	Tail	Total	F	Sig.
Agricultural Development						
Increase in irrigated area	1.93	2.10	1.88	1.99		
Increase in total production	2.05	2.04	1.72	1.96	2.867	0.060
Decline in cost of production	3.78	4.23	3.53	3.92	5.070	0.007
Increase in annual income	2.03	1.93	1.85	1.93	0.411	0.664
Ease in availability of agricultural equipments	2.65	3.33	2.95	3.05	7.464	0.001
Ease in agriculture activities	2.50	3.31	2.70	2.93	13.829	0.000
Increase in the visits of government officials	1.55	1.37	1.95	1.57	4.484	0.013
Decrease in land erosion	4.05	4.45	3.80	4.17	6.992	0.001
Socio-economic Development						
Increase in literacy rate	2.30	2.54	2.72	2.52	0.748	0.475
Increase in non-farm activities	2.38	2.93	3.33	2.89	3.657	0.028
Increase in healthcare services	2.93	2.20	3.15	2.65	7.990	0.001
Decrease in diseases outbreak	3.88	4.19	3.74	3.99	2.684	0.072
Increase in forestation/number of trees	3.73	3.99	3.10	3.68	7.762	0.001
Increase in the quality of agricultural produce	2.55	3.03	2.87	2.86	2.809	0.064
Increase in employment opportunities	1.93	1.93	2.18	1.99	1.074	0.344
Increase in crop rotation	2.93	3.64	2.50	3.15	11.850	0.000
Increase in credit availability	3.90	4.23	3.83	4.03	2.297	0.104
Decrease in pollution	3.95	4.19	3.73	4.00	2.670	0.073
Increase in value of land	1.40	1.30	2.15	1.55	12.751	0.000
Decrease in migration to cities	3.38	3.53	3.53	3.49	0.147	0.864

*strongly agree-1,..., strongly disagree-5

Section 4 : Process of Project Management

The farmers' response on process of project management has been captured in Table 5.19. About 45% farmers believe that there exists proper system for water distribution. However, majority feel that there is equitable distribution of water. Still 80% farmers responded that there is no influence in water distribution. Very few farmers get information about water release through WUA indicating the defunct nature of these people organizations. Surprisingly more than 80% of the farmers make timely payment of irrigation charge. However when asked about their willingness to pay additional charges for assured water supply the response was low from middle and tail enders. The farmers located at head end were enthusiastic to pay more for a better access of irrigation water.

Table 5.19: Beneficiary's Response on Process of Project Management

	Head		Middle		Tail		Total	
	N	%	N	%	N	%	N	%
Beneficiary response on proper system existence for water distribution	18	45.0	28	40.6	17	43.6	63	42.6
Beneficiary agreeing equitable distribution of water	27	67.5	53	76.8	30	75.0	110	73.8
Beneficiary disagreeing any group influence on the water distribution	36	90.0	50	72.5	33	82.5	119	79.9
Beneficiary response on support from Irrigation management system when ask/complain	12	30.8	36	50	12	31.6	60	40.3
Beneficiary acquire information about water release through WUA	11	27.5	11	15.9	12	27.3	34	22.2
Beneficiary acquire information about water release through gram panchayat	11	27.5	20	29	16	36.4	47	30.7
Beneficiary response on timely payment of irrigation charges	32	84.2	54	83.1	31	79.5	117	82.4
Beneficiary willingness to pay extra charges for assured water supply	15	37.5	6	8.8	7	17.9	28	19.0

Chapter 6

Evaluation of Accelerated Irrigation Benefit Program (AIBP) in Jammu & Kashmir

Section 1: State Level Overview

Under AIBP, several projects have been funded in the Jammu and Kashmir (J&K) as listed in Table 6.1. Since 1996-97 Rs, 818.10 crores have been given as Central Assistance to the state under the scheme so far. Year-wise Central Government assistance/ grants are presented in Table 6.2

Table 6.1: List of Projects Funded under AIBP in Jammu & Kashmir

Name of Projects	Central Assistance in Rs. Crores (1996-97 to 2009-10)
Marval Lift	0.3000
Lethpora Lift	3.3161
Koil Lift	0.5000
Mod. of Ranbir Canal	58.7580
Mod. of Pratap Canal	18.6760
Mod. of New Pratap Canal	4.7697
Mod. of Kathua Canal	7.6160
Rajpora Lift	45.6362
Tral Lift	44.6971
Lgophey	9.6300
Rafiabad Lift Irrigation	32.9855
Zaingir Canal	4.8492
Mod. of Dadi Canal Project	31.5534
Mod. of Martand Canal	14.8988
Mod. of Mav Khul	7.1049
Mod. of Babul Canal	6.7584
Mod. of Kandi Canal	16.2000
Parachik Khows Canal Project	4.0500
Mod. of Ahji Canal (XI)	2.4300
Minor Irrigation Schemes	503.3748
Jammu & Kashmir Total	818.1041

Source: Ministry of Water Resources

Table 6.2: Year-wise Central Assistance/Grant under AIBP to Jammu & Kashmir

Year	Amount (Rs. Crore)
1996-97	1.30
1997-98	0.00
1998-99	0.00
1999-00	4.68
2000-01	10.46
2001-02	11.07
2002-03	35.00
2003-04	21.55
2004-05	12.74
2005-06	36.69
2006-07	37.77
2007-08	199.23
2008-09	393.07
2009-10	54.56
Total	818.12

Source: Ministry of Water Resources

Eight of the irrigation projects under large and medium sector have already been completed under AIBP in the state (Table 6.3).

Table 6.3: List of Completed Projects under AIBP in J & K

Sl. No.	Name of the Project
1.	Zaingir Canal
2.	Marwal Lift
3.	Lethpora Lift
4.	Koil Lift
5.	Mod. of Pratap Canal
6.	Mod. of Kathua Canal
7.	Igophey
8.	Rajpora LIS

Source: Ministry of Water Resources

Section 2: New Pratap Canal, Jammu

The Pratap Canal was constructed in 1906 but became non-functional by 1958 due to damages in major floods during this period. The Head works of the Old Pratap Canal was also badly damaged and became difficult to maintain due to change in course of River Chenab. In 1957-58 it was decided to construct New Pratap Canal with proper Head works, alignment and suitable structure to cope up with the changed topography and settlements of displaced persons from Pakistan. Construction work of Remodeling of Pratap Canal was taken up during the year 1958 and got completed in year 1969. Most of the distribution system was the same as that of old canal. But the alignment of the main canal underwent complete change. Some of the old systems had become defective and at number of places the canal reaches and distributaries required pitching, lining and strengthening of banks. Because, the remodeling of the canal had been done under

financial constraints, the job done was not of such standards that could have allowed the required discharge to pass as envisaged and planned.

To remove the engineering defects as also the agronomical deficiencies to reduce the water loss and also to bring the additional area under cultivation, the idea of Modernization of New Pratap Canal was conceived and its execution was taken up in hand during 1981-82. The project was included under AIBP from the year 1999-2000.

The New Pratap Canal (NPC) Project is located on river Chenab. The water is fed directly from the right bank of river Chenab and the main headwork of the canal has been constructed at Akhnour in Jammu District. Drawing of water from the river Chenab and feeding it in the NPC Project for irrigation purposes is governed by the Indus Water Treaty, 1960. Maximum of 500 cusecs of discharge from the river Chenab can be utilized for irrigation and other agricultural purposes. The main canal's model is still based on Old Pratap Canal, which was constructed prior to 1906. As such no land was acquired by the government for construction of NPC. The gross Command Area of the NPC is 13620 hectare and cultivable Command Area is 9028 hectare. Total estimated cost of modernization of NPC is Rs. 4760 Lacs and the scheduled date of completion of the NPC project is the year 2009-10 but it may take one more year (i.e. up to 2010-11) for getting the project completed.

Table 6.4: Details about the Canal System at the Design Stage

Sl. No.	Particulars	Original	77th TAC meeting	Proposed
1	Length of main canal		33.69 km	33.69 km
2	Full supply level and canal head (mts)		1.6 mts	1.6 mts
3	Full supply discharge at canal head		500 cusecs	500 cusecs
4	Length of complete distributor system		90.57 kms	156.82 kms
5	Gross Command area	13620	13620	13620
6	C.C.A	9028	9028	9028
7	Ultimate irrigation Potential	10690	12042	13309
8	Intensity of irrigation	118%	131%	147%

Table 6.5: Expected Cropping Pattern Season wise

Sl.No	Name of crop season wise	Pre. Modernization in 77th TAC %age of crop	Proposed %age of crop	Area in Ha
1	Kharif			
	a) Paddy	50%	61%	4247
	b) Basmati		23%	1608
	c) Maize	15%	3%	206
	d) Maize fodder	5%	5%	364
	e) Moong	5%	3%	242
	f) Vegetable	5%	5%	323
	g) Bazaar	20%	-	-
2	Rabi			
	a) Wheat	90%	83%	4306
	b) Oil seeds	3.00%	3.50%	202
	c) Barseen	5.00%	7.50%	435
	d) Vegetable	2%	6%	376
3	Zaid			
	a) Vegetable	-	100%	1000

Current Status of the Project

Table 6.6: Physical Properties of the Irrigation System

Sl. No.	Parameters	Design Stage	At Completion	Present
1 (a)	Length of Main Canal (km)	33.69	33.69	33.00
1 (b)	Of which lined (km)	33.69	33.00	33.00
2 (a)	Length of Branch Canal (km)	-	-	-
2 (b)	Of which lined (km)	-	-	-
3 (a)	Length of Distributaries (km)	106.35	106.35	95.21
3 (b)	Of which lined (km)	106.35	106.35	95.21
4 (a)	Length of Minors (km)	46.670	46.670	22.69
4 (b)	Of which lined (km)	46.670	46.6701	22.69
5 (a)	Length of Sub-Minors (km)	3.80	3.80	1.20
5 (b)	Of which lined (km)	1.20	1.20	1.20

Table 6.7: Status of outlets for water distribution

Sl. No.	Name of the branch canal	Total Outlets			Closed outlets	Damaged outlets	Outlets in proper condition
		Design stage	At completion	At present			
1.	-	650	650	650	Nil	49	601

Table 6.8: Physical Progress

	Year			
	2007-08		2008-09	
	Target	Achievement	Target	Achievement
1. Main Canal				
Earth Work	0.151kms.	0.46 kms.	0.90 kms.	0.54 kms.
Grouting (Lining)	1.175 kms.	0.74 kms.	2.00 kms.	1.10 kms.
Structures	16 Nos.	10 Nos.	26 Nos.	13 Nos.
Walling	500 M	210 M	100 M	55 M
2. Distribution & Minors				
Earth Work	25.00 kms.	12.20 kms	25.51 kms.	15 kms
Grouting (Lining)	25.00 kms.	10.00 kms.	25.50 kms.	12.75 kms.
Structures	75 Nos	55 Nos	205 Nos	110 Nos
Walling	2500 M	1800 M	800 M	500 M
3. Water Course/ Direct Outlets				
Earth Work	20.00 kms.	12.00 Kms.	25.00 kms.	15 Kms.
Grouting (Lining)	20.00 kms.	14.20 Kms.	25.00 kms.	15 Kms.
Structures	58 Nos.	51 Nos.	60 Nos.	34 Nos.
Walling	3500 M	2450 M	3000 M	1500 M
4. Anti Water Logging Channel				
Earth Work	30.00 Th. CUM	14.50 Th. CUM	20.00 Th. CUM	13.00 Th. CUM

Table 6.9: Financial Progress

Year	Proposed Outlay during the year (in Lacs)	Progress Central /State		Total (in lacs)	Expenditure (in lacs)
		Central Loan Assistance	State Share		
2007-08	1050.56	270.00	42.64	312.64	312.64
2008-09	1245.70	657.00	55.00	712.00	712.00

Length of main canal of the project is 33.65 km and numbers of distributaries and minors (including direct outlets minor and sub-minor) are 17 and 81 respectively. Total command area of the project is 13,309 ha and utilized area is 12320 ha. During the last seven years actual irrigated area from the project has been presented in the table 6.11 below.

Table 6.10: Potential Irrigated Area

Season	Potential Irrigated Area (in ha)		
	Design Stage	At completion	Present
Kharif	6990	6990	6468
Rabi	5319	5319	4928
Other (Zaid)	1000	1000	924
Total	13309	13309	12320

Table 6.11: Actual Gross Irrigated Area

Year	Actual Gross Irrigated Area (ha)		
	Kharif	Rabi	Other (Zaid)
2002-03	5840	4450	835
2003-04	5993	4566	856
2004-05	6148	4684	878
2005-06	6179	4708	883
2006-07	6226	4744	890
2007-08	6347	4836	907
2008-09	6468	4928	924

Reasons for Gap between Created and Actually Utilized Irrigation potential:

Delay in Physical Progress of the Canal

The project is ongoing and the targeted date of completion of the project is 2009-10. But, the completion of the project is likely to be delayed by one more year due to limited working period (when the canal is closed during January to March). The canal remains functional nearly for 9 months i.e. from April to January. The actual number of days of operation of the canal is presented below in the table. The closure period of the canal varies every year.

The construction works are to be executed during a short span of three months (during closing period). But the same period is crucial for the farmers too, because by that time the crop of wheat requires irrigation. In earlier times the retreat monsoon rains used to

reduce the need for irrigation but for last few years the trend has changed and the retreat monsoon has not remained a regular feature. This climatic change has increased the demand for water which coincides with the closure period of canal by the department for execution of works.

Table 6.12: Actual Number of Days of Operation of the Canal

Month/ Year	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09
January	31	31	31	-	8	10	13
February	28	19	-	-	-	11	-
March	-	-	-	-	-	-	19
April	17	14	20	12	30	12	30
May	31	31	22	31	31	31	31
June	30	30	30	30	30	30	30
July	31	31	31	31	31	31	31
August	31	26	31	31	31	31	31
September	30	30	30	30	30	30	30
October	31	31	31	31	31	31	31
November	28	30	30	30	30	30	30
December	31	31	31	31	31	31	31

Insufficient and Untimely Availability of Fund

Another reason for delaying the completion of the project is inadequate and late receipt of funds by the project authorities. Flow of funds for the maintenance and operation of canal infrastructure is not sufficient to check the canal system from getting deteriorated. These result in lack of supply of sufficient volume of water for crops as per the requirement as a lot of water gets wasted on account of seepages and leakages.

The approved budget for the project under AIBP and amount actually received during different years are presented in tables 6.13 and 6.14, respectively. Total expenditure under AIBP scheme on this project is also presented in table 6.15.

Table 6.13: Approved budget of the project under AIBP

(in Rs. Lacs)

Year	Central Govt.	State Govt.	Total
2002-03	21.70	39.00	60.70
2003-04	228.20	60.00	288.20
2004-05	144.00	175.00	319.00
2005-06	291.60	140.40	432.00
2006-07	-	60.50	60.50
2007-08	270.00	42.64	312.64
2008-09	651.00	55.00	706.00

Table 6.14: Amount received for New Pratap Canal under AIBP

(in Rs. Lacs)

Year	Central Govt.	State Govt.	Total
2002-03	21.70	39.00	60.70
2003-04	228.20	60.00	288.30
2004-05	144.00	175.00	319.00
2005-06	291.60	140.40	432.00
2006-07	-	60.50	60.50
2007-08	270.00	42.64	312.64
2008-09	651.00	55.00	706.00

Table 6.15: Total expenditure from AIBP funds

(in Rs Lacs)

Year	Expansion of irrigation system
2002-03	60.70
2003-04	288.30
2004-05	319.00
2005-06	432.00
2006-07	60.50
2007-08	312.64
2008-09	706.00

The above table shows that 100 per cent fund is being used for maintenance of canal. However, according to irrigation officials this amount is very less for maintenance of the system. Due to non sufficient budget canal system is not able to cover all command area.

Water Losses

In this vast network of the irrigation canals, one of the main causes of losses is the unlined canal network. Canal network is only partially lined. The losses take place on account of leakages, evaporation and seepages through the sides and bed. The strata of soil available in Kandi areas of Jammu Division consists of high content of sand as a result of which more quantity of water is required for crops due to which the requirement of water is far more than the norms over which the projects are formulated.

Change in Cropping Pattern

The farmers of the complete command belt does not follow cropping pattern as envisaged in the approved projects which contributes the major gap between the potential created and potential utilized. As per the approved projects the paddy cultivation proposed is much lesser compared to the current situation when the cultivation of paddy is far higher. There is also no cooperation among farmers for utilization of canal water as there is no water users association in this area. Due to this, tail end area is deprived of irrigation facility which is the one of the main causes of gap between the created and utilized irrigation potential. Strict laws are to be enforced for equitable distribution of irrigation water. It is high time that the water provided for irrigation purpose should be supplied quantitatively instead of supplying the water over the period of time. This may bring more area under utilization.

Less Availability of Rainfall Water

Climate change has also been one of the main causes of concern, which has reduced the frequency and quantity of the rainfall over the areas as solely canal water has never been sufficient for the current cropping patterns. The average amount of rainfall presumed during the design stage was 153 mm but the actual amount of rainfall during the last several years is much less as presented in the following table.

Table 6.16: Monthly Average Rainfall in the Catchments Area (in mm)

Month/year	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08
January	0.32	0.50	4.48	5.90	3.05	Nil
February	0.29	8.78	1.16	10.59	0.62	5.77
March	1.49	4.39	Nil	5.31	2.09	9.97
April	0.14	Nil	1.74	1.22	0.40	Nil
May	0.39	Nil	1.40	0.14	0.97	0.49
June	1.42	3.50	4.47	0.31	2.50	9.70
July	4.50	23.84	21.71	15.46	15.70	7.18
August	14.63	16.00	12.37	8.49	19.76	14.18
September	6.80	9.62	1.69	4.66	15.80	3.34
October	1.05	Nil	2.13	0.14	2.05	Nil
November	Nil	1.00	0.50	Nil	0.35	Nil
December	0.24	1.18	1.10	Nil	2.85	0.27
Total	31.27	68.81	52.75	52.22	66.14	50.09

The lower amount of rainfall results in less water availability and less volume of water discharge in the canal compared to the level of water discharge presumed during the design stage (i.e., 500 cusecs). This is presented in the following table. Less discharge of water has led to inadequate water supply to tail end villages. Data of last seven years monthly water discharge has been presented below in the table. In 2008-09 maximum water discharge has been observed in the months of July, August and September.

Design discharge:

Kharif Season (15th April to 14th October)

- i) For agriculture: 400 cusecs
- ii) For silt extraction: 100 cusecs

Rabi season (15th October to 14th April)

- i) For agriculture use: 100 cusecs

Table 6.17: Head Water Discharge (m³/sec)

Month/ Year	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09
January	1.78	1.78	3.34	Nil	1.78	1.24	1.61
February	1.78	1.78	Nil	Nil	Nil	1.38	Nil
March	Nil	Nil	Nil	Nil	Nil	Nil	2.37
April	3.73	3.87	2.83	1.55	3.96	2.60	4.36
May	6.51	8.97	7.22	4.38	8.43	7.41	7.41
June	10.33	11.32	10.96	8.63	11.33	11.33	9.71
July	11.32	11.32	11.53	11.33	11.33	11.33	11.33
August	9.71	7.30	9.03	11.33	8.15	11.33	11.33
September	6.76	8.01	9.82	11.33	6.11	9.71	11.33
October	1.78	4.53	5.46	6.51	5.35	4.53	5.46
November	1.78	3.87	1.78	3.87	3.87	3.87	3.87
December	1.78	3.87	1.78	1.78	3.87	3.87	3.87

Lack of Manpower

Manpower required as per norms for operation and maintenance is far below for the project. This leads to the poor maintenance and regulation of irrigation water especially during peak irrigation seasons. Due to this a large volume of water gets wasted. The numbers of irrigation department staffs required, sanctioned and presently working for the project are shown below. The table shows that the irrigation department is really inadequately staffed and needs additional manpower support especially at the middle and lower level.

Table 6.18: Staffing Pattern in the Irrigation Department for the Project

Designation	Required	Sanctioned	Presently working
Executive Engineer	1	1	1
Assistant Engineer	2	2	2
Junior Engineer	9	9	9
Work Supervisor	9	9	6
Zilledar	1	1	1
Patwari	19	19	3
Gauge reader	8	8	4
Gang coulee	20	20	9

Collection of Water Charges

Revenue wing set up for collection of revenue for irrigation consists of Ziledar, Patwari, Ameen and Village Numberdars. The water charges are being collected by the Numberdars who are paid at the rate of 5 per cent of the revenue collected by them. The duty of Numberdars is to collect the charges and deposit the same in the Government Treasury. The position of revenue collection is very grim. It was observed that revenue collection was less than 10 percent. The water charges are levied after the survey of the crops by the Revenue Patwaris of the department. But due to shortage of revenue staff, the works of revenue assessment have not been done for last two to three years in many areas. Besides, the rates of revenue are very low, which do not cover even the O&M charges of the project. The existing rate of irrigation per acre for different crops is as following.

Table 6.19: Irrigation Charges for Different Crops

Rabi	Rate Rs./Acres.	Kharif	Rate Rs./Acres.
Wheat	15	Paddy	30
Barseem	20	Maize	15
Fodder	12	Sugarcane	30
Vegetables	20	Vegetables	20
Oil seeds	15	Arched	30

Actual revenue collected from the irrigation under the project is presented in the Table 6.20.

Table 6.20: Annual Revenue from Irrigation

(in Rs. Lacs)

Year	Assessed Revenue	Actual Revenue collected
2002-03	208774.01	25083.50
2003-04	172903.72	22152.07
2004-05	26956.08	58088.75
2005-06	92029.78	86831.50
2006-07	183042.97	7345.94
2007-08	94383.64	19605.70
2008-09	98164.00	21333.13

There has been shortfall in revenue collection due to various reasons like shortages of revenue staffs (i.e. Patwari), disturbance in border areas, lack of cooperation between Lumberdars and the revenue staffs. The Village Lumberdars deposit the collected revenue in the treasury through irrigation department. Most of the Village Lumberdars are unwilling to collect the irrigation bill as farmers are not willing to share the increased tariff.

Suggestions

1. The remaining portion of the project should be completed as early as possible. For this sufficient and timely funds should be released so that the action plan for execution of the works can be adhered.
2. Lining of canals should be undertaken in phases, especially in those areas where the soil is sandy to prevent distribution losses.
3. Mechanism should be developed to encourage the farmers to grow crops as per the project design stage assumption.
4. Effort should be made for afforestation and water harvesting in the area to increase the rainfall and preserve it at the local level.
5. Adequate technical and revenue staff should be appointed.
6. De-silting of canal should be done regularly preferably during the rabi season
7. A proper system needs to be developed for equitable distribution of water among farmers irrespective of their location at the head, middle of tail end of the

command area. Although rotation method (barabari) is being used for distribution of water, it should be properly monitored.

8. Proper mechanism need to be developed for collection of water charges. Creation of Water Users' Association should be encouraged in the command area.

Section 3: Impact of AIBP

1. Distribution of Sample and its Profile

As per the methodology of the study, sample of beneficiaries and non-beneficiaries was taken both from command and non-command area of the project. The distribution of the sample across the head, middle and tail location of the canal has been presented in Table 6.21. A total of 160 beneficiaries were selected from 16 villages in the command area of the project. A total of 72 non-beneficiaries were also interviewed both from command and non-command area of the project.

Table 6.21: Distribution of Sample Beneficiary & Non-Beneficiary

Location in the Canal	No. of villages	Number of Beneficiaries/ Non-Beneficiary
Beneficiary		
Head	3	30
Middle	7	70
Tail	6	60
Total	16	160
Non-Beneficiary		
Command	15	32
Non-command	4	40
Total	19	72

2. Social Profile of Sample

Caste wise distribution of sample beneficiaries and non-beneficiaries has been presented in Table 6.22. It is evident from the table that majority of beneficiaries as well as non-beneficiaries belong to general category. Respondents from Scheduled caste contributed to about 24% of total sample.

Table 6.22: Social Profile of Sample Beneficiaries

	Beneficiary								Non-Beneficiary					
	Head		Middle		Tail		Total		Command		Non-command		Total	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%
General	13	43.3	55	78.6	37	61.7	105	65.5	19	59.4	20	50.0	39	54.2
Other Backward Class (OBC)	4	13.3	4	5.7	2	3.3	10	6.3	5	15.6	4	10.0	9	12.4
Scheduled Caste (SC)	8	26.7	10	14.3	21	35.0	39	24.4	8	25.0	13	32.5	21	29.2
Scheduled Tribe (ST)	5	16.7	1	1.4	0	0.0	6	3.8	0	0.0	3	7.5	3	4.2
Total	30	100	70	100	60	100	160	100	32	100	40	100	72	100

3. Land Holding Pattern

The land holding pattern of sample beneficiaries and non-beneficiaries are presented in Table 6.23. The sample consists of mostly small farmers (on an average having close to 2.5 acres of agricultural land) under both beneficiaries and non-beneficiaries categories. About 80% of the area is under irrigation for the beneficiary farmers, which is significantly higher than the percentage of area under irrigation for non-beneficiaries in the command area itself (56.3%). This indicates that the benefit of the Pratap Canal Project for the families belonging to beneficiary groups. Non-beneficiaries farmers from non-command area have about 45% of their land under irrigation.

Table 6.23: Land Holding Pattern of Sample

Description	Beneficiary				Non-beneficiary		
	Head	Middle	Tail	Total	Command	Non-command	Total
1. Average Size of Land (acre)	2.34	3.33	3.23	2.34	3.62	2.26	2.87
2. Average size of Irrigated Land (acer)	1.89	2.04	2.30	1.89	1.85	1.20	1.49
3. Percentage irrigated area	80.66	83.25	81.05	80.66	56.3	45.4	50.4

4. Economic Status of Sample

The profile of the sample in terms of various economic indicators is presented in Table 6.24. About 60% of the sample farmers have pucca houses under both beneficiaries and non-beneficiaries categories. Use of owned hand-pump for drinking water is about 57% for beneficiaries and merely about 19% and 13% for non-beneficiaries in the command area and non-command area respectively. About 64% of beneficiaries and 81% non-beneficiaries do not have latrine in their houses. Electricity is used as a source of light in majority of beneficiary households (77%) but a large proportion of non-beneficiary households are using other sources of lighting in their houses. About 70% households use fire-wood for cooking purpose. Based on the various economic indicators, it appears that most of the respondents belong to middle income class.

Table 6.24: Economic Status of Sample Beneficiaries

	Beneficiary								Non-Beneficiary					
	Head		Middle		Tail		Total		Command		Non-command		Total	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Type of House														
Pucca	17	58.6	49	70.0	30	50.0	96	60.4	21	65.6	22	55.0	43	59.7
Kaccha	10	34.5	9	12.9	15	25.0	34	21.4	9	28.1	12	30.0	21	29.2
Semi-Pucca	2	6.9	12	17.1	15	25.0	29	18.2	2	6.3	6	15.0	8	11.1
Total	29	100	70	100	60	100	159	100	32	100	40	100	72	100
Source of Drinking Water														
Tap water	7	24.1	11	15.7	10	16.7	28	17.6	12	37.5	18	46.2	30	42.3
Owned hand-pump	10	34.5	42	60.0	39	65.0	91	57.2	6	18.8	5	12.8	11	15.5

Contd ...

Table 6.24: Economic Status of Sample Beneficiaries (Contd...)

	Beneficiary								Non-Beneficiary					
	Head		Middle		Tail		Total		Command		Non-command		Total	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Community hand-pump	12	41.4	13	18.6	10	16.7	35	22.0	9	28.1	11	28.2	20	28.2
Wells	0	0.0	1	1.4	1	1.6	2	1.3	4	12.5	0	0.0	4	5.5
Others	0	0.0	3	4.3	0	0.0	3	1.9	1	3.1	5	12.8	6	8.5
Total	29	100	70	100	60	100	159	100	32	100	39	100	71	100
Latrine Room in Home														
Yes	8	27.6	33	47.1	16	26.7	57	35.8	8	25.0	6	15.0	14	19.4
No	21	72.4	37	52.9	44	73.3	102	64.2	24	75.0	34	85.0	58	80.6
Total	29	100	70	100	60	100	159	100	32	100	40	100	72	100
Source of Lighting in House														
Kerosene	1	3.4	2	2.9	0	0.0	3	1.9	0	0.0	1	2.5	1	1.4
Electricity	18	62.1	54	77.1	50	83.3	122	76.7	26	83.9	0	0.0	26	36.6
Other	10	34.5	14	20.0	10	16.7	34	21.4	5	16.1	39	97.5	44	62.0
Total	29	100	70	100	60	100	159	100	31	100	40	100	71	100
Type of Cooking Fuel														
Fire wood	21	72.4	41	58.6	42	70.0	104	65.4	22	68.7	31	77.5	53	73.6
LPG	8	27.6	29	41.4	18	30.0	55	34.6	10	31.3	9	22.5	19	26.4
Total	29	100	70	100	60	100	159	100	32	100	40	100	72	100

5. Cropping Pattern and Cropping Intensity

Wheat and Paddy are the two important crops for beneficiaries as well as non-beneficiaries farmers (Table 6.25). The percentage of area under less water intensive crops like maize and urad are significantly higher for non-beneficiary respondents. This indicates that the beneficiaries have shifted away from less water intensive crops to more water intensive crops due to availability of irrigation water.

The cropping intensities for beneficiaries and non-beneficiaries farmers have been reported in Table 6.26. The cropping intensity for beneficiaries in the command area is much higher compared to the same for non-beneficiaries in the command area. This indicates that the project has really helped farmers in increasing the number of crops in the command area due to easy availability of irrigation water.

Table 6.25: Cropping Pattern of Sample Farmers

(Percent area)

Crop	Beneficiary				Non-Beneficiary		
	Head	Middle	Tail	Total	Command	Non-command	Total
Wheat	46.4	50.5	43.5	47.1	54.7	69.2	61.3
Paddy	43.5	47.3	49.1	47.4	35.6	3.1	20.8
Gram	0.0	0.0	0.0	0.0	-	0.2	0.1
Maize	0.0	0.1	0.5	0.2		10.2	4.6
Mustard	0.0	0.0	0.7	0.3		1.3	0.6
Moong	0.0	0.0	0.5	0.2		1.5	0.7
Urad	0.0	0.4	3.5	1.6	5.6	10.0	7.6
Masoor	0.2	0.6	0.5	0.5	3.7	3.3	3.5
Bajra/Jowar	8.7	0.7	1.3	2.2	0.3	-	0.2

Table 6.26: Cropping Intensity

Description	Beneficiary				Non-Beneficiary		
	Head	Middle	Tail	Total	Command	Non-command	Total
Net Cropped Area (acre)	70.3	232.9	193.6	496.8	115.9	90.5	206.4
Gross Cropped Area (acre)	116.2	342.7	324.1	783.0	118.9	155.7	274.6
Cropping Intensity (%)	165.3	147.2	167.4	157.6	102.6	172.1	133.1

6. Total Income of the Sample Household

The average income of majority of farmers in both beneficiary and non-beneficiary categories is between Rs. 25,000 to Rs. 1 Lac (Table 6.27). Apart from this 20-25% farmers also belong to the income group of Rs. 1 Lac to Rs. 2 Lac, indicating that farmers in this region are reasonably well on economic terms. About 14% of the beneficiaries also belong to the highest income group of more than Rs. 2 Lac, which is significantly higher than the same for non-beneficiaries (5.6 %). This shows that the project has really helped in increasing the income level of beneficiaries in the command area.

Table 6.27: Total Income of the Household

Income	Beneficiary								Non-Beneficiary					
	Head		Middle		Tail		Total		Command		Non-command		Total	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Below Rs. 10000	0	0.0	1	1.4	0	0.0	1	0.6	0	0.0	0	0.0	0	0.0
Rs. 10,000 to Rs. 25,000	2	6.7	2	2.9	2	3.3	6	3.8	4	12.5	0	0.0	4	5.5
Rs. 25,000 to Rs. 50,000	16	53.4	19	27.1	21	35.0	56	35.0	12	37.5	15	37.5	27	37.5
Rs. 50,000 to Rs. 1,00,000	7	23.3	15	21.4	23	38.4	45	28.1	9	28.1	10	25.0	19	26.4
Rs. 1,00,000 to Rs. 2,00,000	1	3.3	23	32.9	6	10.0	30	18.7	5	15.6	13	32.5	18	25.0
Rs.2,00,000 and above	4	13.3	10	14.3	8	13.3	22	13.8	2	6.3	2	5.0	4	5.6
Total	30	100	70	100	60	100	160	100	32	100	40	100	72	100

7. Status of Migration

The data related to status of migration for beneficiary and non-beneficiary households are presented in Table 6.28. Since the area under the project is economically well, very few people responded that they migrate to other places. The percentage of respondents reporting at least one person of migration is even less (5.7%) for beneficiaries compared

to non-beneficiaries in command area (9.4%). Among beneficiaries, it is mostly taking place in the middle and tail end of the command area and that too for one season (rabi) only. No migration was reported in the head-end of the command area. In most of the cases, only one person has migrated from households. Most of the respondents quoted employment seeking as the main reason for migration.

Table 6.28: Status of Migration

	Beneficiary								Non-beneficiary					
	Total		Head		Middle		Tail		Command		Non-command		Total	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%
% of households reported at least one person of migration		5.6		0.0		5.7		8.3		9.4				
No. of Person Migrated from a Household														
One person	6	66.7			2	50.0	4	80.0	3	100.0			3	100.0
2-3 person	3	33.3			2	50.0	1	20.0		0.0				0.0
>3 person		0.0				0.0		0.0		0.0				0.0
Total	9	100.0			4	100.0	5	100.0	3	100.0			3	100.0
No. of Times Migrated by a Person (in a year)														
One crop season	3	37.5			0	0.0	3	60.0	3	100.0			3	100.0
Two crop seasons		0.0				0.0		0.0		0.0				0.0
Three or more crop seasons	5	62.5			3	100.0	2	40.0		0.0				0.0
Total	8	100.0			3	100.0	5	100.0	3	100.0			3	100.0
Reason of Migration														
Employment	7	77.8			3	75.0	4	80.0	1	33.3			1	33.3
Others	2	22.2			1	25.0	1	20.0	2	66.7			2	66.7
Total	9	100			4	100.0	5	100.0	3	100.0			3	100.0
Migration Season														
Rabi	4	57.1			1	50.0	3	60.0	2	100.0			2	100.0
Kharif		0.0				0.0		0.0		0.0				0.0
Zaid	1	14.3			1	50.0	0	0.0		0.0				0.0
All	2	28.6			0	0.0	2	40.0		0.0				0.0
Total	7	100.0			2	100.0	5	100.0	2	100.0			2	100.0
Duration of Migration by a Person (in a year)														
<120 days	3	33.3			2	50.0	1	20.0		0.0				0.0
120-240 days	2	22.2			1	25.0	1	20.0		0.0				0.0
>240 days	4	44.5			1	25.0	3	60.0	3	100.0			3	100.0
Total	9	100.0			4	100.0	5	100.0	3	100.0			3	100.0

8. Quality of Assets Created under AIBP

The response of the sample farmers on various parameters related to quality of assets created under AIBP has been tabulated in Table 7.29. About 70% of the overall beneficiaries reported the proper maintenance of water outlets as well as distribution channels in the village. About 68% respondents agreed about the presence of cemented water outlets in the village and about 78% agreed about the presence of lined water distribution channels in the village. More than 60% of respondents did not have any complain regarding maintenance of the outlets and water distribution channels during the last one year.

