FARMERS MANAGEMENT OF IRRIGATION SYSTEMS - A CASE STUDY OF KRISHNA DISTRICT OF ANDHRA PRADESH

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CERTIFICATE

Mr. V. SREEDHAR has satisfactorily prosecuted the course of research and that the thesis entitled **"FARMERS MANAGEMENT OF IRRIGATION SYSTEMS - A CASE STUDY OF KRISHNA DISTRICT OF ANDHRA PRADESH"** submitted is the result of original research work and is of sufficiently high standard to warrant its presentation to the examination. I also certify that the thesis or part thereof has not been previously submitted by him for a degree of any university.

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CERTIFICATE

This is to certify that the thesis entitled **"FARMERS MANAGEMENT OF IRRIGATION SYSTEMS - A CASE STUDY OF KRISHNA DISTRICT OF ANDHRA PRADESH"** submitted in partial fulfilment of the requirements for the degree of **MASTER OF SCIENCE IN AGRICULTURE** of the **Acharya N.G. Ranga Agricultural University, Hyderabad**, is a record of the bonafide research work carried out by **Mr. V. SREEDHAR** under our guidance and supervision. The subject of the thesis has been approved by the Student's Advisory Committee.

No part of the thesis has been submitted for any other degree or diploma. The published part has been fully acknowledged. All assistance and help received during the course of the investigation have been duly acknowledged by the author of the thesis.

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(SREEDHAR V.)

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LIST OF ABBREVIATIONS

APERP	:	Andhra Pradesh Economic Restructuring Project
APFMIS act	:	The Andhra Pradesh farmers management of irrigation systems act.
CA	:	Competent authority
DC	:	Distributory committee
FO	:	Farmers' organisation
GOAP	:	Government of Andhra Pradesh
ID	:	Irrigation department
IMT	:	Irrigation management transfer
IRDAS	:	Institute of Research Development and Social Management
O and M	:	Operation and maintenance
PC	:	Project committee
PIM	:	Participatory irrigation management
TC	:	Territorial constituency
WALAMTARI	:	Water and land management training and research institute
WUA	:	Water users association

DECLARATION

I, **V. SREEDHAR** hereby declare that the thesis entitled "**FARMERS MANAGEMENT OF IRRIGATION SYSTEMS - A CASE STUDY OF KRISHNA DISTRICT OF ANDHRA PRADESH**" submitted to the **ACHARYA N.G. RANGA AGRICULTURAL UNIVERSITY** for the degree of **MASTER OF SCIENCE IN AGRICULTURE** is the result of original research work done by me. I also declare that any material contained in the thesis has not been published earlier.

Date : 9.9.99

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ABSTRACT

Andhra Pradesh is a river state and mostly agrarian in nature. Krishna, Godavari and Pennar are the Perennial rivers on which many irrigations projects have been constructed by utilising huge public moneys. The management of the irrigation systems was not effectively under taken during the last four decades. The involvement of the farmers was not felt necessary at any stage of the execution of the irrigation projects.

In the early 90s, the Government of Andhra Pradesh felt the need for involvement of farmers in management of the irrigation systems and introduced **participatory irrigation management (PIM)** in the state. In order to facilitate the farmers in management of irrigation systems, an Act was introduced during the year 1997. **The Andhra Pradesh Farmers Management of the Irrigation Systems Act (APFMIS) - 1997** was a boon to the farmers in the state which empowered the farmers to share the Administrative, Financial, Legal responsibilities and Power to manage the irrigation systems through **Water Users Associations (WUAs).**

Around 10,292 WUAs, 174 Distributory Committees in the state are the viable local organisations in the command areas of various irrigation projects, which bring about a radical change in the Management of irrigation systems.

The present study is therefore designed to study the success of the water users' associations programme in Andhra Pradesh and to critically examine the farmers involvement with the following objectives.

1. To assess the need for and the goals of farmers' management of irrigation systems.

2. To analyse the powers and functions of different water user associations constituted at different levels of irrigation system.

3. To estimate the cost of various operations undertaken in the selected operational area and to assess the benefits accrured to WUAs.

4. To critically examine the farmers' participation in the management of irrigation systems.

Keeping in view the above objectives, the literature was reviewed and multiple random sampling was followed in this study and was carried out in Krishna district of Andhra Pradesh. The respondents were water users in the selected WUAs, and the sampling size was 80, 10 each from eight territorial constituencies and 4 TCs from one WUA.

The data was collected with the help of questionnaire specifically designed for this purpose. The data thus collected was coded, tabulated and analysed.

The following research findings have emerged out of the present study.

1. Government of Andhra Pradesh through enacting a new legislation called Andhra Pradesh farmers management of irrigation systems Act, 1997 (APFMIS Act, 1997) which exclusively empowers their organisations and enables them as decision makers and implementers in management of irrigation systems.

2. Small farmers constituted major percentage of water users association in the selected ones i.e. 57.5 per cent and 86.25 per cent literacy has been observed.

3. 73.75 per cent of respondents were having voting right to elect the WUA presidents and TC members.

4. The total land holding of respondents was 720 acres and in which 248 acres of land was under paddy cultivation and remaining under irrigated dry crops such as cotton, chilli, groundnut.

5. Totally Rs. 18,35,000/- were spent on O & M works by both associations on various categories of works in the financial year 1998-99.

6. Even if it was not possible to measure the benefits in terms of all the valid parameters, WUAs found to be quite good. It is absolutely essential to see the impact interms of some key parameters like area irrigated, total income generated and changes in cropping pattern etc.

All these were examined in terms of a comparision of position before and after formation of WUAs.

I. Quantified benefits

i. Increase in land value was about Rs. 8888/ in case of irrigated and Rs. 23745/- in case of irrigated dry land.

ii. Productivity levels have been increased as mentioned below in various crops.

Rice - 3 bags/acre
Chillies 1 q/acre
Cotton - 2 q/acre
Groundnut - 2 q/acre

iii. There was totally an additional income of Rs. 3.86 lakhs to the respondents after formation of WUAs has been observed, from only 720 acres of land out of total operational area of 18998 acres.

II. Non-quantified benefits

i) Majority of the Farmers have satisfied with distribution of water.

ii) 91.25 per cent of respondents agreed that disputes were decreased after formation of WUAs.

iii) 93.75 per cent of respondents have confirmed the transparency of works.

iv) 97.5 per cent of respondents were satisfied with utilisation of funds.

7. Farmers were not actively involving in the works undertaken by WUAs except presidents and TC members. But they were actively participated in the elections of WUAs, and prioritision works.

Based on the data collected, it was found that WUAs have done exceedingly well.

INTRODUCTION

CHAPTER I

INTRODUCTION

Andhra Pradesh (A.P.) is the fifth largest state in India with geographical area of 27.6 million hectars. It is primarily an agrarian state with about 70 per cent of its population depending on agriculture. Around 49 per cent of the geographical area is the cropped area (13.5 M ha). Irrigation contribution to agricultural production is around 70 per cent (Bureau of economics and statistics). The mean annual rainfall in the state is 858 mm, received mostly between June to October. Longspells of dry periods during the rainy season affecting crop production is not uncommon. Consequently, irrigation plays a vital role in agricultural production. The Government of Andhra Pradesh (GOAP) has been laying great stress on creating irrigation facilities through the major, medium and minor irrigation projects.

Numerous rivers including three major rivers Godavari, Krishna and Pennar flow through the State. Dependable flows from these river systems is estimated at 77766.72 mm^3 or 2746 thousand million cubic feet (TMC). Traditionally, irrigation and drainage have the large share of plan funds, second only to the power sector. The irrigation potential under various sources which was around 2.17 M. ha in 1956 has increased to about 6.4 M ha by 1997-98. Of this potential, ground water accounts for 29 per cent.

Table 1.1 :Irrigation utilisation (Million. ha)

Surface sources	Irrigation potential created	Irrigation potential utilized	Percentage of utilisation
Major and medium irrigation project	3.60	1.87	52
Minor irrigation sources	1.20	0.97	81
Ground water sources	1.60	1.47	92
Total	6.40	4.31	

Source : Statistical abstract, Andhra Pradesh, 1994

The ground water exploitation is done, by and large through private enterprises and is largely utilized. However, development and management of surface water resources is done by the State government.

The irrigation department of the state is incharge of constructing, operating and maintaining all irrigation works of major, medium and minor at government cost right from the head works done to the pipe outlets generally commanding upto about 40 hectares. Traditionally all development below the pipe outlet including the construction and maintenance of field channels has been the responsibility of the beneficiary farmers. Of late government have also taken up the task of constructing the field channels.

Availability of irrigation water in a predictable and dependable pattern and at assured intervals to all the farmers in the entire command area is an essential requirement for optimizing the irrigation utilisation and increase crop production under a project. Currently in many irrigation projects, the tail-end reaches of the distributories, majors, minors and even

outlet remain unirrigated because of undependable flows, inequitable distribution of water in different areas of the command. This has been compounded by a purely governmental approach despite the limited capacity for government to intervene especially at the lower levels of the system. The need to remedy this situation has been a major concern of the government.

In the state around 2.89 M. ha of land is not receiving irrigation water, eventhough considerable investments have been made for the creation of irrigation potential. Some of the major benefits that can accrue, by improving the performance of irrigation system to bridge this gap between potential created and utilised over the 2.89 m ha are :

i) Increase in the annual agricultural production by about 3.0 to 3.5 million tonnes, valued at about Rs. 10,000 million (or around US $ 300 million).

ii) Increase in employment opportunities to rural landless poor. It is estimated that this can provide an additional employment of about 250 to 300 million man-days.

iii) An effective means for poverty alleviation in the rural side.

iv) Boost to the economy in the area.

Source : Management of irrigation systems by farmers in Andhra Pradesh, India by J. Raymond Peter

The weakness of the present system can be summarized as follows.

a) The approach is top down wherein all decisions relating to management of irrigation system are taken by the irrigation department as per the standard administrative procedures, as laid down in the departmental codes and without any consideration to the field requirement and local needs.

b) The irrigation administration usually concerns itself with maximisation of budget and staff, which does not necessarily improve performance.

c) The level of coordination between various government departments is minimal.

d) Wide cognitive distance between the farmers and the irrigation agency leading to a mismatch of objectives.

e) Inadequate allocations towards maintenance charges leading to poor operation and maintenance of irrigation system.

Experiences all over the world has shown that transfer of irrigation systems from government agencies to farmers' organisation, can be a viable alternative. This is also reflected in the National Water Policy (1987) adopted by Government of India.

In A.P. a pilot project to gain experience and to demonstrate the utility and ability of the water users association (WUA), a farmers' organisation in management of irrigation systems was initiated in the early nineties. A pilot programme was taken up on a small scale with a command area of about 500 ha (5 L of D- 64) under Sriram Sagar project (SRSP).

This was followed up with a large scale pilot programme covering a command area of about 20,000 ha, under six different distributories in SRSP during 1995-97 through two non-government agencies. The pilot study was however based on the existing thought on PIM prevalent in the country. The aim was also to evolve a framework for farmers' organisations in irrigation system.

The design of the pilot project was basically drawn from Maharastra where PIM was in process on the Mula project. The approach however was to examine whether PIM as a process could be fitted into the existing legislation's such as the company's Act or the societies Act or the newly enacted mutually aided cooperative societies Act.

Table 1.2 : Achievements of the pilot project in two distributories of A.P.