However, the response is not uniform across farmers located at different ends of the canal. Farmers at the tail end of the canal are significantly less satisfied (compare to respondents in the head and middle end of command area) regarding the maintenance of water outlets and distribution channels in the village as about 40% of them do not agree that there is proper maintenance of water outlets and distribution channels in the village. More percentage of people in the tail end (about 50%) have also complained regarding maintenance of water outlets and distribution channels compared to respondents in head and middle end of the command area.

More than 68% of all respondents agree about the existence of cemented water outlets and more than 78% agree about the existence of lined water distribution channels in the village.

Table 6.29: Quality of Assets Created under AIBP

(Percentage of respondents)

Description		Head	Middle	Tail	Total	Chi-Square	Sig.
Proper maintenance of water outlets	Yes	67.9	82.6	59.3	71.2	8.583	0.014
	No	32.1	17.4	40.7	28.8		
	Total	100.0	100.0	100.0	100.0		
Proper maintenance of distribution channels in the village	Yes	67.9	81.4	63.3	72.2	5.577	0.062
	No	32.1	18.6	36.7	27.8		
	Total	100.0	100.0	100.0	100.0		
Cemented water outlets in the village	Yes	57.1	77.1	63.3	68.4		
	No	42.9	22.9	36.7	31.6		
	Total	100.0	100.0	100.0	100.0		
Lined water distribution channels in the village	Yes	53.8	90.0	75.0	78.2	15.126	0.001
	No	46.2	10.0	25.0	21.8		
	Total	100.0	100.0	100.0	100.0		
Complains for maintenance of water outlets in last one year	Yes	32.1	30.0	51.7	38.6	6.999	0.030
	No	67.9	70.0	48.3	61.4		
	Total	100.0	100.0	100.0	100.0		
Complains for maintenance of water distribution channels in last one year	Yes	29.6	21.4	48.3	33.1	10.737	0.005
	No	70.4	78.6	51.7	66.9		
	Total	100.0	100.0	100.0	100.0		

The farmers' response regarding condition of water distribution structure was also taken on a 5-point scale with 1-indicating very good and 5-indicating very poor, which is shown in Table 6.30. A consistent score of less than 3 was observed for all categories of respondents for all items, indicates a good condition of water distribution infrastructure in the project.

Table 6.30: Condition of Water Distribution Structure

	Head	Middle	Tail	Total
Condition of water outlets in the village	2.6	2.7	2.1	2.6
Condition of water distribution channels in the village	2.4	2.4	2.3	2.4
Condition of canal infrastructure in the village	2.8	2.7	2.6	2.8

Note: 1 indicates very good and 5 indicates very poor.

9. Overall Impact Assessment of AIBP

The overall impact of AIBP scheme on agricultural and socio-economic development of farmers has been captured through their response on a 5-point scale (Table 7.31). A value of these parameters less than 3 indicates the respondents' agreement on those dimensions. On agricultural development related parameters, majority of the respondents agreed that there has been an increase in irrigated area, total agricultural production, annual income and crop rotation. They also agree that the cost of production has somewhat declined due to the project. On socio-economic development parameters, respondents do not strongly agree that there have been several direct and indirect benefits due the project as the average value of responses are more than 3 in all the cases.0020

Table 6.31: Overall Impact Assessment of AIBP

	Total	Head	Middle	Tail	F	Sig.
Socio-economic Development						
Increase in literacy rate	3.23	3.27	3.26	3.17	0.241	0.786
Increase in non-farm activities	3.22	3.20	3.16	3.31	0.409	0.665
Increase in healthcare services	3.57	3.57	3.47	3.69	1.163	0.315
Decrease in diseases outbreak	3.36	3.34	3.29	3.45	0.636	0.531
Increase in forestation/number of trees	3.12	2.97	3.01	3.32	1.601	0.205
Increase in employment opportunities	3.39	3.30	3.44	3.38	0.250	0.779
Increase in the visits of government officials	3.29	3.00	3.16	3.58	4.551	0.012
Increase in credit availability	3.54	3.57	3.57	3.48	0.157	0.855
Decrease in pollution	3.18	3.13	3.11	3.28	0.469	0.627
Increase in value of land	3.24	3.43	3.16	3.23	0.613	0.543
Decrease in migration to cities	3.38	3.60	3.34	3.31	0.845	0.432
Agricultural Development						
Increase in irrigated area	2.28	1.90	2.24	2.52	4.116	0.018
Increase in total production	2.45	2.10	2.37	2.72	4.590	0.012
Decline in cost of production	2.88	3.17	2.64	3.00	5.267	0.006
Increase in annual income	2.63	2.33	2.40	3.05	9.207	0.000
Ease in availability of agricultural equipments	3.13	3.07	2.96	3.37	3.535	0.032
Ease in agriculture activities	3.14	2.93	2.97	3.45	4.585	0.012
Increase in crop rotation	2.88	3.20	2.93	2.70	1.788	0.174
Decrease in land erosion	3.03	2.87	2.97	3.17	1.285	0.279
Increase in the quality of agricultural produce	3.25	2.93	3.24	3.42	2.395	0.094

Note: 1 indicates strongly agree and 5 indicates strongly disagree.

10. Process of Implementation of Project

The overall response of the sample beneficiaries on implementation process of the project has been summarized in Table 6.32. About 81% of beneficiary farmers agreed about the existence of a proper system for water distribution. About 75% respondents expressed their opinion that the system ensures the equitable distribution of water in villages and 84% also agreed that there is no influence of group on water distribution. About 44 percent beneficiaries agreed about the availability of necessary support from irrigation department on their complaints and requests. A large proportion of respondents (above 72%) expressed the view that they get information about water in canal only when it actually starts flowing. However, only about 20 percent respondents visit to irrigation department to acquire information about water release. About 60 percent of respondents in the head and middle end of the command area agreed about the timely payment of irrigation charges but it is quite low (about 36%) in tail end of the command area. About 40% of all respondents (irrespective to their location in the command area) showed their willingness to pay an extra charge for assured water supply.

Table 6.32: Beneficiary's Response on Process of Project Management

	Tail		Head		Middle		Total	
	N	%	N	%	N	%	N	%
Existence of a proper system for water distribution	45	75.0	26	83.9	59	85.5	130	81.2
Equitable distribution of water	40	66.7	27	90.0	53	75.7	120	75.0
Agreement on no group influence on water distribution	46	78.0	30	100	58	82.9	134	84.3
Support from irrigation department on complain and requests	25	41.7	15	50.0	31	43.7	71	44.1
Information on water in canal only when it starts flowing	49	81.7	14	48.3	52	74.3	115	72.3
Beneficiary visiting irrigation department to acquire information about water release	8	13.3	13	44.8	11	15.7	32	20.1
Timely payment of irrigation charges	19	35.8	18	60.0	38	58.5	75	50.7
Willingness to pay extra charges for assured water supply	25	44.6	12	41.4	25	39.1	62	41.6

Chapter 7

Evaluation of Accelerated Irrigation Benefit Program (AIBP) in Rajasthan

Section 1: State Level Overview

Under AIBP assistance has been given to ten irrigation projects in Rajasthan, out of which five are major and 5 are medium irrigation projects (Table 7.1). The five major irrigation projects are Mahi Bajaj Sagar, Narmada Canal, Gang Canal Modification, Bisalpur and I.G.N.P Stage-II. The five medium irrigation projects are Panchana, Chhapi, Chauhi, Jaismand and Gambhiri. Out of these projects seven (two major and five medium) have already been completed. Jaismand and Gambhiri were completed in 2004-05 and Mahi, Chauhi were completed in 2006-07. Bisalpur project was excluded from AIBP during 2000-01 and included for NABARD loan assistance.

Table 7.1: Project Sanctioned under AIBP from 1996 in Rajasthan

Sl.No.	Category	Completed	Ongoing
1.	Major	2	3
2.	Medium	5	-
3.	Extension, Renovation and Modernization (ERM)	-	-
4.	Minor Irrigation	-	-
	Total	7	3

The projects under AIBP have resulted in increase in area under irrigation potential in the state. The irrigation potential created under AIBP for the last seven years are shown in Table 7.2. Maximum irrigation potential created in the state are under AIBP are though major irrigation projects only.

Table 7.2: Irrigation Potential Created under AIBP Scheme in Rajasthan

(Thousand ha)

Project	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09
Major	30.67	47.88	52.87	81.16	46.99	62.47	50.55
Medium	4.84	1.30	5.14	4.73	1.23	-	-
Total	35.51	49.18	58.01	85.89	48.22	62.47	50.55

Irrigation potential created in Rajasthan other than AIBP is presented in Table 7.3. In recent years, the irrigation potential created under AIBP is much higher than the irrigation potential created in the state through non-AIBP schemes. There is hardly any water users association in the command area of the AIBP projects in Rajasthan.

Table 7.3: Irrigation Potential Created in State other than AIBP

(Thousand ha)

Project	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09
Major	46.10	19.05	49.22	67.00	32.85	10.65	10.46
Medium	-	1.00	3.32	-	0.95	9.46	-
Minor Irrigation	3.26	1.77	7.54	11.69	8.79	11.01	5.87
Total	49.36	21.82	60.08	78.69	42.59	31.12	16.33

The amount of budget under AIBP in Rajasthan since 2002-03 and actual expenditure are given in Table 7.4.

Table 7.4: Budget under AIBP since 2002-03

(Rs. Crore)

Project	Source	Received	Expenditure
1. Major	Central	1402.684	-
	State	-	2078.86
2. Medium	Central	69.603	-
	State	-	109.44
Total	Central	1472.287	-
	State	-	2188.30

Section 2: Jaismand Dam Project

Jaismand dam is situated at Sarada tehsil, Udaipur district of Rajasthan. It was constructed in the year 1711-1730 mainly for recreation and wild life preservation purpose. Canal system was developed during the period from 1954-55 to 1960-61 to make proper use of Jaismand lake water for socio-economic development of the area. About 6,047 ha of area got benefited from irrigation facilities in this area. Though the canal system was developed, the canals were not lined resulting in wastage of lots of water by seepage. The modernization scheme was envisaged mainly for lining the existing canal to reduce transmission losses and to increase the irrigation efficiency, which got approved by C.W.C during the year 1992.

According to the project proposal following were the main objectives under AIBP scheme:

- Raising the height of the dam by 5.74 m.
- Lining of the left and right main canals entirely for 51.09 km and 22.36 km respectively.
- Construction of 39 NO. of addition structure such as Cross Regulator, Head Regulator & fall etc.
- Lining of entire exiting distribution system and construction of water courses and field channels up to 5-8 ha. block with a provision of lining in selected reaches up to 50 % of their length.

The total catchment area of the dam is 1813 sq km, out of which 1654 sq km is free catchment for the project. Under modernization of this project, Rs 1566.07 lacs have been spent for lining the left main canal, right main canal and some parts of the distribution system. The modernization project started under AIBP scheme in 1996-1997 and got completed in 2000-01. A total of 124 villages have been covered under this project and it contains 58 minors and 2 distributaries. Some of the salient features of the Jaismand Dam Project are given in Table 7.5.

Table 7.5: Salient Features of Jaismand Project

<p>Hydrology:</p> <ol style="list-style-type: none"> 1. Name of river: Gomati 2. Gross catchment area: 1813 sq.km 3. Catchment area intercepted: 159 sq.km 4. Free catchment area: 1654 sq.km 5. 75% dependable monsoon rainfall: 556 mm 6. Maximum probable flood: 18876
<p>Utilization:</p> <ol style="list-style-type: none"> 1. Irrigation: <ul style="list-style-type: none"> G.C.A: 37282 ha. C.C.A: 16000 ha. Annual Irrigation: 14400 ha. 2. Storage planning: <ul style="list-style-type: none"> Gross storage: 414.60 mcum Live storage: 296.14 mcum Dead storage: 118.46 mcum
<p>Dam:</p> <p>Type of dam: Composite section consisting of two massive masonry walls on upstream and downstream faces with earth filling in between.</p> <p>Length of dam: 335.4 m Width of the dam: 94.00 m</p>
<p>Canal:</p> <ol style="list-style-type: none"> 1. Type of canal: lined 2. Length of left main canal: 51.09 km 3. Length of right main canal: 22.86 km 4. Discharge at head of left canal: 5.01 cumecs 5. Discharge at the head of right canal: 0.78 cumecs

Potential Designed and Created

Table 7.6 presents the potential designed and created irrigation area in rabi and kharif seasons. However, the full irrigation potential is not being currently being utilized due to various reasons.

Table 7.6: Potential Irrigated Area during Design and Completion Stage

Season	Potential Irrigated Area(ha.)		
	Design Stage	At completion	Present
Kharif	9600	9600	9600
Rabi	4800	4800	4800
Other	1600	1600	1600
Total	16000	16000	16000

Received and Expenditure of Fund Received under AIBP

Year wise funds demanded for the project under AIBP are listed in Table 7.7. The table also includes the actual budget approved for the project for different years. There has been some mismatch between the budgets demanded and budget actually approved for the project during the different years. Actual expenditure in the project during the various years is presented in Table 7.8.

Table 7.7: Demanded and Approved AIBP fund for Jaismand Project
(Rs. Lakh)

Year	Fund Demanded	Fund Approved
1996-97	400	200
1997-98	200	350
1998-99	200	150
1999-2k	250	59
2000-01	250	20
2001-02	200	-
2002-03	586	10

Note: No fund was allotted under this project after 2002-2003

Table 7.8: Amount Expenditure for the Project under AIBP

Year	(Rs. Lakh)		
	Work	Prorata	Total
1996-97	169.34	30.66	200
1997-98	258.17	51.83	310
1998-99	114.87	35.13	150
1999-2k	44.38	14.62	59
2000-01	20	-	20
2001-02	0	-	-
2002-03	10	-	10

Erratic Pattern of Rainfall

The rainfall in Udaipur region is always inadequate. Due to this the water storage capacity of the project is not fully utilized. Against the expected average rainfall of 556 mm, the actual amount of rain is quite low in many years as shown in Table 7.9, which presents the monthly average rainfall during 2002-2009 in the catchment area of the project.

Table 7.9: Monthly Average Rainfall (in mm) in the Catchment Area

Month/ Year	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09
January	Nil	Nil	Nil	Nil	Nil	Nil	Nil
February	Nil	Nil	Nil	Nil	Nil	Nil	Nil
March	Nil	Nil	Nil	Nil	Nil	Nil	Nil
April	Nil	Nil	Nil	Nil	Nil	Nil	Nil
May	Nil	Nil	Nil	Nil	Nil	Nil	Nil
June	59	76	82	75	73	20	20
July	15	114	163	240	342	375	538
August	192	90	455	145	657	360	277
September	101	80	15	185	105	63	90
October	Nil	Nil	Nil	Nil	Nil	Nil	Nil
November	Nil	Nil	Nil	Nil	Nil	Nil	Nil
December	Nil	Nil	Nil	Nil	Nil	Nil	Nil

Although the storage capacity of the Jaismand project is 14650 (mcft), it has never been filled up to its maximum capacity. Table 7.10 shows the actual storage of water in the dam during the last 7 years.

Table 7.10: Storage Capacity of the Reservoir

(Million cubic feet)

Year	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09
Maximum capacity	14650	14650	14650	14650	14650	14650	14650
Actual capacity	Below sill	898.04	2639	10789	14650	10367.12	5861

Less water availability in the reservoir reduces the water discharge rate in the left and right main canals. The number of days for which the canal was under operation also comes down due to lack of water in the reservoir. It can be seen from the Table 7.11 that canal could not be operated in several months because of lack of water in the reservoir especially during 2002-2004. Although the number of days of operation of canal has increased during 2005-2007, it was somewhat less in 2008.

Table 7.11: Number of Days of Operation of the Canal

Month/ Year	2002	2003	2004	2005	2006	2007	2008
January	**	**	**	59	44	59	22
February	**	**	**	46	53	53	20
March	**	**	**	14	12	31	22
April	**	**	**	**	37	30	16
May	**	**	**	**	25	20	16
June	-	-	-	-	-	-	-
July	-	-	-	-	-	-	-
August	-	-	-	-	-	-	-
September	-	-	-	-	-	-	-
October	-	-	-	-	-	-	-
November	**	**	**	25	40	50	**
December	**	**	**	15	56	50	18

** Canal could not be operated due to lack of water in the lake.

- Canal is not proposed to operate in these months.

Seepage Loss from Unlined Canal

The total length of the two canal system under the project is about 73.45 km of which 69.45 km lined. The total length of distributaries canals/drainage is 33 km of which only 33 km is lined. Table 7.12 presents the summary of lengths of main canal, distributaries and minors and their lengths that have already been lined. It can be seen that a large portion of minors and sub-minors are un-lined, which increases the loss of water through seepage.

Table 7.12: Length of Different Canals and their Lining Status

Sl.	Parameters	Design Stage	At Completion	Present
1 (a)	Length of Main Canal (km)	73.45	73.45	73.45
1 (b)	Of which lined (km)	73.45	69.45	69.45
2 (a)	Length of Branch Canal (km)	-	-	-
2 (b)	Of which lined (km)	-	-	-
3 (a)	Length of Distributaries (km)	33	33	33
3 (b)	Of which lined (km)	33	33	33
4 (a)	Length of Minors (km)	228.34	228.34	228.34
4 (b)	Of which lined (km)	228.34	104.37	104.37
5 (a)	Length of Sub-Minors (km)	27.6	27.6	27.6
5 (b)	Of which lined (km)	27.6	11.42	11.42

Non-availability of Sufficient Number of Staffs

Table 7.13 presents the number of sanctioned staff positions under the project and number of people actually working currently. Against a total 144 sanctioned staff positions, only 118 people are actually working in project.

Table 7.13: Sanctioned Positions and Current Number of Staffs

Designation	Sanctioned	Presently working
Chief Engineer	1	1
Superintendent Eng.	1	1
Executive Eng.	1	1
Assistant Eng.	2	2
Junior Eng.	4	4
Beldar	78	65
Gateman	32	18
Mistry/Labour	6	6
Cashier	3	3
Helper	5	4
Pump driver	2	2
Sweeper	1	1
Driver	3	1
Compressor driver	-	3
Met	8	6
Total	147	118

Change in Cropping Pattern in the Command Area

The irrigation potential of a project is arrived after assuming an expected cropping pattern for the command area for different crop seasons. However, the availability of water has resulted in change in the cropping pattern of the command area. The mismatch between the area under different crops during kharif and rabi seasons during the design stage and at the time of completion of the project is presented in Table 7.14.

Table 7.14: Cropping Pattern during Design and Completion Stage

Name of the Crop	Season	Area proposed at the project design stage (hectare)	Area at the time of completion of the project (hectare)
Maize	Kharif	4800	2994
Soyabean	Kharif	800	500
Wheat	Rabi	4800	2000
Barley	Rabi	640	300
Gram	Rabi	960	1675
Mustard	Rabi	1440	1675

Some Field Based Observations:

During the study following observation were noticed:

- Canal infrastructure is relatively in a good condition but some wear and tear were observed especially at the tail end of the canal.
- There is acute shortage of water for irrigation in RMC command area as water is released at a gauge of 9.5 m for RMC while LMC gets sufficient water at a gauge of 0 m.
- Maize (kharif) , wheat(rabi), Moong(zaid) etc. are the major crops although their productivity has been quite low for last few years because of shortage of water.
- Farmers reported visits by people from irrigation department who often hold meetings with farmers to inform them about when the time of water release through the canal and other agriculture related information.
- Many farmers are deprived of irrigation facilities because of unlevelled land.
- Due to shortage of water for agriculture migration is very high as people are moving out frequently in search of employment.
- Irrigation charges vary from Rs 25 to Rs 40 per acre for different crops.
- Farmers are not communicated properly about the collection process, and they often complain about discrepancies in bill collection.

Suggestions for Implementation of AIBP Scheme

Jaismand Project is entirely dependent on jaismand lake which is primarily dependent on rainfall for water. But rainfall is quite low in that region. So connecting the canal system with some alternative source of water like Tedi river may improve the irrigation system, as sufficient water could be made available particularly for RMC which at present is facing acute shortage of water due to low rainfall as well as high water gauge.

Section 3: Impact of AIBP

1. Distribution of Sample and its Profile

As per the methodology of the study, sample of beneficiaries and non-beneficiaries was taken both from command and non-command area of the project. The distribution of the sample across the head, middle and tail location of the canal has been presented in Table 7.15. A total of 160 beneficiaries were selected from 16 villages in the command area of the project. A total of 65 non-beneficiaries were also interviewed both from command and non-command area of the project.

Table 7.15: Distribution of Sample Beneficiary & Non-Beneficiary

Location in the Canal	No. of villages	Number of Beneficiaries/ Non-Beneficiary
Beneficiary		
Head	3	30
Middle	9	90
Tail	4	40
Total	16	160
Non-Beneficiary		
Command	14	25
Non-command	4	40
Total	18	65

2. Social Profile of Sample

Caste wise distribution of sample beneficiaries and non-beneficiaries has been presented in Table 7.16. It is evident from the Table that majority of beneficiaries as well as non-beneficiaries belonged to Scheduled Tribes. People from OBC contributed to about 36.9% of total sample.

Table 7.16: Social Profile of Sample Beneficiaries

Caste	Beneficiary								Non-Beneficiary							
	Tail		Head		Middle		Total		Command		Non-command		Total			
	N	%	N	%	N	%	N	%	N	%	N	%	N	%		
General	5	12.5	2	6.7	3	3.3	10	6.3	10	40.0	1	2.5	11	16.9		
Other Backward Classes (OBC)	10	25.0	17	56.7	32	35.5	59	36.8	1	4.0	4	10.0	5	7.7		
Scheduled Caste(SC)	2	5.0	4	13.3	5	5.6	11	6.9	2	8.0	4	10.0	6	9.2		
Scheduled Tribe (ST)	23	57.5	7	23.3	50	55.6	80	50.0	12	48.0	31	77.5	43	66.2		
Total	40	100	30	100	90	100	160	100	25	100	40	100	65	100		

3. Land Holding Pattern and Irrigation Status

The land holding pattern of sample beneficiaries and non-beneficiaries are presented in Table 7.17. The sample consists of mostly small farmers (less than 2.5 acres of agricultural land) under both the beneficiaries and non-beneficiaries categories. On an average about 93% area is under irrigation for the beneficiary farmers, which is significantly higher than the percentage of area under irrigation for non-beneficiary farmers in the command area itself (73.4%). This clearly shows the benefit of the Jaismand Project for the families belonging to beneficiary group. Non-beneficiaries farmers from non-command area have about 87.2% of their total land under irrigation.

Table 7.17: Land Holding Pattern of Sample Beneficiary & Non-Beneficiary

Description	Beneficiary				Non-Beneficiary		
	Head	Middle	Tail	Total	Command	Non-command	Total
1. Average Size of Agricultural Land (acre)	2.43	2.15	2.23	2.43	2.07	2.44	2.30
2. Average size of Irrigated Land (acre)	2.08	2.15	1.74	2.04	1.30	1.99	1.73
3. Percentage irrigated area	92.89	98.16	97.57	92.89	73.4	87.2	81.9

4. Economic Status of Sample

The profile of the sample in terms of various economic indicators is presented in Table 7.18. About 17% of the beneficiary sample farmers have pucca houses but none of the non-beneficiary sample farmers in command area have pucca houses. Majority of respondents use community hand-pump for drinking water. More than 95% of beneficiaries and non-beneficiaries do not have latrine in their houses. Most of the farmer households use kerosene and other non-electric sources for lighting their home. Electricity is source of lighting in house for about 20% beneficiaries households. More than 97% households use fire-wood for cooking purpose. Based on the five economic indicators listed in the table, it appears that most of the respondents belong to lower income class.

Table 7.18: Economic Status of Sample Beneficiaries

	Beneficiary								Non-Beneficiary					
	Head		Middle		Tail		Total		Command		Non-command		Total	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Type of House														
Pucca	5	16.7	11	12.2	5	12.5	21	13.1	0	0.0	3	7.5	3	4.6
Kaccha	22	73.3	66	73.4	30	75.0	118	73.8	16	64.0	31	77.5	47	72.3
Semi-Pucca	3	10.0	13	14.4	5	12.5	21	13.1	9	36.0	6	15.0	15	23.1
Total	30	100	90	100	40	100	160	100	25	100	40	100	65	100
Source of Drinking Water														
Tap water	1	3.3	4	4.4	1	2.5	6	3.7	0	0.0	3	7.5	3	4.6
Owned hand-pump	0	0.0	2	2.2	2	5.0	4	2.5	1	4.0	4	10.0	5	7.7

Contd. ...

Table 7.18: Economic Status of Sample Beneficiaries (Contd...)

	Beneficiary								Non-Beneficiary					
	Head		Middle		Tail		Total		Command		Non-command		Total	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Community hand-pump	24	80.0	77	85.6	34	85.0	135	84.4	24	96.0	29	72.5	53	81.5
Wells	5	16.7	7	7.8	3	7.5	15	9.4	0	0.0	4	10.0	4	6.2
Others														
Total	30	100	90	100	40	100	160	100	25	100	40	100	65	100
Latrine in House														
Yes	3	10.0	1	1.1	1	2.5	5	3.1	0	0.0	3	7.5	3	4.6
No	27	90.0	89	98.9	39	97.5	155	96.9	25	100.0	37	92.5	62	95.4
Total	30	100	90	100	40	100	160	100	25	100	40	100	65	100
Source of Lighting in House														
No lighting	7	23.3	18	20.0	4	10.0	29	18.1	0	0.0	3	7.5	3	4.6
Kerosene	10	33.3	38	42.2	23	57.5	71	44.4	12	48.0	26	65.0	38	58.5
Electricity	0	0.0	25	27.8	8	20.0	33	20.6	0	0.0	2	5.0	2	3.1
Other	13	43.4	9	10.0	5	12.5	27	16.9	13	52.0	9	22.5	22	33.8
Total	30	100	90	100	40	100	160	100	25	100	40	100	65	100
Type of Cooking Fuel														
Fire wood	29	96.7	88	97.8	39	97.5	156	97.5	25	100.0	40	100.0	65	100.0
Cool/ coke	0	0.0	0	0.0	1	2.5	1	0.6						
Bio-gas														
LPG	1	3.3	2	2.2	0	0.0	3	1.9						
Total	30	100	90	100	40	100	160	100	25	100	40	100	65	100

5. Cropping Pattern & Cropping Intensity

Wheat and Maize are the two important crops for beneficiaries as well as non-beneficiaries farmers (Table 7.19). The percentage of area under less water intensive crops like maize and urad are slightly more for non-beneficiary respondents as they have less percentage area under irrigation (as presented in Table 7.17). Thus, the farmers are changing their cropping pattern in response to access to irrigation water.

The cropping intensity for beneficiaries and non-beneficiaries farmers has been reported in Table 7.19. In general, the cropping intensity is quite higher for beneficiaries compared to the same for non-beneficiaries both in command and non-command areas. This shows that the project has really helped farmers in increasing the number of crops in the command area due to availability of water. However, the cropping intensity in head and middle end of the command area is much higher than in tail end, showing that the farmers located at the tail end are not getting enough irrigation water to increase their cropping intensity compared to the upstream end of the project.

Table 7.19: Cropping Pattern of Sample Farmers

(Percent area)

Crop	Beneficiary				Non-Beneficiary		
	Head	Middle	Tail	Total	Command	Non-command	Total
Wheat	30.3	36.3	33.0	34.6	45.0	36.3	38.8
Gram	0.5	1.6	0.0	1.1	3.1	2.5	2.7
Maize	47.9	45.2	56.6	47.9	48.7	55.4	53.5
Moong	1.0	3.0	0.0	2.0			
Urad	0.0	1.3	0.4	0.9		2.9	2.1
Barley	5.5	0.9	2.9	2.1			
Masoor	2.0	2.2	0.0	1.8		2.1	1.5
Beans	11.9	5.3	3.9	6.3			
Tomato	1.0	2.4	2.9	2.2			

Table 7.20: Cropping Intensity

Description	Beneficiary				Non-Beneficiary		
	Head	Middle	Tail	Total	Command	Non-command	Total
Net Cropped Area (acre)	64.5	200.3	78.5	343.3	51.8	97.5	149.3
Gross Cropped Area (acre)	108.8	336.0	104.3	549.1	56.5	129.0	185.5
Cropping Intensity (%)	168.6	167.8	132.8	159.9	109.2	132.3	124.3

6. Total Income of the Sample Household

The average annual income of majority of the farmers in both beneficiary and non-beneficiary categories is between Rs. 25,000 to Rs. 50,000, showing the subsistence nature of agriculture in this area. Only 1.3% beneficiary respondents are able to earn an annual income of more than Rs. 1.0 lac and it was nil for non-beneficiaries in both command and non-command areas.

Table 7.21: Total Income of the Household

Income	Beneficiary								Non-Beneficiary					
	Head		Middle		Tail		Total		Command		Non-command		Total	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Below Rs. 10000	0	0	1	1.1	1	2.5	2	1.3	0	0	0	0	0	0
Rs. 10,000 to Rs. 25,000	10	33.3	37	41.1	17	42.5	64	40.0	2	8.0	10	25.0	12	18.5
Rs. 25,000 to Rs. 50,000	14	46.7	45	50.0	18	45.0	77	48.1	18	72.0	22	55.0	40	61.5
Rs. 50,000 to Rs. 1,00,000	6	20.0	5	5.6	4	10.0	15	9.3	5	20.0	8	20.0	13	20.0
Rs. 1,00,000 to Rs. 2,00,000	0	0.0	2	2.2	0	0.0	2	1.3	0	0.0	0	0.0	0	0.0
Rs.2,00,000 and above	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Total	30	100	90	100	40	100	160	100	25	100	40	100	65	100

7. Status of Migration

The data related to status of migration for beneficiary and non-beneficiary respondents are presented in Table 7.22. Almost all respondents quoted employment seeking as the main reason for migration. The percentage of households reporting at least one person of migration is much less (20.6%) for beneficiaries compared to both non-beneficiaries in command area (24%) and non-beneficiaries in non-command area (30%).

In most of the cases, only one person has migrated from households. However, the percentage of households reporting the migration of more than one person is higher for non-beneficiaries in command and non-command area as well as beneficiaries located at the tail-end of the project.

For most of the respondents the migration takes place for one crop season in a year and the duration is generally less than 120 days. However, the percentage of households reporting migration for two or more than two crop seasons in a year is significantly higher for non-beneficiaries compared to beneficiaries located at head and middle end of the project. Migration is more prominent in zaid season for all categories of households. All the above analysis clearly shows that the project has significantly reduced the migration of people from villages especially at the head and middle end of the project.

Table 7.22: Status of Migration

	Beneficiary								Non-beneficiary					
	Head		Middle		Tail		Total		Command		Non-command		Total	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%
% of households reported at least one person of migration		23.3		20.0		20.0		20.6		24.0		30.0		27.7
No. of Person Migrated from a Household														
One person	7	100.0	16	88.9	6	75.0	29	87.9	5	83.3	9	75.0	14	77.8
2-3 person		0.0	2	11.1	2	25.0	4	12.1	1	16.7	3	25.0	4	22.2
>3 person		0.0		0.0		0.0		0.0		0.0		0.0		0.0
Total	7	100.0	18	100.0	8	100.0	33	100.0	6	100.0	12	100.0	18	100.0
No. of Times Migrated by a Person (in a year)														
One crop season	5	71.4	12	70.6	5	62.5	22	68.8	3	50.0	8	72.7	11	64.8
Two crop seasons	2	28.6	5	29.4	2	25.0	9	28.1	1	16.7	2	18.2	3	17.6
All crop seasons	0	0.0	0	0.0	1	12.5	1	3.1	2	33.3	1	9.1	3	17.6
Total	7	100.0	17	100.0	8	100.0	32	100.0	6	100.0	11	100.0	17	100.0

Contd ...

Table 7.22: Status of Migration (Contd...)

	Beneficiary								Non-beneficiary					
	Head		Middle		Tail		Total		Command		Non-command		Total	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Reason of Migration														
Employment	7	100.0	18	100.0	8	100.0	33	100.0	6	100.0	12	100.0	18	100.0
Others		0.0		0.0		0.0		0.0		0.0		0.0		0.0
Total	7	100.0	18	100.0	8	100.0	33	100.0	6	100.0	12	100.0	18	100.0
Migration Season														
Rabi	2	28.6	0	0.0	3	42.9	5	16.7	0	0.0	3	27.3	3	18.8
Kharif	0	0.0	2	12.5	0	0.0	2	6.7	1	20.0	3	27.3	4	25.0
Zaid	4	57.1	12	75.0	3	42.8	19	63.3	3	60.0	4	36.3	7	43.7
All	1	14.3	2	12.5	1	14.3	4	13.3	1	20.0	1	9.1	2	12.5
Total	7	100.0	16	100.0	7	100.0	30	100.0	5	100.0	11	100.0	16	100.0
Duration of Migration by a Person (in a year)														
<120 days	7	100.0	12	70.6	4	50.0	23	71.9	6	100.0	10	83.3	16	88.9
120-240 days	0	0.0	3	17.6	2	25.0	5	15.6	0	0.0	2	16.7	2	11.1
>240 days	0	0.0	2	11.8	2	25.0	4	12.5		0.0		0.0		0.0
Total	7	100.0	17	100.0	8	100.0	32	100.0	6	100.0	12	100.0	18	100.0

8. Quality of Assets Created under AIBP

The response of the sample farmers on various parameters related to quality of assets created under AIBP has been tabulated in Table 7.23. About 86% of the overall beneficiaries reported the proper maintenance of water outlets as well as distribution channels in the village. About 84% respondents agreed about the presence of cemented water outlets in the village and about 72% agreed about the presence of lined water distribution channels in the village. More than 90% of respondents did not have any complain regarding maintenance of the outlets and more than 85% also did not have any complain regarding maintenance of the water distribution channels during the last one year.

However, the response is not uniform across farmers located at different ends of the canal. Farmers at the tail end of the canal are somewhat less satisfied regarding the maintenance of water outlets and distribution channels in the village. More than 40% of tail-end respondents also do not agree about the cemented water outlets and lined water distribution channels in the village. On the other hand, respondents at the head-end are more pro-active in complaining regarding maintenance of water outlets and water distribution channels in the village compared to other respondents in middle and tail-end. This may also be one of the reasons about why they are more satisfied about the quality of assets created under AIBP.

Table 7.23: Quality of Assets Created under AIBP*(Percentage of respondents)*

Description		Head	Middle	Tail	Total	Chi-Square	Sig.
Proper maintenance of water outlets	Yes	86.7	96.6	60.0	85.5	29.96	0.000
	No	13.3	3.4	40.0	14.5		
	Total	100.0	100.0	100.0	100.0		
Proper maintenance of distribution channels in the village	Yes	96.7	94.4	57.5	85.5	34.04	0.000
	No	3.3	5.6	42.5	14.5		
	Total	100.0	100.0	100.0	100.0		
Cemented water outlets in the village	Yes	96.6	92.1	57.5	84.2	28.94	0.000
	No	3.4	7.9	42.5	15.8		
	Total	100.0	100.0	100.0	100.0		
Lined water distribution channels in the village	Yes	76.7	77.5	56.4	72.2	6.39	0.041
	No	23.3	22.5	43.6	27.8		
	Total	100.0	100.0	100.0	100.0		
Complains for maintenance of water outlets in last one year	Yes	24.1	8.0	2.5	9.6	9.61	0.008
	No	75.9	92.0	97.5	90.4		
	Total	100.0	100.0	100.0	100.0		
Complains for maintenance of water distribution channels in last one year	Yes	30.0	12.4	7.5	14.5	7.74	0.021
	No	70.0	87.6	92.5	85.5		
	Total	100.0	100.0	100.0	100.0		

The farmers' response regarding condition of water distribution structure was also taken on a 5-point scale with 1-indicating very good and 5-indicating very poor, which is shown in Table 7.24. A consistent score of less than 3 was observed for all categories of respondents for all items, indicating good condition of water distribution infrastructure in the project.

Table 7.24: Condition of Water Distribution Structure

	Head*	Middle	Tail	Total
Condition of water outlets in the village	2.1	2.0	2.7	2.2
Condition of water distribution channels in the village	2.2	2.0	2.9	2.3
Condition of canal infrastructure in the village	2.5	2.3	2.9	2.5

Note: 1 indicates very good and 5 indicates very poor.

9. Overall Impact Assessment of AIBP

The overall impact of AIBP scheme on agricultural and socio-economic development of farmers has been captured through their response on a 5-point scale (Table 7.25). A value of these parameters less than 3 indicates the respondents' agreement on those dimensions. On agricultural development related parameters, majority of the respondents agreed that there has been an increase in irrigated area, total agricultural production, annual income and crop rotation. They also agree that the cost of production has somewhat declined due to the project.

On socio-economic development parameters, respondents agreed that there have been several direct and indirect benefits due the project such as, increase in value of land (due to creation of irrigation facility), increase in the visits of government officials, decrease in migration to cities, increase in literacy rate, decrease in pollution, increase in healthcare services, increase in number of trees in the area, increase in credit availability etc.

Table 7.25: Overall Impact Assessment of AIBP

	Head	Middle	Tail	Total*	F	Sig.
Socio-economic Development						
Increase in literacy rate	2.77	2.84	2.80	2.82	0.103	0.902
Increase in non-farm activities	3.13	3.04	3.20	3.10	0.779	0.461
Increase in healthcare services	2.80	2.93	2.90	2.90	0.392	0.676
Decrease in diseases outbreak	3.03	3.07	3.20	3.09	0.782	0.459
Increase in forestation/ number of trees	3.00	2.99	2.88	2.96	0.417	0.660
Increase in employment opportunities	3.00	3.12	2.90	3.04	1.679	0.190
Increase in the visits of government officials	2.77	2.73	2.73	2.74	0.023	0.977
Increase in credit availability	2.93	2.94	2.83	2.91	0.342	0.711
Decrease in pollution	2.70	2.90	2.78	2.83	1.283	0.280
Increase in value of land	2.27	2.21	2.20	2.22	0.186	0.831
Decrease in migration to cities	3.00	2.78	2.64	2.79	3.395	0.036
Agricultural Development						
Increase in irrigated area	2.07	2.17	2.13	2.14	0.977	0.379
Increase in total production	2.30	2.33	2.25	2.31	0.425	0.655
Decline in cost of production	2.73	2.78	2.78	2.77	0.065	0.937
Increase in annual income	2.63	2.90	2.63	2.78	4.516	0.012
Ease in availability of agricultural equipments	3.13	3.01	2.93	3.01	1.098	0.336
Ease in agriculture activities	3.00	3.12	3.08	3.09	0.413	0.662
Increase in crop rotation	2.73	2.80	2.75	2.78	0.142	0.868
Decrease in land erosion	2.97	3.12	3.15	3.10	0.891	0.412
Increase in the quality of agricultural produce	3.07	3.00	3.00	3.01	0.152	0.859

Note: 1 indicates strongly agree and 5 indicates strongly disagree.

10. Process of Implementation of Project

The overall response of the sample beneficiaries on implementation process of the project has been summarized in Table 7.26. About 42% of beneficiary farmers agreed about the existence of a proper system for water distribution. About 99% respondents also expressed their opinion that the system ensures the equitable distribution of water in villages. A large proportion of farmers at middle and tail end of the canal feel that they can get help from the irrigation department on complain or request. However, respondents on the head end are not very enthusiastic about the support from irrigation department.

More than one third of the farmers (about 37%) have knowledge about time of flow or water in the canal and only very few people (about 13%) go to irrigation department to acquire direct information about water release etc. Most of the farmers especially located at head-end (about 94%) pay irrigation charges on time. However, at tail end only about 72% beneficiaries pay irrigation charges on time, which may be because of less frequent availability of water at that end. About 74% of the beneficiary farmers are willing to pay even an extra charge for assured water supply. It indicates that access to water is more important than the cost of it.

Table 7.26: Percentage of Beneficiaries Agreeing on Different Aspect of Implementation Process

	Head		Middle		Tail		Total	
	N	%	N	%	N	%	N	%
Existence of a proper system for water distribution	14	46.7	38	42.7	13	33.3	65	41.7
Equitable distribution of water	30	100	87	97.8	39	100	156	98.7
Support from irrigation department on complaints and requests	9	26.5	57	60	29	72.5	95	56.2
Beneficiary visiting irrigation department to acquire information about water release	0	0.0	15	16.3	7	16.7	22	13.4
Knowledge about time of water flows in the canal	11	36.7	33	35.9	16	38.1	60	36.6
Timely payment of irrigation charges	15	93.8	33	78.6	13	72.2	61	80.3
Willingness to pay extra charges for assured water supply	21	70	66	77.6	23	69.7	110	74.3

Chapter 8

Evaluation of AIBP in Madhya Pradesh

Section 1: The Ban Sagar Dam

1. Project Profile

Ban Sagar Dam is a multipurpose river valley project on Son River situated in Ganga Basin in Madhya Pradesh, India envisaging both irrigation and hydroelectric power generation. The Bansagar Dam across Sone River has been constructed at village Deolond in Shahdol district on Rewa – Shahdol Road, at a distance of 51.4 km from Rewa. Bansagar Dam is located at Latitude 24-11-30 N and Longitude 81-17-15 E. The project was initially envisaged as "Dimba Project" in 1956 by Central Water Commission, New Delhi to be constructed on Sone River at the confluence of Sone and Banas River near Shikarganj town 30 km down the present site. Later it was shifted to the present site at Deolond. There was an agreement in 1973 between the State Governments of Madhya Pradesh, Uttar Pradesh and Bihar for the construction of the Dam, according to which States had to share the expenditure in the ratio of 2:1:1. The sharing of 4 maf water is also to be done by the states in the same ratio. The construction work was started in year 1978 at original approved cost of Rs. 91.31 crores. The latest estimated cost in 1998 was Rs. 1054.96 crores. The Bansagar Dam project, Bansagar Canal project (MP), Bansagar HE project (MP), Bansagar Canal project (UP) and Sone Canal scheme of Bihar have been approved as separate projects and also they are being executed by separate agencies. Catchment area of Bansagar project spread 18648 square km.

Bansagar was proposed to provide irrigation facility over an area of 2,490 km² in Madhya Pradesh, 1,500 km²; in Uttar Pradesh and 940 km² in Bihar. It also provides power generation of 425 MW in Madhya Pradesh. The Bansagar Canal project comprises of seven canal systems - Sihawal Canal, Purwa Canal, Keoti Canal, Right Bank Canal, Bhitari Canal, Teonthar Lift Canal and Gurh Mauganj Lift Canal.

The State Government had requested Central Loan Assistance (CLA) for the project under the Accelerated Irrigation Benefit Programme (AIBP) in 1996-97 for strengthening the irrigation capacity of the project.

The present components under AIBP (Bansagar Canal Project-MP) are as below:

1. Phase-I of canal system (RBC from 0 to 30.8 km, Bhitari Canal, Sihawal canal from 0 to 22 km, Purwa canal from 0 to 12.8 km and Keoti canal from 0 to 8.20 km along with its distribution system) to create irrigation potential of 22,432 hectares/ 28,040 hectares (Annual irrigation).
2. Phase – II of canal system (Balance work of Sihawal Canal from 22.00 to 75.30 km, Balance work of Purwa Canal from 12.80 to 128.90 km and Balance work of

Ketoi Canal from 8.20 to 90.0 km) to create irrigation potential of 1,01,202 hectares / 126,502 hectares (Annual irrigation).

2. Proposed Components under AIBP

The component proposed to be completed by the year 2000-01 were

- i) The Bansagar Dam up to crest level
- ii) Phase-I of the canal system to irrigate an area of 22432 ha
- iii) Water carrier system for supplying 0.04 MAF assured drinking water supply to Rewa, Satna and Sidhi districts

To achieve above targets, funds required for different components of the project as on 01.04.1996 (at the start of AIBP) as proposed by the State Government were as follow:

- a) Unit I - Head Works (200 cr.)
- b) Unit II - Canal System (55 cr.)
- c) Unit III – Common Water Carrier & Head Regulators (65 cr.)

Under the present study, the Right Bank Canal has been covered for detailed analysis, which takes off from Bansagar dam and the length of the canal is 30.8 km. The canal creates irrigation potential of 4047 hectares. The earthwork and structures in the main canal have been completed. About 92% lining of the main canal have also been completed in the main canal.

3. Financial Detail under AIBP

Before the financial assistance under AIBP, the expenditure on Bansagar canal project was Rs. 123.02 crores. The cumulative expenditure of the project has gone up to the level of Rs. 899.53 crores upto March 2009. Of the total allocated budget under the scheme 88.5 percent have been invested on infrastructure creation. Year-wise expenditure under the scheme has significantly increased over the time (Table 8.1).

Table 8.1: Investment under AIBP in Madhya Pradesh

(in crores)

Year	Central Loan Assistance			Exp. incurred on AIBP Components (On work) Year wise
	Ist Inst.	IInd. Inst.	Total	
1996-97	23.25	-	23.25	7.73
1997-98	27.00	27.00	54.00	8.89
1998-99	20.00	-	20.00	9.06
1999-00	19.00	19.00	38.00	9.54
2000-01	Nil	-	0	11.02
2001-02	Nil	Nil	0	11.58
2002-03	39.836	Nil	39.836	15.00

Contd ...

Table 8.1: Investment under AIBP in Madhya Pradesh (Contd...)

Year	Central Loan Assistance			Exp. incurred on AIBP Components (On work) Year wise
	Ist Inst.	IInd. Inst.	Total	
1996-97	23.25	-	23.25	7.73
1997-98	27.00	27.00	54.00	8.89
1998-99	20.00	-	20.00	9.06
1999-00	19.00	19.00	38.00	9.54
2000-01	Nil	-	0	11.02
2001-02	Nil	Nil	0	11.58
2002-03	39.836	Nil	39.836	15.00
2003-04	40.64	Nil	40.64*	50.33
2004-05	34.00	34.00	68.00*	79.90
2005-06	18.142	0	18.142*	91.32
2006-07	42.74	0	42.74*	126.90
2007-08	44.76	0	44.76*	170.10
2008-09	59.61	0	59.61*	133.62

*CLA for Unit – II only.

Note: From 1996-97; CLA for Unit- I, II, III, was released combined. No CLA was released for Unit-II during Financial Year 2000-01 & Financial Year 2001-02. For Financial Year 2002- 03, CLA for Unit – I & II again released combined. From Financial Year 2003-04, CLA for Unit –I & II are being released separately

4. Gap Analysis: Difference between Potential and Actual Irrigation

It can be observed from the Table 8.2 that there is a difference of 72271 ha. between Design irrigated area and Potential irrigated area. The reason for this deviation is the constructions of only 2 (Right Bank and Bhitari Canal) out of 7 canals have been completed. The works of 5 uncompleted canals is 78% completed and remaining 22% is proposed to be completed till 2012.

Table 8.2: Difference between Design and Actual Potential Irrigated Area

Canal	Season	Potential Irrigated Area (ha)		
		Design Stage	At completion	Present
Sihawal Canal	Rabi	12159	8506	8506
	Kharif	9555	6684	6684
	Total	21714	15190	15190
Purwa Canal	Rabi	33189	19880	19880
	Kharif	26078	15620	15620
	Total	59267	35500	35500
Keoti Canal	Rabi	20396	14277	14277
	Kharif	16026	11218	11218
	Total	36422	25495	25495
Right Bank Canal*	Rabi	2266	2267	2267
	Kharif	1781	1780	1780
	Total	4047	4047	4047

Contd ...

Table 8.2: Difference between Design and Actual Potential Irrigated Area (Contd ...)

Canal	Season	Potential Irrigated Area (ha)		
		Design Stage	At completion	Present
Sihawal Canal	Rabi	12159	8506	8506
	Kharif	9555	6684	6684
	Total	21714	15190	15190
Purwa Canal	Rabi	33189	19880	19880
	Kharif	26078	15620	15620
	Total	59267	35500	35500
Keoti Canal	Rabi	20396	14277	14277
	Kharif	16026	11218	11218
	Total	36422	25495	25495
Right Bank Canal*	Rabi	2266	2267	2267
	Kharif	1781	1780	1780
	Total	4047	4047	4047
Bhitari Canal**	Rabi	1224	1224	1224
	Kharif	960	960	960
	Total	2184	2184	2184
Teonthar Lift Canal	Rabi	6345	0	0
	Kharif	4985	0	0
	Total	11330	0	0
Gurh Mauganj Lift Canal	Rabi	11045	0	0
	Kharif	8678	0	0
	Total	19723	0	0
Total	Rabi	86624	46154	46154
	Kharif	68063	36262	36262
	Total	154687	82416	82416

* Surveyed and Functional canal

** Functional canal

Further it can be observed from the Table 8.3 there is a gap of 29182 ha. and 30154 ha. in Kharif and Rabi season (2008-09) respectively between Potential irrigated area and Actual irrigated area. The reason for this deviation is the 2 canals which are operational are under trial for 3 years and water is released only for few days in a year for inspection of the canals.

Table 8.3: Difference between Potential and Actual Gross Irrigated Area

Year	Created Irrigation Potential Area (ha)			Actual Gross Irrigated Area (ha)		
	Kharif	Rabi	Total	Kharif	Rabi	Total
2005-06	9545	19369	28914	0 (0%)	6482 (33.46%)	6482 (22.41%)
2006-07	13360	28271	41631	1580 (11.82%)	8532 (30.18%)	10112 (24.29%)
2007-08	36262	46154	82416	7080 (19.52%)	16000 (34.67%)	23080 (28%)

Section 2: Impact Analysis

1. Sample Distribution and its Profile

Distribution of Sample

As per the Terms of Reference of the study on sampling methodology, 157 beneficiary respondents were contacted and responses were recorded from Head (50), Middle (70) and tail (37) of the Bansagar Canal project. Thirty one (31) non-beneficiaries from 16 selected villages of command area and 40 non-beneficiaries from 4 villages of non-command area were contacted and their responses were recorded.

Table 8.4: Distribution of Sample Beneficiary and Non-Beneficiary

Location in the Canal	No. of villages	Number of Beneficiaries/ Non-Beneficiary
Beneficiary		
Head	5	50
Middle	7	70
Tail	4	37
Total	16	157
Non-Beneficiary		
Command	16	31
Non-command	4	40
Total	20	71

Socio-Demographic Profile of Sample

Socio-demographic profiles of beneficiary and non-beneficiary samples were analysed in terms of social category, income level, distribution of landholdings and living status of surveyed households. It is interesting to note that most of beneficiary households are belonging to general and other backward class (OBC) categories implying that beneficiary households represent socially upper class. Among respondents, the highest proportion of beneficiary was from OBCs (52%) which is slightly higher than non-beneficiary OBC (44.9%). Percentage of General, Scheduled Caste (SC) and Scheduled Tribe (ST) of beneficiary is 16%, 8% and 24% and of non-beneficiary is 10.1%, 5.8% and 39.1% respectively. Non-beneficiary households are primarily belonging to socially lower class (Table 8.5).

Table 8.5 : Social Profile of Sample Beneficiaries

	Beneficiary								Non-Beneficiary					
	Head		Middle		Tail		Total		Command		Non-Command		Total	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%
General	8	16.0	21	30.0	14	37.8	43	27.4	4	13.8	3	7.5	7	10.1
Other Backward Class	26	52.0	37	52.8	13	35.2	76	48.4	13	44.8	18	45.0	31	44.9
Scheduled Caste	4	8.0	3	4.3	2	5.4	9	5.7	3	10.4	1	2.5	4	5.9
Scheduled Tribe	12	24.0	9	12.9	8	21.6	29	18.5	9	31.0	18	45.0	27	39.1
Total	50	100.0	70	100.0	37	100.0	157	100.0	29	100.0	40	100.0	69	100.0

The total income of the household is a major indicator of the economic status and living standard of farmers. The above table states that the most of the respondents 54.5 % of beneficiary and 57.4 % of non-beneficiary falls in the slab of Rs 25,000 to Rs 50,000.

Table 8.6 : Income profile of Sample Households

Income	Beneficiary								Non-Beneficiary					
	Head		Middle		Tail		Total		Command		Non-command		Total	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Below 10,000	1	2.0	0	0.0	0	0.0	1	0.6	0	0.0	0	0.0	0	0.0
Rs. 10,000 to Rs. 25,000	5	10.0	13	18.8	8	21.6	26	16.7	3	10.7	12	30.0	15	22.1
Rs. 25,000 to Rs. 50,000	23	46.0	40	58.0	22	59.5	85	54.5	19	67.9	20	50.0	39	57.4
Rs. 50,000 to Rs. 1,00,000	16	32.0	13	18.8	5	13.5	34	21.8	6	21.4	8	20.0	14	20.5
Rs. 1,00,000 to Rs. 2,00,000	4	8.0	3	4.4	2	5.4	9	5.8	0	0.0	0	0.0	0	0.0
Rs.2,00,000 and above	1	2.0	0	0.0	0	0.0	1	0.6	0	0.0	0	0.0	0	0.0
Total	50	100.0	69	100.0	37	100.0	156	100.0	28	100.0	40	100.0	68	100.0

It can be observed that beneficiary farmers having land in head of canal have maximum percentage (93.27%) of irrigated area. Therefore it can be derived that farmers in head have better access of water. Non beneficiary farmers in command and non-command have 87.5% and 85.3% of irrigated land which indicates that non-beneficiary farmers have facility of personal irrigation equipments.

Table 8.7 : Landholding Pattern of Sample Beneficiary & Non-Beneficiary

Description	Beneficiary				Non-Beneficiary		
	Head	Middle	Tail	Total	Command	Non-command	Total
Number of farmers							
Marginal	30	38	22	90	14	21	35
Small	9	18	4	31	12	9	21
Medium	11	10	6	27	4	6	10
Large	0	4	5	9	1	4	5
Total	50	70	37	157	31	40	71
Area distribution (acres)							
Marginal	36.8	46.7	20.1	103.6	18.6	24.4	43.0
Small	27.0	57.7	12.0	96.7	36.0	32.2	68.2
Medium	63.5	66.0	30.5	160.0	25.5	34.5	60.0
Large	0	52.0	64.0	116.0	50.0	95.7	145.7
Total	127.3	222.4	126.6	476.3	130.1	186.8	316.9
Average Size of Land (acre)	2.55	3.18	3.42	3.03	4.20	4.67	4.46
Average size of Irrigated Land (acre)	2.23	2.49	2.91	2.51	2.98	3.63	3.35
Percentage irrigated area	93.27	86.37	89.47	89.34	87.5	85.3	86.3

Living status of sample households have been analyzed in respect to type of house, source of drinking water, availability of latrine, source of light and use of cooking fuel (Table 8.8).

Type of House: Most of the houses of the respondents are kaccha houses 75.8% and 73.9% of beneficiary and non-beneficiary. Corresponding figures for Pacca and Semi-Pacca houses are 8.9% and 15.3% of beneficiary and 4.3% and 21.7 % of non beneficiary.

Source of Drinking Water: Community hand-pump and Wells are the most frequently used source of drinking water in both beneficiary and non-beneficiary households.

Latrine room in House: Sanitation is a big problem, this could be easily verified from the percentage of non-availability of Latrine room in both beneficiary (78.4%) and non-beneficiary (91.3%) households.

Source of Lighting in House: Non availability of electricity has badly affected the personal and commercial life of farmers. Percentage of beneficiary and non-beneficiary using Electricity is 3.8% and 4.3% respectively. Kerosene is the most frequently used fuel for lighting.

Type of Cooking Fuel: Farmers in command and non-command area are heavily dependent on natural resources. Wood is used for cooking by 88.5% of beneficiary and 94.2% of non-beneficiary.

Table 8.8 : Living Status of Sample Beneficiary & Non-Beneficiary

	Beneficiary								Non-Beneficiary					
	Head		Middle		Tail		Total		Command		Non-command		Total	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Type of House														
Pacca	2	4.0	8	11.4	4	10.8	14	8.9	1	3.4	2	5.0	3	4.3
Kaccha	42	84.0	46	65.7	31	83.8	119	75.8	23	79.4	28	70.0	51	73.9
Semi-Pacca	6	12.0	16	22.9	2	5.4	24	15.3	5	17.2	10	25.0	15	21.8
Total	50	100.0	70	100.0	37	100.0	157	100.0	29	100.0	40	100.0	69	100.0
Source of Drinking Water														
Tap water	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Owned hand-pump	2	4.0	3	4.3	1	2.7	6	3.8	0	0.0	1	2.5	1	1.4
Community hand-pump	36	72.0	40	57.1	11	29.7	87	55.4	20	69.0	29	72.5	49	71.0
Wells	10	20.0	27	38.6	24	64.9	61	38.9	9	31.0	10	25.0	19	27.5
Others	2	4.0	0	0.0	1	2.7	3	1.9	-	-	-	-	-	-
Total	50	100.0	70	100.0	37	100.0	157	100.0	29	100.0	40	100.0	69	100.0
Latrine in House														
Yes	7	14.0	8	11.4	8	21.6	23	14.6	4	13.8	2	5.0	6	8.7
No	43	86.0	62	88.6	29	78.4	134	85.4	25	86.2	38	95.0	63	91.3
Total	50	100.0	70	100.0	37	100.0	157	100.0	29	100.0	40	100.0	69	100.0

Contd ...

Table 8.8 : Living Status of Sample Beneficiary & Non-beneficiary (Contd...)

	Beneficiary								Non-Beneficiary					
	Head		Middle		Tail		Total		Command		Non-command		Total	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Source of Lighting in House														
No lighting	14	28.0	6	8.6	4	10.8	24	15.4	4	13.8	6	15.0	10	14.6
Kerosene	12	24.0	27	38.5	19	51.4	58	36.9	13	44.8	16	40.0	29	42.0
Electricity	0	0.0	6	8.6	0	0.0	6	3.8	1	3.4	2	5.0	3	4.3
Other	24	48.0	31	44.3	14	37.8	69	43.9	11	37.9	16	40.0	27	39.1
Total	50	100.0	70	100.0	37	100.0	157	100.0	29	100.0	40	100.0	69	100.0
Type of Cooking Fuel														
Leave/ Straw														
Fire wood	43	87.7	64	91.4	31	83.8	138	88.4	27	93.1	38	95.0	65	94.3
Cool/ coke	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Kerosene	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	1	2.5	1	1.4
Bio-gas	4	8.2	4	5.7	3	8.1	11	7.1	0	0.0	0	0.0	0	0.0
LPG	2	4.1	0	0.0	3	8.1	5	3.2	0	0.0	0	0.0	0	0.0
Electricity	0	0.0	0	0.0	0	0.0	0	0.0	2	6.9	1	2.5	3	4.3
Others	0	0.0	2	2.9	0	0.0	2	1.3	0	0.0	0	0.0	0	0.0
Total	49	100.0	70	100.0	37	100.0	156	100.0	29	100.0	40	100.0	69	100.0

2. Impact of AIBP

The Accelerated Irrigation Benefit Programme (AIBP) at Bansagar Canal Project has been implemented in 3 phases for creating the irrigation potential to the extent of 1.55 lakh hectares annually. This section of the report aims to assess the impacts of AIBP in the project area. An attempt has been made to segregate the AIBP impact from overall development in the project area by comparing the changes in various indicators across beneficiary and non-beneficiary households. As accessibility of water for irrigation varies at various locations on the canal system, a comparison has also been made between head, middle and tail of the selected canal system.

Impact on Agricultural Production

Farming is the major economic activities among majority of the respondents. The irrigation project has direct impact on cropping pattern, agricultural production and productivity across the agricultural system. Wheat and paddy are dominating crops in the project command area followed by gram and ginger. It is interesting to note that beneficiary farmers have comparative more diversified cropping system as compared to non-beneficiary farmers during to availability of irrigation facility in the project villages.

Table 8.9: Cropping Pattern of Sample Beneficiary & Non-Beneficiary

(Percent area)

Crop	Beneficiary				Non-Beneficiary		
	Head	Middle	Tail	Total	Command	Non-command	Total
Wheat	46.6	0.7	45.1	1.7	9.2	3.4	5.2
Paddy	38.1	0.6	40.1	1.4	7.1	90.2	64.6
Arhar	3.0	0.0	2.8	0.1	0.6	1.0	0.8
Gram	2.2	98.3	3.1	96.3	0.6	0.5	0.5
Maize	1.3	0.0	0.3	0.0	1.5	1.8	1.7
Pea	0.2	0.0	0.1	0.0		0.1	0.1
Urad	5.1	0.3	7.4	0.4	2.4	1.5	1.8
Masoor	0.4	0.0	0.8	0.0	0.0	0.0	0.0
Bajra/Jowar	0.0	0.0	0.0	0.0	-	0.4	0.3
Ginger	0.0	0.0	0.0	0.0	78.6	0.0	24.2

This is also clearly visible from the analysis of cropping intensity, which is an indicator of the frequency of usage of land. Beneficiary has higher cropping intensity (175.7) as compared to non-beneficiary (110.4). This shows that availability of permanent irrigation system results in higher crop intensity.

Table 8.10: Cropping Intensity of Sample Beneficiary & Non-beneficiary

Description	Beneficiary				Non-Beneficiary		
	Head	Middle	Tail	Total	Command	Non-command	Total
Net Cropped Area (acre)	127.3	222.3	126.6	476.2	130.1	186.7	316.8
Gross Cropped Area (acre)	225.6	375.3	235.9	836.8	140.5	209.2	349.7
Cropping Intensity (%)	177.3	168.8	186.3	175.7	108.0	112.1	110.4

The results presented in Table 8.11 reveal that due to proper irrigation availability the yield of various crops among beneficiary farmers are comparatively higher than the non-beneficiary farmers. Among beneficiary and non-beneficiary, wheat has the highest productivity of 6.9 and 6.6 quintal per acre. Due to shortage of adequate water, productivity in tail has decreased for most of the crops. (ex. 5.6 quintal per acre for wheat).

Table 8.11: Productivity of Major Crops

(Quintal per acre)

Crop	Beneficiary				Non-Beneficiary		
	Head	Middle	Tail	Total	Command	Non-command	Total
Wheat	7.4	7.6	5.6	6.9	7.0	6.3	6.6
Paddy	8.5	9.5	8.9	9.1	5.0	5.5	5.3
Arhar	-	-	-	-	-	-	-
Gram	5.5	2.0	1.7	2.6	2.9	2.0	2.4
Maize	1.7	7.1	0.4	4.7	-	-	-
Pea	6.0	0.3	-	3.2	-	5.1	5.1
Urad	1.8	0.9	2.7	1.8	-	-	-
Masoor	-	-	-	-	-	-	-
Bajra/Jowar	-	-	-	-	-	5.0	5.0

The change in marketed surplus in term of quantity and number of farmers generating, has been showing a positive direction in project villages as compared to non-project and control villages. Due to the increase in the yield of two main crops i.e. paddy and wheat the total surplus has also been increased. Major proportion of wheat and paddy are sold in market. Maize and Urad are commonly used for self consumption. Surprisingly there is no production of Maize and Pea in tail and non beneficiary command area which indicates lack of water.

Table 8.12: Market Surplus of Major Crops

(Percent of total production)

Crop	Beneficiary				Non-Beneficiary		
	Head	Middle	Tail	Total	Command	Non-command	Total
Wheat	54.7	63.5	69.9	62.7	56.4	58.0	57.3
Paddy	59.7	68.0	30.7	49.8	42.4	52.6	49.4
Arhar	-	-	-	-	-	-	-
Gram	63.6	33.3	26.5	44.8	22.7	65.0	43.1
Maize	18.9	27.5	-	26.3	-	-	-
Pea	33.3	33.3	-	33.3	-	54.0	54.0
Urad	23.1	24.4	52.7	38.5	-	-	-
Masoor	-	-	-	-	-	-	-
Bajra/Jowar	-	-	-	-	-	-	-

Impact on migration

The analysis given in Table 8.13 clearly indicates that there is no difference in migration between beneficiary of the project under AIBP and non-beneficiary households. The average duration of migration per beneficiary farmer turned out only 85 days in a year whereas the corresponding figure for non-beneficiaries is reported as high as 115 days per year due to non-availability of agricultural work at their farms. The season of migration has been observed during Rabi in all the categories of sample farmers.

Table 8.13: Response on Migration by Beneficiary and non-beneficiary Households

	Beneficiary								Non-beneficiary					
	Head		Middle		Tail		Total		Command		Non-command		Total	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%
% of households reported migration		22.0		24.3		18.9		22.3		19.4		22.5		21.1
No. of Person Migrated from a Household														
One person	10	90.9	16	94.1	6	85.7	32	91.4	6	100.0	4	44.4	10	66.7
2-3 person	1	9.1	1	5.9	1	14.3	3	8.6	0	0.0	5	55.6	5	33.3
>3 person		0.0		0.0		0.0		0.0		0.0		0.0		0.0
Total	11	100.0	17	100.0	7	100.0	35	100.0	6	100.0	9	100.0	15	100.0
No. of Times Migrated by a Person (in a year)														
One time (one crop season)	5	50.0	11	68.7	4	57.1	20	60.6	2	33.3	7	77.8	9	60.0
Two times (two crop season)	4	40.0	4	25.0	2	28.6	10	30.3	4	66.7	1	11.1	5	33.3
Three and/or more times (all crop season)	1	10.0	1	6.3	1	14.3	3	9.1	0	0.0	1	11.1	1	6.7
Total	10	100.0	16	100.0	7	100.0	33	100.0	6	100.0	9	100.0	15	100.0
Average no. of times	1.5		1.3		3.7		1.9		1.8		1.4		1.6	
Reason of Migration														
Employment	9	81.8	12	80.0	6	85.7	27	81.8	3	50.0	8	100.0	11	78.6
Others	2	18.2	3	20.0	1	14.3	6	18.2	3	50.0	0	0.0	3	21.4
Total	11	100.0	15	100.0	7	100.0	33	100.0	6	100.0	8	100.0	14	100.0
Migration Season														
Rabi	3	30.0	5	35.7	4	80.0	12	41.4	2	33.3	5	62.5	7	50.0
Kharif	1	10.0	1	7.1	0	0.0	2	6.9	4	66.7	2	25.0	6	42.9
Zaid	6	60.0	5	35.7	1	20.0	12	41.4		0.0		0.0		0.0
All	0	0.0	3	21.5	0	0.0	3	10.3	0	0.0	1	12.5	1	7.1
Total	10	100.0	14	100.0	5	100.0	29	100.0	6	100.0	8	100.0	14	100.0
Duration of Migration by a Person (in a year)														
<120 days	6	85.7	11	84.6	3	60.0	20	80.0	3	50.0	5	55.6	8	53.3
120-240 days	0	0.0	2	15.4	2	40.0	4	16.0	2	33.3	4	44.4	6	40.0
>240 days	1	14.3	0	0.0	0	0.0	1	4.0	1	16.7	0	0.0	1	6.7
Total	7	100.0	13	100.0	5	100.0	25	100.0	6	100.0	9	100.0	15	100.0
Average duration of migration (days)	94.3		84.2		95.2		85.2		135.0		102.2		115.3	

Quality of Assets Created under AIBP

Beneficiaries were asked to respond on the maintenance of water outlets and distribution channel, of which more than 90% responded negatively. They were also asked about lining and cemented water outlets, of which again more than 90% responded negatively. Ironically when they were asked “have they ever complained about above mention problems in last one year” only few of them responded positively. This shows lack of awareness and willingness among farmers to forward their grievances.

Table 8.14: Beneficiary Response on Quality of Assets Created under AIBP

(Percentage of respondents)

Description		Head	Middle	Tail	Total	Chi-Square	Sig.
Properly maintenance of water outlets	Yes	6.4	4.8	5.6	5.5	0.137	0.934
	No	93.6	95.2	94.4	94.5		
	Total	100.0	100.0	100.0	100.0		
Complains for maintenance of water outlets in last one year	Yes	20.8	22.2	22.2	21.8	0.037	0.982
	No	79.2	77.8	77.8	78.2		
	Total	100.0	100.0	100.0	100.0		
Cemented water outlets in the village	Yes	6.1	6.3	2.8	5.4	0.645	0.724
	No	93.9	93.7	97.2	94.6		
	Total	100.0	100.0	100.0	100.0		
Properly maintenance of distribution channels in the village	Yes	6.1	1.6	5.6	4.1	1.733	0.420
	No	93.9	98.4	94.4	95.9		
	Total	100.0	100.0	100.0	100.0		
Complains for maintenance of water distribution channels in last one year	Yes	12.2	3.2	13.9	8.8	4.378	0.112
	No	87.8	96.8	86.1	91.2		
	Total	100.0	100.0	100.0	100.0		
Lined water distribution channels in the village	Yes	0.0	0.0	0.0	0.0		
	No	100.0	100.0	100.0	100.0		
	Total	100.0	100.0	100.0	100.0		

Conditions of water outlets, distribution channel and canal infrastructure have 4.3, 4.4 and 4.4 points respectively. This indicates the poor condition of the AIBP infrastructure and its maintenance.