Items	D-51	D-64
1) Area planted for irrigation (ha)	3111	5940
2) Area irrigated prior to WUA formation (1993-94)	1852	2690
3) Per cent area irrigated	60	50
4) Area irrigated with involvement of WUAs (1995-96)	2541	4666
5) Increase in area irrigated	689	1706
6) Percentage area irrigated	81	78
7) Total water received (mcft)	863	1532
8) Irrigation water used as avg. per ha before WUA (mcft)	0.466	0.517
9) Irrigation water used with WUA per ha (mcft)	0.34	0.33

Source : Results of the pilot study done by IRDAS 1995-97 in SRSP project

Some of the important issues that emerged out of the pilot project work are as follows :

1) The WUAs should have a clear "Water Right" so that they cannot only insist on getting their supplies accordingly, but also develop suitable crop planning for the area and work out appropriate operational plan for distribution of water.

2) Under the pilot project WUAs were registered under the "Societies Act" and some under the 'mutually aided co-operative Act'. The field officers of the irrigation department could not easily recognise the WUA as legal body. The WUA should have proper legal status, to be recognised by the irrigation authorities.

3. The accountability of WUA to the irrigation department, in terms of utilisation of irrigation water and area irrigated is to be spelt out in clear terms, so that proper water budget could be developed.

4. The financial resources of the WUAs are required to be builtup.

5. Role clarity is needed for the WUA for taking over the management of the irrigation system.

In 1997 a factual note on the irrigation sector was presented in the Andhra Pradesh Legislative Assembly highlighting the performance of the irrigation sector and the investments made. The results of pilot study, the experience gained abroad and the national and international seminars on participatory irrigation management influenced the thought process in government.

The Chief Minister of Andhra Pradesh gave a lead to the dynamic process of promoting participatory irrigation management in the state of Andhra Pradesh in early 1996. After a series of consultations with farmers. public representatives, administrators and the irrigation department it was decided that PIM should be implemented with a BIG BANG approach in the entire state. Implementation of the policy is very complex since it has to cross through various political, economic and administrative barriers. The process of implementation of this policy has eight distinct stages. Implementing the programme throughout the state in one go has its own merits and demerits. But decidedly has more advantages if the activities could be sustained constantly.

Eight stages of PIM programme implementation in A.P. are listed below :

Stage one : Generating political support at the highest level. This is essential to provide the required motivation.

Stage two : Creating favorable local environment.

Stage three : Developing legal framework.

Stage four : Formation of farmers' organisation - WUAs and distribution committees.

Stage five : Supplement the programme with clarity of roles of the farmers' organisation, irrigation department and other government agencies.

Stage six : Capacity building of WUA, irrigation department and other government agencies.

Stage seven : Ensure transparency and accountability in the working of farmers organisation and social audit.

Stage eight : Monitoring and evaluation.

Political support : A politically supportive climate has been generated to empower farmers in enabling them to manage the irrigation systems. This was followed with several rounds of dialogues with farmers and political parties on the benefits of Participatory Irrigation Management. Though there was initial resistance to the idea, it gained gradual acceptance by all political parties because of one overriding fact namely empowerment of the farmers. No law enacted in the state so far, which has a direct impact on the farming community. Political and administrative will is one of the important requirements for bringing about a paradigm shift. Participatory Irrigation Management requires changes in attitudes, work culture and major changes which visually bring about reversal of roles between the irrigation department and farmers' organisation.

Creation of favourable environment : One of the major step initiated was to have detailed dialogue with farmers in the project area on PIM. The state was divided into seven zones and to initiate the process of discussion with farmers along with the local irrigation authorities. The comments and opinions of various group of farmers were widely reported.

The initial apprehensions that government is trying to pass on its responsibility of management of irrigation project to farmers was widely debated and gradually an appreciation for PIM slowly emerged over a period of time. This initial process was continued for a period of about 8 to 9 months.

Developing a legal frame work : The pilot project on PIM threwup a number of issues which needed to be remedied especially when PIM was to be scaled up to cover the whole state. Firstly, water is owned, controlled and regulated by the State government. Secondly there are more than one department which cater to the needs of the farmer. For example, the revenue department collects the water charges. The agricultural department assists the farmers with advice on agricultural practices and the irrigation department supplies water. Further cooperative department caters to the short term and long term credit needs of the farmers. Existing Acts do not view irrigation in a comprehensive manner. They are mostly regulatory oriented. Most important of all, a legislation exclusively for farmers' organisations would identify them as a unique entity.

It was with this background that the Government of Andhra Pradesh enacted a new legislation called the "Andhra Pradesh Farmers' Management of Irrigation systems Act, 1997". This is a novel and revolutionary legislation and first of its kind in India, which exclusively empowers farmers and their organisations and enables them as decision-makers and implementers in management of irrigation system. The Act mandates all farmers to be the members of the water users' association. This is opposed to voluntary

membership usually done in pilot experiments on PIM. All land holders or tenants as recorded in the record of rights are members with voting rights. All other water users who are not registered as land holders or tenants but are in occupation of the land are members without voting rights.

Some of the important provisions under the Andhra Pradesh farmers' management of irrigation system Act 1997 are as follows:

i) Delineation of area of operation : Every WUA is to have an area of operation notified, which formed its operational area. The areas have been delineated on hydraulic basis after extensive consultation with the farmers by ID. In identifying the areas, care was taken to see that it is a viable area. In respect of a tank or a lift irrigation scheme the entire ayacut is delineated into one WUA. However, in respect of major and medium irrigation projects, a group of minors and direct pipe outlets constituted the WUAs area. In major irrigation project the WUA area ranged from about 2000 acres in undulating terrains to as high as 8000 acres in delta system.

ii) Election to the WUAs : The WUA and DC has managing committee which attends to the day-to-day functioning. This body has a president and managing committee members ranging from 4 to 10, who are elected by the members. The operational area is divided into territorial units to give equitable representation. Voting members in that area elect it territorial members. The president is elected directly by all in the hydraulic unit.

Table 1.3 : Territorial constituencies (TCs)

Major and medium irrigation projects	
Upto 1000 ha	4 Tcs
From 1001 ha to 1500 ha	6 Tcs
From 1501 to 2000 ha	8 Tcs
More than 2000 ha	10 Tcs
Minor irrigation project	
Upto 200 ha	4 Tcs
From 201 ha to 400 ha	6 Tcs
From 401 ha to 600 ha	8 Tcs
From 601 ha to 2000 ha	10 Tcs

Basis for Constituting the territorial constituencies under the APFMIS Act. 1997.

The APFMIS Act also provides for RECALL under section (10)a. Chairman or the member of the managing committee can be recalled by the members after a period of one year by giving written notice signed by not less than one-third of the members of the farmers' organisation.

iii) Tenure : Every farmer organisation has been elected for a period of five years. While there is direct election for the water user association from amongst farmers, election to the distributory committee and the project committee are indirect and held from out of the presidents of water user associations.

iv) Resources of the water users' associations : The water charges collected in the area of the WUA forms an important component of the resource. GOAP have decided to transfer 90 per cent of the water charges to the

farmers' organisations. However the amounts are shared as a percentage amongst the various tiers or organisations as follows.

Table 1.4 : Sharing of water charges

Level	Irrigation project		
	Major	Medium	Minor
WUA	60	70	100
DC	20	30	-
PC	20	-	-

In addition, the WUAs can collect contributions from their members. They can also raise income from properties within the system such as auctions of fruits of trees, rents on irrigation properties or from other funds as received from the central government as management subsidy or calamity relief would also contribute to its resources. All amounts are to be deposited in a bank account of WUA opened in a nationalised bank as joint account.

v) Involvement of irrigation department : With a view to bring about a closer interaction and greater accountability of the irrigation department with WUAs, an officer of the irrigation department nominated to work with WUA as its "competent authority" (CA). Each competent authority in a major irrigation scheme has about 4 to 10 WUAs, while in the minor irrigation tanks a competent authority may have around 15-20 WUAs. CA coordinates with the WUA and gives technical guidance in the preparation of estimates and maintenance of hydraulic particulars and structures of an irrigation system.

vi) Settlement of disputes : The disputes between the farmers within the association are to be taken care of by the WUA it self. The distributory committee shall be the final level for an appeal in the case of a WUA and the project level committee for a distributory committee and the apex committee for the project committee. The appeal must be preferred within 15 days of the order to the person aggrieved. Every appeal shall be disposed of within 15 days from the data of filing of the appeal.

Formation of farmers' organization - WUAs and DCs

Water users' associations and DCs have been constituted on a hydraulic basis. Depending on the type of the irrigation scheme the farmers' organisation could be single tiered or two tiered or three tiered as shown in Table 1.5.

Table 1.5 : Different tiers for farmers' organisation in Andhra Pradesh

Type of irrigation schemes	WUA committee	Distributory committee	Project
1) Minor irrigation	Yes	No	No
2) Medium irrigation	Yes	No	Yes
3) Major irrigation	Yes	Yes	Yes

Elections have been conducted to all 10,292 water users' Associations on June 17, 1997. Since the elections were exclusively for farmers tremendous enthusiasm was displayed by farmers in electing their leaders as the presidents and the members of the territorial constituencies. An incentive amount of Rs. 50,000 was given to 5763 WUAs for having elected their

presidents and members of the managing committee unanimously. An advance of Rs. 30,000 from out of the water charges collectable in future was given to 4529 WUAs which went in for a contest.

Implementation of the programme : The most important task of government was to ensure that the WUAs take part in the irrigation management of the system. WUAs were asked to carryout a system diagnosis through a participatory walk through along with their members and the irrigation department and identified critical reaches requiring immediate repair. There has been a mixed reaction to the overwhelming response of farmers by the irrigation department. This has been basically due to the fact that WUAs have been given the freedom and flexibility to decide the works to be taken up and the manner in which the works taken up and the total control on finances.

Capacity building : Capacity building is a continuous process and constant training modules need to be evolved as per the needs. Government has decided to train all the 70,000 territorial constituency members along with grassroot level functionaries of the Revenue, Irrigation and Agriculture departments.

Transparency/accountability in the working of WUA and social audit: The main aim of the government in creating WUAs has been to bring about a transparent administration by farmers, for farmers and of farmers. Creating WUA in itself has brought in the sense of ownership of farmer

to the irrigation system. Social audit is a new concept introduced in the WUAs mainly to ensure the quality of the functioning of the WUA.

Monitoring and mid-term evaluation : The success of the water users' associations programme in Andhra Pradesh would depend on an efficient monitoring system which would be constantly identifying WUAs which are active, inactive or dormant.

PIM - Vision of Andhra Pradesh : Government of Andhra Pradesh in its irrigation budget statement for the year 1995-96 have already stated that it proposed to constitute water users associations and hand them over to farmers' organisations. The vision of Andhra Pradesh, as stated in its policy statement "Reforming the irrigation sector for sustainable management and development" has been to achieve democratic decentralisation, farmers' management and financial autonomy leading to sustainable water resources management.

1.3 NEED FOR THE STUDY

Since Independence in 1947, the Government of India and State Governments have launched many major, medium, minor irrigation projects to supply the water to the farmers in the command area for increasing production to feed increasing population. The last 40 years featured a massive expansion of irrigated area at correspondingly heavy economic investment. Though the irrigation projects, increased in number, the anticipated income and increase in irrigation efficiency did not occur. As a result,

there has been a growing tendency to focus less on establishing new irrigation projects and more on improving the existing ones. Though the irrigation potential has been considerable, there is a gap between the potential created and utilised at the field level, which is estimated to be from 35 to 55 per cent in various irrigation projects.