Table 8.15: Beneficiary Perception on Quality of Assets

Description	Head*	Middle	Tail	Total
Condition of water outlets in the village	4.4	4.3	4.3	4.3
Condition of water distribution channels in the village	4.5	4.4	4.4	4.4
Condition of canal infrastructure in the village	4.4	4.4	4.4	4.4

*very good-1,...,very poor-5

The overall impact of AIBP scheme on agricultural and socio-economic development of the farmers has been captured through 5 point likert scale response of the sample beneficiaries (Table 8.16); where 1 indicates strong agreement on a particular statement and 5 indicate strong disagreement. Therefore, lower mean scores on a particular statement implied that the project has comparatively better impact. The impact indicators have been divided into two categories i.e. agriculture and socio-economic

development. Majority of the farmers agreed that there has been increase in irrigated area and total agricultural production. However, farmers do not believe that there has been substantial decline in the cost of agricultural production due to AIBP scheme. Overall there is an agreement that there has been an increase in annual income of the farmers. Because of increase irrigation facility the value of the land has increased as per the opinion of respondents. Simultaneously the migration to the cities has been reduced and on farm employment opportunities have increased. There has been increased crop rotation. The disturbing trend is the majority of the respondents do not agree that there has been increase in the visit of the government officials after the AIBP. Results from analysis of mean variance indicate that beneficiaries at almost all the locations have similar response on various impact indicators except on increase in irrigated area, increase in annual income, ease in availability of agricultural equipments and increase in tree plantation.

Table 8.16: Beneficiary Response on Overall Impact of AIBP

	Head	Middle	Tail	Total*	F	Sig.
Agricultural Development						
Increase in irrigated area	2.14	2.10	2.30	2.16	3.385	0.036
Increase in total production	2.22	2.27	2.35	2.27	0.768	0.466
Decline in cost of production	2.74	2.80	2.65	2.75	0.637	0.530
Increase in annual income	2.50	2.81	2.76	2.70	4.501	0.013
Ease in availability of agricultural equipments	2.82	3.10	3.11	3.01	4.097	0.018
Ease in agriculture activities	2.80	2.91	3.05	2.91	1.525	0.221
Increase in the visits of government officials	2.76	2.99	2.97	2.91	1.979	0.142
Increase in the quality of agricultural produce	2.74	2.76	2.97	2.80	1.524	0.221
Decrease in land erosion	3.02	2.99	3.11	3.03	0.545	0.581
Increase in crop rotation	2.80	2.70	2.61	2.71	1.140	0.323
Socio-economic Development						
Increase in literacy rate	2.68	2.89	2.86	2.82	1.526	0.221
Increase in non-farm activities	2.82	2.93	2.92	2.89	0.472	0.625
Increase in healthcare services	2.90	2.96	3.08	2.97	0.830	0.438
Decrease in diseases outbreak	3.02	3.00	3.24	3.06	1.840	0.162
Increase in forestation/number of trees	2.56	2.83	2.97	2.78	4.981	0.008
Increase in employment opportunities	2.82	2.97	2.97	2.92	0.862	0.424
Increase in credit availability	3.04	2.86	2.86	2.92	1.010	0.367
Decrease in pollution	2.72	2.87	2.75	2.79	1.068	0.346
Increase in value of land	2.12	2.14	2.22	2.15	0.687	0.505
Decrease in migration to cities	2.68	2.71	2.81	2.72	0.418	0.659

*strongly agree-1,....., strongly disagree-5

Process of Project Implementation by Irrigation Department

Distribution of water is the most important feature of irrigation system. Primarily there is no system of water distribution which often leads to wastage of water as reported by 73.4% of the respondents. This is also a primary reason of dispute among farmers. WUA's have failed to introduce any feasible system of water distribution. Although there is no system of distribution it is worth mentioning most of the beneficiaries are satisfied with the distribution of the water. 92.9% beneficiary believe that water is equitable distributed. The above figures shows that 96.1% beneficiaries believe that no person or group influence the distribution of water. This can be concluded that distribution of water is free from any external influence. Grievance support system seems to be lacking in command area. Most of the beneficiaries got negative responses (43.6%) from irrigation officials whenever they asked for any type of help. Nearly 31% beneficiary got help only when they complained about their problems. Most of the beneficiaries (47.8%) come to know about water release when they see water in the canal. Another common way to know about water release is to visit irrigation department. This clearly shows that irrigation department does not have any mechanism to communicate water release. Irrigation charges are paid by most of the farmers, 81.5% of farmers reported that they have paid their irrigation charges. Beneficiary farmers in tail (78.9%) are ready to pay extra charges for assured water supply. This is substantially higher than 65.5% of overall beneficiary which agreed to pay higher charges. This reflects, farmers in tail are more needy of assured water supply.

Table 8.17: Beneficiary's Response on Process of Project Management

	Head		Middle		Tail		Total	
	N	%	N	%	N	%	N	%
Beneficiary response on proper system existence for water distribution	4	8.0	23	32.4	15	40.5	42	26.6
Beneficiary agreeing equitable distribution of water	49	98.0	64	94.1	31	83.8	144	92.9
Beneficiary disagreeing any group influence on the water distribution	49	98.0	64	94.1	34	97.1	147	96.1
Beneficiary response on non-support from Irrigation department	16	32.0	40	51.9	16	42.1	72	43.6
Beneficiary comes to know only when water flows in the canal	26	52.0	31	43.1	19	51.4	76	47.8
Beneficiary visit irrigation department to acquire information about water release in the canal	15	30.0	10	13.9	6	16.2	31	19.5
Beneficiary response on untimely payment of irrigation charges	47	94.0	59	84.3	29	78.4	135	86.0
Beneficiary willingness to pay extra charges for assured water supply	14	66.7	28	59.6	15	78.9	57	65.5

Chapter 9

Evaluation of AIBP in Chattisgarh

Section 1: State Level Overview

AIBP assistance has been provided to 205 irrigation projects since the year 1996 in the State. Out of these 205 projects, 4 are the major irrigation projects while 4 medium irrigation projects and 197 minor irrigation projects have received the AIBP funds (Table 9.1). 39 projects have been completed till now and 166 projects are ongoing projects.

Table 9.1: Projects sanctioned under AIBP from 1996 to till date

Sl. No.	Category	Completed	Ongoing
1.	Major	1	3
2.	Medium	3	1
3.	Extension, Renovation and Modernization (ERM)	-	-
4.	Minor Irrigation	35	162
	Total	39	166

The year-wise irrigation potential created under AIBP assisted projects has been presented in Table 9.2. It can be seen that during the year 2008-09, irrigation potential of 54 thousand hectares was created under AIBP as compared to 420 thousand hectares in the projects other than AIBP (Table 9.3).

Table 9.2: Irrigation Potential Created under AIBP Scheme

(in Lac Hectare)

Sl. No.	Project	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09
1.	Major	-	-	1.232	-	-	0.147	0.317
2.	Medium	0.052	-	.090	-	-	-	0.030
3.	Extension, Renovation and Modernization (ERM)	-	-	-	-	-	-	-
4.	Minor Irrigation	-	-	-	-	-	0.027	0.048
	Total	0.052	-	1.322	-	-	0.174	0.395

Table 9.3: Irrigation Potential Created other than AIBP Scheme

(in Lac Hectare)

Sl. No.	Project	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09
1.	Major	7.2418	8.0269	8.5752	8.8050	9.0457	9.9030	-
2.	Medium	2.2468	2.2468	2.2593	2.2671	2.5200	2.7971	-
3.	Extension, Renovation and Modernization (ERM)	-	-	-	-	-	-	-
4.	Minor Irrigation	5.0425	5.2421	5.4230	5.5845	5.6593	5.8839	-
	Total	14.5311	15.5158	16.2575	16.6566	17.2250	18.5840	-

The total cumulative assistance to all AIBP projects has been of the tune of Rs. 3376.58 crores (Table 9.4). Out of these, the central assistance has been about three fourth, while the remaining funds have been contributed by State Government.

Table 9.4: Budget for AIBP Since 2002-03 to Till Date

(Rs. Crore)

Sl. No.	Project	Source	Approved	Received	Expenditure
1.	Major	Central	1133.73	350.26	663.72
		State	-	-	-
2.	Medium	Central	101.40	37.00	132.62
		State	-	-	-
3.	Extension, Renovation and Modernization (ERM)	Central	-	-	-
		State	-	-	-
4.	Minor irrigation	Central	435.86	237.33	185.08
		State	-	-	-
	Total	Central	1670.99	624.59	981.42
		State	-	-	-

Section 2: The Shivnath Diversion Medium Irrigation project

The Shivnath diversion medium project is located on Shivnath river, a tributary of Mahanadi. The project is located near village Chando in tehsil Churia, District Rajnandgaon, Chhattisgarh. The salient features of the project have been presented in Table 9.5.

Table 9.5: Salient Features of Shivnath Diversion Medium Irrigation Project

Sl. No.	Salient Features	
1.	Name	: Shivnath Diversion Project
2.	River	: Shivnath River
3.	Location	: Rajnandgaon (Chhattisgarh)
4.	Name of River Basin	: Mahanadi
5.	Longitude and	: 80° -50' - 0"
	Latitude	: 20° -54 -20"
6.	Year of start	: 1976
7.	Year of completion	: 2002
8.	Hydrological data:	
	a) Annual	: 58.0"
	b) Monsoon	: 55.3"
9.	Flood:	
	a) Maximum observed by dickens formula	: 149350 cusecs/4229.68 cumac.

Contd ...

Table 9.5: Salient Features of Shivenath Diversion Medium Irrigation Project (Contd ...)

Sl. No.	Salient Features	
10.	Reservoir/weir:	
	a) Catchment Area	: 505.95 miles (1295.23 sq km)
	b) Full Tank Level	: R.L. 1010.50 ft
	c) Top of Bank Level	: R.L. 1032.50 ft
	d) Lowest sill level	: R.L 1003.00 ft
11.	Pick-up weir/anicut:	
	a) Design Discharge	: 149350 cusecs
	b) Crest of weir level	: R.L. 1010.50 ft
	c) T.B.L of Afflux Bank	: R.L. 1032.50 ft
	d) No., size & sill level of	
	Head sluice	: 2 no., 7'x 5' ft - 1003
	e) No., size & sill level of	
Under sluice	: 2 no. , 10'x 6' ft	
12.	Dam Data:	
	a) Length of Dam	: HT – Top width
	b) Earthen	: 2800'- 14'- 10'
	c) Masonary	: 900'- 10.35'- Creager profile of 8'
13.	Canal:	
	a) Length of main canal	: 50.4 km
	b) Length of minor	: 36.84 mile (Proposed)
	c) Head Discharge	: 11.33 cusecs
	d) Duty adopted head	: 80 acres/cusecs
	e) AT Canal outlet	: 60 acre/cusecs
14.	Command Area:	
	a) No. of villages to be benefited	: 34 no.
	b) Command area	: 8553 ha.
	c) Net cropped area	: 10875 acre
	d) Irrigated area	: 3467 acre
	e) Design irrigated area	: 5870 ha (rice, kharif)

Section 3: Analysis of Shivnath Diversion Medium Irrigation Project

1. Potential Irrigated Area and Actual Irrigated Area

The potential and actual irrigated areas across different seasons have been shown in Tables 9.6 and 9.7, respectively. It is seen that so far 66 percent of potential which was conceived at the design stage has been created.

Table 9.6: Irrigated Potential Created Across Seasons Shivnath Diversion Medium Irrigation Project

Season	Potential Irrigated Area (hectare)		
	Design Stage	At completion	Present
Kharif	5040	-	3362.31
Rabi	-	-	-
Other	-	-	-
Total	5040	-	3362.31

The actual irrigated area has varied over years as farmers have used the water for other crops of the season. The total actual irrigated area is less as compared to potential created. The farmers do not take crops in seasons other than Kharif.

Table 9.7: Actual Irrigated Area Across Seasons in Shivnath Diversion Medium Irrigation Project

Year	Actual Gross Irrigated Area (hectare)		
	Kharif	Rabi	Other
2003-04	1390.27	-	-
2004-05	2498.11	-	-
2005-06	1335.36	-	-
2006-07	3774.78	-	-
2007-08	3996.46	-	-
2008-09	3513.79	-	-

2. Possible reasons for gap in Irrigation Potential Creation and Its Utilization

The irrigation potential has been lost due to less water inflow received in reservoir, encroachment of field channels and hydro logically misfit canal and distributories (Table 9.8).

Table 9.8: Reasons for Gap between irrigation Potential Creation and its Utilization

Sl. No.	Factor	Approximate loss in Irrigation Potential Created
1.	Change in cropping pattern then envisaged in the project design	-
2.	Less water inflow received in the dam	Yes
3.	Change in water allocation for non irrigation purpose (for example drinking water, industrial purpose or environmental purposes)	-
4.	Condition of the main canal & distribution system is not hydro logically fit	Yes
5.	Non existence/improper maintained water distribution and field channels	-
6.	Loss of command area due to urbanization or soil salinity or water logging)	-
7.	Unauthorized utilization of water by farmers	-
8.	Encroachment of area under field channels	Yes
9.	Any other (please specify)	-

3. Head Water Discharge

The designed discharge of IBC is 83.48 cubic meter per second. The figures given in Table 9.9 indicate that the discharge has always been much below the discharge capacity. The canal mostly remains closed during May – July.

Table 9.9: Head Water Discharge Shivnath Diversion Medium Irrigation Project
(cubic meter per second)

Month/year	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09
January	-	-	-	-	-	-	-
February	-	-	-	-	-	-	-
March	-	-	-	-	-	-	-
April	-	-	-	-	-	-	-
May	-	-	-	-	-	-	-
June	-	-	-	-	-	-	-
July	1.21	1.15	1.20	1.25	1.20	1.18	1.23
August	1.80	1.76	1.74	1.79	1.82	1.74	1.81
September	2.42	2.37	2.43	2.43	2.47	2.52	2.43
October	1.02	0.97	1.02	1.02	0.93	0.94	1.03
November	-	-	-	-	-	-	-
December	-	-	-	-	-	-	-

4. Expenditure from Funds

The assistance has been used for expansion of irrigation system (Table 9.10).

Table 9.10 Expenditure Pattern including AIBP

(Rs. Lakh)

Year	Salary & compensation for regular staff	Wage bill for contractual staff	Travel conveyance and stationeries	Other recurring office expenses	Capital expenditure	
					Expansion of irrigation system	Creation of other assets
2002-03	4.77	-	1.03	1.52	-	-
2003-04	4.40	-	1.37	1.74	-	-
2004-05	3.12	-	1.45	1.40	-	-
2005-06	4.42	-	2.47	2.08	-	-
2006-07	3.88	-	2.37	1.88	-	-
2007-08	2.00	-	0.26	0.22	-	-
2008-09	3.51	-	1.92	1.44	-	-

5. Staffing Pattern:

The project is already completed. At present the staff consists of one Sub Divisional Officer, Four Junior Engineers, three Field Assistants and two patwaris.

Section 4: Impact Analysis

1. Distribution of Sample and its Profile

Distribution of Sample

As per the methodology of the study, sample of beneficiaries and non-beneficiaries was taken both from command and non-command area of the project. The distribution of the sample across the head, middle and tail location of the canal has been presented in Table 9.11. A total of 160 beneficiaries were selected from 16 villages in the command area of the project. A total of 72 non-beneficiaries were also interviewed both from command and non-command area of the project.

Table 9.11: Distribution of Sample Beneficiary & Non-Beneficiary

Location in the Canal	No. of villages	Number of Beneficiaries/ Non-Beneficiary
Beneficiary		
Head	4	40
Middle	8	80
Tail	4	40
Total	16	160
Non-beneficiary		
Command	16	32
Non-command	4	40
Total	20	72

Socio-Demographic Profile of Sample

Socio-demographic profiles of beneficiary and non-beneficiary samples were analysed in terms of social category, income level, distribution of landholdings and living status of surveyed households. It is interesting to note that most of beneficiary households are belonging to general and other backward class (OBC) categories implying that beneficiary households represent socially upper class. Among respondents, the highest proportion of beneficiary was from OBCs (52%) which is slightly higher than non-beneficiary OBC (44.9%). Percentage of General, Scheduled Caste(SC) and Scheduled Tribe (ST) of beneficiary is 16%, 8% and 24% and of non-beneficiary is 10.1%, 5.8% and 39.1% respectively. Non-beneficiary households are primarily belonging to socially lower class (Table 9.12).

Caste wise distribution of sample beneficiaries and non-beneficiaries has been presented in Table 9.13. It is evident from the data that majority of beneficiaries as well as non-beneficiaries belongs to OBC.

Table 9.12: Social Profile of Sample Beneficiaries

	Beneficiary								Non-Beneficiary					
	Head		Middle		Tail		Total		Command		Non-command		Total	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%
General	1	2.5	2	2.5	0	0.0	3	1.9	1	3.1	0	0.0	1	1.4
Other Backward Class	31	77.5	74	92.5	37	92.5	142	88.7	29	90.7	38	95.0	67	93.1
Scheduled Caste	2	5.0	2	2.5	3	7.5	7	4.4	1	3.1	0	0.0	1	1.4
Scheduled Tribe	6	15.0	2	2.5	0	0.0	8	5.0	1	3.1	2	5.0	3	4.1
Total	40	100.0	80	100.0	40	100.0	160	100.0	32	100.0	40	100.0	72	100.0

Income Profile of Sample Households

The total income of the household is a major indicator of the economic status and living standard of farmers. The table below states that the most of the respondents 48.1% of beneficiary and 52.8% of non-beneficiary falls in the slab of Rs 25,000 to Rs 50,000.

Majority of the farmers, whether beneficiary or non-beneficiary, falls under the annual income range of Rs.25,000 to 50,000. Less than 1% of the sample farmers are able to earn an income of more than Rs. 2.0 lacs per annum. This analysis clearly indicates the low level of incomes generated through agricultural activities.

Table 9.13: Income Profile of Sample Households

Income	Beneficiary								Non-Beneficiary					
	Head		Middle		Tail		Total		Command		Non-command		Total	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Below Rs. 10000	1	2.5	0	0.0	0	0.0	1	0.6	1	3.1	1	2.5	2	2.8
Rs. 10,000 to Rs. 25,000	10	25.0	18	22.5	8	20.0	36	22.5	11	34.4	8	20.0	19	26.4

Contd ...

Table 9.13: Income Profile of Sample Households (Contd ...)

Income	Beneficiary								Non-Beneficiary					
	Head		Middle		Tail		Total		Command		Non-command		Total	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Rs. 25,000 to Rs. 50,000	19	47.5	34	42.5	24	60.0	77	48.1	14	43.8	24	60.0	38	52.7
Rs. 50,000 to Rs. 1,00,000	8	20.0	23	28.7	5	12.5	36	22.6	5	15.6	7	17.5	12	16.7
Rs. 1,00,000 to Rs. 2,00,000	2	5.0	5	6.3	2	5.0	9	5.6	1	3.1	0	0.0	1	1.4
Rs.2,00,000 and above	0	0.0	0	0.0	1	2.5	1	0.6	-	-	-	-	-	-
Total	40	100.0	80	100.0	40	100.0	160	100.0	32	100.0	40	100.0	72	100.0

Land Holding Pattern of Sample Beneficiary & Non-beneficiary

It can be observed that beneficiary farmers having land in middle of canal have maximum percentage (90.41%) of irrigated area. Therefore it can be derived that farmers in middle have better access of water. Non beneficiary farmers in command and non-command have 70.0% and 74.3% of irrigated land which indicates that non-beneficiary farmers have facility of personal irrigation equipments.

Table 9.14 Land Holding Pattern of Sample Beneficiaries

Description	Beneficiary				Non-Beneficiary		
	Head	Middle	Tail	Total	Command	Non-command	Total
Number of Farmers							
Marginal	15	27	16	58	14	10	24
Small	12	25	9	46	10	15	25
Medium	9	20	8	37	8	10	18
Large	4	8	7	19	0	5	5
Total	40	80	40	160	32	40	72
Area Distribution (Acres)							
Marginal	20.7	25.2	25.0	70.8	16.4	17.0	33.4
Small	41.0	91.1	28.0	160.1	30.6	49.5	80.1
Medium	53.0	122.5	48.0	223.5	55.5	64.5	120.0
Large	48.0	123.0	163.0	334.0	0.00	56.0	56.0
Total	162.7	361.8	264.0	788.4	102.5	187.0	289.5
Average Size of Land (acre)	4.07	4.52	6.60	4.93	3.20	4.68	4.02
Average size of Irrigated Land (acre)	3.49	3.99	5.86	4.33	2.54	3.16	2.89
Percentage Irrigated Area	88.52	90.41	79.91	87.21	70.0	74.3	72.4

Living Status of Sample Beneficiaries

Living status of sample households have been analyzed in respect to type of house, source of drinking water, availability of latrine, source of light and use of cooking fuel (Table 9.15).

Type of House: Most of the houses of the respondents are kaccha houses 44.7% and 56.9% of beneficiary and non-beneficiary.

Source of Drinking Water: Community hand-pump is the most frequently used source of drinking water among beneficiary and non-beneficiary households. However, 18.9% beneficiary households use owned hand-pumps for drinking water whereas 28.2% non beneficiary households get their drinking water from other sources.

Latrine room in House: Sanitation is a big problem, this could be easily verified from the percentage of non-availability of Latrine room in both beneficiary (67.9%) and non-beneficiary (73.9%) households.

Source of Lighting in House: Non availability of electricity has badly affected the personal and commercial life of farmers. Percentage of beneficiary households using Electricity is 29.6%, whereas none of the non beneficiary household use electricity, for lighting. Most of the beneficiary and non-beneficiary households use other indigenous methods of lighting their house.

Type of Cooking Fuel: Farmers in command and non-command area are heavily dependent on natural resources. Fire wood is used for cooking by 94.3% of beneficiary and 97.2% of non-beneficiary.

Table 9.15: Living Status of Sample Beneficiary & Non-Beneficiary

	Beneficiary								Non-Beneficiary							
	Head		Middle		Tail		Total		Command		Non-command		Total			
	N	%	N	%	N	%	N	%	N	%	N	%	N	%		
Type of House																
Pacca	11	27.5	19	24.1	13	32.5	43	27.0	8	25.0	8	20.0	16	22.3		
Kaccha	22	55.0	28	35.4	21	52.5	71	44.7	20	62.5	21	52.5	41	56.9		
Semi-Pacca	7	17.5	32	40.5	6	15.0	45	28.3	4	12.5	11	27.5	15	20.8		
Total	40	100.0	79	100.0	40	100.0	159	100.0	32	100.0	40	100.0	72	100.0		
Source of Drinking Water																
Tap water	1	2.5	6	7.6	1	2.5	8	5.0	2	6.5	2	5.0	4	5.6		
Owned hand-pump	7	17.5	14	17.7	9	22.5	30	18.9	5	16.1	4	10.0	9	12.7		
Community hand-pump	28	70.0	51	64.6	23	57.5	102	64.2	11	35.5	26	65.0	37	52.1		
Wells	0	0.0	2	2.5	0	0.0	2	1.3	0	0.0	1	2.5	1	1.4		
Others	4	10.0	6	7.6	7	17.5	17	10.6	13	41.9	7	17.5	20	28.2		
Total	40	100.0	79	100.0	40	100.0	159	100.0	31	100.0	40	100.0	71	100.0		

Contd ...

Table 9.15: Living Status of Sample Beneficiary & Non-beneficiary (Contd ...)

	Beneficiary								Non-Beneficiary					
	Head		Middle		Tail		Total		Command		Non-command		Total	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Latrine room in Home														
Yes	8	20.0	23	29.1	20	50.0	51	32.1	9	30.0	9	23.1	18	26.1
No	32	80.0	56	70.9	20	50.0	108	67.9	21	70.0	30	76.9	51	73.9
Total	40	100.0	79	100.0	40	100.0	159	100.0	30	100.0	39	100.0	69	100.0
Source of Lighting in House														
No lighting	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Kerosene	5	12.5	4	5.1	0	0.0	9	5.7	3	9.4	0	0.0	3	4.2
Electricity	10	25.0	27	34.2	10	25.0	47	29.6	0	0.0	0	0.0	0	0.0
Other	25	62.5	48	60.7	30	75.0	103	64.7	29	90.6	40	100.0	69	95.8
Total	40	100.0	79	100.0	40	100.0	159	100.0	32	100.0	40	100.0	72	100.0
Type of Cooking Fuel														
Fire wood	39	97.5	74	93.6	37	92.5	150	94.3	32	100.0	38	95.0	70	97.2
Cool/ coke	0	0.0	1	1.3	0	0.0	1	0.6	0	0.0	1	2.5	1	1.4
Kerosene	0	0.0	1	1.3	1	2.5	2	1.3	0	0.0	0	0.0	0	0.0
Bio-gas	0	0.0	2	2.5	1	2.5	3	1.9	0	0.0	0	0.0	0	0.0
LPG	1	2.5	0	0.0	1	2.5	2	1.3	0	0.0	1	2.5	1	1.4
Other	0	0.0	1	1.3	0	0.0	1	0.6	0	0.0	0	0.0	0	0.0
Total	40	100.0	79	100.0	40	100.0	159	100.0	32	100.0	40	100.0	72	100.0

2. Impact of AIBP

Impact on Agricultural Production

Farming is the major economic activities among majority of the respondents. The irrigation project has direct impact on cropping pattern, agricultural production and productivity across the agricultural system. Paddy is major crop in the project area cropped on 89.8% and 96.6% area by beneficiaries and non-beneficiaries, followed by gram and wheat. Non-beneficiary farmers are only able to take kharif crop during good rain season. It is interesting to note that beneficiary farmers have comparative more diversified cropping system as compared to non-beneficiary farmers due to availability of irrigation facility in the project villages.

Table 9.16: Cropping Pattern of Sample Beneficiary & Non-beneficiary

(Percent area)

	Beneficiary				Non-Beneficiary		
	Head	Middle	Tail	Total	Command	Non-command	Total
Wheat	5.2	2.6	1.8	2.8	1.1	-	0.4
Paddy	94.2	84.0	96.8	89.8	98.9	95.4	96.6
Arhar	0.6	4.4	0.0	2.4	-	-	-
Gram	0.0	7.0	0.7	3.8	-	4.6	3.0
Masoor	0.0	0.2	0.0	0.1	-	-	-
Sunflower	0.0	1.7	0.7	1.1	-	-	-

Cropping Intensity

The Cropping Intensity is higher in beneficiary area as compared to non-beneficiary farmers'. Beneficiary belonging to head has highest cropping intensity (153.7%) and non-beneficiary farmers of command area have lowest intensity (107.9%). Head land has highest cropping intensity, this shows that availability of permanent irrigation system results in higher crop intensity.

Table 9.17: Cropping Intensity

Description	Beneficiary				Non-Beneficiary		
	Head	Middle	Tail	Total	Command	Non-command	Total
Net Cropped Area (acre)	162.7	361.8	264.0	788.5	102.5	187.0	289.5
Gross Cropped Area (acre)	250.0	503.6	382.0	1135.6	110.6	205.5	316.1
Cropping Intensity (%)	153.7	139.2	144.7	144.0	107.9	109.9	109.2

Productivity of Major Crops

The results presented in Table 9.18 reveal that due to proper irrigation availability the yield of various crops among beneficiary farmers are comparatively higher than the non-beneficiary farmers. Among beneficiaries and non-beneficiaries, Paddy has the highest productivity of 14.3 and 11.5 quintal per acre respectively. Wheat is other major crop with productivity of 5.6 and 4.5 quintals per acre for beneficiaries and non-beneficiaries.

Table 9.18: Productivity of Major Crops

(Quintal per acre)

Crop	Beneficiary				Non-Beneficiary		
	Head	Middle	Tail	Total	Command	Non-command	Total
Wheat	1.0	5.8	6.5	5.6	4.5	-	4.5
Paddy	14.3	12.6	16.9	14.3	12.7	11.1	11.5
Arhar	-	-	-	-	-	-	-
Gram	-	2.8	2.0	2.7	-	2.1	2.1
Masoor	-	-	-	-	-	-	-
Sunflower	-	-	-	-	-	-	-

Market Surplus of Major Crops

The major crop as shown in table 9.19, are Paddy, Wheat and Gram in the command and non-command area of the project. Major proportion of Paddy and Gram are sold in market. Surprisingly only two major crops are grown by non-beneficiaries this indicates scarcity of water.

Table 9.19: Market Surplus of Major Crops

(Percent of total production)

Crop	Beneficiary				Non-Beneficiary		
	Head	Middle	Tail	Total	Command	Non-command	Total
Wheat	50.0	62.9	19.2	44.4	-	-	-
Paddy	71.7	62.5	84.3	72.9	68.5	62.9	64.5
Arhar	-	-	-	-	-	-	-
Gram	-	86.5	-	78.0	-	82.4	82.4
Masoor	-	-	-	-	-	-	-
Sunflower	-	-	-	-	-	-	-

Impact on Migration

The analysis given in Table 9.20 clearly indicates that there is no much difference in migration between beneficiary of the project under AIBP and non-beneficiary households. The average duration of migration per beneficiary farmer turned out only 135 days in a year whereas the corresponding figure for non-beneficiaries is reported as high as 150 days per year due to non-availability of agricultural work at their farms. The season of migration has been observed during Kharif all the categories of sample farmers.

Table 9.20: Status of Migration

	Beneficiary								Non-beneficiary					
	Head		Middle		Tail		Total		Command		Non-command		Total	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%
% of households reported migration		7.5		7.5		0.0		5.6		9.4		0.0		4.2
No. of Person Migrated from a Household														
One person	1	33.3	5	83.3			6	66.7	1	33.3	1	100.0	2	50.0
2-3 person	2	66.7	1	16.7			3	33.3	2	66.7	0	0.0	2	50.0
>3 person		0.0		0.0				0.0		0.0		0.0		0.0
Total	3	100.0	6	100.0			9	100.0	3	100.0	1	100.0	4	100.0
No. of times Migrated by a Person (in a year)														
One time (one crop season)	0	0.0	2	33.3			2	25.0	3	100.0	1	100.0	4	100.0
Two times (two crop season)		0.0		0.0				0.0		0.0		0.0		0.0
Three and/ or more times (all crop season)	2	100.0	4	66.7			6	75.0		0.0		0.0		0.0
Total	2	100.0	6	100.0			8	100.0	3	100.0	1	100.0	4	100.0
Average no. of times	4.8		10.3				8.5		15.0		10.0		13.8	
Reason of Migration														
Employment	2	66.7	3	50.0			5	55.6	3	100.0	1	100.0	4	100.0
Others	1	33.3	3	50.0			4	44.4		0.0		0.0		0.0
Total	3	100.0	6	100.0			9	100.0	3	100.0	1	100.0	4	100.0
Migration Season														
Rabi		0.0		0.0				0.0						
Kharif	0	0.0	3	100.0			3	50.0						
Zaid	2	66.7	0	0.0			2	33.3						
All	1	33.3	0	0.0			1	16.7						
Total	3	100.0	3	100.0			6	100.0						
Duration of Migration by a Person (in a year)														
<120 days	2	66.7	2	40.0			4	50.0	2	66.7	0	0.0	2	50.0
120-240 days	0	0.0	1	20.0			1	12.5						
>240 days	1	33.3	2	40.0			3	37.5	1	33.3	1	100.0	2	50.0
Total	3	100.0	5	100.0			8	100.0	3	100.0	1	100.0	4	100.0
Average no. of days	136.7		134.2				135.0		100.0		300.0		150.0	

Quality of Assets Created under AIBP

Beneficiaries were asked to respond on the maintenance of water outlets and distribution channel, of which more than 88% responded negatively. They were also asked about cemented water outlets in the village, on which total beneficiaries responded negatively. More than 75% beneficiaries also said that the distribution channels in the village were not lined. Ironically when they were asked “have they ever complained about above mention problems in last one year” only few of them responded positively. This shows lack of awareness and willingness among farmers to forward their grievances.

Table 9.21: Quality of Assets Created under AIBP

(Percentage of respondents)

Description		Beneficiary	Total
Properly maintenance of water outlets	Yes	11.1	11.1
	No	88.9	88.9
	Total	100.0	100.0
Complains for maintenance of water outlets in last one year	Yes	23.1	23.1
	No	76.9	76.9
	Total	100.0	100.0
Cemented water outlets in the village	Yes	0.0	0.0
	No	100.0	100.0
	Total	100.0	100.0
Properly maintenance of distribution channels in the village	Yes	23.1	23.1
	No	76.9	76.9
	Total	100.0	100.0
Complains for maintenance of water distribution channels in last one year	Yes	33.3	33.3
	No	66.7	66.7
	Total	100.0	100.0
Lined water distribution channels in the village	Yes	23.1	23.1
	No	76.9	76.9
	Total	100.0	100.0

Conditions of water outlets, distribution channel and canal infrastructure have 2.5, 2.5 and 3.6 points respectively. This indicates the poor condition of the AIBP infrastructure and its maintenance.

Table 9.22: Condition of Water Distribution Structure

Description	Head*	Middle	Tail	Total
Condition of water outlets in the village		2.5		2.5
Condition of water distribution channels in the village		2.5		2.5
Condition of canal infrastructure in the village	4.7	3.1	5.0	3.6

*very good-1,...,very poor-5

Overall Impact Assessment

The overall impact of AIBP scheme on agricultural and socio-economic development of the farmers has been captured through 5 point likert scale response of the sample beneficiaries (Table 9.23); where 1 indicates strong agreement on a particular statement and 5 indicate strong disagreement. Therefore, lower mean scores on a particular statement implied that the project has comparatively better impact. The impact indicators have been divided into two categories i.e. agriculture and socio-economic development. Majority of the farmers of middle end agreed that there has been increase in irrigated area and total agricultural production. However, farmers do not believe that there has been substantial decline in the cost of agricultural production due to AIBP scheme. There is an agreement at middle that there has been an increase in annual income of the farmers. However most of the beneficiary farmers disagree that the migration to the cities has been reduced and on farm employment opportunities have increased. The disturbing trend is the majority of the respondents do not agree that there has been increase in the visit of the government officials after the AIBP. Results from analysis of mean variance indicate that beneficiaries at almost all the locations have different responses on all impact indicators except on increase in the visits of Government officials.

Table 9.23: Overall Impact Assessment*

	Head	Middle	Tail	Total	F	Sig.
Agricultural Development						
Increase in irrigated area	3.23	1.76	4.20	2.74	-	-
Increase in total production	3.33	1.77	4.18	2.77	81.598	0.000
Decline in cost of production	3.25	2.35	4.18	3.04	43.712	0.000
Increase in annual income	3.43	2.05	4.23	2.96	64.495	0.000
Ease in availability of agricultural equipments	3.75	3.24	4.20	3.61	17.695	0.000
Ease in agriculture activities	3.80	3.27	4.33	3.67	19.245	0.000
Increase in the visits of government officials	3.73	3.56	3.78	3.66	1.196	0.305
Decrease in land erosion	3.60	3.16	4.03	3.49	14.815	0.000
Socio-economic Development						
Increase in literacy rate	3.63	3.35	3.93	3.57	8.178	0.000
Increase in non-farm activities	3.75	3.30	3.95	3.58	9.285	0.000
Increase in healthcare services	3.55	3.31	3.83	3.50	5.926	0.003
Decrease in diseases outbreak	3.65	3.27	4.05	3.56	15.936	0.000
Increase in forestation/number of trees	3.75	3.37	4.15	3.66	11.072	0.000
Increase in the quality of agricultural produce	3.78	3.18	4.48	3.65	24.569	0.000
Increase in employment opportunities	3.88	3.41	4.53	3.81	23.092	0.000
Increase in crop rotation	4.53	3.87	4.69	4.24	11.515	0.000
Increase in credit availability	4.53	3.71	4.62	4.14	14.802	0.000
Decrease in pollution	4.30	3.69	4.62	4.08	13.077	0.000
Increase in value of land	4.10	3.16	4.62	3.76	20.286	0.000
Decrease in migration to cities	4.33	3.45	4.56	3.95	18.788	0.000

*strongly agree-1, ..., strongly disagree-5

3. Process of Project Implementation by Irrigation Department

Distribution of water is the most important feature of irrigation system. Most of the respondents reported existence of proper system for water distribution. Despite existence of proper system for water distribution only 35% of the beneficiaries are satisfied with the distribution of the water and say that water is equitably distributed. The figures show that 84.6% beneficiaries believe that no person or group influence the distribution of water. This can be concluded that distribution of water is free from any external influence. Grievance support system seems to be lacking in command area. Most of the beneficiaries got required help from irrigation officials, 39.1% respondents said they got help whenever they asked for any type of help. However, 19.5% respondents reported that they the irrigation department provides all required help. About 20% beneficiary farmers said that they come to know of release of water only when it flows in canal. Another common way to know about water release is to visit irrigation department. This clearly shows that irrigation department does not have any mechanism to communicate water release. Irrigation charges are not paid on time by most of the farmers, 61.6% of farmers reported that they have paid their irrigation charges timely. Most of beneficiary farmers agree to pay extra for assured water supply. About 80% beneficiary farmers at middle are prepared to pay extra charges for assured water supply. This is substantially higher than 60.3% of overall beneficiary which agreed to pay higher charges. This reflects, farmers in middle are most needy of assured water supply.

Table 9.24: Beneficiary's Response on Process of Project Management

	Head		Middle		Tail		Total	
	N	%	N	%	N	%	N	%
Beneficiary response on proper system existence for water distribution	20	54.1	53	67.9	0	0.0	73	53.7
Beneficiary agreeing equitable distribution of water	12	32.4	36	46.8	0	0.0	48	35.6
Beneficiary disagreeing any group influence on the water distribution	34	91.9	59	76.6	22	100.0	115	84.6
Beneficiary response on support from irrigation management system on complain/ask	18	42.9	48	53.9	0	0.0	66	39.1
Beneficiary acquire information about water release through gram panchayat	1	3.7	13	17.3	0	0.0	14	13.7
Beneficiary comes to know only when water flows in the canal	12	44.4	9	12.0	0	0.0	21	20.6
Beneficiary response on timely payment of irrigation charges	11	29.7	44	57.1	1	3.1	56	38.4
Beneficiary willingness to pay extra charges for assured water supply	18	47.4	61	80.3	6	22.2	85	60.3

Chapter - 10

Evaluation of Accelerated Irrigation Benefit Program (AIBP) in Assam

Section 1: State Level Overview

The state of Assam has a predominantly agrarian economy. About 85% of the population of the Assam is dependent on agriculture and allied activities for their livelihood. The net sown area in the State of Assam is 2,734 million hectare, which is approximately 35% of the geographical area of Assam. To meet the rising demand for food and to provide employment to the growing population, it is highly necessary to increase the productivity of agriculture. Interestingly, though Assam receives more rain fall than many other states but irrigation is not well developed in the state. Not only this, distribution of rainfall is not even over the whole year. There are frequent long dry spells during which irrigation is required for sustaining crops. Therefore, to strengthen the irrigation facility and attain higher crop productivity various major, medium and minor irrigation projects have been undertaken in the state. Some of these irrigation projects have already been completed whereas some are ongoing. There are few projects which are at proposal stage.

AIBP assistance has been provided to 11 major and medium size irrigation projects since the year 1996. Out of which seven projects have already been completed. In addition to this, project has also provided assistance to as many as 751 minor irrigation projects (Table 10.1).

Table 10.1: Projects sanctioned under AIBP from 1996 to till date

Sl. No.	Category	Completed	Ongoing
1.	Major	-	-
2.	Medium	-	11
3.	Extension, Renovation and Modernization (ERM)	-	-
4.	Minor Irrigation	-	751
	Total	-	762

Table 10.2: Irrigation Potential created under AIBP upto 2008-09

(Thousand hectare)

Sl. No.	Name of the Project	Potential Created upto March 2006	Potential created during 2006-07	Cumulative Potential Created up to March 2007	Potential created during 2007-08	Potential created during 2008-09	Cumulative Potential Created up to March 2009
1	Pahumara (Andhra Pradesh 1978-80) (c)	9.3000	1.3000	10.6000	1.1510		11.7510
2	Hawaipur LIS (VI) (c)	3.0400	0.0000	3.0400	0.0000		3.0400

Contd ..

Table 10.2: Irrigation Potential created under AIBP upto 2008-09 (Contd...)

(Thousand hectare)

Sl. No.	Name of the Project	Potential Created upto March 2006	Potential created during 2006-07	Cumulative Potential Created up to March 2007	Potential created during 2007-08	Potential created during 2008-09	Cumulative Potential Created up to March 2009
3	Rupahi LIS (Andhra Pradesh 1978-80) (c)	0.2000	0.0000	0.2000	0.0000		0.2000
4	Dhansiri (V)	18.5000	7.5000	26.0000	0.1000	5.0000	31.1000
5	Cham Pamati (VI)	1.4500	0.0000	1.4500	0.5600	1.7950	3.8050
6	Borolia (Andhra Pradesh 1978-80)	1.3000	0.2000	1.5000	0.2000	0.2000	1.9000
7	Kolonga (V) (c)	0.0000	0.0000	0.0000	0.0000		0.0000
8	Burhi Dihang LIS (Andhra Pradesh 1978-80)	1.9250	0.0000	1.9250	0.0000		1.9250
9	Bordikarai (V) (C)	7.2030	0.0000	7.2030	0.0000		7.2030
10	Mod. Of Jamuna Irr.Project (IX)	8.5000	0.0000	8.5000	2.4000	1.8000	12.7000
11	Integrated Irri. Scheme in Kollong Basin (V) (C)	4.4150	0.0000	4.4150	0.0000		4.4150
	Total	55.833	9.0000	64.8330	4.4110	8.7950	78.0390

Information available in table 10.3 below indicate that total Central Assistance (CA)/ released under AIBP during 1996-97 to 2009-10 was Rs. 221.16 crores for the major and medium irrigation projects and Rs. 476.45 crores for minor irrigation projects.

Table 10.3 : Central Assistance (CA)/ Grant released under AIBP during 1996-97 to 2009-10 (As on 13.04.2009)

Sl. No.	Name of Project	Amount (Rs. in crore)							Grant Total	
		1996-97 to 2001-02 Loan	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08		2008-09
Major and Medium Projects										
1	Pahumara (Andhra Pradesh 1978-80) (c)	4.3100			0.075	1.755		1.260	1.89	9.2900
2	Hawaipur LIS (VI) (c)	2.9650	2.0000					0.0000	0.0000	4.9650
3	Rupahi LIS (Andhra Pradesh 1978-80) (c)	0.6550						0.0000	0.0	0.6550
4	Dhansiri (V)	28.8200		2.870				5.290	59.117	96.0970
5	Cham Pamati (VI)	10.8300	2.170	0.733				0.0000	0.0	13.1333

Contd ...

Table 10.3 : Central Assistance (CA)/ Grant released under AIBP during 1996-97 to 2009-10 (As on 13.04.2009) (Contd ...)

Sl. No.	Name of Project	Amount (Rs. in crore)								Grant Total
		1996-97 to 2001-02 Loan	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09	
6	Borolia (Andhra Pradesh 1978-80)	6.9370	2.000			3.6		4.320	6.48	23.3370
7	Kolonga (V) (c)	0.5000						0.000	0.0	0.500
8	Burhi Dihang LIS (Andhra Pradesh 1978-80)	3.7240	0.500					0.000	0.0	4.224
9	Bordikarai (V) (C)	6.7000	0.313						0.000	7.013
10	Mod. Of Jamuna Irr.Project (IX)	0.3750	3.960	4.700		7.245		4.320	15.7626	36.3626
11	Integrated Irri. Scheme in Kollong Basin (V) (C)	10.5000	1.357	1.125				0.0	0.0	12.982
Total (11 Major & Medium Projects)		76.316	12.3	9.428	0.075	12.6	0	15.19	83.2496	209.1586
Minor Irrigation Projects										
1.	6 MI schemes in 1999-2000 (KAAC) (C-6-3/01)	3.0400							0.0	3.040
2.	39 MI schemes (General area) in 2000-01 (C-13-3/07)	4.2570	2.128	2.625	0.000	3.726		2.340	3.5	18.576
3.	5 MI schemes in 2001-2002 (KAAC) (C-4-3/03)	1.1050	0.6243	0.544					0.0	2.2733
4.	5 MI schemes in 2002-03 (KAAC) (C-5-3/04)		0.830	0.544					0.0	1.374

Contd ...

Table 10.3 : Central Assistance (CA)/ Grant released under AIBP during 1996-97 to 2009-10 (As on 13.04.2009) (Contd ...)

Sl. No.	Name of Project	Amount (Rs. in crore)								Grant Total
		1996-97 to 2001-02 Loan	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09	
5.	4 MI schemes in 2002-03 NC hills (C-2-3/04)		0.3915	1.3335					0.0	1.725
6.	24 MI schemes in 2003-04 (KAAC) (C-24-3/06)			4.7270	7.3100				0.000	12.0370
7.	24 MI schemes in 2004-05 (KAAC) (C-24-3/07)				7.9060	11.7178	15.330		0.000	34.9538
8.	11 MI schemes in 2004-05 NC hills				1.639				0.000	1.639
9.	22 MI schemes in 2005-06 (KAAC) (C-22-3/07)					6.8894	7.8100	12.8860	0.000	27.5854
10.	47 MI schemes in 2006-07 (KAAC) (C-14)						7.1285	23.982	5.030	36.1405
11.	10 MI schemes in 2007-048 (KAAC)							16.420	4.900	21.32
12.	92 MI schemes (General area) in 2007-08							6.5200	9.780	16.30
13.	39 New surface MI schemes								28.48	28.48
14.	32 New surface MI schemes (KAAC)								12.15	12.15

Contd ...

Table 10.3 : Central Assistance (CA)/ Grant released under AIBP during 1996-97 to 2009-10 (As on 13.04.2009) (Contd ...)

Sl. No.	Name of Project	Amount (Rs. in crore)								Grant Total
		1996-97 to 2001-02 Loan	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09	
15.	42 New surface MI schemes								30.46	30.46
16.	1 New MI scheme (Karoo Flow Irri. Scheme)								16.94	16.94
17.	85 New surface MI schemes								60.345	60.3450
18.	23 New surface MI schemes 2008-09 (BTC)								10.93	10.93
19.	25 OG New surface MI schemes (KAAC)								25.25	25.25
20.	25 OG New surface MI schemes (KAAC) II nd Installment								19.125	19.1250
21.	9 New surface MI schemes (2008-09)								16.2	16.20
22.	92 OG New surface MI schemes (2008-09)								50.7864	50.7864
23.	89 New surface MI schemes (2008-09)								28.828	28.8280
Total (751 MI Projects)		8.402	3.9738	9.7735	16.855	22.3332	30.2685	62.148	322.7044	476.4584

Completed Projects = Seven

1. Rupahi LIS (Andhra Pradesh 1978-80), 2. Bordikarai (V), 3. Kolonga (V), 4. Hawaipur LIS (VI), 5. Integrated Irri. Scheme in Kollong Basin (V), 6. Pahumara 7. Modernization of Jamuna

Section 2: Dhansiri Major Irrigation Project

1. Salient Features of the Project:

Dhansiri major irrigation project is an ongoing project. This Project is situated in Udalguri district now within jurisdiction of Bodoland Territorial Autonomous District (B.T.A.D.). Prior to June 14, 2004 Udalguri was subdivision of Darrang district of Assam. The project area lies between the river basin of Brahmaputra on the south and the foothills of the Bhutan and Arunachal Himalayas on the north. The district of Darrang and Udalguri is surrounded by Bhutan and Arunachal Pradesh on the north.

Dhansiri Irrigation Project (Major) was originally conceived in the year 1975 and aimed to provide assured irrigation to 41,683 hectare or 68 percent of Gross Cropped Area of the state. Project area is spread over 5 development blocks i.e., Udalguri, Rowta, Kalaigaon, Mazbat and Bechimari under Udalguri Civil Sub-Division. It is a runoff type flow irrigation project. Project proposed construction of head works across the river Dhansiri at Bhairabkund near tri-junction of Assam, Arunachal Pradesh state of India and the Bhutan. The river Dhansiri is a culmination of its two major tributaries i.e., Bhutan hill river 'Jampani' and Arunachal Pradesh hill river 'Bhairabi'. As project fall in territories of different Indian states and the Bhutan, it has serious inter state/international coordination challenges. The Project also has the provision generation of 20 MW hydropower.

Table 10.4 : Salient features of Dhansiri Irrigation Project (Major) Assam

		As originally Approved by Planning Commission in 6/1975	As of now (revised March/2004 price level)
1	Name of the Project	Dhansiri Irrigation Project (Major) Assam	Dhansiri Irrigation Project (Major) Assam
2	Location	Dhansiri	Dhansiri
i	River	Dhansiri	Dhansiri
ii	District	Darrang	Udalguri
iii	Coordination		
	Latitude	26°-53'-20.75"	26°-53'-20.75"
	Longitude	92°-7'-12"	92°-7'-12"
3.	Hydrology		
i	Total catchment area at Dam site	1165.50 Sq km	1165.50 Sq km
ii	Intercepted catchment area	751.10 Sq. Km in Bhutan	751.10 Sq. Km in Bhutan
iii	Net catchment area	414.40 Sq. Km in A.P	414.40 Sq. Km in A.P
iv	Avg. Annual rain fall	3500 mm	3500 mm
v	Avg. Annual rain fall at site	2360.88 mm ³	2360.88 mm ³
		As originally Approved by Planning Commission in 6/1975	As of now (revised March/2004 price level)

Contd ...

Table 10.4 : Salient features of Dhansiri Irrigation Project (Major) Assam (Contd ...)

		As originally Approved by Planning Commission in 6/1975	As of now (revised March/2004 price level)
vi	75% dependable run off	1470.18 mm ³	1470.18 Mm ³
	a) Maximum	104 cumecs	104 cumecs
	b) Minimum	9.80 cumecs	9.80 cumecs
vii	Water requirement on 10 daily basis		
	a) Maximum	50.20 cumecs during August	50.20 cumecs during Aug.
	b) Minimum	2.80 cumecs during march	2.80 cumecs during March
viii	Gross Annual	492 mm ³	492 mm ³
4.	Barrage		
i	Pound Level	RL 210.31 M	RL 210.80 M
ii	Average Level	RL 207.26 M	RL 207.24 M
iii	Crest Level		
	Under Sluice	RL 207.26 M	RL 208.00 M
	River Sluice	RL 207.57 M	RL 208.00 M
iv	High Flood Level	RL 211.15 M	RL 213.41 M
v	Afflux	0.38 M	1.94 M
vi	Maximum Flood Level	RL 211.53 M	RL 215.35 M
vii	Design Flood Level	4250 cumecs	4250 cumecs
viii	Length of Barrage	418.17 M	160.00 M
ix	River Sluice	26 bays of 12.191 M each 316.97 M 25 piers of 1.524 M each 38.10 M	4 bays of 16 M each 64 M 3 piers of 2 M each 6 M
x	Under Sluice	5 bays of 10.06 M each 50.30 M 5 piers of 1.524 M Each 7.62 M Divide Wall =3.05 M Fish Ladder = 2.13 M	2 bays of 16 M each 32 M 1 piers of 2 M = 2 M
xi	Spillway		3 bays of 16 M each 48 M 2 piers of 2 M each 4 M
xii	Divide Wall		2 Nos of 23 M each= 4 M
5	Head Regulator		
i	Location	On Right Flank	On Right Flank
		As originally Approved by Planning Commission in 6/1975	As of now (revised March/2004 price level)
ii	No of bays	5 nos of 3.05 M each = 15.25 M	6 nos of 5 M each = 30.00 M
iii	Piers	4 Piers of 1.52 M each =6.08 M	5 Piers of 1.50 M each =7.50 M
iv	Length	21.33 M	37.05 M

Contd ...

Table 10.4 : Salient features of Dhansiri Irrigation Project (Major) Assam (Contd ...)

		As originally Approved by Planning Commission in 6/1975	As of now (revised March/2004 price level)
v	Pond Level	RL 210.80 M	RL 210.80 M
vi	Crest Level	RL 208.02 M	RL 209.50 M
vii	Design Capacity	57.08 cumecs	68.00 cumecs
6.	Canal System		
i	Length of R.B Canal (Lined)	20 km	21.20 km
ii	Design Discharge	52.70 cumecs	56.63 cumecs
iii	Nos of Branch Canal	5 Nos	5 Nos
iv	Length of Distributaries, Minors and sub-minors	415.615 km	414.41 km
7.	Command Area		
i	G.C.A	60876 Ha.	60876 Ha.
ii	C.C.A	41683 Ha.	41683 Ha.
iii	Annual Irrigation	83366 Ha.	83366 Ha.
iv	Intensity of Irrigation	200%	200%
v	Numbers of village covered 270 Nos.	270	
vi	Length of Main Canal	21.20 KM	
vii	Numbers of sub Canals	5 No.	
viii	Numbers of Distributaries	15	
ix	Numbers of Minors	36	
8.	Financial Aspects		
i	Estimated Cost	Rs. 1583.00 lakhs	Rs. 40124.00 lakh
ii	B.C Ratio	5.10	1.71
iii	Financial return at the end of 10th year after completion.	1.36%	5.266%
iv	Cost per Ha. of Annual Irrigation	Rs. 1899/ Ha.	Rs. 48514/ Ha.

Section 3 : Analysis of Dhansiri Project.

1. Salient Features of Project Progress:

The delay in completion of project has resulted in project cost over run. As a result of this, government has reworked the project cost estimates in September, 2007. . After receiving the second revised project report, a time bound action plan was prepared by the project authorities so that project can be completed by March 2010. However, due to availability of limited working window in the year 2007 -8, no new works could be taken up in the year 2007-08. Actually it was only in the year 2008-09 that some progress could be made. The ethnic violence between communities during August 2008 and October 2008 further hampered the project progress. A natural consequence of this is that till March 2009 only 31,100 ha irrigation potential could be created against the target of 83,366 ha.

Irrigation department is now planning to complete all project related work by March 2010. So far majority of the damaged structures like falls, HPCD etc. have been reconciled and about 75% of the silted canals have been cleared. This progress enabled passing of the canal water across NH 52 and U.T. Road. In the project area alternate sources of supply of potable water are limited. Therefore, canal water is being used by the people for human and animal consumption. Even the Public Health Engineering department drawing canal water for supplying drinking water in the area. Canal water is also being used for pisciculture by the farmers. This water is main source of water for their private fish ponds.

Progress of the project is getting hampered by the lack of coordination between various agencies. For example lack of progress in relocation of inspection bungalow of Arunachal Pradesh have delayed the construction of main canal from 400 ft to 700 ft.

It was informed by the officials involved in project execution that to complete remaining 20% work of the project an amount of Rupees 144.14 crore is required. However, in absence of any background analysis these estimates could not be verified. Department is seeking this fund to minimize risk of damage and erosion by reconstructing the damaged structure like falls, cross-drainage, restoring of damaged canal system, construction of steel plate cladding, construction of silt ejectors, completion of Khowrang Aqueduct etc. and to complete the entire project work by March-2010, so as to target of 83,366 ha irrigation potential development (Table 10.4).

2. Present Stage of Dhansiri Project

Visit of the project site and field study of the project revealed that there is urgent need for construction of steel plate cladding over damaged crest of barrage to maintain pond level and to supply main canal design discharge of 5600 cumec through the main canal. So far overall physical progress achieved in the project is about 80%.

The sub-head wise physical progress of project components is as follows:

- a. Head Work : 89%
- b. Main and Branch Canal : 98.75%
- c. Distributors : 77%

Table 10.5 : Present Stage of Dhansiri Irrigation Project

Sl. No.	Parameters	Design Stage	At Completion	Present
1 (a)	Length of Main Canal (km)	21.60	21.60	21.30
1 (b)	Lined Main Canal (km)	21.60	21.60	21.30
2 (a)	Length of Branch Canal (km)	102.67	102.67	101.40
2 (b)	Lined Branch Canal (km)	15.08	15.08	14.02
3 (a)	Length of Distributaries (km)	156.23	156.23	121.00
3 (b)	Lined Distributaries (km)	-	-	-
4 (a)	Length of Minors (km)	258.18	258.18	208.18
4 (b)	Lined Minors (km)			
5 (a)	Length of Sub-Minors (km)			
5 (b)	Lined Sub Minors (km)			

3. Potential Irrigated Area and Actual Irrigated Area

In terms of coverage of command area, progress is very slow as only about 40 percent potential area has been created so far (Table 10.6)

Table 10.6 : Command Area (Potential Irrigated Area)

Season	Potential Irrigated Area		
	Design Stage	At completion	Present
Kharif	41683 Ha	41683 Ha	15550 Ha
Rabi	41683 Ha	41683 Ha	15550 Ha
Other	-	-	-
Total	83366 Ha	83366 Ha	31100 Ha

Year wise review of progress of irrigation potential created under the project reveals that the progress of the project has been very slow between April 1996 and July 2009 as during this period only 16100 hectare additional irrigation potential has been created (Table 10.7).

Table 10.7 : Year wise Potential Created from March 1996 till date

Sl. No.	During Year	Potential Creation in Ha
1.	Upto 3/96	15000
2.	1996-97	-
3.	1997-98	1500
4.	1998-99	3500
5.	1999-2000	5000
6.	2000-2001	250
7.	2001-2002	750
8.	2002-2003	-
9.	2003-2004	-
10.	2004-2005	-
11.	2005-2006	-
12.	2006-2007	-
13.	2007-2008	100
14.	Till date	31100

Table 10.8 : Actual Gross Irrigated Area

(In hectare)

Year	Actual Gross Irrigated Area (hectare)		
	Kharif	Rabi	Other
2002-03	1030	-	-
2003-04	1484	-	-
2004-05	1970	-	-
2005-06	1540	200	-
2006-07	3000	748	-
2007-08	2940	359	-
2008-09	2700	110	-

A close look of information available in table 10.8 above clearly indicates that area under rabi crops is very low. Sufficiency of irrigation water during rabi season appears reason for this. The potential of growing crop during rabi season is lost due to breaches of canal embankment and damage of canal structures because of flood and there by missing link in created potential.

4. Possible Reasons for Gap in Irrigation Potential Creation and its Utilization

Review of data presented in table 10.9 below indicate that there is hardly any change in cropping pattern then envisaged in the project design. Water is not available in sufficient quantity in the canal.

Table 10.9: Possible reasons for gap in irrigation potential creation and its utilization

Sl. No.	Factor	Approximate loss in Irrigation Potential Created
1.	Change in cropping pattern then envisaged in the project design	Marginal change in cropping pattern
2.	Less water inflow received in the dam	Yes
3.	Change in water allocation for non irrigation purpose (for example drinking water, industrial purpose or environmental purposes)	Very small. There is only one stance where water allocation for non irrigation purpose is being done
4.	Condition of the main canal & distribution system is not hydro logically fit	-
5.	Non existence/improper maintained water distribution and field channels	-
6.	Loss of command area due to urbanization or soil salinity or water logging)	Nil
7.	Unauthorized utilization of water by farmers	Very rare
8.	Encroachment of area under field channels	Nil
9.	Any other (please specify)	4650 Ha Loss due to poor maintenance of canal system and non completion of linking structure along with lack of awareness. Farmers are reluctant for Rabi crops.

5. Head Water Discharge (cubic meter per second):

The designed discharge of the canal is 56.63 cumecs (table 10.10). However, as of now water discharge is much below the level of water discharge planned at the design stage of the project.

Table 10.10: Head Water Discharge (2002-03 to 2008-09)

(cubic meter per second)

Month/ Year	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09
January	3.650	4.105	3.098	3.669	3.994	3.768	2.144
February	3.611	5.624	4.212	3.940	3.107	3.764	3.334
March	5.440	5.182	5.237	3.124	3.642	4.586	3.167
April	5.525	5.920	6.166	3.815	4.253	4.794	3.881
May	9.420	7.624	5.503	4.101	6.317	5.607	6.102

Contd ...

Table 10.10: Head Water Discharge (2002-03 to 2008-09) (Contd ...)

(cubic meter per second)

Month/ Year	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09
June	7.455	5.453	5.557	4.709	5.776	6.373	6.094
July	5.121	6.586	6.424	5.245	7.588	7.073	6.022
August	5.417	5.392	8.566	5.936	8.030	5.784	6.241
September	8.276	5.630	6.525	6.126	9.258	5.984	6.229
October	9.149	5.798	5.102	6.272	6.473	3.992	4.766
November	6.964	4.050	4.691	3.573	3.836	2.889	3.440
December	4.103	3.774	3.923	3.869	3.954	1.992	2.895

6. Status of Outlets For Water Distribution and Availability of Canal Water:

Information available in table 10.11 below indicate that only about 84% irrigation outlets are functioning properly. B1M branch has maximum number of damaged outlets.

Table 10.11: Status of Outlets for Water Distribution

Sl. No.	Name of the branch canal	Total Outlets			Closed outlets	Damaged outlets	Outlets in proper condition
		Design stage	At completion	At present			
1.	M/Canal	-	-	10	-	-	10
2.	B1M	93	93	20	-	8	12
3.	B2M	91	91	7	-	-	7
4.	B3M	79	79	15	-	-	15
5.	B4M	39	39	-	-	-	-
6.	B5M	58	58	-	-	-	-
	Total	360	360	52	-	8	44

Review of data for number of days water is available in main canal reveals that water is available in main canal virtually round the year (Table 10.12). However, quantity of water is very less when compared with the project plan. Majority of outlets which were visited by the team member are functional (Table 10.11) even though response of beneficiary farmers about quality of asset was not very positive.

**Table 10.12 : Operation of the Canal (number of days)
Month wise 2002-03 - 2008-09**

Month/ Year	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09
January	31	31	28	31	31	31	26
February	28	28	29	28	28	28	29
March	31	31	31	31	31	31	31
April	30	30	30	30	30	30	30
May	31	31	25	31	31	31	31
June	30	29	30	30	30	30	30
July	25	22	31	31	31	28	31
August	31	30	30	30	31	30	31
September	30	30	30	30	30	30	30
October	31	31	31	31	31	26	26
November	30	30	30	29	30	23	24
December	31	31	31	31	31	30	31

7. Expenditure from AIBP Funds

AIBP assistance has been used for expansion of irrigation system (10.13). In last seven years little over Rs. 41 lakh have been spent on capital expenditure.

Table 10.13 : Total expenditure from AIBP Funds during Last Seven Years

Year	Salary & compensation for regular staff	Wage bill for contractual staff	Travel conveyance and stationeries	Other recurring office expenses	Capital expenditure	
					Expansion of irrigation system	Creation of other assets
2002-03	-	-	-	-	5.30	-
2003-04	-	-	-	-	0.71	-
2004-05	-	-	-	-	2.38	-
2005-06	-	-	-	-	0.36	-
2006-07	-	-	-	-	2.10	-
2007-08	-	-	-	-	12.77	-
2008-09	-	-	-	-	17.45	-
Total					41.07	

The amount of revenue collected is far below the expected revenue amount (table 10.14). One of the reasons for this may be lesser supply of water but the main reason is the law and order problem, due to which the officials do not go for collection of revenue in the disturbed areas.

Table 10. 14 : Annual revenue from the irrigation (2002-03 to 2008-09)

Year	Assessed Revenue (Rs. Lakh)	Actual Revenue collected (Rs. Lakh)
2002-03	3.06	0.15
2003-04	4.41	0.05
2004-05	5.86	0.075
2005-06	4.58	0.12
2006-07	8.91	0.165
2007-08	8.74	0.165
2008-09	8.02	0.08

8. Staffing Pattern

There is acute shortage of staff at the Assistant Engineer and Junior Engineer level. Lack of skilled staff is also causing delay in the completion of the project.

Table 10.15 : Staff Position

Designation	Required	Sanctioned	Presently working
Executive Engineer	3	3	3
Asstt. Executive Engineer	9	9	8
Assistant Engineer	17	17	9
Junior Engineer	30	30	9

9. Constraints in Implementation of AIBP Scheme

- Law and order situation in and around the project site is the main hurdle in implementing the project.
- Flow of fund in proper time is also another hurdle in implementation of the project.
- Shortage of technical manpower also a setback to progress of work.

Suggestions for Implementation of AIBP Scheme

- a. Timely flow of fund.
- b. Posting of adequate nos. of technical persons in respect of work load.
- c. Improvement of law and order situation.

Section 4 : Impact of AIBP

1. Distribution of Sample and its Profile

For capturing project impact a customized sampling design was developed. For the study sample respondents were drawn from all three impact zone areas ie., farmers located in head, middle and tail zones of irrigation canal. Study is based on detailed study of information obtained from 156 farmers located in 16 villages. To distill impact of project a control sample of 61 farmers spread in 17 villages was obtained (Table 10.16)

Table 10.16 : Distribution of Sample beneficiary & non-beneficiary

Location in the Canal	No. of villages	Number of Beneficiaries/ non beneficiary
Beneficiary		
Head	4	39
Middle	8	79
Tail	4	38
Total	16	156
Non-beneficiary		
Command	13	21
Non-command	4	40
Total	17	61

2. Social Profile of Sample

A close look of profile of the farmers presented in the table 10.17 below indicate that farmers from socially marginalized and vulnerable groups such as OBC and Scheduled Tribes (ST) have benefited from the project activities across the project zones. This can be attributed to the fact these groups have more concentration in remote rural areas. Location wise farmers from OBC communities are relatively better placed than their Scheduled Tribe (ST) counterparts who are located in tail zones of the canal system.

Table 10.17 : Social Profile of Sample Beneficiaries

	Beneficiary								Non-beneficiary					
	Head		Middle		Tail		Total		Command		Non-command		Total	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%
General	0	0.0	3	3.8	0	0.0	3	1.9	1	4.8	5	12.5	6	9.9
Other Backward Class	19	48.7	32	40.5	3	7.9	54	34.6	6	28.6	5	12.5	11	18.0
Scheduled Caste	1	2.6	1	1.3	5	13.2	7	4.5	1	4.8	0	0.0	1	1.6
Scheduled Tribe	19	48.7	43	54.4	30	78.9	92	59.0	13	61.8	29	72.5	42	68.9
Other									0	0.0	1	2.5	1	1.6
Total	39	100.0	79	100.0	38	100.0	156	100.0	21	100.0	40	100.0	61	100.0

3. Land Holding Pattern

Analysis of land holding pattern indicates that most of the beneficiaries are small and marginal farmers (Table 10.18). This can be also attributed to the fact that in project area most of the farmers belong to these groups. A close look of information reveals that beneficiary farmers have almost all crop area under assured irrigation (97.67 %) facilities whereas in case of non beneficiary farmers it is 16.7 % and 57.9 % for farmers located in command and non command area respectively.

Table 10.18 : Land Holding Pattern of Sample

Description	Beneficiary				Non-beneficiary		
	Head	Middle	Tail	Total	Command	Non-command	Total
1. Average Size of Land (acre)	3.12	4.02	3.13	3.58	2.93	4.03	3.65
2. Average size of Irrigated Land (acre)	2.96	3.98	2.72	3.42	0.33	2.32	1.64
3. Percentage irrigated area	98.02	99.30	94.06	97.67	16.7	57.9	43.7

4. Economic Status of Sample

Beneficiaries in the project area are poor and have very poor resource (table 10.19). This can be gauged from the fact that more than 90 % farmers in the project area have Kachha houses, about 60 % of them do not have access to proper drinking water, and living in unhygienic environment. Majority of them use wells for drinking water. 80% of beneficiaries and non-beneficiaries do not have toilets in their houses. More than 90% farmers use fire-wood for cooking purpose.

Table 10.19 : Economic Status of Sample

	Beneficiary								Non-Beneficiary					
	Head		Middle		Tail		Total		Command		Non-command		Total	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Type of House														
Pacca	0	0.0	6	7.6	3	7.9	9	5.8	1	4.8	1	2.5	2	3.3
Kaccha	36	92.3	66	83.5	23	60.5	125	80.1	15	71.4	35	87.5	50	82.0
Semi-Pacca	3	7.7	7	8.9	12	31.6	22	14.1	5	23.8	4	10.0	9	14.7
Total	39	100.0	79	100.0	38	100.0	156	100.0	21	100.0	40	100.0	61	100.0
Source of Drinking Water														
Tap water	1	2.6	1	1.3	0	0.0	2	1.3	0	0.0	0	0.0	0	0.0
Owned hand-pump	10	25.6	18	22.8	20	54.1	48	31.0	11	52.4	10	25.0	21	34.4
Community hand-pump	8	20.5	5	6.3	1	2.7	14	9.0	0	0.0	2	5.0	2	3.3
Wells	20	51.3	55	69.6	15	40.5	90	58.1	10	47.6	28	70.0	38	62.3
Others	0	0.0	0	0.0	1	2.7	1	0.6						
Total	39	100.0	79	100.0	37	100.0	155	100.0	21	100.0	40	100.0	61	100.0
Latrine Room in Home														
Yes	5	12.8	15	19.0	11	29.7	31	20.0	6	28.6	6	15.0	12	19.7
No	34	87.2	64	81.0	26	70.3	124	80.0	15	71.4	34	85.0	49	80.3
Total	39	100.0	79	100.0	37	100.0	155	100.0	21	100.0	40	100.0	61	100.0
Source of Lighting in House														
No lighting	4	10.3	0	0.0	2	5.3	6	3.8	2	9.5	7	17.5	9	14.8
Kerosene	26	66.6	41	51.9	12	31.6	79	50.6	5	23.8	25	62.5	30	49.2
Electricity	8	20.5	38	48.1	23	60.5	69	44.3	14	66.7	7	17.5	21	34.4
Other	1	2.6	0	0.0	1	2.6	2	1.3	0	0.0	1	2.5	1	1.6
Total	39	100.0	79	100.0	38	100.0	156	100.0	21	100.0	40	100.0	61	100.0
Type of Cooking Fuel														
Leave/ straw	0	0.0	2	2.5	0	0.0	2	1.3						
Fire wood	37	94.8	70	88.6	36	97.3	143	92.3	20	95.2	39	97.5	59	96.7
Cool/ coke	0	0.0	2	2.5	1	2.7	3	1.9	0	0.0	0	0.0	0	0.0
Bio-gas	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
LPG	1	2.6	5	6.4	0	0.0	6	3.9	1	4.8	1	2.5	2	3.3
Electricity	1	2.6	0	0.0	0	0.0	1	0.6	0	0.0	0	0.0	0	0.0
Total	39	100.0	79	100.0	37	100.0	155	100.0	21	100.0	40	100.0	61	100.0

5. Cropping Pattern

Paddy is the most important crop for beneficiaries as well as non-beneficiaries farmers irrespective of their location in the command and non command area of the canal (Table 10.20). Thus, the cropping pattern is at par with the access to irrigation water.