In most of irrigation projects in Andhra Pradesh the irrigation efficiency is said to be around 30-40 per cent. This has to be increased to at least 55 to 65 per cent to achieve goals through well defined objectives.

One of the most important methods in trying to achieve the irrigation efficiency is by organising the farmers at the local level as they are the ultimate beneficiaries of the water in the commands of various irrigation projects. The Government of Andhra Pradesh has made many efforts and came out with an innovative technique for involving the farmers in management of irrigation systems thereby equal distribution of water and increase in the production through Participatory Irrigation Management. The participatory irrigation management (PIM) is a new technique, and an alternative for the existing methods of management of irrigation systems. The APFMIS Act implemented during the year 1997 necessitated the formation of water users' associations in the entire state. These water users' associations were empowered with administrative, legal, technical and the social powers in order to manage the system on their own with the help of competent authority (irrigation department). Since the inception of WUAs in the state many effective measures related with irrigation systems

management, operation and maintenance, distribution of water etc., were given top priority in the state. The WUAs have involved themselves in the management of irrigation systems. Till now there is no research study conducted on the performance of water users' associations in the state. Hence an attempt has been made to study the performance of WUAs in the state to know to what extend the WUAs have been involved themselves in management of irrigation systems and increase in agricultural production.

Problem : The success and failures of management of irrigation systems in the state depend upon the performance abilities of water users' associations. The performance depends on the physical, biological, economic and other social factors which make them viable units to manage the irrigation systems effectively. The extent of involvement of farmers in the management of irrigation systems and the likely benefits to them have to be assessed. Further, it is reported that some of the WUAs have not been functioning properly. All these issues will have to be studied. Hence, an attempt has been made to study the performance of WUAs under PIM in the state of Andhra Pradesh with the following objectives:

Objectives

1. To assess the need for and goals of farmers' management of irrigation systems
2. To analyse the powers and functions of different water user associations constituted at different levels of irrigation systems

3. To estimate the cost of various operations undertaken in the selected operational area and to assess the benefits accrued to WUAs and

4. To critically examine the farmers' participation in the management of irrigation systems.

1.4 SCOPE OF THE STUDY

The findings of this study could be gainfully utilised by the Govt. agencies, extension personnel, administrators and policy makers of state government of AP for taking up necessary steps to increase the capacity building of the WUAs as it reveals the weaknesses and strengths of WUAs in the management of irrigation systems.

1.5 LIMITATIONS OF THE STUDY

1) The study was based on the expressed opinions of the water users, which some times might not be free from personal bias and prejudice. Enough care was taken to insulate such biases entering into the data collected.

2) The implications of the present study are applicapable only to the Krishna district and generalisation can be made for the other districts in the state where the similar situations exist.

3. As the author of the study having limited resources and limited timeframe for conducting the study, the sample size of respondents was limited.

Since study is based on only two years data, utmost care may have to be taken in drawing conclusions.

REVIEW OF LITERATURE

REVIEW OF LITERATURE

CHAPTER II

REVIEW OF LITERATURE

The research study on "Farmers management of irrigation system' is a new venture in the area of management of irrigation systems in the state and as such there were no research studies in this area, since its inception of two years, therefore, some of the studies concerned with participatory irrigation management (PIM) were collected from different sources and are presented for the convenience under the following heads.

2.1 Need for and the goals of farmers' management or participatory irrigation management

2.2 PIM - Historical back ground

2.3 Problems that are faced in establishment and functioning of water users associations

2.4 Costs and benefits of PIM

2.1 NEED FOR AND THE GOALS OF FARMERS' MANAGEMENT or PARTICIPATORY IRRIGATION MANAGEMENT

The demand for water from non-agricultural sectors is on the increase, perhaps being essential for improving the quality of life which too cannot be under-rated eventhough these do reduce the availability of water for irrigation purpose. The irrigation sector to meet the challenge must plan covering large areas even with diminishing water resources not only to maintain but also to increase the production of food and fibre. This certainly warrants improvement in storing, handling and delivering

water as per requirements of plants for increasing the production per unit volume of water (FAO, ICD Paper 24, 1982).

Abel (1977) identified four kinds of inputs for good water management viz., recognisation of water as a scarce factor of productivity, centralised planning for irrigation investments and decentralised management of the system, exchange of agronomic and engineering information between users of water and managers of the system and incentives for both managers and users of water.

Bottrall (1981) concluded that there was a great scope for improving performance in terms of productivity and earning through improved organisation and management of services to farmers, especially in the field of main system of water distribution. Many weaknesses in management were attributable to the neglect of institutional and organisational questions at the planning and design stage.

Niranjan (1981) in a study of kosi command had made the observation that the findings of various scholars indicated that the bigger farmers were the greater beneficiaries of canal irrigation facility. This brought the question of linkages between powerful social groups and unscrupulous officials affecting their additional incomes, transfer and promotion. This led to discrepancies in water services between those with resources and those without.

Jain *et al.* (1982) reported that the conveyance losses in canals as well as in the fields were high. The conveyance losses varied from 30 to 60 per cent depending upon the distance and condition of canals and channels.

Palanisami (1984) concluded that some irrigation management organisations were necessary for efficient utilisation of water. He also mentioned that revenue and agricultural departments should encourage such organisations.

Pant (1986) revealed that the net result of broken legitimacy was that the tailenders did not get water when they need and had their fields waterlogged when no water is required.

Lowdermille *et al.* (1986) defined farmers' involvement or participation as farmers playing an active role in decision making regarding planning, implementing, operating, maintaining and evaluating projects and programmes designed to improve the productivity, equity and effectiveness of irrigation projects. Without active participation of farmers, irrigation systems could never be efficient or cost effective. There were many things government could not do effectively for farmers. Farmers needed a countervailing power and voice to assure that their needs were met by those who should be more accountable to them.

Narayana *et al.* (1986) stressed the need for enlisting peoples' involvement in the management of irrigation systems. He argued that

participation was seriously conditioned by several socio economic parameters. Traditional power structures should be considered when designing irrigation projects for they could not thwart ,development programmes by preventing the benefits from percolating to the people.

Sharma (1990) pointed out that the non-involvement of other disciplines (other than engineering) was dangerous and had already taken its toll on water utilisation.

Reddy (1990) indicated that lack of involvement of farmers in operation and maintenance of irrigation systems paved the way for the gap between potential created and utilised.

Hassan (1990) reported that some of the reasons as mentioned below for the lag between potential created and utilised.

1. Delivery system was not attended properly
2. Non-introduction of scientific WARABANDI in the commands
3. Lack of farmers organisations in the commands
4. Waterlogging and salinity in extension areas of commands
5. The irrigation department has no jurisdiction for water regulation below the outlet for interventions to resolve disputes among farmers in the command.

Yaqoob (1990) informed that the agencies involved in water resources development and management did not appropriately deal with the users and their social environment either at planning stage or at management stage.

Rao *et al.* (1992) clarified that existing system was breaking down because people were not involved in management. Peoples' participation was the only way for improving irrigation management and achieving better water utilisation.

Sampath *et al.* (1992) identified the main reasons for poor management of irrigation systems as follows : under - utilisation of created potential, inefficient functioning of water users organisations and non-involvement of farmers in planning, construction and management of the irrigation systems. To achieve control over water distribution at the field outlets, farmers needed to be organised in units that encourage co-operation. He added that existing models for water users organisation (irrigation panchayats) needed to be improved and also extended at the field level.

Maloney *et al.* (1994) reported that we needed to move from participation to organisation and eventually to turnover a part of the system itself to farmers' management as farmers involvement was often suggested as a way to strengthen current water administration.

Vaidyanathan (1994) explained the reasons for chronic inability of state to recover costs from their users in the state managed irrigation systems and added that distress consequences such as burden on budget

had forced many governments to think of ways to make beneficiaries of irrigation take over greater responsibility for management and for meeting the cost.

Nicholaichuk *et al.* (1996) opined that with the transfer of systems such as irrigation schemes from individuals and farmer groups to governments, it had been possible to arrange the investment of very large amounts of capital into the processes of irrigation infrastructure. Although the benefits had been large, it had resulted in a divergence between farmers and organisations responsible for operation, management and maintenance, which inturn had been responsible for the chronic malaise effecting many developing countries.

Jayaraj (1999) reported that farmers' participation in large numbers in using their voting right may due to the discontent in the minds of farmers over the government managed irrigation systems in equitable irrigation services provided in the commands and their desire to manage the system through farmers organisation (WUA) at local level.

Groenfield (1999) said that farmers who depended on irrigation water for their livelihoods had the strongest incentive to manage that water very carefully. No public sector agency could ever maintain the discipline that farmers impose themselves when they manage their own irrigation systems.

Patel (1999) emphasised that the involvement of water users' associations was necessary in order to manage water resources efficiently and recover operational and maintenance costs. It was understood that the Andhra Pradesh experience under an internationally funded project with the involvement of WUA in this specific area as mentioned in the budjet would have a demonstrative effect if extended to other states.

2.2 PIM-HISTORICAL BACK GROUND

Meinzen Dick (1984) based upon field research in a small scale irrigation tank in Tirunelvell district in Tamil Nadu indicated that non-formal local cultivators' associations made an important contribution to the overall performance of the irrigation system, even where government agencies were responsible for irrigation. Such organisations were found to mobilise local resources for use in a wide range of irrigation related tasks, including inspection and repair of physical structures, acquisition and distribution of tank water and interaction with government bureaucracies. The existence of these non-formal association concluded that the traditional institutions of kinship, caste, village, religion and party were not the only organising forces in Indian rural society, nor were they necessarily obstacles to co-operation for economic purposes.

Singh *et al.* (1986) pointed out that better water utilisation did not bear a linear correlationship with financial investments. Too much emphasis on main system deficiencies conceded the fact that even under conditions of scarcity water can be distributed to much larger area if officials operated

canals expediently. This could be achieved by rotating the supplies between certain reaches, encourage right time irrigation and above all taking the farmers into confidence in order to bring about peoples participation. The outlet command was an integral part of the main irrigation system and responsibility for it should be shared by irrigation engineers and beneficiaries.

Walker *et al.* (1993) stressed that irrigation systems needed to be regarded as socio-technical systems with effective co-operation between the people involved using the available resources. He has outlined two examples of participate oriented irrigation i.e., the 'Subak' community in Bali (Indonesia) and the water users' association in Taiwan.

Hoshino (1996) stressed that farmers' participation and the strengthening of their organisations were indispensable for sustainable agricultural development based on the experience gained at the union of Nasunogahara land improvement districts, 150 km north of Tokyo.

Nes-A-Van *et al.* (1996) reported that to increase levels of investment, intended beneficiaries of new irrigation systems were increasingly involved with the Government of Bangladesh in the planning and design of many new projects. Further more, the development of small scale irrigation projects was left to enterprises. He added that the government has abolished subsidies for irrigation, but has also withdrawn restrictions such as import limitations and taxes or licenses on equipment and installation. The advantage of development through private enterprises was that the government gains the macroeconomic benefits of irrigation without using public funds. Moreover

performance of irrigation was better. The farmers better insight on how the simple scheme should be operated. They were highly motivated because they dealt directly with the traders and technicians and the decision to invest depended only on their own consideration.