The cropping intensity across the beneficiaries and non-beneficiaries farmers has been calculated and the same has been reproduced in Table 10.17. The cropping intensity is similar among the beneficiaries and non-beneficiaries farmers at all locations. No

significant difference is seen in the cropping intensity figures between the beneficiaries and non-beneficiaries.

Table 10.20 : Cropping Pattern of Sample Farmers

(Percent area)

Crop	Beneficiary				Non-Beneficiary		
	Head	Middle	Tail	Total	Command	Non-command	Total
Wheat	3.3	0.6	8.7	3.0	1.5	0.0	0.5
Paddy	95.0	98.6	73.6	92.1	81.5	100.0	93.6
Arhar	0.0	0.0	13.6	3.1	-	-	-
Gram	0.0	0.0	0.0	0.0	-	-	-
Maize	1.7	0.6	0.0	0.7	0.8	0.0	0.3
Potato	0.0	0.0	1.7	0.4	14.6	0.0	5.0
Vegetables	0.0	0.2	0.8	0.3	1.5	0.0	0.5
Jute	0.0	0.0	1.5	0.3	-	-	-

Cropping Intensity

A close look of data presented in table 10.21 below indicate that development of irrigation has positive impact on intensity of land use. Due to project activities cropping intensity has increased from 81 % to 105 %. Irrigation has facilitated use of even that land which earlier farmers were unable to cultivate due to absence of irrigation facilities.

Table 10.21 : Cropping Intensity

(Quintal per acre)

Description	Beneficiary				Non-Beneficiary		
	Head	Middle	Tail	Total	Command	Non-command	Total
Net Cropped Area (acre)	121.8	317.4	118	557.2	61.43	160.25	221.68
Gross Cropped Area (acre)	133.4	335.2	124.9	593.5	63.93	160.5	224.43
Cropping Intensity (%)	109.5	105.6	105.8	106.5	104.1	100.2	101.2

6. Total Income of the Sample Household

Majority of the farmers, whether beneficiary or non-beneficiary, falls under the annual income range of Rs. 25,000 to 50,000. About 26% farmers fall in the income group of Rs. 50,000 to Rs. 1 lac. The analysis of income data indicates the subsistence nature of agriculture in this area. In the project area less than 5% of the sample farmers are able to earn an income of more than Rs. 2.0 lacs per annum.

Table 10.22 : Total Income of the Household

Income	Beneficiary								Non-Beneficiary					
	Head		Middle		Tail		Total		Command		Non-command		Total	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Below Rs. 10000	0	0.0	0	0.0	1	2.6	1	0.6	0	0.0	2	5.0	2	3.3
Rs. 10,000 to Rs. 25,000	5	12.8	6	7.6	4	10.5	15	9.6	5	23.8	11	27.5	16	26.2
Rs. 25,000 to Rs. 50,000	24	61.5	34	43.0	18	47.5	76	48.7	7	33.3	18	45.0	25	41.0
Rs. 50,000 to Rs. 1,00,000	9	23.1	23	29.1	11	28.9	43	27.6	7	33.3	8	20.0	15	24.6
Rs. 1,00,000 to Rs. 2,00,000	1	2.6	9	11.4	3	7.9	13	8.4	1	4.8	1	2.5	2	3.3
Rs.2,00,000 and above	0	0.0	7	8.9	1	2.6	8	5.1	1	4.8	0	0.0	1	1.6
Total	39	100.0	79	100.0	38	100.0	156	100.0	21	100.0	40	100.0	61	100.0

7. Status of Migration

Study tried to assess the impact of project activities on level of migration in the project area. Results of the study on migration of farmers from project area reveal that little over 10 percent beneficiary farmers are migrating from project area. Contrary, level of migration for non beneficiary farmers is slightly less. In non beneficiary farmer category on an average one person migrates from each family, whereas in case of beneficiary farmers' category migration problem is more serious. Both short term and long term migration is prevalent in the project area (table 10.23).

Table 10.23 : Status of Migration

Description	Beneficiary				Non-Beneficiary		
	Head	Middle	Tail	Total	Command	Non-command	Total
No. of person migrated	1.0	1.3	1.0	1.2	1.0	1.0	1.0
No. of times migrate in a year	1.5	1.0	2.3	1.4	1.5	1.5	1.5
Reason of migration ¹	1.0	1.6	1.7	1.5	1.0	1.5	1.3
Duration of migration in a year (days)	75.0	324.4	123.7	239.7	75.0	136.8	116.2
Migration season ²	1.0	1.9	1.3	1.6	1.0	1.3	1.2

¹ Employment-1, Others-2

² Rabi-1, Kharif-2, Zaid-3, Others-4/mix

8. Quality of Assets Created under AIBP

The results of analysis of related to quality of assets created under AIBP has been presented in Table 10.24. Findings of the study indicate that majority of the beneficiaries feel that maintenance of water outlets is very poor. The response is uniform across the farmers irrespective of their location on canal. About 80% respondents told that water outlets have not been cemented. Only 11% farmers were found having positive opinions about quality of maintenance of distribution canal. More than 95% of all the respondents were of the opinion that water distribution channels have not been lined properly in the command area.

Table 10.24 : Quality of Assets Created under AIBP

(Percentage of respondents)

Description		Head	Middle	Tail	Total	Chi-Square	Sig.
Properly maintenance of water outlets	Yes	15.4	5.1	5.3	7.7	4.335	0.114
	No	84.6	94.9	94.7	92.3	.	
	Total	100.0	100.0	100.0	100.0		
Complains for maintenance of water outlets in last one year	Yes	45.9	40.3	42.4	42.3	0.322	0.851
	No	54.1	59.7	57.6	57.7		
	Total	100.0	100.0	100.0	100.0		
Cemented water outlets in the village	Yes	28.2	11.5	21.1	18.1	5.183	0.075
	No	71.8	88.5	78.9	81.9		
	Total	100.0	100.0	100.0	100.0		
Properly maintenance of distribution channels in the village	Yes	20.5	8.9	5.3	10.9	5.293	0.071
	No	79.5	91.1	94.7	89.1		
	Total	100.0	100.0	100.0	100.0		
Complains for maintenance of water distribution channels in last one year	Yes	66.7	32.1	55.3	46.5	14.096	0.001
	No	33.3	67.9	44.7	53.5		
	Total	100.0	100.0	100.0	100.0		
Lined water distribution channels in the village	Yes	5.1	3.8	2.7	3.9	0.299	0.861
	No	94.9	96.2	97.3	96.1		
	Total	100.0	100.0	100.0	100.0		

The response of the farmers related to condition of water distribution structure was obtained on a 5 point scale. Response analysis indicate that condition of water distribution is slightly better than average (with a score of more than 3) of all the water distribution structures in the village (Table 10.25). This observation was reconfirmed during focus group discussion with the farmers in the selected villages. The major response in the focus group discussion was that the water does not reach to all the areas in the villages and the condition of the field channel needs to be improved.

Table 10.25 : Condition of Water Distribution Structure*

	Head	Middle	Tail	Total
Condition of water outlets in the village	3.6	3.5	3.6	3.5
Condition of water distribution channels in the village	3.4	3.3	3.7	3.4
Condition of canal infrastructure in the village	3.4	3.3	3.6	3.4

*very good-1,...,very poor-5

9. Overall Impact Assessment of AIBP

The overall impact of AIBP scheme on agricultural in particular and socio-economic development of the farmers in general has been captured through 5 point scale response of the sample beneficiaries (Table 10.26). Results of the data presented in table below indicate that majority of the farmers do not see any significant increase in irrigated area and total agricultural production. Farmers do not believe that there has been decline in the cost of agricultural production due to AIBP scheme. Overall farmers do not agree that there has been an increase in their income due to project activities. Neither project had any positive impact on prices of agricultural land nor it could reduce migration to the cities. All other impact parameters such as cropping intensity, crop productivity and market surplus remain unaffected

Table 10.26 : Overall Impact Assessment of AIBP*

	Head	Middle	Tail	Total	F	Sig.
Agricultural Development						
Increase in irrigated area	3.21	3.23	3.42	3.27	0.900	0.409
Increase in total production	3.64	3.43	3.53	3.51	0.941	0.393
Decline in cost of production	3.85	3.85	3.68	3.81	0.634	0.532
Ease in availability of agricultural equipments	3.79	3.52	3.89	3.68	3.946	0.021
Ease in agriculture activities	3.65	3.53	3.92	3.65	3.191	0.044
Increase in the visits of government officials	3.95	3.89	4.11	3.96	1.189	0.307
Decrease in land erosion	3.64	3.58	3.76	3.64	1.258	0.287
Increase in the quality of agricultural produce	3.62	3.23	3.82	3.47	6.661	0.002
Increase in crop rotation	3.59	3.39	3.84	3.55	8.167	0.000
Socio-economic Development						
Increase in literacy rate	3.55	3.52	3.68	3.57	0.978	0.378
Increase in non-farm activities	3.67	3.49	3.89	3.63	4.569	0.012
Increase in healthcare services	3.51	3.61	3.78	3.63	1.869	0.158
Increase in annual income	3.62	3.37	3.84	3.54	4.108	0.018
Decrease in diseases outbreak	3.63	3.62	3.84	3.68	1.360	0.260
Increase in forestation/number of trees	3.62	3.53	3.76	3.61	1.201	0.304
Increase in employment opportunities	3.69	3.53	3.84	3.65	2.628	0.075
Increase in credit availability	3.69	3.22	3.95	3.51	8.779	0.000
Decrease in pollution	3.69	3.34	4.03	3.60	9.282	0.000
Increase in value of land	3.68	3.25	4.00	3.54	9.617	0.000
Decrease in migration to cities	3.87	3.57	3.97	3.74	5.617	0.004

*strongly agree-1,....., strongly disagree-5

Section 5 : Process of Implementation of Project

The overall beneficiary perception about quality of project process has been presented in table 10.27. Farmers perception about the effectiveness of irrigation system reveals that about majority of farmers (74 %) feel that a proper water distribution system is

functioning in project area. Whereas about 70 % farmers feel that water is being distributed equitably. 32 percent farmers feel that project did not help them. Communication process for dissemination of information of water release in the canal is not very effective. Results of the study indicates that majority of farmers (64%) do not have information about timings of release of water in the canal. Due recovery process of the irrigation charges is not very effective as 65 % farmers are not making irrigation charges. This number is as high as 96 % for the farmers located in tail end of canal. In general farmers are willing to pay for irrigation if it is assured. Findings of the study indicate that 83 % farmers are willing to pay for timely assured irrigation facility.

Table 10.27 : Beneficiary's Response on Process of Project Management

	Head		Middle		Tail		Total	
	N	%	N	%	N	%	N	%
Beneficiary response on proper system existence for water distribution	28	71.8	59	74.7	28	75.7	115	74.2
Beneficiary agreeing equitable distribution of water	29	74.4	54	68.4	26	68.4	109	69.9
Beneficiary disagreeing any group influence on the water distribution	37	100.0	73	93.6	37	100.0	147	96.7
Beneficiary response on non-support from irrigation management system	16	41.0	17	21.5	17	44.7	50	32.1
Beneficiary comes to know only when water flows in the canal	19	48.7	56	70.9	25	65.8	100	64.1
Beneficiary acquire information about water release through WUA	13	33.3	5	6.3	7	18.4	25	16.0
Beneficiary response on timely payment of irrigation charges	26	74.3	15	25.0	1	4.0	42	35.0
Beneficiary willingness to pay extra charges for assured water supply	34	94.4	60	87.0	15	57.7	109	83.2

Chapter - 11

Evaluation of Accelerated Irrigation Benefit Program (AIBP) in Tripura

Section 1: State Level Overview

Tripura is one of the seven northeastern states of India. Tripura shares about 84 % of its boundaries with Bangladesh. State of Mizoram makes eastern side boundary of Tripura. The economy of Tripura is predominantly agrarian as 64 % people of the state are engaged in agricultural activities. Contribution of Agriculture sector in GDP of state is about 48%.

Tripura experiences average annual rain fall of about 2500 mm. The rainfall is evenly distributed across the state. State has moderately high hills, hillocks and intermittent narrow to moderately flat valleys which are suitable for horticulture and plantations crops such as Pineapple, Oranges, Cashew nut, Jackfruit, Coconut, Tea, Rubber, Forest , Plantations etc. The net sown area in the state is only 281000 hectare, which is approximately 27% of the geographical area of Tripura. As agriculture is the major employment provider in the state, it is critical to increase the pace of irrigation development in the state as it can improve productivity of crops and maximize welfare of the people of the state.

AIBP assistance has been provided to three medium size irrigation projects since the year 1996. In addition to this project has also provided assistance to as many as 1236 minor irrigation projects (Table 11.1).

Table 11.1: Projects sanctioned under AIBP from 1996 to till date

Sl. No.	Category	Completed	Ongoing
1.	Major	-	-
2.	Medium	-	3
3.	Extension, Renovation and Modernization (ERM)	-	-
4.	Minor Irrigation	-	1236
	Total	-	1239

The year-wise irrigation potential created under AIBP assisted projects has been presented in table 11.2. It can be seen that up to March 2009 13 thousand hectares, irrigation potential has been created under AIBP.

Table 11.2: Irrigation Potential created under AIBP upto 2008-09 (31st March)

(Thousand heactare)

Sl. No.	Name of the Project	Potential Created upto March 2006	Potential created during 2006-07	Cumulative Potential Created upto March 2007	Potential created during 2007-08	Potential created during 2008-09	Cumulative Potential Created up to March 2009
1	Gumti (V)	3.9800	0.0000	3.9800	0.1240	0.8560	4.9600
2	Manu (VI)	2.3500	0.0000	2.3500	0.4000	1.8120	4.5620
3	Khowai (VI)	2.4800	0.0000	2.4800	0.5200	1.3600	4.3600
	Total	8.8100	0.0000	8.8100	1.0440	4.0280	13.8820

Central Assistance (CA)/ Grant released under AIBP during 1996-97 to 2009-10 has been to the tune of Rs. 73 crore for the medium irrigation projects. Whereas, Rs.152 crore has been released for execution of 1236 minor irrigation projects (Table 11.3).

Table 11.3 (A) : Central Assistance (CA)/ Grant released under AIBP during 1996-97 to 2009-10 (As on 13.04.2009)

Sl No.	Name of Project	1996-97 to 2001-02 Loan	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09	Grant Total
Major and Medium Projects										
1	Gumti (V)	10.2440	0.8437	0.7650	0.7500	1.3500	0.9400	0.0000	7.6543	22.5470
2	Manu (VI)	9.2530	0.5620	0.8374	1.1250	6.7500		0.0000	7.4842	26.0116
3	Khowai (VI)	6.5590	1.2190	0.3370	1.1250	8.1000		0.0000	7.5300	24.8700
Total (3 Medium Projects)		26.056	2.6247	1.9394	3	16.2	0.94	0	22.6685	73.4286

Table 11.3 (B) : Central Assistance (CA)/ Grant released under AIBP during 1996-97 to 2009-10 (As on 13.04.2009)

Minor Irrigation Projects		Amount (Rs. in crore)								Grant Total
		1996-97 to 2001-02 Loan	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09	
1.	397 MI schemes in 1999-2000 (C-397-3/03)	44.3530							0.000	44.3530
2.	130 MI schemes in 2000-01 (C-130-3/04)	10.0380	3.000	4.0000					0.000	17.0380

Contd ...

Table 11.3 (B) : Central Assistance (CA)/ Grant released under AIBP during 1996-97 to 2009-10 (As on 13.04.2009) (Contd ...)

Minor Irrigation Projects	Amount (Rs. in crore)								Grant Total
	1996-97 to 2001-02 Loan	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09	
3. 79 MI schemes in 2001-02 (C-79-3/04)	2.0000	5.050	4.0000					0.000	11.0500
4. 220 MI schemes in 2002-03 (C-220-3/05)		2.720	3.4375	8.00	4.167			0.000	18.3245
5. 176 MI schemes in 2005-06 (C-129-3/07)					11.628	15.5831		0.0000	27.2111
6. 80 MI schemes in 2006-07						5.9900	2.200	1.8900	10.0800
7. 87 MI schemes in 2007-08							5.900	6.7400	12.6400
8. 127 OG MI schemes in 2008-09								11.8765	11.8765
Total (1296 MI Projects)	56.391	10.77	11.4375	8.00	15.795	21.5731	8.1	20.5065	152.5731

A close look of the Table 11.3 reveals that there is no specific pattern of fund allocation from central and state Governments. Interestingly for several years the fund provided by state has been more than the funds made available by central Government and vice versa.

Table 11.3 : Amount received for the project under AIBP (Rs. Crore)

Year	Central Govt.	State Govt.	Total
2002-03	0.8437	0.0674	0.9111
2003-04	0.3825	1.483	1.8655
2004-05	0.75	0.5431	1.2931
2005-06	1.35	0.145	1.495
2006-07	0.94	1.1038	2.0438
2007-08	0	1.285	1.285
2008-09	6.885	0.765	7.65
Total	11.1512	5.3923	16.5435

Section 2 : Gumti Irrigation Project

Gumti Irrigation Project is a medium size irrigation project which is located in South Tripura district of Tripura. Project was sanctioned in 1979 with the aim of increasing availability of irrigated water during non-monsoon period. As it was realized that not only most of rainfall (More than 90%) water received between mid May and middle of October go waste but due to absence of irrigation capacity it frequently experience problem of flash floods with lot of destruction potential. The torrential rivers of Tripura during monsoon turn to trickles in summer. As a result of this water is not available for irrigation despite demand during non-monsoon period.

Originally project envisaged construction of a barrage across the river Gumti which is just downstream of confluence of Maharani Cherra and Gumti rivers to utilize the tail-race discharge from the Gumti power house and run off contribution from free catchment between Gumti dam and the barrage. The total length of canal system is 45.90 Km of this 23.4 Km is right bank canal and 22.50 Km is left bank canal. Project covers CCA of 4486 ha. It is expected that on completion, vast agricultural fields from Maharani to Kakraban shall be benefited.

Table 11. 4 : Salient Features of Gumti Medium Irrigation Project

Name of the Project	: Gumti Medium Irrigation Project, Tripura
1. Location	: Maharani
2. River	: Gumti
3. District	: South Tripura
4. Site of Barrage	: About 100 M downstream of confluence Maharani Cherra.
Latitude	: 23 ^o 31'-30" N
Longitude	: 91 ^o 34'-0" E
5. Hydrology	:
i. Design flood at	
Barrage site	: 3341 cumecs (1,18,000 cusecs)
ii. Details of Project	
U/S and D/S	: Upstream: Gumti Hydro-Elec. Project Downstream: Nil
iii. Dependable flow	
for irrigation	: 445 cusecs (12.5 cumecs)
6. Barrage	:
i. Full pond level	: 24.000 M
ii. Intake level	: 23.000 M
iii. Canal F.S.L.	: 24.000 M
iv. Crest level	: 20.000 M (revised 20.50 M)
v. Number & size	: 10.000 X 4.000 (revised 12.0 X 3.8 M)
of gates	: 10 Nos. (revised 7 Nos.)
vi. Design discharge	: 3783 cumecs. (revised 3341 cumecs)
vii. Number of piers	: 9 Nos. (revised 6 Nos.)
viii. Pier thickness	: 2 Mtr.

Contd ...

Table 11. 4 : Salient Features of Gumti Medium Irrigation Project (Contd ...)

Name of the Project : Gumti Medium Irrigation Project, Tripura			
ix. Top level of the bund U/S : 28.50 Mtr. (revised 32.00 Mtr.)			
x. Head Regulator :			
Left Bank	:	Independent head regulator about 2 Km. on Maharani Cherra	Revised head regulator at barrage R.C.C. box type 3 M X 1.5 M
Right Bank	:	Located at barrage itself R.C.C. Rectangular box type 3.500 X 1.00 M	Revised Head regulator at barrage R.C.C. box type 2.5 M 1.85 M
7. Canal System			
i.	Length of L/B canal	: 22.5 km. (18.2+4.3)	20.411 km.
ii.	Length of R/B canal	: 23.40 km	23.40 km.
iii. F.S.L discharge of			
i.	L/B canal	: 85 cusecs	85. cusecs
ii.	R/B canal	: 55 cusecs	55 cusecs
iv.	Type of canal	: Trapezoidal section with general bed slope if it 1:5000 lined in places filling (approx. 25% of the length)	Bed slope 1:7000 all portion lined.
8. Command Area:			
i.	Gross command area	: 5220Ha.	5220Ha.
ii.	Irrigation area (CCA)	: 4486Ha.	4486Ha.
iii.	Annual Irrigation	: 9800Ha.	9800Ha.
iv.	Cropping intensity	: 218.45%	218.45%
v.	Estimated cost	: Rs.588 Lakhs	Rs.7040 Lakhs
vi.	Benefit cost ratio	: 1.69	1.486
vii. Financial Return at the end of the 10 th year after completion = 0.02%			

Section 3 : Analysis of Gumti Irrigation Project

1. Present Stage of Gumti Project

The construction work under the Project started in the year 1980-81 and is expected to be completed by 2009-10. The barrage and its appurtenant works had been completed in the year 1986-87 itself. In the year 2009 the main canal net work for left bank canal was also completed. Branch canal are under construction and is expected to be complete very soon as only branch canal net work from 6.30 km to 23.00 km is yet to be constructed. All project related construction work is expected to be completed by the end of financial year 2009-10. There is still about one third of main canal to be constructed. Lining of this portion of canal is also to carried out. As of today about 17% of the main canal is pending for lining.

Table 11.5: Present Stage of Gumti Project

Sl. No.	Parameters	Design Stage	At Completion	Present
1 (a)	Length of Main Canal (km)	45.90	-	30.008
1 (b)	Lined Main Canal (km)	41.67	-	24.73
2 (a)	Length of Branch Canal (km)	19.96	-	6.5
2 (b)	Lined Branch Canal (km)	19.96	-	6.5
3 (a)	Length of Distributaries (km)	-	-	-
3 (b)	Lined Distributaries (km)	-	-	-
4 (a)	Length of Minors (km)	-	-	-
4 (b)	Lined Minors (km)	-	-	-
5 (a)	Length of Sub-Minors (km)	-	-	-
5 (b)	Lined Sub Minors (km)	-	-	-

2. Potential Irrigated Area Created and Actual Irrigated Area:

Review of information presented in Tables 11.6 and 11.7 below suggest that potential created by the project is about two third of the project design potential. Data of potential irrigated area at completion stage of the project is not available therefore present performance of the project

Table 11.6 : Irrigation Potential Created Across Seasons

(In hectares)

Season	Potential Irrigated Area		
	Design Stage	At completion	Present
Kharif	4486		3049
Rabi	4486		3049
Other	828		548
Total	9800		6646

Table 11.7 : Year wise potential created from March 1996 till date

(in hectares)

Sl.No.	During Year	Potential Creation in Ha
1.	Upto 3/96	2180
2.	1996 to 2000	Nil
3.	2000-01	750
4.	2001-02	890
5.	2002-05	Nil
7.	2004-05	519
8.	2005-06	1145
9.	2006-07	682
10.	2007-08	124
11.	2008-09	1092
12.	2009-10	2421

Actual season wise data in project area has been obtained from irrigation department. As we can see from table 11.8 below there has been substantial increase in gross cropped area of the project for rabi and kharif crops both. However, identical nature of data for

rabi and kharif crops seriously undermine reliability of this data even though irrigation department maintains accuracy of data provided by it.

Table 11.8 : Actual Gross Irrigated Area

Year	Actual Gross Irrigated Area (hectares)		
	Kharif	Rabi	Other
2002-03	1748	1748	315
2003-04	1748	1748	315
2004-05	1985	1985	357
2005-06	2509	2509	451
2006-07	2821	2821	506
2007-08	2879	2879	518
2008-09	3049	3049	548

3. Possible Reasons for Gap in Irrigation Potential Creation and its Utilization

The irrigation potential has been lost due to change in cropping pattern and unauthorized utilization of water by farmers by using unauthorized pumping sets (Table 11.9).

Table 11.9: Reasons for Gap between Irrigation Potential Creation and its Utilization

Sl. No.	Factor	Approximate loss in Irrigation Potential Created
1.	Change in cropping pattern then envisaged in the project design	-
2.	Less water inflow received in the dam	-
3.	Change in water allocation for non irrigation purpose (for example drinking water, industrial purpose or environmental purposes)	Nil
4.	Condition of the main canal & distribution system is not hydro logically fit	Nil
5.	Non existence/improper maintained water distribution and field channels	Nil
6.	Loss of command area due to urbanization or soil salinity or water logging)	Not significant
7.	Unauthorized utilization of water by farmers	Not significant
8.	Encroachment of area under field channels	Nil
9.	Any other (please specify)	-

5. Head Water Discharge:

The designed total discharge of the RB and LB canals is 140.00 cusecs but as shown in the table 11.10 the water discharge is much below the designed discharge level. However focus group discussion with farmers reveals that there is no shortage of irrigation water and irrigation water available to them is sufficient to meet their irrigation requirement at current level of cropping intensity.

Table 11.10 : Head Water Discharge (2002-03 to 2008-09)

Month/ Year	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09
January	55	55	61.94	78	88	89	95
February	52	52	60	75	86	86	91
March	54	54.50	58	72	85	86	90
April	50	51	52	70	80	82	88
May	-	-	-	-	-	-	-
June	-	-	-	-	-	-	-
July	-	-	-	-	-	-	-
August	-	-	-	-	-	-	-
September	30	30	31	32	41	43	45
October	32	32	32	35	40	42	50
November	34	37	35	37	43	40	50
December	39	39	37	44	48	41	52

6. Status of Outlets for Water Distribution:

Information available in table 11.11 below indicates all the existing main canals and branch canals are being maintained properly and functioning.

Table 11.11 : Status of Outlets for Water Distribution

Sl. No.	Name of the branch canal	Total Outlets			Closed outlets	Damaged outlets	Outlets in proper condition
		Design stage	At completion	At present			
1.	L.B.M.C.			56			56
2.	R.B.M.C.			16			16
3.	LB Br.Canal 13 Nos.			78			78
4.	RB Br. Canal 4 Nos.			24			24
	Total			174			174

7. Expenditure on Operation and Maintenance of the Project (Rs. Lakh):

Though project is yet to be completed but one of the canal which was made fully operational few years back need maintenance. State government is giving proper attention on maintenance of irrigation system as it has spent Rupees 32.22 lakh on maintenance between 2005-06 and 2008-09 (table 11.12).

Table 11.12: Expenditure on Operation and Maintenance of the Project

(Rs. Lakh)

Sl. No.	Activity/ Year	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09
1.	Required amount							
2.	Sanctioned amount							
3.	Expenditure				6.58	7.87	8.65	9.12

A close look of expenditure data presented in table 11.13 below indicate that total capital expenditure on expansion of irrigation system has been over 10 lakhs and salary and other compensation has been Rs. 0.825 lakhs.

Table 11.13 : Total capital expenditure from AIBP funds during last seven years
(Rs. Lakhs)

Year	Salary & compensation for regular staff	Wage bill for contractual staff	Travel conveyance and stationeries	Other recurring office expenses	Capital expenditure	
					Expansion of irrigation system	Creation of other assets
2002-03	0.123				0.6533	-
2003-04	0.109				1.7565	-
2004-05	0.0682				1.2249	-
2005-06	0.12				1.375	-
2006-07	0.1238				1.92	-
2007-08	0.15				1.135	-
2008-09	0.131				2.42	-
Total	0.825				10.4847	

No revenue has been collected from beneficiaries till date. Farmers do not pay the water charges and no stringent action to realize water charges have been made. Irrigation department attribute this to law and order problem in the area and local political considerations. Majority of the farmers are not willing to pay for irrigation charges as revealed through FGD of beneficiary farmers.

8. Staffing Pattern:

Project is being implemented with skeleton (table 11.14). The table below shows that at functional level there is shortage of staff. Work Assistant required are 8 against which there are only 3 Water Assistants are presently working. Similarly there is one operator presently posted but the required nos. is 3, likewise Surveyors and helpers are also falling short of requirements.

Table 11.14: Staffing Pattern

Designation	Required	Sanctioned	Presently working
Chief Engineer	1		1
Superintending Engineer	1		1
Executive Engineer	1		1
Assistant Engineer	1		1
Junior Engineer	4		4
Work Assistant	8		3
Operator	3		1
UDC/SDC	1/1		1
Surveyor	4		1
Driver	1		1
Helper	20		11
Sweeper	1		1
Peon	2		1

9. Constraints in Implementation of AIBP Scheme

Focus Group discussion with project executing staff resulted in identification of following broad constraints in project execution.

- Law and order situation in and around the project site is the main hurdle in implementing the project.
- Flow of fund in proper time is also another hurdle in implementation of the project.
- Shortage of technical manpower also a setback to progress of work.

Timeframe Description of Problems Encountered in Gumti Project

Following is the brief description of problems encountered in construction of the Gumti Project:

1979-80

- a. Absence of road for cartage of material to Barrage site.
- b. Sheet piles had to be imported from Belgium to cope up with the standards laid down by the Central Government.
- c. There was no electricity at the site.
- d. Lack of infrastructure at Barrage site.

1980-81

- a. Land acquisition problem.
- b. River diversion problem. Cofferdam had to be constructed.
- c. There was an early monsoon that had arrived in the month of April.
- d. Communication problem due to trouble in Assam.
- e. Terrorism and riots in June 1980 that left the barrage site deserted.

1981-82

- a. River diversion problem.
- b. Dewatering problem due to sandy bed.
- c. Unpredicted flood causing damage to cofferdam.
- d. Labour unrest presaged strike by the W/C employees of M/S. N.P.C.C. from second week of April.

1982-83

- a. Shorter working season.
- b. Unprecedented flood.
- c. Labour unrest causing opening of fire by police and resultant effect, causing dislocation of work.

- d. Induction of a microhydel power house in the barrage causing changes in design etc.
- e. Scarcity of materials for construction like Industrial Gas, boulders etc. due to trouble in Assam.

1983-84

- a. Labour unrest.
- b. Delay in providing drawings from C.W.C. for microhydel power house.
- c. Dewatering problem.

1984-85

- a. Labour unrest.
- b. Construction of microhydel power house.

1985-86

- a. Labour problem

10. Suggestions for Implementation of AIBP Scheme

- Timely flow of fund.
- Posting of adequate nos. of technical persons in respect of work load.
- Improvement of law and order situation.

Section 4 : Impact of AIBP

1. Distribution of Sample and its Profile

As per the methodology of the study, sample of beneficiaries and non-beneficiaries was taken both from command and non-command area of the project. The distribution of the sample across the head, middle and tail location of the canal has been presented in Table 11.15. For the study total of 160 beneficiaries were selected from 16 villages in the command area of the project. A total of 72 non-beneficiaries were also interviewed both from command and non-command area of the project.

Table 11.15 : Distribution of Sample Beneficiary & Non-Beneficiary

Location in the Canal	No. of villages	Number of Beneficiaries/ Non-Beneficiary
Beneficiary		
Head	4	40
Middle	9	90
Tail	3	30
Total	16	160
Non-beneficiary		
Command	16	32
Non-command	4	40
Total	20	72

2. Social Profile of Sample

Caste wise distribution of sample beneficiaries and non-beneficiaries has been presented in Table 11.16. It is evident from the data that large number farmers from socially vulnerable groups such as Scheduled Caste (SC) and OBC are being benefitted from the project. Therefore these groups have been prominently included in the sample of farmers selected for this study.

Table 11.16 : Social Profile of Sample Beneficiaries

Caste	Beneficiary								Non-Beneficiary					
	Head		Middle		Tail		Total		Command		Non-command		Total	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%
General	6	15.0	30	33.3	6	20.0	42	26.3	12	37.5	16	40.0	28	38.8
Other Backward Class	4	10.0	11	12.3	2	6.7	17	10.6	3	9.4	19	47.5	22	30.6
Scheduled Caste	25	62.5	21	23.3	6	20.0	52	32.5	7	21.9	4	10.0	11	15.3
Scheduled Tribe	0	0.0	0	0.0	0	0.0	0	0.0	1	3.1	0	0.0	1	1.4
Others	5	12.5	28	31.1	16	53.3	49	30.6	9	28.1	1	2.5	10	13.9
Total	40	100.0	90	100.0	30	100.0	160	100.0	32	100.0	40	100.0	72	100.0

3. Land Holding Pattern

Table 11.17 shows land holding pattern of sample beneficiaries and non-beneficiaries. The sample consists of small beneficiaries and non-beneficiaries farmers of non-command area. Both beneficiaries as well as non-beneficiaries are marginal farmers. The beneficiary and non beneficiary farmers have more or less all crop area under irrigation.

Table 11.17 : Land Holding Pattern of Sample

Description	Beneficiary				Non-Beneficiary		
	Head	Middle	Tail	Total	Comm and	Non-command	Total
1. Average Size of Land (acer)	2.12	2.13	1.14	1.94	1.30	1.15	1.21
2. Average size of Irrigated Land (acer)	2.12	2.13	1.14	1.94	1.29	1.13	1.20
3. Percentage irrigated area	100.00	100.00	100.00	100.00	99.0	98.5	98.7

4. Economic Status of Sample

Farmers of the area are very poor as reflected from the fact that less than 2 % of them own pacca houses and 93 % of them have to collect firewood to meet their cooking and other fuel requirement (table 11.18).