Rakesh (1999) said that participatory irrigation management needs to be distinguished from farmer participation in irrigation that PIM involves the water users' association (WUA) taking over the management (including operation and maintenance - O and M) of at least one level of canals above the outlet or the minor or subminor and also being associated in efforts at improved water and agricultural management.

2.3 PROBLEMS THAT ARE FACED IN ESTABLISHMENT AND FUNCTIONING OF WATER USERS' ASSOCIATIONS

However it is very difficult to make precise comparision of the costs and benefits of efforts of Governments to increase farmers' participation. Even when costs are reasonably well measured, many of the benefits elude quantification.

Investments in irrigation hardware are considered justified if they have rates of returns in 10-20 per cent range. The programme of farmers participation providing irrigation "software" appears have payoffs closer to 50 per cent per annum. Introducing greater farmers participation can have non-economic costs in the administration and political system. Increased farmer participation may enhance irrigation system productivity as much as

by helping to make government performance more responsive and equitable as by system of Andhra Pradesh.

Marria *et al* said that economic rationality and urgency for a water institution was legally based and farmers managed water rights system was indeed very clear and compelling. The role of the state compared to that of the central government was more focussed in understanding water law reforms within the states. Panchayat and irrigation co-operatives could play a major role.

Chand (1994) reported that for the equitable and efficient performance of Kuhls (small gravity channels, constructed along mountain sides conveying surface water from springs, rivers and stream in agricultural lands) in Himachal Pradesh, their beneficiary farmers be accorded well-defined and legally enforceable water rights. Conferments of such water rights by the state in the past, at the time of revenue settlements, had encouraged the formation of water users' associations which helped in conflict resolution among beneficiaries and also in effective maintenance of kuhls.

Meinzen-Dick (1996) reported that many countries were reviewing the role of the government in the management of irrigation with the result that water users' associations (WUAs) were increasingly being asked to take on greater responsibilities for the operation and maintenance of their systems and highlighted the importance of farmers' incentives for collective action and sustainability of WUAs. Similarly the staff of irrigation agencies needed to be capable and motivated to work with farmers. Structural

incentives such as tying agency budgets to farmers contributions, or linking salaries with performance appraisals to work with farmers, generally create the strength motivators for staff to work with WUAs, less tangible incentives, such as personal satisfaction and reduction in conflict, were more likely to emerge once the agency staff gains experience with WUAs. In all of this, a strong commitment from government policy-makers was needed to provide a facilitating framework for collaboration between irrigation staff and irrigators.

Tankhiwale *et al.* (1996) expressed that the annual loss of irrigation potential in India was due to both poor maintenance of the system and the ability of state agencies to provide adequate funds to O and M and establishment. Awareness of the problem amongst government and farmers led to the transfer of co-management of irrigation systems. Certain basic issues such as stage of transfer, composition and functions of water users associations, restricting of irrigation water charges etc had to be resolved to build material and internal confidence. WUAs also needed financial, technical and managerial assistance, which had to come from financing agencies, state agencies and NGOs. This also required amendment in the present irrigation act. Co-management with WUAs would reduce the burden on government exchequer, would increase equitability and efficiency of costly water utilization and would enrich productivity and improve the economic and social status of the members.

Sinha (1996) examined five key irrigation tanks to show how farmers cultivating land under short-term share and fixed rent tenancies experience serious limitations in evolving organisations for increasing their control over local irrigation management. The process could be enhanced by relaxing restrictions on tenancy contracts, emphasizing the training of stockholders for institutional building, establishing tradable water rights and making membership of water users' associations open to cultivators with water rights and not conditional on land ownership and state imitated the creation of an enabling environment for the devolution of powers within the irrigation bureaucracy.

During 13th Bahikaka memorial lecture on "farmers participation in irrigation water management", Shri.Amernadh Chowdery, chief minister of Gujarat (1990) said that to ensure the farmers participation in irrigation water management for increasing the productivity, it is essentially a joint responsibility of many sectors like irrigation, agriculture, public administration, co- operation and rural sociology.

2.4 COSTS AND BENEFITS OF PIM

With in the first year of introducing farmers organisation there was 30 per cent increase in flow of water reaching the down stream half of the 15,000 acre Minipe Scheme in Srilanka (Desilva, 1985).

Irrigable area in SRSP in Andhra Pradesh was extended by 25 to 35 per cent through water relations operation after pipe committees were

introduced. The time required for land development of turnout areas was cut from one year to 4 to 6 months with farmers' participation (Singh, 1983)

Cropping intensity increased from 50 to 90 per cent in two years time through working with farmers' organisations in the Non Wai Scheme in Thailand (Kathpalia, 1984).

A participatory approach to expand the Buliato scheme in Phillip ines saved costs by avoiding unnecessary construction. The channels built by farmers were better than average quality and done four months ahead of schedule (Illio and Chiong Xavier, 1983).

Water issues were reduced by one third in left branch canal of the Gal Oya scheme in Srilanka with organised farmers co-operation. Tail-end areas that had no irrigation water for 10 to 20 yrs were able to get water in the dry season through farmer operated rotation (Up Hoff, 1986).

In china, irrigation authorities adopted farmers' strategy for wali storage and distribution (called recon on-the-vine) and with farmers' help, constructed 21 small reservoirs and over 6,000 ponds to add over 29 million cubic meters Mani Meechnan reservoir (Nickam, 1986).

Bhandari (1990) reported that benefits of farmers' involvement in irrigation management was very clear because with the same quantity of water the farmers by using proper seeds and fertilisers could obtain good

crops and sustained a better standard of living for their family from their small holdings.

Alberts *et al.* (1996) based on his findings of a case study of a village in Pakistan's North-west frontier province on water management organisations reported that farmers were able to manage the water allocation and distribution and conflicts were prevented and controlled through these organisations.

Lesbats *et al.* (1996) based on his findings of the study on C.A.C.G., a regional development agency, which had been responsible for development of irrigation in France reported that the irrigators were responsible for operating the networks. The success of the system was due to the small size of each association, corresponding to one or two rural communities (communes) marked by a very ancient democratic life and high sense of responsibilities. Investment was managed by professional development agency (CACG) that was able to design farmer operated irrigation project and the clarity of the maintenance and monitoring contracts between the agency and the association.

Salman (1997) made a comparative study of the legal framework of water users' association in six countries and suggested that if farmers participate through WUAs in managing and operating parts of the irrigation system including collecting water charges, the result will be an optimum use of the water.

MATERIAL AND METHODS

CHAPTER III

MATERIAL AND METHODS

The sampling procedures followed, method of data collection and various tools of analysis used for the study are discussed in this chapter. This chapter is presented under the following heads for convenience.

3.1 Selection of study area

3.2 Sampling technique

3.3 Data collection

3.4 Terms and concepts

3.5 Tools and analysis

3.1 SELECTION OF STUDY AREA

Krishna district is endowed with natural resources and with progressive farmers besides a variety of crop entrepreneurs. It is selected purposively for the study as there is a lot of appreciation goes to WUA's performance in Krishna district during 97 floods.

3.2 SAMPLING TECHNIQUE

Multistage random sampling technique was used to elicit primary data from the sample farmers. At the first stage Krishna district was purposively selected. At the second stage two water users' associations among 465 water users associations viz., water users association number 192 and 59 were selected randomly. Based on the same criterion from the

each water users association four territorial constituencies were selected by adopting the stratified random sampling.

The stratification of territorial constituency as follows :

1. up to 1000 ha.
2. 1001 - 1500 ha.
3. 1501 - 2000 ha.
4. More than 2000 ha.

From each constituency 10 farmers were selected randomly. Thus a sample size of 80 was derived.

The approach for the study was comparision of pre and post periods of WUA's formation. The data for the year 1996-97, 1997-98 (*rabi*) and 1997-98, 1998-99 (*kharif*) were collected to study the impact.

Name of the selected water users' association i.e. no, and territorial constituencies and No.of farmers

Distributary committee	No. of WUA	Name of T.C	No. of farmers selected
1) DC-17	1) WUA-192	1) Hanumallanka	10
		2) Kanumoor	10
		3) Kondur	10
		4) Kottapalli	10
2) DC-10	2) WUA-59	1) Gundupalem	10
		2) Mallavolu	10
		3) Rudravaram	10
		4) Dodalapalem	-10
		Total	80

Source : Records from the office of the divisional engineer.
Irrigation and CAD departments, Mylavaram and Machilipatnam. 1997

A reconnaissance survey was undertaken to have prior knowledge about the functioning and organisation of WUA's of the study area. Detailed discussions held with the irrigation authorities, Agricultural Officers, Mandal Officials were useful for the study.

3.3 DATA COLLECTION

3.3.1 Primary data

The primary data were collected from the sample units by the interview method through specifically designed schedule for the purpose.

3.3.2 Secondary data

Information regarding total utilisation created, utilised, and other necessary information was provided by chief planning officer, Krishna district and other institutions such as WALAMTARI and Bureau of Economics and statistics.

3.4 TERMS AND CONCEPTS USED IN THE STUDY

Area of operation : In relation to farmers' organisation it means a contiguous block of land in the command area of an irrigation system as may be notified for the purpose by the Act.

Ayacut road : Means a road within the area of operation of a farmers' organisation for the purpose of irrigation and agriculture but does not include a road vested in a gram panchayat, mandal parishad, zillaparishad,

municipality, municipal corporation or Roads and Buildings Department of the Government.

Command area ; Means an area irrigated or capable of being irrigated either by gravitational flow or by lift irrigation or by any other method from a government or the corporation source and includes every such area whether it is called 'ayacut' or by any other name under any law for the time being in force.

Competent authority : The Government may by notification appoint such officer from the irrigation and command area development department or any other department or corporation including irrigation development corporation as they consider necessary to be the competent authority to every farmers' orgnisation for the purpose by this Act. It shall be responsible to the respective farmers' organisation in the implementation and execution of all decisions taken by farmers' organisation.

Distributory system : Means and includes

- All main canals, branch canals, distributories and minor canals constructed for the supply and distribution of water for irrigation constructed for the supply and distribution of water for irrigation.
- All works, structures and appliances connected with the distribution of water for irrigation.
- All field channels and other related channels and structures under a pipe outlets.

Drainage system in relation to an irrigation system includes

i) Channels either natural or artificial, for the discharge of waste or surplus water and all works connected there with or ancillary thereto.

ii) Escape channels from an irrigation or distribution system and other works connected there with but dose not include works for removal of sewage.

iii) All collecting drains and main drains to drain off surplus water from field drains

iv) All field drains and related structures under pipe out lets.

Farmers' organisation

i) Water users' association at the primary level, consisting of all the water users

ii) Distributory committee at the secondary level

iii) Project committee at the project level

Field channel : It include a channel existing or to be constructed by the Government or by the land holders or by any agency to receive and distribute water from a pipe outlet.

Field drains : It include a channel excavated and maintained by the land holder or by any other agency, to discharge waste or surplus water from the land holding under a pipe outlet.

Financial year : It means a year commencing from the 1st April of the relevant year to the 31st March of the ensuing year.

Hydraulic basis : It means the basis for identifying a viable irrigation area served by one or more hydraulic structures such as head works, distributories, minors, pipe outlets and the like.

Irrigation : It is a process of artificial distribution of water to crops as per the their requirement in right time in right quantity in right place for increasing the agricultural production.