Table 11.18 : Economic Status of Sample

	Beneficiary								Non-Beneficiary							
	Head		Middle		Tail		Total		Command		Non-command		Total			
	N	%	N	%	N	%	N	%	N	%	N	%	N	%		
Type of House																
Pacca	0	0.0	3	3.3	0	0.0	3	1.9	1	3.1	4	10.0	5	6.9		
Kaccha	3	7.5	4	4.4	0	0.0	7	4.4	5	15.6	11	27.5	16	22.3		
Semi-Pacca	37	92.5	83	92.3	30	100.0	150	93.7	26	81.3	25	62.5	51	70.8		
Total	40	100.0	90	100.0	30	100.0	160	100.0	32	100.0	40	100.0	72	100.0		
Source of Drinking Water																
Tap water	1	2.5	0	0.0	0	0.0	1	0.6	0	0.0	1	2.5	1	1.4		
Owned hand-pump	14	35.0	34	37.8	12	40.0	60	37.5	14	43.8	11	27.5	25	34.7		
Community hand-pump	0	0.0	0	0.0	0	0.0	0	0.0	1	3.1	0	0.0	1	1.4		
Wells	0	0.0	1	1.1	0	0.0	1	0.6								
Others	25	62.5	55	61.1	18	60.0	98	61.3	17	53.1	28	70.0	45	62.5		
Total	40	100.0	90	100.0	30	100.0	160	100.0	32	100.0	40	100.0	72	100.0		
Latrine Room in Home																
Yes	39	97.5	87	98.9	28	96.6	154	98.1	32	100.0	39	100.0	71	100.0		
No	1	2.5	1	1.1	1	3.4	3	1.9	0	0.0	0	0.0	0	0.0		
Total	40	100.0	88	100.0	29	100.0	157	100.0	32	100.0	39	100.0	71	100.0		
Source of Lighting in House																
No lighting	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0		
Kerosene	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0		
Electricity	39	97.5	90	100.0	30	100.0	159	99.4	31	96.9	39	97.5	70	97.2		
Other	1	2.5	0	0.0	0	0.0	1	0.6	1	3.1	1	2.5	2	2.8		
Total	40	100.0	90	100.0	30	100.0	160	100.0	32	100.0	40	100.0	72	100.0		
Type of Cooking Fuel																
Leave/straw	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0		
Fire wood	40	100.0	80	88.9	30	100.0	150	93.8	32	100.0	38	95.0	70	97.2		
Cool/ coke	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0		
Bio-gas	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0		
LPG	0	0.0	10	11.1	0	0.0	10	6.2	0	0.0	2	5.0	2	2.8		
Total	40	100.0	90	100.0	30	100.0	160	100.0	32	100.0	40	100.0	72	100.0		

5. Cropping Pattern

Most of the farmers follow paddy based farming system in Tripura. Therefore, paddy is most important crops commanding over 90 % of cropped area of beneficiary and non-beneficiary farmers irrespective of their location in the command and non-command areas (Table 11.19). Vegetable is another important crop category for the farmers in the area.

Table 11.19 : Cropping Pattern of Sample Farmers

(Percent area)

Crop	Beneficiary				Non-Beneficiary		
	Head	Middle	Tail	Total	Command	Non-command	Total
Paddy	92.6	99.2	99.4	97.6	96.6	100.0	98.4
Vegetables	7.4	0.8	0.6	2.4	3.4	0.0	1.6

Cropping Intensity

In the study, cropping intensity of beneficiary and non-beneficiary farms have been calculated and the same has been reproduced in Table 11.20. The cropping intensity is found to be significantly higher in case of beneficiary farmers irrespective of their locations. In case of non beneficiary cropping intensity for non-beneficiary farmers located in the non command area is more as compared to their counterparts located in command area.

Table 11.20: Cropping Intensity

Description	Beneficiary				Non-Beneficiary		
	Head	Middle	Tail	Total	Command	Non-command	Total
Net Cropped Area (acre)	84.7	191.6	34.1	310.4	41.6	45.9	87.5
Gross Cropped Area (acre)	155.7	357.4	63.2	576.3	50.1	45.1	95.2
Cropping Intensity (%)	183.7	186.6	185.3	185.7	120.5	98.2	108.8

6. Total Income of the Sample Household

Farmers in the area are very poor as majority of the farmers, whether beneficiary or non-beneficiary, falls under the annual income range of Rs. 25,000 to 50,000. The analysis clearly indicates the subsistence nature of agriculture in this area. Hardly 1% of the sample farmers are able to earn an income of more that Rs. 2.0 lacs per annum and none of them is among non-beneficiaries.

Table 11.21 : Total Income of the Household

Income	Beneficiary								Non-Beneficiary					
	Head		Middle		Tail		Total		Command		Non-command		Total	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Rs. 10,000 to Rs. 25,000	4	10.0	9	10.0	2	6.7	15	9.4	7	21.9	8	20.0	15	20.8
Rs. 25,000 to Rs. 50,000	20	50.0	49	54.5	24	80.0	93	58.1	20	62.5	22	55.0	42	58.3
Rs. 50,000 to Rs. 1,00,000	12	30.0	19	21.1	4	13.3	35	21.8	4	12.5	10	25.0	14	19.5
Rs. 1,00,000 to Rs. 2,00,000	4	10.0	11	12.2	0	0.0	15	9.4	1	3.1	0	0.0	1	1.4
Rs.2,00,000 and above	0	0.0	2	2.2	0	0.0	2	1.3						
Total	40	100.0	90	100.0	30	100.0	160	100.0	32	100.0	40	100.0	72	100.0

7. Status of Migration

A close look of information available in Table 11.22 indicates that migration is a frequent feature for beneficiary farmers. Interestingly no case of migration was reported by the non beneficiary farmers. The average duration of migration per farm family turned out to be as high as 365 days in a year for the farmers located at middle and tail end. This high magnitude of migration can be attributed to non-availability of agricultural work on their farms. Migration appears a generic feature as there is no specific season which has high incidents of migration.

Table 11.22 : Status of Migration

Description	Beneficiary				Non Beneficiary		
	Head	Middle	Tail	Total	Command	Non-command	Total
No. of person migrated		1.0	1.0	1.0			
No. of times migrate in a year		0.0	0.0	0.0			
Reason of migration ¹		1.5		1.5			
Duration of migration in a year (days)		365.0	365.0	365.0			
Migration season ²			4.0	4.0			

¹ Employment-1, Others-2

² Rabi-1, Kharif-2, Zaid-3, Others-4/mix

8. Quality of Assets Created under AIBP

The response of the sample farmers on various parameters related to quality of assets created under AIBP has been tabulated in Table 11.23. About 80% of the beneficiaries feel that irrigation asset created under the project is being maintained properly. Satisfaction about quality of asset management deteriorates progressively as we move from head to tail section of the canal. The response related to proper maintenance of distribution channels has also been found to be quite different across the farmers located at different ends. Only 18% farmers in the tail ends feels that maintenance of distribution canal is satisfactory. More than 90% of all the respondents were of the opinion that water distribution canals have been lined in the command area properly.

Table 11.23 : Quality of Assets Created under AIBP

(Percentage of respondents)

Description		Head	Middle	Tail	Total	Chi-Square	Sig.
Properly maintenance of water outlets	Yes	90.0	80.0	66.7	80.0	5.833	0.054
	No	10.0	20.0	33.3	20.0		
	Total	100.0	100.0	100.0	100.0		
Complains for maintenance of water outlets in last one year	Yes	10.8	4.9	13.8	8.1	2.769	0.250
	No	89.2	95.1	86.2	91.9		
	Total	100.0	100.0	100.0	100.0		

Contd ...

Table 11.23 : Quality of Assets Created under AIBP (Contd ...)*(Percentage of respondents)*

Description		Head	Middle	Tail	Total	Chi-Square	Sig.
Cemented water outlets in the village	Yes	100.0	79.8	76.7	84.0	9.418	0.009
	No	0.0	20.2	23.3	16.0		
	Total	100.0	100.0	100.0	100.0		
Properly maintenance of distribution channels in the village	Yes	89.7	83.1	66.7	81.6	6.332	0.042
	No	10.3	16.9	33.3	18.4		
	Total	100.0	100.0	100.0	100.0		
Complains for maintenance of water distribution channels in last one year	Yes	12.8	7.2	18.5	10.7	2.948	0.229
	No	87.2	92.8	81.5	89.3		
	Total	100.0	100.0	100.0	100.0		
Lined water distribution channels in the village	Yes	100.0	91.8	78.6	91.4	9.594	0.008
	No	0.0	8.2	21.4	8.6		
	Total	100.0	100.0	100.0	100.0		

The response of the farmers related to condition of water distribution structures was also measured on a 5 point scale which shows the above average condition (with score of 2.1 to 2.4) of all the water distribution structures in the village (Table 11.24). The same observations were made in the focus group discussion with the farmers in the selected villages.

Table 11.24 : Condition of Water Distribution Structure*

Description	Head	Middle	Tail	Total
Condition of water outlets in the village	2.1	2.1	2.4	2.2
Condition of water distribution channels in the village	2.1	2.3	2.4	2.3
Condition of canal infrastructure in the village	2.1	2.3	2.4	2.2

*very good-1,...,very poor-5

9. Overall Impact Assessment of AIBP

The overall impact of AIBP scheme on agricultural and socio-economic development of the farmers has been captured through 5 point scale response of the sample beneficiaries (Table 11.25). Majority of the farmers agreed that there has been increase in irrigated area and total agricultural production. However, farmers do not believe that there has been substantial decline in the cost of agricultural production due to AIBP scheme. Because of increased irrigation facility the value of the land has increased as per the opinion of respondents. The disturbing trend is the majority of the respondents do not agree that there has been increase in the visit of the government officials after the AIBP.

Table 11.25 : Overall Impact Assessment of AIBP*

	Head	Middle	Tail	Total	F	Sig.
Agricultural Development						
Increase in irrigated area	1.73	1.99	2.03	1.93	6.067	0.003
Increase in total production	2.13	2.10	2.03	2.09	0.469	0.626
Decline in cost of production	2.88	2.98	3.00	2.96	3.422	0.035
Increase in crop rotation	3.25	3.86	3.93	3.72	17.079	0.000
Ease in availability of agricultural equipments	2.43	2.32	2.50	2.38	1.487	0.229
Ease in agriculture activities	2.65	3.01	3.00	2.92	11.599	0.000
Increase in the quality of agricultural produce	2.78	2.97	3.07	2.94	4.981	0.008
Decrease in land erosion	3.05	3.01	3.00	3.02	0.484	0.617
Socio-economic Development						
Increase in literacy rate	3.05	2.92	2.97	2.96	2.668	0.073
Increase in non-farm activities	3.08	2.98	2.73	2.96	9.846	0.000
Increase in healthcare services	3.23	2.97	3.00	3.04	6.203	0.003
Increase in annual income	2.68	2.90	2.93	2.85	4.868	0.009
Decrease in diseases outbreak	4.03	3.98	3.79	3.96	6.691	0.002
Increase in forestation/number of trees	3.45	3.97	3.79	3.80	15.188	0.000
Increase in the visits of government officials	3.50	3.63	3.50	3.57	0.996	0.372
Increase in employment opportunities	3.30	2.99	2.97	3.06	12.913	0.000
Increase in credit availability	2.74	2.94	2.97	2.90	5.763	0.004
Decrease in pollution	3.10	2.90	2.97	2.96	4.661	0.011
Increase in value of land	2.03	2.37	2.30	2.27	3.764	0.025
Decrease in migration to cities	2.88	3.00	2.97	2.96	6.368	0.002

*strongly agree-1,...., strongly disagree-5

Section 5 : Process of Implementation of Project

The overall response of the sample beneficiaries on process of management has been summarized below (Table 11.26). The table reveals that in the opinion of about 85% of the farmers, system exists as far as distribution of water is concerned in their villages. Most of the beneficiary farmers say that there it equitable distribution of water in the villages. All the farmers said that there is no influence of any person or any body in the distribution of water in the villages. About 90% of the farmers at head, middle and tail end of the canal feel that they get required help from the irrigation department whenever they need. Less than 70% of the farmers come to know of the availability of water when the water flows in the canal. Mostly the information of release of water reaches farmers through Gram Panchayat. The direct information from the irrigation department is not a common practice. Payment of irrigation charges on time by the users is the most sensitive issue in the irrigation management across the country. It has been observed that most of the farmers do not pay irrigation charges on time. However, most of the farmers are not willing to pay extra charge for assured water supply.

Table 11.26 : Beneficiary's Response on Process of Project Management

	Head		Middle		Tail		Total	
	N	%	N	%	N	%	N	%
Beneficiary response on proper system existence for water distribution	38	95.0	77	85.6	24	80.0	139	86.9
Beneficiary agreeing equitable distribution of water	30	75.0	84	93.3	28	93.3	142	88.8
Beneficiary disagreeing any group influence on the water distribution	40	100.0	89	100.0	29	100.0	158	100.0
Beneficiary response on support from irrigation management system	35	87.5	84	93.3	26	86.7	145	90.6
Beneficiary acquire information about water release through gram panchayat	27	67.5	67	74.4	24	77.4	118	73.8
Beneficiary comes to know only when water flows in the canal	11	27.5	11	12.2	5	16.1	27	16.9
Beneficiary response on untimely payment of irrigation charges	25	100.0	72	98.6	25	100.0	122	99.2
Beneficiary willingness to pay extra charges for assured water supply	2	6.1	2	2.7	0	0.0	4	3.0

Chapter 12

Conclusions and Suggestions

Section 1: Irrigated Potential Created and Utilization

The Accelerated Irrigation Benefits Program (AIBP) was designed primarily to extend financial assistance to the States for creation of irrigation potential by completion of identified ongoing irrigation projects. A large number of irrigation projects which could not be completed mainly because of financial constraints being faced by the State Governments, were supported under AIBP by Central Government so that envisaged irrigation potential of the project could be created and thereby extend irrigation to more areas. Table 12.1 presents the percent gap between irrigation potential which was supposed to be created at design stage of the project and the one which has been created so far in the selected irrigation projects. The same table also shows the percent irrigation potential utilization across the different categories of irrigation projects. It is disheartening to note that gap between irrigation potential at design and present stage is highest in Dhansiri (v) project in Assam (62 percent). The progress of irrigation potential creation has also been quite slow in Yerrakalva (v) in Andhra Pradesh as well as in Bansagar (unit -1) (v) project in Madhya Pradesh. About one third of the designed irrigation potential has not been created in Shivnath Diversion (v) project, Chattisgarh and Gumti (v) project, Tripura.

Table 12.1 Gap between Irrigation Potential and Utilization

Project Category	Project Name	Performance Indicators	
		Gap between Irrigated Potential Created at Design and Present Stage (%)	Irrigation Potential Utilized (%)
Major	Upper Krishana St 1, Karnataka	10	64
	Raighat Dam, Uttar Pradesh	nil	37
	Bansagar (Unit -I) (V), Madhya Pradesh	47	28
	Dhansiri (V), Assam	62	17
Medium	Yerrakalva (V), Andhra Pradesh	40	100
	New Pratap Canal, Jammu & Kashmir	7	100
	Shivnath Diversion (V), Chattisgarh	33	100
	Gumti (V), Tripura	32	100
Extension, Renovation and Modernization (ERM)	Narai Barrage (IX), Orissa	N.A	N.A
	Jaismand (Modernization) VI, Rajasthan	nil	N.A

Some of the prominent reasons behind the non-completion of the designed irrigation potential have been cited as follows:

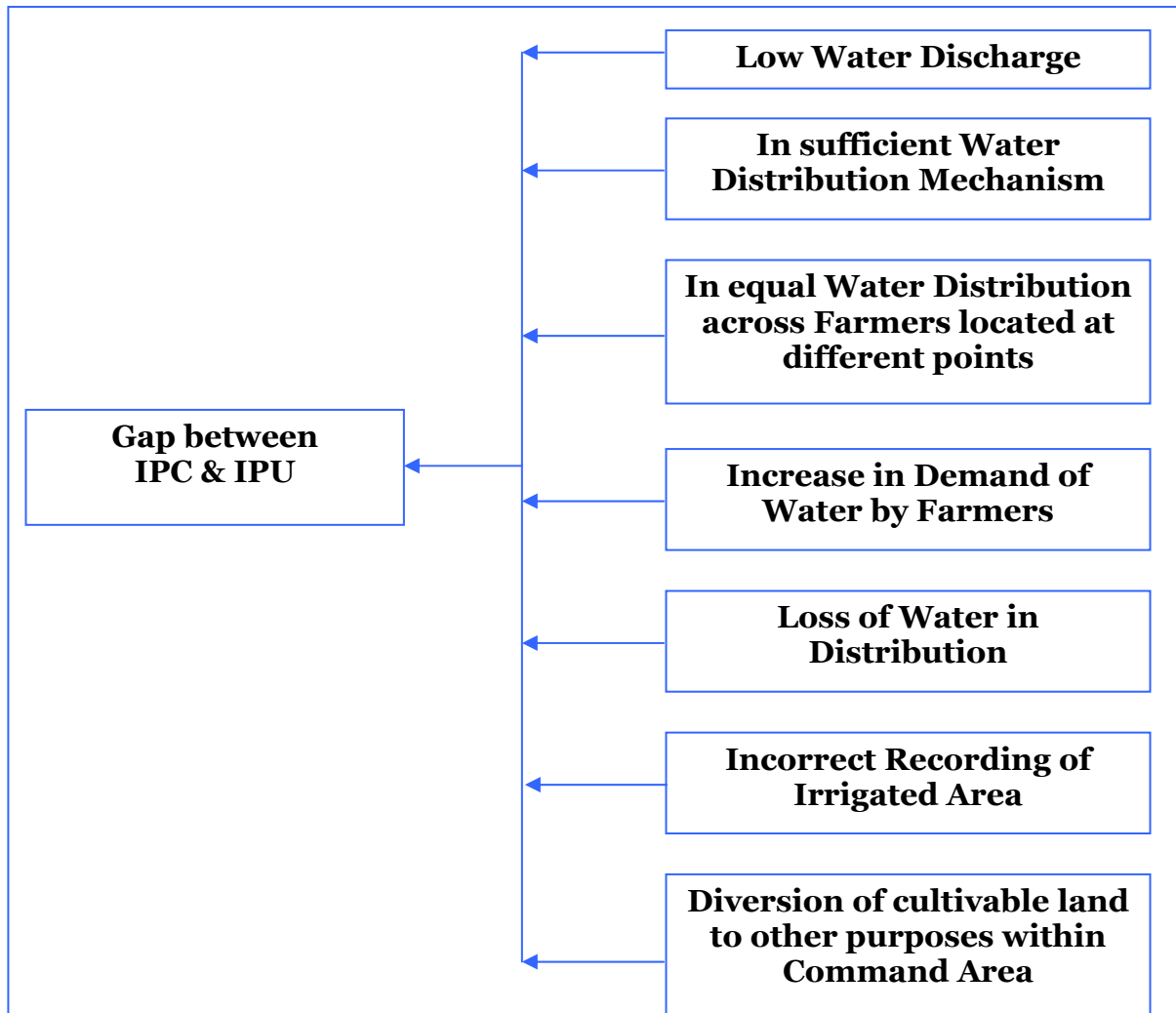
- (a) Problem in land acquisition
- (b) Law and order problem particularly in North-Eastern states
- (c) Construction of railway and road bridges in the command areas of the project
- (d) Labour problems
- (e) Lack of coordination among different departments of State Government

Developing irrigation potential requires a lot of financial and environmental cost to the society, and therefore, non-utilization of irrigation potential created so far leads to wastage of precarious resources on the one hand, and loss of opportunity to increase the agricultural production, on the other. Table 12.1 depicts percent irrigation potential utilization across different irrigation projects. It is clear that the problem of utilization of irrigation potential is sever in major irrigation projects where the irrigation potential utilization has been found very low in Dhansiri (v) project, Assam(17%), Rajghat Dam, Uttar Pradesh (37%) and Bansagar (unit-1) (v), Madhya Pradesh (28%). On the other hand 100% irrigation potential utilization has been reported in all selected four medium irrigation projects.

Based on the information and data collected from the irrigation projects in different States on the one hand, and detailed discussion with Chief/Executive Engineers of the irrigation projects on the other, possible reasons responsible for gap between irrigation potential created (IPC) and irrigation potential utilization (IPU) have been outlined in Figures 12.1 to 12.6. An attempt has been made to develop a Problem Tree Analysis, which provides a systematic way of examining the problems in a project context. Most problems can generally be traced back to other problems which, in turn, could be the cause of other problems/constraints. Problem Tree Analysis visualizes such links in a Problem Tree Diagram. This consists of a diagram illustrating a set of relationship amongst the problems by fitting them in a hierarchy of cause-effect relationship. In such a diagram the causes are, conventionally, presented at lower levels and the effects are at upper level. A location of a problem in a tree diagram does not necessarily indicate its level of importance, but simply its position in the logical sequence of cause-effect linkages.

The underline idea in constructing a Tree Diagram is that such a process should facilitate the organization of problems into a logical sequence which, in turn, would lead to logical conclusions and eventually to the identification of cost/effective solutions. Figures 12.1 to 12.6 clearly demonstrate the cause and effect relationship of various factors responsible for gap between IPC and IPU. Although, individually each factor may contribute to a small gap, but their cumulative impact is very high. Another interesting point of this analysis is that unless all these factors are tackled in a coordinated manner, the problem of non-utilization of IPC will not be solved.

Figure 12.1: Problem Tree Diagram for Gap between IPC & IPU

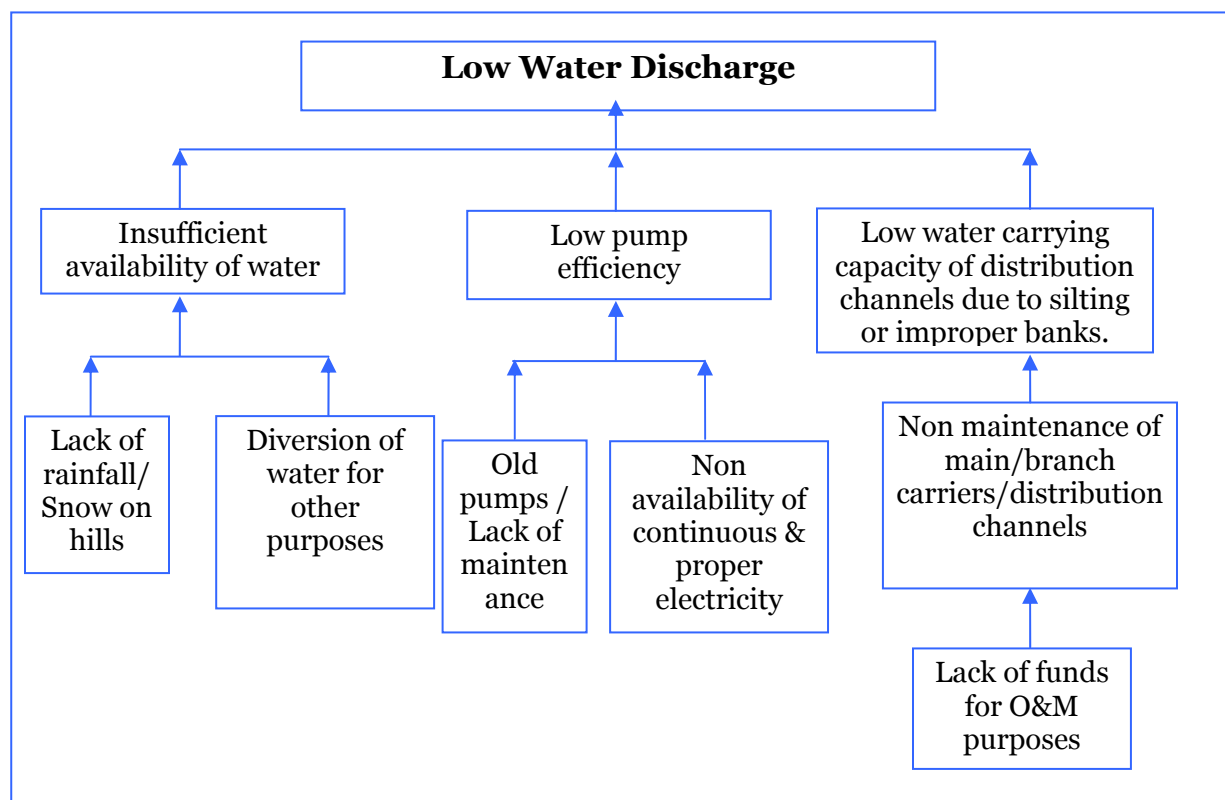


Note:

IPC = Irrigation Potential Created

IPU = Irrigation Potential Utilized

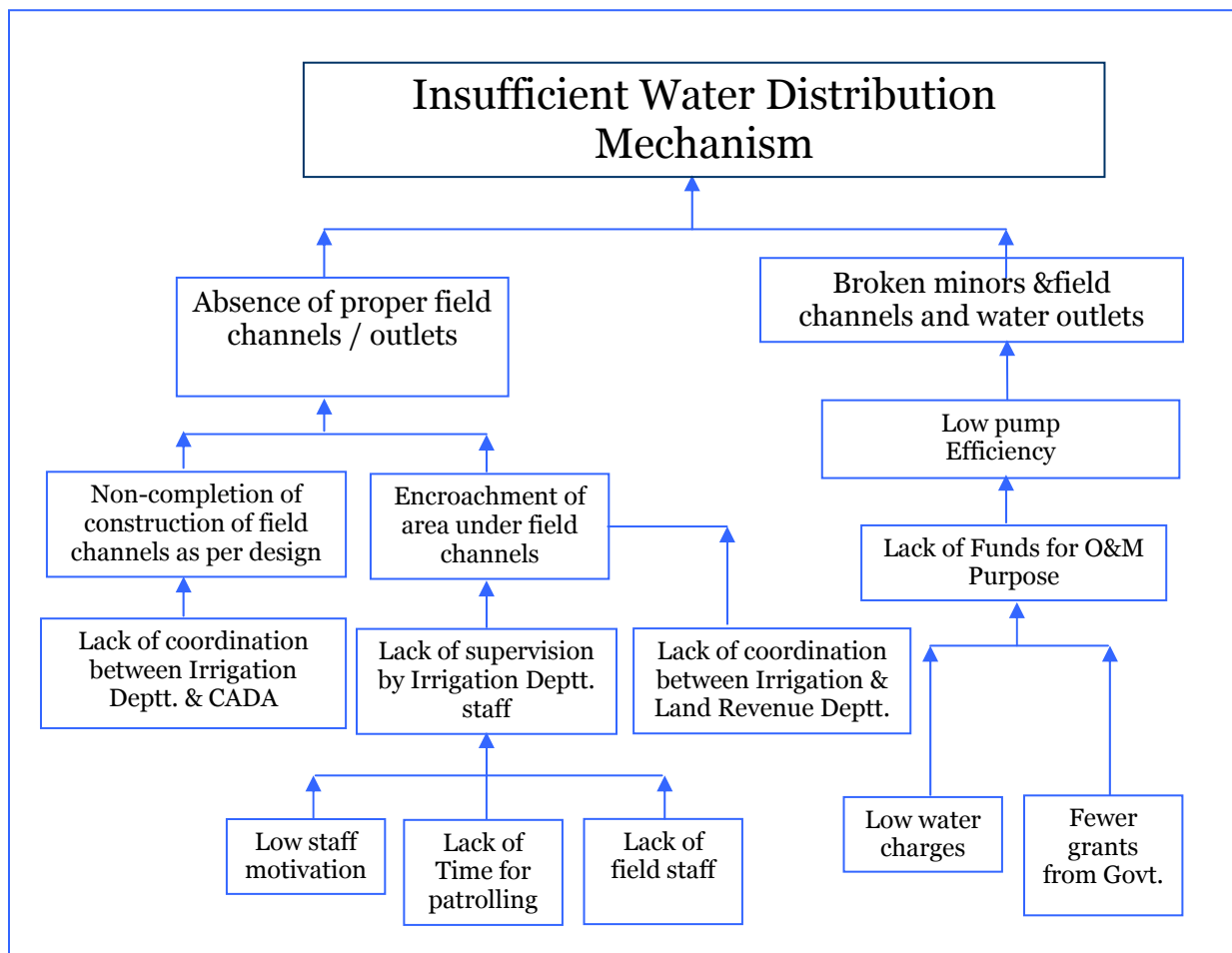
Figure 12.2: Problem Tree Diagram for Low Water Discharge



Notes:

- 1- Distribution channels include sub-canal, distributaries and minors.
- 2- Main Canals and Branches are in bad shape in many systems and the too need proper maintenance/ rehabilitation Apart from silting, their banks at many places are low & weak and needs strengthening to allow full carrying capacity.
- 3- Apart from continuous electric supply, it needs qualitative i.e. with out interruptions and with proper voltage.
- 4- Mechanical and electrical faults in motors, pumps, and panels/switchyards also contribute to inefficiency. If not attended immediately, as happens normally, efficiency goes down even if pumps / motors are not very old.
- 5- Shortage or inadequate rainfall on hills is one of the most important factors, contributing to low water availability of water in the River source, especially during non- monsoon period.

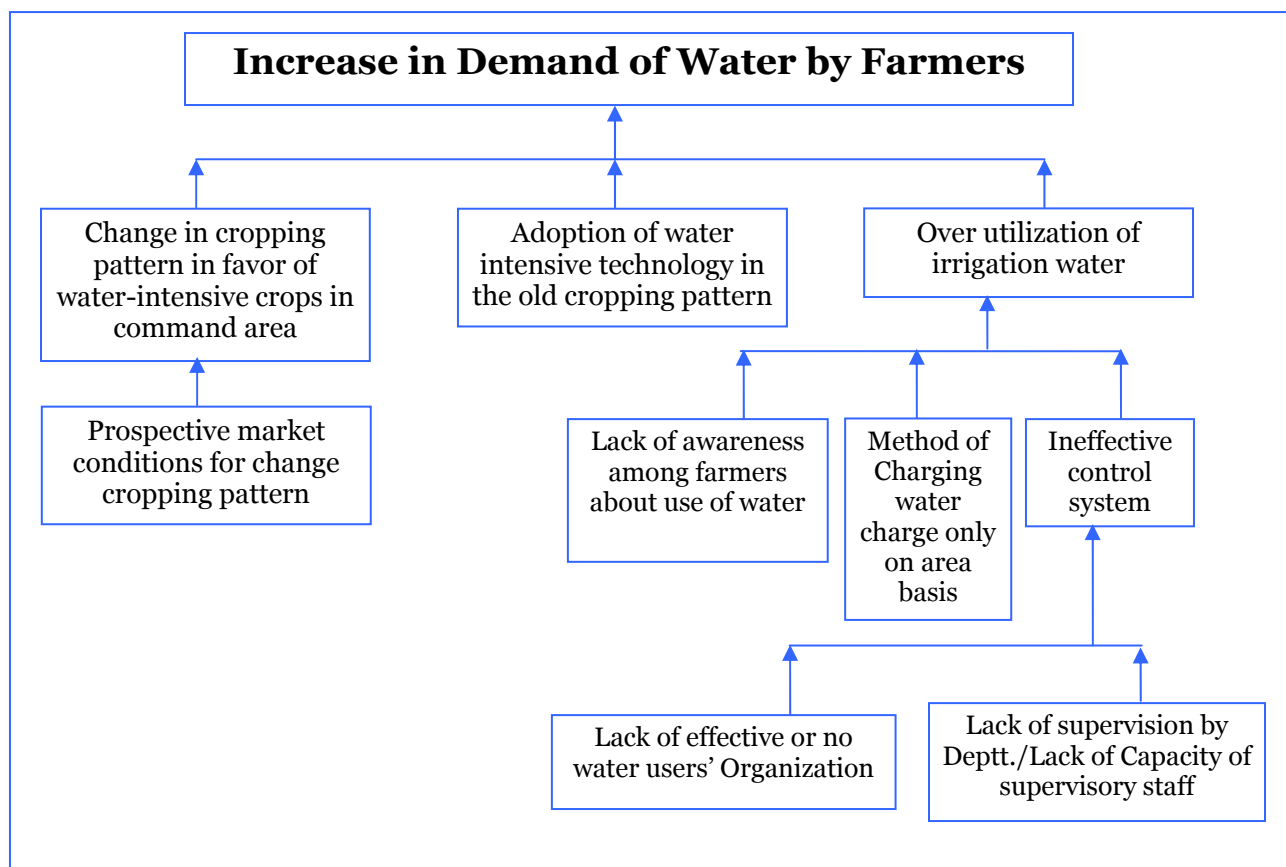
Figure 12.3: Problem Tree Diagram for Insufficient Water Distribution Mechanism



Notes:

- 1- Adoption of old practice of irrigation i.e. Flood Irrigation irrespective of actual water demand. There is a need to persuade the farmers to adopt new/modern innovative techniques such as Drip and Sprinkler Irrigation, which requires much lesser water.
- 2- Lack of coordination & and support from law enforcing agencies, in cases of cutting of channels by farmers/miscreants.
- 3- Developmental activities under Local Area Development funds popularly known as MLA/MP funds. Many field channels/Guls have been obstructed or damaged due to indiscriminate construction of roads under these programs.
- 4- In many cases it has been seen that construction of guls at improper level, or not connected to the outlets, at all or not properly, has led to inefficiency & wastage of resources.
- 5- Now a time has come to resort to Volumetric System of water accounting as well as charges. Differential rate system is also is the need of the hour. It can be location wise and application of water.
- 6- Canals are also required to be redesigned in order to meet the present scenario with modern technology regarding Head/Cross Regulators, Gates, Falls & other structures
- 7- Although Main Canal & Branches are Designed as non silting channels, but some typical terrain, it has been observed that there is lot of silting in them thus reducing the discharge carrying capacity of the main carriers.

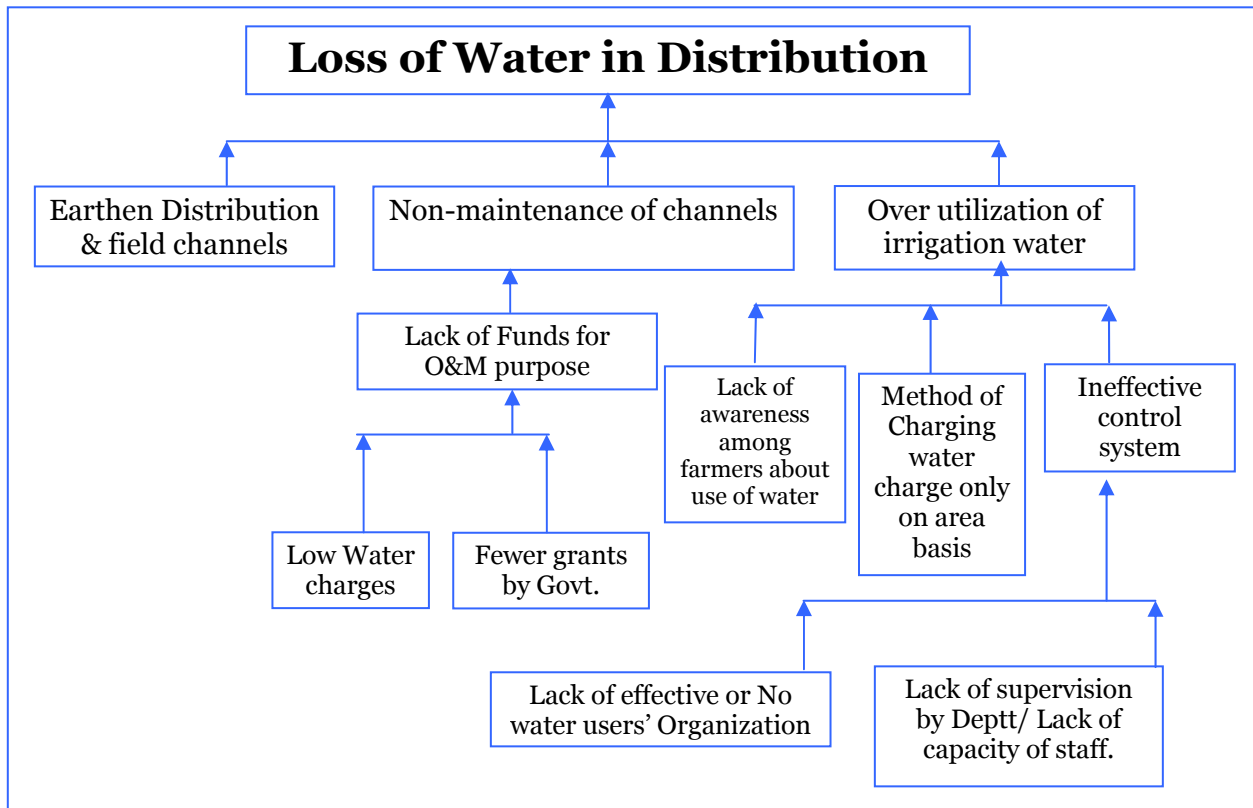
Figure 12.4: Problem Tree Diagram for Increase in Demand of Water by Farmers



Notes:

- 1- Lack of capacity of the staff & officers to meet the current challenges is also one of the important aspects. Programs are required for building capacity and update their skill and knowledge.
- 2- Although there are User's Organizations in some areas/states, but they are ineffective.