Irrigation system : Means such major, medium minor irrigation system for harnessing water for irrigation and other allied uses from Government corporation source and includes reservoirs. Open head channels, diversion system, ayacuts, lift irrigation schemes, tanks, wells and the like.

- Major irrigation system means irrigation system under major irrigation project having irrigable command area of more than 10,000 hectares.
- Medium irrigation system means irrigation system under medium irrigation project having irrigable command area of more than 2,000 hectares and upto 10,000 hectares.
- Minor irrigation system means irrigation system under minor irrigation project having irrigable command area up to 2,000 hactares.

Maintenance : Means execution of such works as the irrigation system as are necessary to ensure that the physical system designed to the standards

operation for proper distribution of water to the land holders in the area of operation.

Management : It is a process of by which decision taken are put into action.

Notification : Means notification published in the Andhra Pradesh Gazette and the expression 'notified' shall be constructed accordingly.

Operational plan ; Means a schedule of irrigation deliveries with details of the mode and duration of supplies drawn up for regulation of irrigation in the command area of an irrigation system.

Partipatory irrigation management : It is a process of working together constructively by synchronising the efforts of the farmers to share the responsibility in irrigation water management in order to increase the production.

Prescribed : Means prescribed by the Government by rules made under APFMIS Act. 1997

Warabandi : It means a system of distribution of water allocation to water users by turn, according to any approved schedule indicating the day, duration and the time of supply.

Water allocation : In relation to an irrigation system means distribution of water determined from time to time by a farmers organisation in its area of operation.

Water user : Means and includes any individual or body corporate or a society using water for agriculture, domestic, power, non- domestic, commercial, industrial or any other purpose from a government or the corporation source of irrigation.

3.5 TOOLS AND ANALYSIS

Simple averages and percentages were worked out to study the general characteristics of the study area, cropping pattern, productivity levels, additional incomes, participatory levels to interpret the results and to draw conclusions with respect to different objectives.

Calculation of the productivity :

1) Productivity $= \frac{\text{Yield in q}}{\text{Area in acres}}$

2) Average difference in productivity (D_p) =

Average Productivity before formation of WUA's – Average productivity after formation of WUA's

3) Calculation of the additional income

Income before formation of WUA (I_b) : Production in q x price/q

Income after formation of WUA (I_a) : Production in quintal x price/q

Difference in income $I_d = I_a - I_b$

Income from land brought under cultivation/suited after formation of WUA's (L_i) = Land in Acres x productivity x price

Additional income $A_i = I_d + L_i$.

AGRO-ECONOMIC FEATURES

CHAPTER IV

AGRO-ECONOMIC FEATURES

General and physical features

Krishna district with its district head quarters at Machilipatnam is the coastal district of Andhra Pradesh. Formally it was called as Machilipatnam district. Later it was renamed as Krishna district after the holy river Krishna by adding certain taluks of the abolished Guntur district in 1859. Again in 1925, Krishna district was further divided into Krishna and West Godavari districts. Further there are no changes in its jurisdictions except some minor changes (in Divi Taluk and Mangala paragana)

Location

It lies between 15°-43' and 17°-10' of the northern latitude and 80 and 81°-33' of eastern longitude which extends over an area of 8727 sq cm with a coast line of 88 km. It is surrounded by Bay of Bengal, on west by Guntur and Nalgonda districts and on north by Khammam district.

Administrative setup

The district is divided into 48 mandals covering 4 revenue divisions viz., 1) Bandar 2) Vijayawada 3) Gudivada 4) Nuziveed. The district is naturally divided into delta and upland zones. All the mandals existing in Bandar, Gudivada divisions and part of Vijayawada division (Penamaluru, Kankipadu, Thotlavalluru, part of Vijayawada division rural) comprise delta and all the mandals existing in Nuziveed division and the remaining mandals

of Vijayawada divisions constituted upland. The upland consisted of an undulating broken by low ranges of Easternghats. The main source of irrigation in upland is tanks. It is being benefited by the water of Nagarjunasagar left canal. The delta land was being irrigated by canals of river Krishna.

Demographic characteristics

The population of the district was 36.98 lakhs as per 1991 census, out of the total population, 18.78 lakhs were males and 18.20 lakhs are females. The scheduled castes constituted 16.57 per cent of the population, while scheduled tribes accounted for 2.48 per cent of the population of the district.

Literacy

Krishna district has recorded a literacy rate of 45 per cent occupying a second place next to Hyderabad in the state. This district is advanced in the field of education. Almost all the villages in the district are having primary schools.

Climate and rainfall

Tropical climate conditions with extreme hot summer and cold winter prevail in this district. April to June are hottest months with high temperature in May.

The monsoon usually breaks in the middle of June and brings good rains upto the middle of October. The normal rainfall of this district is 1028.1 mm, 2/3rds of which received through the south-west monsoon. The average annual rainfall recorded during the year 1998 was 1144 mm, 793 mm during south-west monsoons and 351 mm during north-east monsoon.

Soils

Four types of soils are found in the district these are 1) Black cotton soils 2) Sandy-clay loams 3) Red loamy soils and 4) Sandy soils

Table 4.1:Per cent area under different types of soils in Krishna district

S.No.	Type of soil	Percentage of number of villages covered
1.	Black cotton	57.6
2.	Sandy clay loams	22.3
3.	Red loamy soils	19.4
4.	Sandy soils	0.7

Irrigation

The chief irrigation source is Prakasam Barrage. Other sources of irrigation are tanks, wells and Nagarjunasagar canal in uplands. Table 4.2 produces the irrigation potential of the district and Table 4.3 produces the project wise irrigated area for 1998-99 and 1997-98 years.

Table 4.2 : Irrigation potential of the district

S.No.	Source	Area in lakh ha
1.	Canals	2.59
2.	Tanks	0.34
3.	Tube wells	0.17
4.	Other wells	0.14
5.	Other sources	0.13
	Total	3.37

Source : Handbook of statistics, chief planting officer, 1999

Table 4.3 : Project wise area irrigated in 1998-99 and 1997-98.

Division	Project	Gross area irrigated (in acres)		
		1998-99	1997-98	Difference
1. Bandar	Krishna Barrage	2,13,972	2,14,432	-460
2. Gudivada	Krishna Barrage	1,85,856	1,82,493	3363
3. Vijayawada	K.B	38445	38291	154
	NSP	25178	12493	12685
	Paleru	2331	2166	165
	Munneru	11431	9313	2118
	Total	77,385	62,263	15122
4. Nuziveed	K.B.	90801	89,686	1115
	NSP	7937	5364	2573
	TRP	1046	3665	6796
	Total	99784	98715	10484
	Dist. total	573634	561296	12338

Water users' associations in the Krishna district

There were totally 465 WUAs working in the district out of these 71 WUAs were working in major irrigation sector, 9 in medium irrigation sector and 265 in minor irrigation sector as shown in Fig. 4.1 and the funds disbursed through APERP and APHM schemes to the water users' association of Krishna district were presented in the Table 4.4.