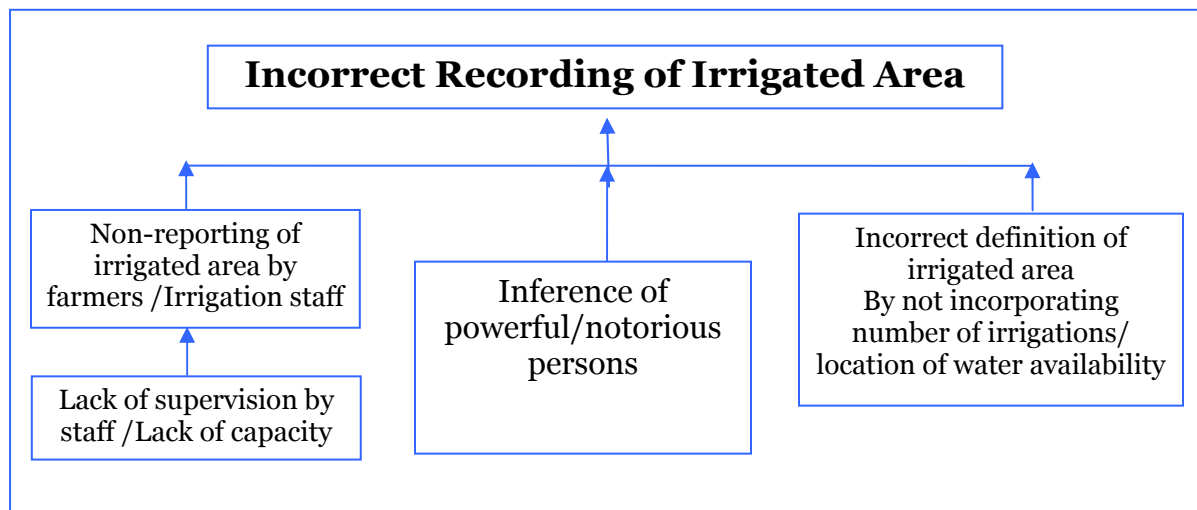
Figure 12.5: Problem Tree Diagram for Loss of Water in Distribution



Notes:

- 1- We all are aware that both water & land are nowadays precious and are under great stress. Both are required to be saved as much as possible to meet the future food demands. In this perspective, canals are now required to be redesigned with lined sections, in order to save water being wasted from seepage & evaporation, and to enhance their efficiency. Much less efforts will be required in the maintenance too. It will save precious land & this can be utilized for Agricultural purposes, as there is already a great pressure on land due to various developmental activities.
- 2- Lot of water is wasted either due to breaches in canals owing to inadequate canal sections or due to negligence of the supervisory staff or due to cutting of canals by farmers/miscreants. Effective and continuous support from law enforcing agencies is necessary, which is seldom available in practical terms.

Figure 12.6: Problem Tree Diagram for Incorrect Recording of Irrigated Area



Typology of Factors Responsible for Gap between IPC and IPU

The various factors responsible for gap between irrigation potential created and its utilization as depicted in Figures 12.1 to 12.6 have been classified in the following categories as given in Chart 12.1.

Chart 12.1: Classification of Factors Responsible for Gap between IPC and IPU

Sl. No.	Category	Example
1.	Technical	<ul style="list-style-type: none"> • Incomplete water distribution channels • Earthen distribution channels • Irregular de-silting of distribution channels • Non-availability of continuous and proper electric power • Faulty design of irrigation project
2.	Socio-political	<ul style="list-style-type: none"> • Encroachment of field channels by farmers • Overuse of irrigation water • Destruction of water outlets
3.	Institutional	<ul style="list-style-type: none"> • Non-existence of effective WUA • Low technical and managerial capacity of Irrigation Department staff
4.	Managerial	<ul style="list-style-type: none"> • Lack of staff • Lack of fund for O&M • Low motivation of Irrigation Department Staff • Lack of supervision by Irrigation Department Staff
5.	Natural	<ul style="list-style-type: none"> • Lack of rainfall • Decreased water level in the River

Contd ...

**Chart 12.1: Classification of Factors Responsible for Gap between IPC and IPU
(Contd ...)**

Sl. No.	Category	Example
6.	Policy Level	<ul style="list-style-type: none"> • Ineffective method for charging irrigation water cost based only on acreage system • Low administrative powers given to Irrigation Department Staff • Incorrect definition of irrigated area by not incorporating the number of irrigation • Lack of coordination between Irrigation Department, Revenue Department and CADA • Diversion of water for other purposes
7.	Agrarian	<ul style="list-style-type: none"> • Change in demand of irrigation water due to change in cropping pattern in the command area • Increased demand of irrigation water due to use of chemical fertilizers and HYV seeds • Diversion of cultivable land for industrial and other purposes

(a) Social Issues

- Farmers of head reach of the canal over irrigated their fields, assuming that they may not get water for the following irrigation, this make canal water not to reach at the tail end of the main and minor canal and this area remains un-irrigated.
- Farmers at reservoir rim and those at idle reaches of canal systems lift water through pump and irrigate their fields located at higher levels and out of command area. This causes less availability of water for the tail end farms as well as damage to the canal, which results into increase in seepage and further loss of water on the way.
- Use of a large number of lift irrigation pumps submerged in the canal by farmers of idle reaches of canal obstruct the flow of canal water and reduces velocity of water and ultimately less supply and delay of water supply at the tail ends.
- Surrounding residents remove flag stones used for the lining of main canal for their domestic use. Frequent removal of flag stones causes severe damage to the main canal, and in turn high ration of seepage and less supply of water towards tail reaches.

(b) Technical Issues

- Because of weeds and siltation in the canal, water bearing capacity of canals is reducing.
- Non-provision of micro distribution (field channels and water course) network in original project plan led to inefficient use of canal water.

-
- Top bank level of entire canal section as exists, is lower than that designed, results in low discharge capacity of canal.
 - Leakage of irrigation water through irrigation sluices reservoir basin causes less storage of water for irrigation.

(c) Management Issues

- Shortage of staff in irrigation department to maintain the canal system, leads continuous deterioration of canals.
- Lack of vehicles (four wheels) on the field for carry out regular patrolling during the irrigation season. Without four wheel vehicle it is very difficult to carry out the regular patrolling in the peak winter of Rabi season, to restrict wastage of water and damage of canal.
- According to the Irrigation Department, now responsibility of maintenance is given to the 'Water Users' Associations'. They have power to get the work done, with approval of irrigation department. WUAs had been given financial power, without preparing them for performing their role. WUA members neither have technical knowledge, nor perception for the community work. If the Irrigation Department does not approve the canal work done by WUA, the members specially chairman make it political issue and get the approval forcefully done through local MLA or MP. Therefore, maintenance of canal work gets done without technical parameters, which leads to poor performance of canal system.
- There is lack of clarity of the role of WUA, to the staff of irrigation department as well as members of WUA. Irrigation staff members at the field level assume that Water Users' Association is only of twelve members, while they are only committee members. In reality WUA consists of all the farmers' of command area who use canal water. Usually irrigation staff members focus on participation of only committee members, while they should ensure participation of all the members, and try to empower them.

(d) Change in Land Use Pattern

- Cultivated area in the head reaches had been converted into urbanized residential area. This changed the focus of use of canal water from irrigation to domestic purpose. Indirect effect of this change is that tail end of these colonies also do not get water because of obstacle created in the minors by these colonies.
- Adoption of HYV wheat by farmers of command area, which requires more water. On the other hand water for kharif crop is not used at all

An exhaustive list of factors explaining the gap between IPC and IPU for sample irrigation projects in different States has been summarized in Chart 12.2 below:

Chart 12.2: Ranking/Prioritization of the Factors Responsible for Gap between IPC and IPU in Major Irrigation Projects

Sl. No.	Reason for Gap Between IPC and IPU	Rank
Supply Side Factors		
1.	Broken water outlets and minors	1
2.	Encroachment of area under field channels	6
3.	Non-maintenance of channels	2
4.	Diversion of cultivable land to other purposes within command area	10
5.	Diversion of water for other purposes	11
6.	Low water carrying capacity of distribution channels due to silting	3
7.	Seepage from unlined minor canals	8
8.	Insufficient availability of water	12
9.	Non-completion of construction of field channels as per design	4
Demand Side Factors		
10.	Change in cropping pattern	5
11.	Non-reporting of irrigated area by farmers/Irrigation Dept.	13
12.	Lack of awareness among farmers about use of water	9
13.	Over utilization of irrigation water by farmers	7

It is evident from Chart 12.2 that supply side factors have emerged more important factors responsible for explaining the gap between IPC and IPU. Majority of these supply side factors are caused by lack of funds for operation and maintenance of irrigation projects. The only important demand side factor emerged in the analysis is change in cropping pattern by the farmers over time. As a result in many cases, the demand of irrigation water has increased as compared to what was planned at the time of inception of the project. In some cases, however, because of no crop in kharif season, there is no demand of water by the farmers in Kharif season resulting in low utilization of IPC. Over utilization of water by the farmers leads not only to in-equity in water distribution but also causes non-accessibility of water to the farmers located in extreme tail end of the distribution system. As a result their area remains un-irrigated leading to gap between IPC and IPU. The irrigation potential was calculated based on a particular cropping pattern in the command area of the project, as the demand of water is based on the nature of crop under cultivation. This parameter has changed over time. Based on market conditions for technological changes, cropping pattern has changed almost in all the places in favor of more water intensive crops. This has resulted in increased demand of irrigation water by the farmers. On the other hand, due to lack of effective control on the distribution of water, farmers located at head of the canal over irrigate the land leaving less water availability to the users at the tail end. With less water availability and non-existence of distribution channels, the water does not reach to the farmers at the tail end. This affects the extent of area irrigated by a particular irrigation source. This problem become more acute when there is less water availability at the irrigation resource due to less rainfall.

Section 2: Quality of Assets under AIBP

The results of farmers' response on the maintenance of assets (water outlets and distribution channels) have been analyzed in Table 12.2. The data reveals that abysmally low percent of respondent feel the proper maintenance of water outlets and distribution channels in major irrigation projects. On the other hand maintenance of water outlets and distribution channels has been found by and large very good in medium irrigation projects and Extension, Renovation and Modernization (ERM) projects. The Shivrath Diversion (V), medium irrigation project in Chattisgarh is an exception.

Table 12.2: Farmers' Response about Quality of Assets under AIBP
(Percent of respondents)

Project Category	Project Name	Quality of Assets	
		Proper Maintenance of Water Outlets	Proper Maintenance of Distribution Channels
Major	Upper Krishana St 1, Karnataka	44	43
	Raighat Dam, Uttar Pradesh	7	1
	Bansagar (Unit –I) (V), Madhya Pradesh	11	23
	Dhansiri (V), Assam	8	11
Medium	Yerrakalva (V), Andhra Pradesh	84	90
	New Pratap Canal, Jammu & Kashmir	86	85
	Shivrath Diversion (V), Chattisgarh	6	4
	Gumti (V), Tripura	80	82
Extension Renovation & Modernisation (ERM)	Narai Barrage (IX), Orissa	N.A	N.A
	Jaismand (Modernization) VI, Rajasthan	71	72

Section 3: Process of Implementation of Project

The responses of beneficiaries related to process of project implementation and management has been captured in Table 12.3. Water being a common property resource, cannot be distributed efficiently and equitably without a common agreed system among the users. Majority of the farmers in the command of medium irrigation projects responded that a proper system exist as far as distribution of water is concerned in their villages. The situation is not good in case of major irrigation projects of Uttar Pradesh and Madhya Pradesh where only 30 percent farmers responded positively about existence of proper system for distribution of water. Although water is not distributed by any standard system in these two projects, it is worthwhile to note that about 80 percent farmers were of the opinion that there exists equitable distribution of water in the villages. The same response was received in all the irrigation projects except the medium irrigation project in Chattisgarh. The response pattern is more or less similar among the beneficiary farmers located at different locations of the canal.

Payment of irrigation charges on time by the users is the most sensitive issue in the irrigation management across the country. Here also it has been observed that majority of the farmers do not pay irrigation charges on time in major irrigation projects of Uttar Pradesh, Karnataka, and Assam. The percentage of farmers making timely payment of irrigation charges is comparatively higher in medium irrigation projects and Extension, Renovation and Modernization (ERM) projects. Surprisingly, more than 50% of the farmers in major irrigation projects are willing to pay extra charge for assured water supply. It clearly indicates that access to water is more important than the cost of it.

Table 12.3 : Beneficiary's Response on Process of Project Management

(% of respondents)

Project Category	Project Name	Process of Project Management			
		Existence of Proper System for Water Distribution	Equitable Distribution of Water	Timely Payment of Irrigation Charges	Willingness to Pay Extra Charges for Assured Water Supply
Major	Upper Krishana St 1, Karnataka	49.7	93.7	5.5	50.0
	Raighat Dam, Uttar Pradesh	28.0	79.4	28.7	62.9
	Bansagar (Unit -I) (V), Madhya Pradesh	26.6	92.9	86.0	65.5
	Dhansiri (V), Assam	74.2	69.9	35.0	83.2
Medium	Yerrakalva (V), Andhra Pradesh	81.5	96.9	89.4	42.7
	New Pratap Canal, Jammu & Kashmir	81.2	75.0	50.7	41.6
	Shivnath Diversion (V), Chattisgarh	53.7	35.6	38.4	60.3
	Gumti (V), Tripura	86.9	88.8	99.2	3.0
Extension Renovation & Modernisation (ERM)	Narai Barrage (IX), Orissa	42.6	73.8	82.4	19.0
	Jaismand (Modernization) VI, Rajasthan	41.7	98.7	80.3	74.3

Section 4 : Impact of AIBP

Any investment in creating irrigation resource should have impact on the livelihood of the farming community. It should also have a multiplier affect on the socio-economic development of the area. Accordingly, an attempt has been made in the present study to find out the impact of AIBP on the agricultural and socio-economic development in the command of the selected irrigation projects. This impact has been measured using two different methodologies. First, data was collected from the farmers using the

structured questionnaire and secondly, the farmers' response on the various parameters was recorded using 5 point scale.

a) Impact assessment of AIBP on Agricultural Development

The cropping intensity and average annual income collected from the beneficiaries and non-beneficiaries farmers across the different irrigation projects has been tabulated in the table 12.4. The cropping intensity has been found higher among the beneficiaries' farms as compared to that of non-beneficiaries' farms in all the irrigation projects. The difference is more pronounced in the medium and Extension, Renovation and Modernization (ERM) irrigation projects. This is quite obvious as availability of irrigation has increased the opportunities to the farmers for taking more crops in area. Subsequently, average annual income of the farmers has increased as evident from data on average annual income of beneficiary and non-beneficiary households. Here the increase in income is more among the beneficiary farmers of the command area in major irrigation projects.

Table 12.4 : Impact of AIBP on Cropping Intensity and Annual Income

Project Category	Project Name	Cropping Intensity (%)		Average Annual Income of Household (Rs.)	
		Beneficiary	Non-beneficiary	Beneficiary	Non-beneficiary
Major	Upper Krishana St 1, Karnataka	120	112	93687	56739 (31.17)
	Raighat Dam, Uttar Pradesh	171	148	62469	57500 (8.64)
	Bansagar (Unit –I) (V), Madhya Pradesh	175	110	49663	40809 (21.70)
	Dhansiri (V), Assam	106	101	63413	46762 (80.0)
Medium	Yerrakalva (V), Andhra Pradesh	173	140	114765	84202 (36.30)
	New Pratap Canal, Jammu & Kashmir	157	133	90531	83437 (8.50)
	Shivnath Diversion (V), Chattisgarh	144	109	48578	39132 (24.14)
	Gunti (V), Tripura	185	109	56406	42187 (33.70)
Extension Renovation & Modernisation (ERM)	Narai Barrage (IX), Orissa	N.A.	N.A.	56937	NA
	Jaismand (Modernization) VI, Rajasthan	160	124	34016	41308 (17.65)

The response of the farmers on varies parameters of agricultural development has been presented in table 12.5. It is clearly evident from the results that as per the farmers' response, there has been substantial increase in irrigated area in all the command of irrigation projects except in major irrigation project of Dhansiri (V), Assam. More

Farmers in medium and Extension, Renovation and Modernization (ERM) irrigation projects believe that the total agricultural production has increased after AIBP intervention. However, there has been no decline in the cost of agricultural production in all the projects. Farmers in the command of Upper Krishana project of Karnataka are of the opinion that there has been increase in availability of agricultural equipments and decrease in land erosion. In the same project and Yerrakalva (V), Andhra Pradesh, increase in quality of agricultural produce has been observed by the farmers.

Table 12.5 : Impact of AIBP on Agricultural Development

Project Category	Project Name	Increase in irrigated area	Increase in total production	Decline in cost of production	Ease in availability of agricultural equipments	Ease in agriculture activities	Increase in crop rotation	Decrease in land erosion	Increase in the quality of agricultural produce
Major	Upper Krishana St 1, Karnataka	3.5	3.4	3.1	1.8	3.0	3.2	2.1	2.4
	Raighat Dam, Uttar Pradesh	2.30	2.51	3.04	3.24	3.07	3.08	3.37	2.73
	Bansagar (Unit –I) (V), Madhya Pradesh	2.16	2.27	2.75	3.01	2.91	2.71	3.03	2.80
	Dhansiri (V), Assam	3.27	3.51	3.81	3.68	3.65	3.55	3.64	3.47
Medium	Yerrakalva (V), Andhra Pradesh	2.47	3.14	2.57	3.10	2.32	3.43	2.01	2.05
	New Pratap Canal, Jammu & Kashmir	2.28	2.45	2.88	3.13	3.14	2.88	3.03	3.25
	Shivnath Diversion (V), Chattisgarh	2.74	2.77	3.04	3.61	3.67	4.24	3.49	3.65
	Gumti (V), Tripura	1.93	2.09	2.96	2.38	2.92	3.72	3.02	2.94
Extension Renovation & Modernisation (ERM)	Narai Barrage (IX), Orissa	1.99	1.96	3.92	3.05	2.93	3.15	4.17	2.86
	Jaismand (Modernization) VI, Rajasthan	2.14	2.31	2.77	3.01	3.09	2.78	3.10	3.01

Note : Strongly agree-1,..... Strongly disagree-5

b) Impact assessment of AIBP on Socio-economic Development

The status of migration among the beneficiary and non-beneficiary farmer households across the different projects has been recorded in table 12.6. It is heartening to see that average duration of migration in a year is lower among the beneficiary households as compared to that of non-beneficiary households in all the irrigation projects. This is

because of availability of irrigation water has increased on-farm involvement of the farming community.

Table 12.6 : Impact of AIBP on Migration

Project Category	Project Name	Average Duration of Migration in a Year (days)	
		Beneficiary	Non-beneficiary
Major	Upper Krishana St 1, Karnataka	124	180
	Raighat Dam, Uttar Pradesh	69	135
	Bansagar (Unit –I) (V), Madhya Pradesh	85	115
	Dhansiri (V), Assam	N.A.	N.A.
Medium	Yerrakalva (V), Andhra Pradesh	84	N.A.
	New Pratap Canal, Jammu & Kashmir	N.A.	N.A.
	Shivnath Diversion (V), Chattisgarh	135	150
	Gumti (V), Tripura	N.A.	N.A.
Extension, Renovation and Modernization (ERM)	Narai Barrage (IX), Orissa	160	N.A.
	Jaismand (Modernization) VI, Rajasthan	N.A.	N.A.

The farmers' response on various parameters on socio-economic development can be seen in table 12.7. AIBP has been success in increasing literacy rate of the farming community in Karnataka and Andhra Pradesh. These are the two states were there has been increase in non-farm activities. Unfortunately, farmers from none of the state reported in increase in health care services and decrease in disease out break. Increase in employment opportunities was responded in Andhra Pradesh and Orrisa. AIBP has failed to increase the credit availability to farmers in all the states. Moreover, there has been no impact in the visit of government officials to rural sector after AIBP.

Table 12.7 : Impact of AIBP on Socio-economic Development

Project Category	Project Name	Increase in Literacy Rate	Increase in non-farm activities	Increase in health-care services	Decrease in diseases outbreak	Increase in forest-ation/ number of trees	Increase in employment opportunities	Increase in the visits of government officials	Increase in credit availability	Increase in value of land
Major	Upper Krishana St 1, Karnataka	1.8	2.1	3.3	2.7	2.9	3.2	3.2	3.4	3.4
	Raighat Dam, Uttar Pradesh	3.19	3.31	3.18	3.34	3.16	3.06	3.55	3.34	2.19
	Bansagar (Unit –I) (V), Madhya Pradesh	2.82	2.89	2.97	3.06	2.78	2.92	2.91	2.92	2.15
	Dhansiri (V), Assam	3.57	3.63	3.63	3.68	3.61	3.65	3.96	3.51	3.54

Contd ...

Table 12.7 : Impact of AIBP on Socio-economic Development (Contd ...)

Project Category	Project Name	Increase in Literacy Rate	Increase in non-farm activities	Increase in health-care services	Decrease in diseases outbreak	Increase in forestation/number of trees	Increase in employment opportunities	Increase in the visits of government officials	Increase in credit availability	Increase in value of land
Medium	Yerrakalva (V), Andhra Pradesh	1.99	1.76	3.36	2.49	2.38	2.06	2.65	2.46	2.01
	New Pratap Canal, Jammu & Kashmir	3.23	3.22	3.57	3.36	3.12	3.39	3.29	3.54	3.24
	Shivnath Diversion (V), Chattisgarh	3.57	3.58	3.50	3.56	3.66	3.81	3.66	4.14	3.76
	Gumti (V), Tripura	2.96	2.96	3.04	3.96	3.80	3.06	3.57	3.90	2.27
Extension Renovation & Modernisation (ERM)	Narai Barrage (IX), Orissa	2.52	2.89	2.65	3.99	3.68	1.99	1.57	4.03	1.55
	Jaismand (Modernization) VI, Rajasthan	2.82	3.10	2.90	3.09	2.96	3.04	2.74	2.91	2.22

Note : Strongly agree-1,..... Strongly disagree-5

Section 5: Strategies Required

The Problem Tree Analysis (performed in Section 1) and Chart 12.2 confirm the hypothesis that under Indian agrarian conditions, the supply side factors are more important to explain the reasons for gap between irrigation potential and its utilization. The same analysis further reinforce that Irrigation Department in all the States has been trapped in vicious circle due to non-availability of sufficient funds for maintenance of irrigation resources, leading to even further poor utilization of irrigation potential of a resource. Though there has been spectacular increase in the irrigated area, State Governments in India are increasingly under severe financial constraints as they find it difficult to finance the recurring costs of irrigation and to collect economic water charges from the farmers. As a result, not only the sustainability of government run irrigation system is in danger, but also its impact on water use efficiency and equity has been dwindling over a period of time.

National Water Policy, 2002 has also highlighted some of the problems and weaknesses in a large number of irrigation projects in the country.

“There have been substantial time and cost overruns on projects. In some irrigation commands, problem of water logging and soil salinity have emerged, leading to degradation of agricultural land. There are complex problems of equity and social justice in regard to water distribution. The development and exploitation of country’s groundwater resources also give rise to questions of judicious and scientific resource management and conservation”.

It further points out that “As maintenance of water resource schemes is under non-plan budget, it is generally being neglected. The institutional arrangements should be such that this vital aspect is given importance equal or even more than that of new constructions” (National Water Policy, GOI, 2002).

In order to make sure that sufficient funds are available for operation and maintenance of irrigation projects, a projected cash in-flow and out-flow statement for the entire life of the project should be prepared at the time of sanction of the project. This would provide a complete understanding about how much funds are required and when to maintain the irrigation project. The cash flow analysis should also provide the source of funds for this purpose.

Irrigation agencies often lack a service orientation. Government emphasis in the past has been on construction of new systems without much, if any, farmer participation. The need for providing sustainable service under diminishing budgets calls for radical measures in the existing irrigation agencies in terms of technology, management and personnel policies. It has been realized in both developed and developing countries all over the world that if irrigation performance is to improve, a wide range of mutually supporting interventions will be needed which include:

- Improved agronomic, maintenance and irrigation management practices;
- System modernization and promotion of advanced irrigation technologies;
- Institutional reform, including the restructuring of irrigation agencies and irrigation management transfer to farmers and private entities; and
- The creation of incentives that treat water as an economic good and promote self-financing of irrigation schemes by water users

Growing realization among governments that new paradigm in irrigation management is needed has ushered in a new wave of reforms in the form of Irrigation Management Transfer (IMT) in the irrigation sectors of both developed and developing countries. It has been advocated that IMT will reduce the cost burden of irrigation on the government on the one hand, and will increase the productivity and profitability of irrigated agriculture enough to compensate for any increase in the cost of irrigation to farmers, on the other. In India, a change started taking place in mid eighties when the need for introducing PIM on the lines of similar measures introduced in some foreign countries was increasingly realized by social thinkers and irrigation professionals. It was felt that complex tasks involved in water management could not be performed efficiently with cost effectiveness by a centralized bureaucracy. Accordingly, it would be better to transfer much of the power and responsibilities to farmers, i.e. actual users of water, if the present organizational structure was not to collapse under its own weight. The priority should be to loosen the tight control of bureaucracy and give a dominant say to farmers in water management.

However, let us understand that IMT is not a panacea for solving the problem of irrigation management. There are two issues, which ought to be kept in mind while designing an appropriate IMT program.

(a) Formation of WUAs should not be treated as an end in themselves. For farmers to play a significant role in all the critical functions of irrigation management including allocation and distribution of water, operation and maintenance, water charge collection and conflict resolution, there is a need for their capacity building (such as, in book

keeping, conducting meetings, preparing O & M plans, dispute resolution, water distribution methods, measuring water flows, etc.), following clear distribution of roles. Thus, most important is to provide continuous capacity building even after the implementation is over.

(b) Although the management functions which government irrigation agencies (often at the strong behest of donor agencies) are most interested in transferring to farmers are the operation and maintenance of canals and pumps, there are other important management functions as well. In the case of new systems, or the rehabilitation / modernization of old systems, the functions of planning, design, and construction are all part of “management”. And at the end of the project cycle, even the process of evaluation should be included as a management function.

The debate related to cost versus access for all the product and services in rural areas has established that rural people give preference to access over cost of any product. The same is true for irrigation as agricultural input. The study finding confirms the same as majority of the farmers under survey showed their willingness to pay higher prices for irrigation water so that they could get adequate quantity of water at right time. Contrary to farmers’ buying behavior, all State Government consider it mandatory to supply irrigation water as a highly subsidized price as the Government think that it is the cost of irrigation, not access to irrigation services, is the major issue before the farmers. In this process, issues related to access of irrigation water are usually ignored and the consequences are very clear. Instead of treating farmers as beneficiaries, this is the right time when the Irrigation Department should consider the farmers as their clients, as the clients can pay the economic cost of resource but we can not expect the same from beneficiaries. However, when the farmers as clients will pay for irrigation water, the same farmers would also demand for better services from the irrigation Department.

We all are aware that both water & land are now-a-days precious and are under great stress. Both are required to be saved as much as possible to meet the future food demands. In this perspective, canals are now required to be redesigned with lined sections, in order to save water being wasted from seepage & evaporation, and to enhance their efficiency. Much less efforts will be required in the maintenance too. It will save precious land & this can be utilized for Agricultural purposes, as there is already a great pressure on land due to various developmental activities. Main Canals and Branches are in bad shape in many systems and the too need proper maintenance/ rehabilitation Apart from silting, their banks at many places are low & weak and needs strengthening to allow full carrying capacity. Canals are also required to be redesigned in order to meet the present scenario with modern technology regarding Head/Cross Regulators, Gates, Falls & other structures. Although Main Canal & Branches are Designed as non silting channels, but some typical terrain, it has been observed that there is lot of silting in them thus reducing the discharge carrying capacity of the main carriers.

Suggestions:

1. Enough budgets should be allocated for timely repair and maintenance of the canals.
2. High priority should be given to the task of lining of the whole canal system, including main medium and minor canals, along with a provision of appropriate slope. High quality technical work should be ensured in this regard. In addition, contractors and field staff of irrigation department should be trained to deliver technical work of a sound quality.
3. Since it is very difficult to stop farmers from lifting water, it is better to install a lift irrigation system on the bank of canals. In this way, farmers can be charged for the amount of water they collect. As per the suggestion of the officials of irrigation department, lift irrigation through the main canal should be legalized and that area should be converted into a command area. This would help eliminate the frequent damage to the canal undergone during lifting water by the farmers.
4. Restructuring of the WUA should be carried out. This should be followed by aggressive training for organizational development, leadership, maintenance of, financial and operational records, training in the basic technical components of canal system and in the methods of monitoring technical work. Instead of vesting WUA with financial clout, it should be given a management and supervisory role, so that wastage of water can be prevented and equity in distribution of canal water can be ensured. WAU should be given enough power to monitor the construction and repair work of canals and if they do not find work done as per the norms, they should have power to get the modifications done. Field level irrigation officials should be given enough financial power, so that they can implement corrective measures in time to save the canal from further damage.
5. Physical safety of the field staff (sub engineer and field personnel) of the irrigation department should be ensured, by providing them appropriate police security, so that they are able to supervise the canal operation even during night and thus prevent wastage of water resulting from damage to canal during peak irrigation season.
6. There is a need to develop a mechanism for proper coordination between relevant government departments, such as the irrigation, agriculture, revenue and the land development department. Perhaps a committee consisting of representatives from the relevant departments can be formed, to look at the holistic development of the command area.
7. A policy needs to be formed to make farmers to adopt appropriate cropping pattern for optimum use of water. A balanced ratio has to be introduced between high, medium and low water consuming crops. This will help maximize the benefits of canal water and at the same time protect head reach land from water logging and ultimately prevent it from becoming infertile land. Some mechanism

is needed to be developed to impose fine on the farmers who disproportionately grow high water consuming crops. Growing high water consuming crops continuously makes the land water logged and saline and ultimately makes it unsuitable for cultivation. It is in the interests of the farmers to adopt balanced cropping pattern. There are many examples in India where highly fertile agriculture land has turned infertile because of excess use of water and imbalance cropping pattern. Farmers need to make aware of this.

8. As of now, under AIBP programme there are constraints for providing funds towards construction of Field Irrigation Canal (FIC) net works. Funds are being provided for construction of main canal, distributaries, laterals and sub laterals. But the networking right from main canal up to the sub laterals does not meet the requirement towards the wet potential unless FIC network is put in place. As such it would be better, if AIBP assistance is extended even for construction of FIC net works so that the networking could be made through in full, wet potential could be achieved and the finished product in true sense could be realized.
9. The main constraint in implementation of AIBP scheme is land acquisition and Rehabilitation & Resettlement. Though the guidelines prescribe that land acquisition need be completed before the project proposals are approved under AIBP, this is not the case in some of the projects. Certain lands remain to be acquired after the project is taken up and it is expected that the lands can be acquired during the course of execution of parts of the project. In many of the cases, the project is continued under AIBP even after the prescribed completion time of 4 years either as Normal AIBP or as Fast Track Programme. Thus the very objective of the Accelerated Irrigation Benefits Programme is undermined.
10. Expenditure incurred on the project is being considered on a year to year basis. If the expenditure incurred on a project during a current financial year is more than the programmed expenditure, the guidelines should be modified suitably to allow reimbursement of central share on expenditure thus incurred.

Project Team

Project Director

Dr. R.C.Dey
Director, PEO

Head Quarters

Shri L. N. Meena
Shri Vipin Kumar
Shri Bhuwan Chander
Shri D.S. Sajwan
Shri Virender Rawal

Economic Officer, PEO
Economic Officer, PEO
Economic Investigator, PEO
Tabulation Clerk, PEO
Young Professional, PEO

Field Team:

Name of REOs	Name and Designation of Officers/Staff	Name of PEOs	Name and Designation of Officers/Staff
REO, Kolkota	Ms. Godhuli Mukharjee, Director	PEO, Guwahati	Shri A.K.Thakur, E.O.
	Ms.Nitika Gupta, S.R.O.		Shri Dicken Pegu, LDC
	Shri M.K.Mishra, E.O.	PEO,	Shri S.Pradhan, S.R.O
	Shri R.Haldar, E.I.	Bhubaneswer	Shri N.C.Samal, R.O.
	Sh Ashutosh Pandey, LDC		Shri S.Routray, E.I.
REO,Lucknow	Shri B.P.Meena, Director	PEO, Patna	Ms. Renulata, S.R.O.
	Sh. Anurag Bhatnagar, E.O.		Sh. Manoj Kr. Pankaj, E.I
	Sh. Shatrughan Pandey, E.I.		Shri Sudhir Kumar, LDC
	Shri Rajeev Srivastava, E.I.		
REO, Jaipur	Shri K.S.Kalasua, Director	PEO, Bhopal	Sh.Shyam Lal, S.R.O.
	Shri K.L.Kaushik, S.R.O.		Shri Virendra Singh, E.O
	Smt. S.K. Chaudhary, R.O		Shri A.K.Rai, E.I.
	Shri.R.K.Sharma, E.O.		
REO, Chandigarh	Shri V.K.Attri, Director	PEO, Shimla	Shri Omesh Paul, E.O.
	Shri R.P.Singh, E.O.		Sh.Krishna V. Kulkarni, E.I
REO,Hydrabad	Shri D.Koil Pillai, Director	PEO, Bangalore	Shri K.V.Suresh, E.O.
	Shri S.R.Verma, E.O.		Shri Raj Kumar, E.O.