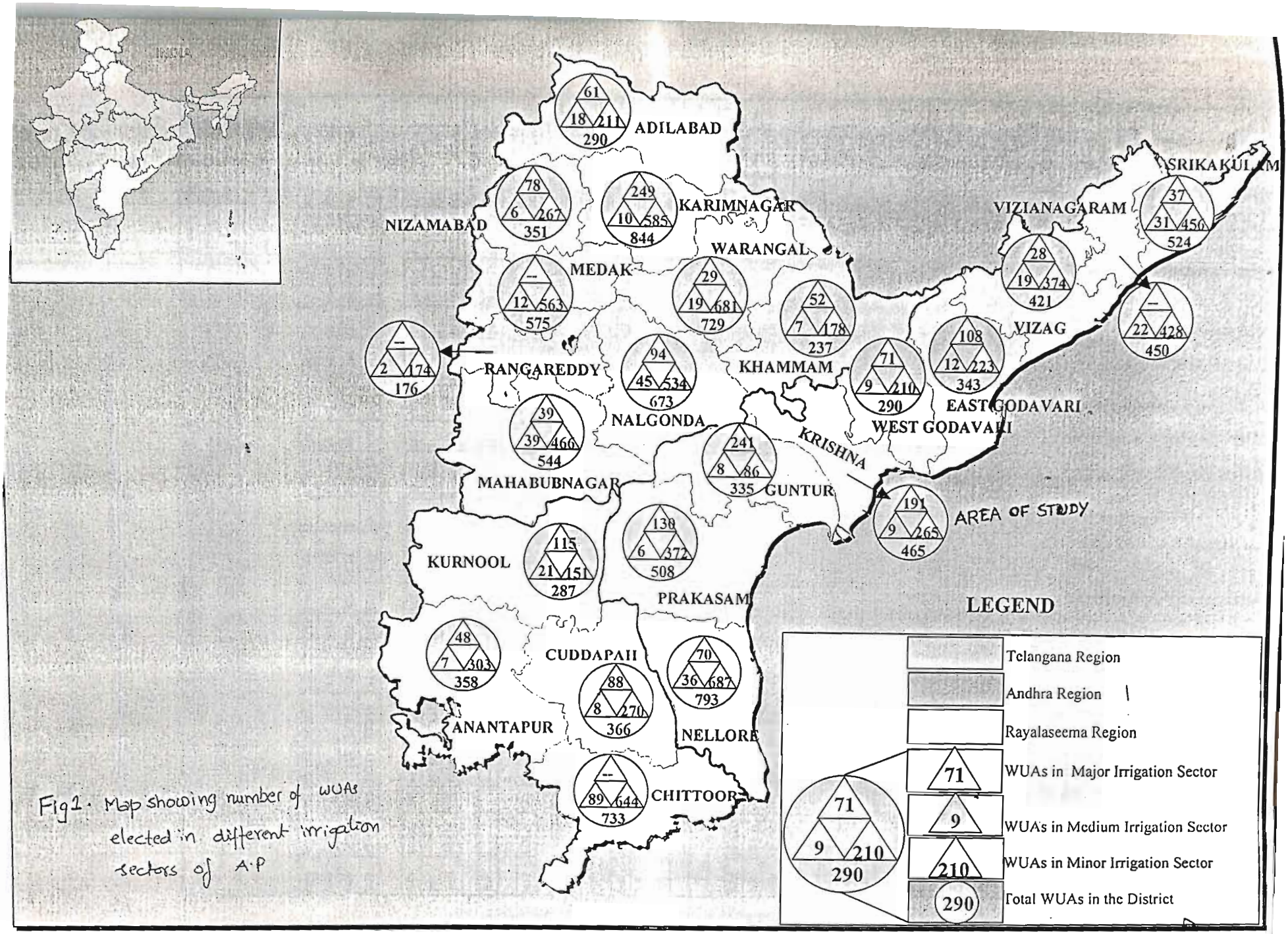


Fig 1. Map showing number of WUAs elected in different irrigation sectors of A.P

KRISHNA DISTRICT PROGRESS REPORT ON WORKS OF APERP & APIM AS ON 13.07.99

Sl. No.	Name of Project	Funds sanctioned in Rs. lakhs	Works Programmed		Works Sanctioned		No.of Agree-ments	Grounding Particulars							Value of Work done Rs.Lakhs	Amount Paid Rs.Lakhs	Works Completed		
								Upto last week		During the week		Cumulative		% Gro-unded (Fin)					
			No.	Value Rs. lakhs	No.	Value Rs. lakhs		No.	Value Rs. lakhs	No.	Value Rs. lakhs	No.	Value Rs. lakhs				No.	Value Rs. lakhs	% Comp-leted(Fin)
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
I. MAJOR IRRIGATION																			
a) Minimum Rehabilitation (G.O. 27 dt. 6.3.99)																			
1	KRISHNA DELTA SYSTEM (6,79,498 ac.)																		
	WUA	682.50	569	690.90	514	554.48	514	419	489.26	44	27.79	463	517.05	75%	451.27	187.09	431	302.17	44%
	DC	682.50	218	668.07	208	640.48	204	195	591.77	8	12.38	203	604.15	90%	546.01	201.62	137	377.87	57%
	PC	1309.36	40	1424.12	40	1407.79	37	36	1318.79	-1	44.65	35	1363.44	96%	1069.02	30.28	18	614.60	43%
	Total	2674.36	827	2783.09	762	2602.75	755	650	2399.82	51	84.82	701	2484.64	89%	2066.30	418.99	586	1294.64	47%
2	NAGARJUNA SAGAR LEFT CANAL (3,18,571 ac.)																		
	WUA	309.64	230	296.53	155	230.59	141	126	225.12	0	0.00	126	225.12	76%	83.50	80.29			0%
	DC	309.64	148	296.83	114	269.59	89	73	204.77	0	0.00	73	204.77	69%	68.20	85.69	7	9.80	3%
	PC	103.07	9	120.44	2	59.50	2	2	59.50	0	0.00	2	59.50	49%	2.17				0%
	Total	722.35	387	713.80	271	559.68	232	201	489.39	0	0.00	201	489.39	69%	153.87	165.98	7	9.80	1%
	TOTAL MAJOR IRRIGATION (M.R.)																		
	WUA	992.14	799	987.43	669	785.07	655	545	714.38	44	27.79	589	742.17	75%	534.77	267.38	431	302.17	31%
	DC	992.14	366	964.90	322	910.07	293	268	796.54	8	12.38	276	808.92	84%	614.21	287.31	144	387.67	40%
	PC	1412.43	49	1544.56	42	1467.29	39	38	1378.29	-1	44.65	37	1422.94	92%	1071.19	30.28	18	614.60	40%
	Total	3396.71	1214	3496.89	1033	3162.43	987	851	2889.21	51	84.82	902	2974.03	85%	2220.17	584.97	593	1304.44	37%
II. MEDIUM IRRIGATION																			
a) Minimum Rehabilitation (G.O. 27 dt. 6.3.99)																			
1	MUNIYERU ANICUT (15,513 ac.)																		
	WUA	15.51	9	16.43	9	16.43	9	9	15.53	0	0.00	9	15.53	95%	14.77	6.20			0%
	PC	22.67	1	14.48	1	15.80	1	1	16.76	0	0.00	1	16.76	116%	10.53				0%
	Total	38.18	10	30.91	10	32.23	10	10	32.29	0	0.00	10	32.29	104%	25.30	6.20	0	0.00	0%
III. MINOR IRRIGATION																			
a) Minimum Rehabilitation (G.O. dt. .99) (Nos.) ac.																			
	WUA									0	0.00								
b) Operation & Maintenance (G.O. 26 dt. 6.3.99) (285 Nos.) 95,512 ac.																			
	WUA	95.54	288	103.50	277	99.50	273	255	89.00	0	0.00	255	89.00	86%	74.26	38.15	75	18.10	17%
IV. Flood banks/ Groynes/ Drains (GO 274 dt23.3.99)																			
	PC	2295.00	54	1472.00	42	1046.35	42	25	672.16	1	39.39	26	711.55	48%	136.10				0%
V. APIM & ECRP																			
	WUA	599.00	333	478.00	310	473.55	301	265	414.30	5	-38.80	270	375.50	79%	345.80	125.28	245	324.00	68%
	PC	280.00	1	280.00	1	280.00	1	1	196.83	0	0.00	1	196.83	70%	133.35	48.06			0%
	Total	879.00	334	758.00	311	753.55	302	266	611.13	5	-38.80	271	572.33	76%	479.15	173.34	245	324.00	43%
VI. GRAND TOTAL																			
	WUA	1702.19	1429	1585.36	1265	1374.55	1238	1074	1233.21	49	-11.01	1123	1222.20	77%	969.60	437.01	751	644.27	41%
	DC	992.14	366	964.90	322	910.07	293	268	796.54	8	12.38	276	808.92	84%	614.21	287.31	144	387.67	40%
	PC	4010.10	105	3311.04	86	2809.44	83	65	2264.04	0	84.04	65	2348.08	71%	1351.17	78.34	18	614.60	19%
	Total	6704.43	1900	5861.30	1673	5094.06	1614	1407	4293.79	57	85.41	1464	4379.20	75%	2934.98	802.66	913	1646.54	28%

VII. Other Items:

i) Publication of Newsletter : Being published

ii) Conduct of Training Programmes :

iii) Quality control checks : a) No. of works inspected : 201 (NSLC) b) No. found as standard : 201 (NSLC)

iv) No. of Boards displayed at work site: 16 (NSLC) v) Funds release required :

vi) No. of machines deployed : 79 vii) Number of labour employed : 17,818

Land utilization

Table 4.5 : Land utilisation pattern of Krishna district 1997-98

Classification	Area in lakh ha.	% to geographical area
i) Forests	0.60	7.5
ii) Barren and uncultivable land	0.60	6.8
iii) Land put to non agricultural use	1.57	17.8
iv) Permanent pastures and other grazing land	0.12	1.4
v) Cultivable waste	0.34	3.9
vi) Land under misc. tree crops groves not included in the net area sown		
vii) Current fallows	0.34	3.9
viii) Other fallows	0.39	3.4
ix) Net area sown	4.81	54.7
x) Total Geographical area	8.80	100.0

Source : Chief Planning Officer, Machilipatnam, 1999

The Table 4.5 shows that net area sown was 4.81 lakh hactares out of total geographical area of 8.80 lakh hectare which was 54.7 per cent. The other particulars were presented below.

Major crops and yields

The cropping pattern of the district show the variety of crops grown and the progressiveness of the district in Agricultural sector.

The predominant crop is paddy grown both in *kharif* and *rabi* seasons followed by sugarcane, jowar, pulses, groundnut, chillies, tobacco and mango. The yields for the year 1997-98 were presented in Table 4.6.

Table 4.6 : Total out turn of principal crops in Krishna district 1997-98

(in tonnes)

Crop	*Kharif* 1997-98	Average of proceedings 5 yrs	*Rabi* 1997-98	Average of procee-ding yrs.	1997-98	Total average of procee-ding 5 yrs
Rice	6,99,362	7,38,198	3,93,492	3,65,464	10,98,254	11,03.662
Jowar	296	51	1994	4107	2290	4158
Maize	10.554	7036	8199	4236	18.753	11.272
Major millets	10.857	7.096	10.193	8344	21.050	15.440
Redgram	3402	3997				
Blackgram	874	3715	55914	71496	56788	75211
Total food grains	7,24,729	770902	461572	448025	1186301	12,18.927
Chillies	14.485	-	3.015	-	17500	23.247
Cotton					108	253

Distribution of operational holding

The particulars of holding of the farmers in the Table 4.7 indicated that small farmers accounted for 25 per cultivating an area of 15 per cent, while 40 per cent marginal farmers owned 10 per cent of the area. This confirms the features of fragmented holdings as elsewhere in India.

Table 4.7 : Distribution of operational holdings

	Category	Names	Area ha
1.	Small farmers	115125	83360.8
2.	Marginal farmers	184665	54232.8
	Total	299790	137593.6

Occupational distribution

Occupational distribution gives an account of economic activity of the people.

It is clear from the Table 4.8 that 20.16 per cent of the district population or more than 50 per cent of the total workers were engaged in agriculture, while 14.96 per cent of total population or 35.71 per cent of total workers were from household industries or others. Thus Krishna district is primarly agriculture based.

Transport and communication : The district is well served by roads and railways. 972 villages (including some of the major hamlets) have been connected with transport facilities of which 923 villages are connected by RTC and 49 villages are connected by bus routs. Vijayawada city, situated

Table 4.8 : Occupational distribution in Krishna district, 1998

S.No.	Category	Number
1.	Cultivators	2,43,563 (6.60)
	a) Males	2,13,930 (5.79)
	b) Females	29,633 (0.80
2.	Agricultural labourers	7,44,248 (20.16)
	a) Males	3,77,897 (1.02)
	b) Females	3,66,351 (9.90)
3.	Household industries	57,722 (1.56)
	a) Males	39,201 (1.06)
	b) Females	18,521 (0.50)
4.	Other workers	4,94,521 (13.40)
	a) Males	4,26,849 (11.56)
	b) Females	67,672 (1.83)
5.	Total workers	15,46,054 (41.89)
	a) Males	10,57,877 (28.66)
	b) Females	4,93,563 (13.06)

Note : Figures in the parenthesis indicates percentage to total population

Source : Chief Planning Officer, Krishna

at the head of the Krishna delta, is the chief commercial centre of the district and also there is an important railway junction being connected to Delhi, Calcutta, Madras, Hubli, Gudivada and Machilipatnam. It has an Aerodrome at Gannavaram about 16 km away and a minor seaport at Machilipatnam.

	(In km)
National highway	119.5
R & B roads (Roads & Buildings)	2386.6
Zillaparishad road	2579.6
Mandalparishad road	418.4
Post offices	840
Telegraph offices	92
Telephone exchanges	116

Power sector :

Towns and villages electrified (No) : 972

Percentage of towns and villages electrified : 100 %

Number of pumpsets energised : 29812

Salient features of the study area

The Ayacut area of both the water users' associations selected for the study comes under tail-end area. However, different situations are prevailing. Ayacut area under water users' association (no. 59) faced with water logging and salinity problems as it is nearer to Bay of Bengal. So drainage is the main concern here, whereas the Ayacut area under water

users' Association (no. 192), which is tail-end of Nagarjunasagar project (N.S.P) left canal has problem of water scarcity and there is provision of irrigation for only one crop. Some of the details of the mandals from which WUAs selected were presented in Tables 4.9 and 4.10.

Table 4.9 : Salient features of mandals from which 2 WUA's are selected

	Machilipatnam	A.Konduru
1 Population	221531 (556/sq km)	41320 (203/sq km)
2 Area in sq. km	398.28	204
3 Total villages	28	13
4 Total workers	823.92 (37.19)	199.02 (48.17)
5 Cultivators	9426	4565
6 Livestock	4532	331
7 Scheduled caste	17838 (8.05)	8173 (19.78)
8 Scheduled tribe	3468 (1.57)	9303 (22.51)
9 Literates	1,15,479 (52.13)	10,707 (25.91)
10 Annual rainfall	1079.1 (normal)	1200 (normal)

Numbers in parenthesis indicate percentage to total population

Table 4.10 : **Mandal wise land utilisation (in acres)** ,1998

		Machilipatnam	A.Konduru
1	Geographical area	96,948	50610
2	Forest	-	8420 (16.64)
3	Barren and Uncultivable	20258 (20.90)	2962 (5.85)
4	Landput to non agricultural uses	25458 (26.26)	57.23 (11.31)
5	Landput to other grazing land	395 (0.41)	1.73 (0.34)
6	Miscellaneous tree crops	584 (6.00)	-
7	Cultivable waste	14390 (14.84)	-
8	Other fallow land	2718 (2.80)	-
9	Current fallows	535.2 (5.52)	7216 (14.26)
10	Net area sown	22563 (23.27)	26116 (51.60)

Number in parenthesis indicates percentages over total geographical area

Aquaculture

There are 25 fresh cooperatives working in Machilipatnam and one in A.Konduru with paid up shares of Rs. 54472.00 and Rs. 858 respectively.

Comparision of two water users associations selected

Table 4.11: Comparision of two water user association selected per the study

		WUA-59	WUA-192
1	Project it comes under	Krishna barrage	Nagajunasagar Project left canal
2	Distributory committee it falls under	DC-10	DC-17
3	No.of territorial constituencies	10	10
4	Total members having right to vote	2400	900
5	Total Ayacut area	11,998 acres	7000 acres
6	Main crops grown	Rice,Vegetables	Rice
7	Horticultural crops	-	Mango
8	Subsidiary	Fish tanks	-
9	Months of assured water irrigation	First crop & second crop	only for second crop i.e. (Nov-Feb)
10	Rate of water flow at outlet	120 cusec/sc	250 cusec/sc

The Table 4.11 clearly concludes there were many dissimilarities existing between the two selected WUAs and there by the different solutions they have to findout.

As per the rule envisaged in the APFMIS act 1997 the number of territorial constituencies in both water users association selected, of which operational area exceeds 2000 ha were 10. They were Thummaturu, Mallavolu, Gundupalem (2), Sulthanpuram, Gollapalem, Rudravaram (2), Dodlapalem in WUA 59 and Konduru, Allapragada, Chikkullagudem, Kanumoor (2), Hanumallanka (3), Vinagadapa, Kottapalli comes under WUA 192.

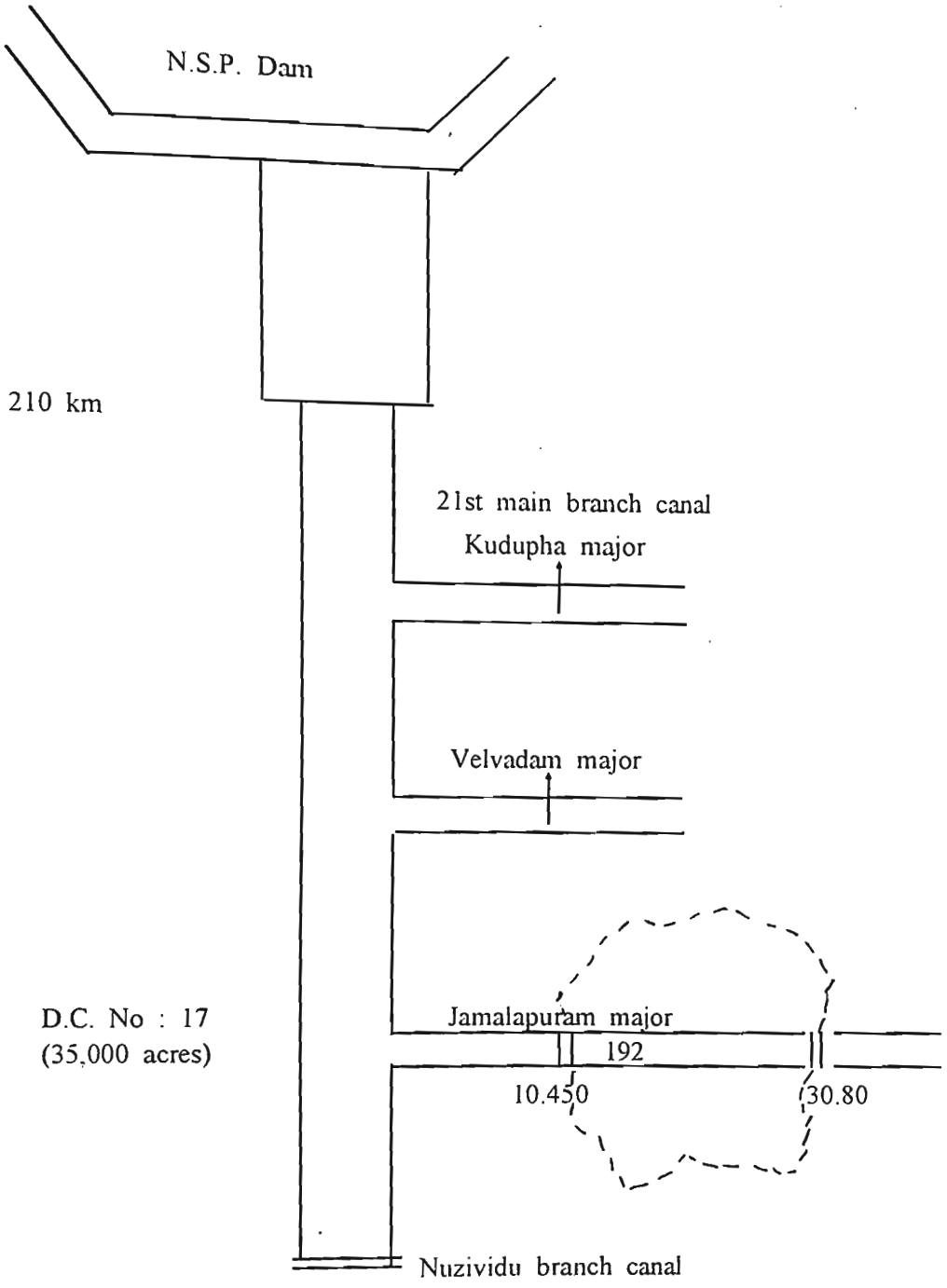


Fig. 2 : Map showing operational area of WUA-192.

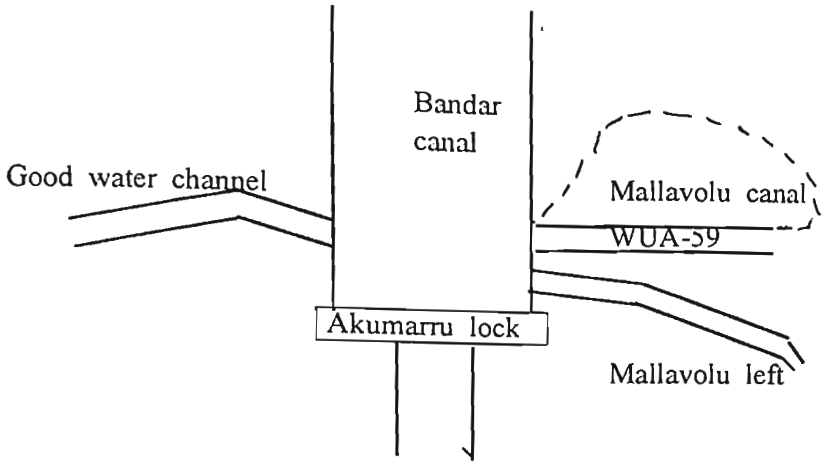


Fig. 3 : Map showing operational area of WUA-59.

RESULTS AND DISCUSSION

CHAPTER V

RESULTS AND DISCUSSION

The results obtained from the study are presented in this chapter with critical discussion. These are presented under the following subheads.

5.1 Need for and the goals of farmers' management of irrigation systems

5.2 Functions and powers of WUAs

5.3 Costs incurred and benefits accrued

5.3.1 Socio economic profile of the selected respondent

5.3.1.1 Category of the farmers

5.3.1.2 Literacy levels of farmers

5.3.1.3 Voting rights of respondents

5.3.1.4 Landholdings of respondents

5.3.2 Costs incurred by WUAs in the selected area

5.3.3 Benefits accrued by the respondents

5.3.3.1 Land value

5.3.3.2 Productivity levels

5.3.3.3 Additional income

5.3.3.4 Distribution of water

5.3.3.5 Disputes among farmers

5.3.3.6 Transparency of works

5.3.3.7 Quality of works

5.3.3.8 Utilisation of funds

5.3.4 Farmers participation in the management of irrigation systems

5.3.4.1 Electing the water user association

5.3.4.2 Social auditing

5.3.4.3 Prioritising of O and M works

5.3.4.4 Form of participation by respondents

5.1 NEED FOR AND THE GOALS OF FARMERS' MANAGEMENT OF IRRIGATION SYSTEMS

5.1.1 Need for the farmers' management of irrigation systems

The estimated irrigation potential of Andhra Pradesh through schemes utilising surface water has been of the order of 87.80 lakh ha, out of which major and medium irrigation schemes contributing 64.80 lakh ha and from minor irrigation schemes it was 23.00 lakh ha. The total potential created upto the end of year 1997 was 51.60 lakh ha. This leaves a balance of 36.20 lakh irrespective of huge amounts spended as detailed below.

Table 5.1 : Planned expenditure on irrigation from 1994-98 Net irrigated area

Year	Expenditure (lakh RS)	Percentage	Net irrigated area (lakh ha)
upto 1994-95	4763.29	26.1	39.77
1995-96	652.50	22.7	40.12
1996-97	689.81	22.6	43.90
1997-98	796.23	22.1	39.40

Source : Handbook of Statistics, A.P., 1997-98

There is a gap between potential created and utilised due to faulty localisation, unauthorised cultivation and excessive use of water in the upper reaches, excessive seepage losses, faulty distribution system, tampering of distributory system by some farmers, lack of communication and other facilities which are prominent in the state managed irrigation systems.

In practice, there have been critical differences between the results of farmers participation on their own systems and in the management of government system. Users clearly have a stronger stake in the former, where farmers themselves have invested in developing their systems and where system performance is completely dependent on their own actions.

Farmers participation in planning and management is a key element of most future oriented strategies for irrigation management.

The current climate of economic liberalisation in many countries has contributed to growing interest in water market in two ways. First the general trend toward reliance on markets rather than state agencies for allocating goods and services has influenced thinking about market for water as well. Second, liberalisation of agriculture often increases the potential value of output, and hence of water but at the same time requires more flexible water allocation patterns so that farmers can diversify cropping pattern

This situation calls for the formation of farmers organisations and effective management of irrigation systems.

5.1.2 Goals of farmers' management of irrigation systems

The objects of the farmers organisation are to promote and secure distribution of water among the user, adequate maintenance of the irrigation system, efficient and economical utilisation of water to optimise agricultural productivity, to protect the environmental and to ensure ecological balance by involving the farmers, including a sense of ownership of the irrigation system in accordance with the water budget and the operational plan.

The goals of the farmers management of irrigation systems include.

- With due regard to the rights of members functions as democratic manners through consensus respective the rights.
- To specifically emphasise in making available water to tailend area.
- To ensure collection of dues, make prudent investment of their resources, to utilise their assets in a manner that is essential, productive and sustainable.
- To work in close coordination with Government departments and its agencies.
- To strive for sustainable water resources management and development.
- To ensure in dissemination of information.
- To buildup a reliable database.

- To ensure that hydraulic structures are preserved and protected without any modification.

- To work towards maintaining and sustaining an ecological balance and prevent degradation of the environment particularly soils and quality of water.

- To optimise productivity and production consistent with availability of water supplies.

5.2 FUNCTIONS AND POWERS OF WUAs

5.2.1 Functions of water users' associations

The water users' association shall perform the following functions namely.

- To prepare and implement Warabandhi schedule for each irrigation season consists with the operational plan based upon the entitlement, area soil and cropping pattern as approved by the distributory committee as the case may be the project committee.

- To prepare a plan for the maintenance of irrigation systems in the area of the operation at the end of each crop season and carryout the maintenance works of both distributory system and minor and field drains in its area of operation with the funds of the association from time to time.

- To regulate the use of water among the various pipe outlets under its area of operation according to the Warabandi schedule of the system.

- To promote economy in the use of water allocated.

- To assist the revenue department in the preparation of demand and collection of water rates.
- To maintain a register of landholders as published by the revenue department.
- To prepare and maintain a register of coopted members.
- To prepare and maintain an inventory of the irrigation system within the area of operation.
- To monitor flow of water for irrigation.
- To resolve the disputes if any, between the numbers and waterusers in its area of operation.
- To raise resources
- To maintain accounts
- To cause annual audit of its account
- To assist in the conduct of elections to the managing committee.
- To abide by the decision of the distributing and project committees.
- To conduct general body meeting.
- To encourage general body meetings.
- To conduct regular water budgeting and also to conduct periodical social audit.

Functions of the Distributory Committee

The distributory committee shall perform the following functions namely

- To prepare an operational plan based on it entitlement, area, sub cropping pattern at the beginning of each irrigation season, constant with the operational plan prepared by the project committee.
- To prepare a plan for the maintenance of both distributories and medium drain within its area of operation at the end of each crop season and execute the maintenance works with the funds of the committee from time to time.
- To regulate the use of water among the various water users' association under its area of operation.
- To resolve disputes, if any, between the water users' association in its area of operation.
- To maintain register of water users' associations in its area of operation
- To resolve disputes, if any between the water users' associations in its are operation.
- To maintain an inventory of the irrigation system in the area of its operation, including drains.
- To promote economy in the use of water allocated.
- To maintain accounts
- To cause annual audit.
- To maintain other records
- To conduct general body meetings
- To monitor the flow of water for irrigation.
- To cause regular water budgeting and also the periodical social audit.
- To abide by the decisions of the project committee.

- To assist the conduct of selection to the managing committee.
- To encourage avenue plantation in the area of operation.

Functions of Project Committee

The project committee shall perform the following functions.

- To approve an operational plan based on its entitlement area soil, cropping pattern as prepared by the competent authority in respect of the entire project at the beginning of each irrigation season.
- To approve a plan for the maintenance of irrigation system including the major drain within its area of operation at the end of each crop season and execute the maintenance works with the funds of the committee from time to time.
- To maintain an inventory of the distributory committees and water users associations in the area of operation
- To maintain an inventory of the distributory and drainage system in its area of operation.
- To resolve disputes if any, between the distributory committees.
- To promote economy in the use of water.
- To maintain accounts.
- To cause annual audit of its accounts.
- To maintain other records.
- To cause regular water budgeting and also the periodical social audit.
- To encourage avenue plantation in its area of operation.

5.2.2 Powers of water users' associations

Expanding farmers' role in irrigation requires more than a single programme, but also a policy environment that is conducive to participation. Countries seeking to promote participation have therefore had to reform the legal frame work that regulates the formation of farmers' organisations, recognise the organisations as representative of the farmers, enables them to mobilise resources from members and other sources, operate bank accounts and obtain credit.

So some powers are provided to the general body as follows as per the APFMIS Act. 1997

- To approve the operational plan for each crop season and review its implementation in its area of operation.
- To allocate water amongst various main canals/ distributers/ minors/ outlets according to the operational plan approved.
- To decide on the manner of regulation and distribution of water.
- To prepare annual and long term financial and work plans and practical works for maintenance/repairs/upkeeps, rehabilitation of the irrigation system.
- To approve annual financial budget and review performance of the previous years budget.
- To appoint auditors for the annual audit and/or concurrent audit and to fix fees for the same.
- To setup sub-committees of members for various activities and functions of the organisation.

- To create or/setup such fund as may be required for different activities/works.
- To entertain and dispose appeals against order of managing committee between water users.
- To levy a fees as defined under section 20 of the Act.
- To take decisions on raising of resources as defined under section 22 of the Act. To invest surplus funds in banks or Government approved securities or as may be directed by Government from time to time for the benefit of the organisations.
- To decide on permissible administrative expenses within the ceilings prescribed from time to time.
- To carry out the recall proceedings as per section 10 of the Act.

Powers of the managing committee

- To prepare and implement operational plan for each season in its area of operation.
- To prepare and implement *kharif* and *rabi* plan for various crops to be grown.
- To prepare budget and allocate resources for various activities.
- To prepare and implement annual plan for repairs, maintenance, rehabilitation for development of the irrigation and drainage systems and to accord administrative sanction takingup works as per availability of resources on priority.
- To prepare or cause to be prepared annual account of incomes and expenditures and assets and liabilities.
- To ensure equitable distribution of water among various water users.

- To evolve and implement systems of regulator control, monitoring and reporting of water use and landuse.
- To recommend appointment of auditors for annual audit or concurrent audit to general body.
- To organise execution of works.
- To raise resources and determine its deployment for various activities/functions of the organisation.
- To recommend formation of sub-committee to the General body for understanding various activities.
- To settle disputes amongst the members.
- To nominate one of it member to operate the funds of the organisation.
- To provide development services to the members related to irrigation and agriculture.
- To takeup training programme for members.
- To prepare annual list of all water users and members with voting right.
- To assist the revenue, irrigation and agriculture department in the preparation and maintenance of records.
- To maintain and operate a reserve fund.
- To scrutinize the audit reports and rectify defect and report to the General Body.
- To carryout and implement all decisions of the General body.
- To establish a management information system and submit periodical report as may be prescribed by Government.

The analysis of the data collected from the respondents (WUA-192 and WUA-59) were totally tabulated, coded. Frequencies and percentages were calculated to arrive at the results of study. The results have been discussed as under.

5.3 COSTS INCURRED AND BENEFITS ACCRUED

5.3.1 Socio economic profile of the selected respondents

5.3.1.1 Category of the farmers

Table 5.2 : Category of farmers in the study area

N = 80

Sl. No.	Category	WUA-192		WUA-59		Total	
		F	%	F	%	F	%
1.	Marginal farmers (1 - 2.5 ha)	11	27.5	5	12.5	16	20.0
2.	Small farmers (2.5 - 5.00 ha)	21	52.5	25	62.5	4.6	57.5
3.	Big farmers (> 5.00 ha)	8	20.0	10	25.0	18	100.0
	Total	40	100.0	40	100.0	80	100.0

F =Frequency; % = Percentage

From the total respondents 57.5 per cent of the farmers in the WUAs belong to small farmers category, having 2.5 to 5.0 ha. of land holding, 22.5 per cent of the farmers belong to big farmers category having more than 5.0 ha land holding and 20.0 per cent of the farmers belong to marginal farmers category having less than 2.5 ha of land holding.

In WUA No. 59 and WUA No. 192, the small farmers were 62.5 per cent and 52.5 per cent respectively.

From this, it can be concluded that majority of the farmers in water users associations were belonging to small farmers category which was also ascertained by Niranjan Pant (1981).

5.3.1.2 Literacy levels of farmers

Table 5.3 : Literacy levels of farmers in WUAs

Sl. No.	Category	WUA-192		WUA-59		Total	
		F	%	F	%	F	%
1.	Literates	33	82.5	36	90.0	69	86.25
2.	Illiterates	7	17.5	4	10.0	11	13.75
	Total	40	100.0	40	100.0	80	100.0

It is seen from the Table 5.3 that 86.5 per cent of the farmers in WUAs were literates and majority of them having minimum SSC qualification and only 13.75 per cent of the farmers were not having any educational standards.

It can be concluded that the majority of the farmers in WUAs can read and write. The more the education, the more will be the awareness of the roles and responsibilities of farmers in WUAs.

5.3.1.3 Voting rights of respondents

Table 5.4 : Farmers with voting rights in WUAs

Sl. No.	Category	WUA-192		WUA-59		Total	
		F	%	F	%	F	%
1.	Farmers with voting right	29	72.5	30	75.0	59	73.75
2.	Farmers without voting right	11	27.5	10	25.0	21	26.25
	Total	40	100.0	40	100.0	80	100.0

Apart from percentage of numbers in relation to total land holders, it is also important what proposition of members' land constitutes WUA operational area.

From the Table 5.4, it can be said that 73.75 per cent of the farmers of the WUAs have the voting right to elect the President and Territorial constituency members of WUAs and only 26.25 per cent of the farmers in the WUAs have no voting power but they are the water users in the area of operation of WUAs.

From the above, it can be concluded that majority of the farmers of WUAs were having the voting power to elect their president and territorial constituency members of WUAs. Further, it reveals that the majority of the farmers ware having the lands registered on their name and therefore had the voting right.

5.3.1.4 Landholdings of respondents

Table 5.5 : Particulars of land holdings of respondents and area under different major crops in the year 1998-99

Crop	WUA-192 (land in acres)	WUA-59 (land in acres)	Total
Rice	120	128	248
Cotton	172	-	172
Groundnut	62	-	62
Mango	130	-	130
Fish tanks	-	53	53
Total	539	181	720

From the Table 5.5 it can be concluded that the area under paddy was highest i.e. 248 acres in the respondents total holding of 720 acres, whereas the area converted into fish tanks accounts for about 53 acres. The cropping intensity of operational area of WUA-59 was 2, whereas the cropping intensity of most of the land comes under WUA-192 was one and irrigated dry crops were generally under cultivation.

5.3.2 Costs incurred by WUAs in the selected area

From the Table 5.6, it can be inferred that totally Eighteen lakhs thirty five thousand rupees works had been undertaken by WUA's 59 and 192 in the financial year 1998-99. As already mentioned earlier. In WUA 59, the works undertaken aimed to address the water logging problems, drainage whereas in WUA- 192, the main intention of the works undertaken was to increase irrigation efficiency, so that more land can be brought under cultivation.

Table 5.6 : Costs of various works undertaken by WUAs in the financial year 1998-99

S. No.	Type of work	Cost incurred (in Rs.)	Type of work	Cost incurred (in Rs.)
1.	Providing shuttering arrangement on various channels in operational area	2,90,000	1. Maintenance works i.e. Desilting	3,40,000
2.	M R to Mallavolumain channel	4,95,000	2. Embarkment repairs	2,10,000
3.	M R to Kolimakodu channel	2,16,000	3. Repairs to shutters sluices	1,50,000
4.	M R to Dressercodu channel	84,000		
5.	M.R to Good water channel	50,000		
	Total Rs.	11,35,000		7,00,000

5.3.3 Benefits accrued to the respondents

5.3.3.1 Land value

Table 5.7 : Average land value of the farmers before and after formation of WUAs

Sl. No.	WUAs No.	Irrigated			Irrigated dry		
		Before (Rs.)	After (Rs.)	Increased (Rs.)	Before (Rs.)	After (Rs.)	Increased (Rs.)
1.	WUA-192	75002	85203	10201	52506	76251	23745
2.	WUA-59	80166	87741	7575	-	-	-
	Total (Avg.)	77584	56472	8888	52506	76251	23745

* Irrigated dry : Few irrigations made available in certain months only

Though the Krishna district was provided with the irrigation facilities since last 10 yrs the land value might have been stabilised.

Yet, from the Table 5.7, it can be observed that the value of the irrigated has been increased by Rs. 8,888/ac, after formation of WUAs in Krishna district, whereas in irrigated dry area the land value was increased by around Rs. 23,745 per acre.

When both types, the irrigated and irrigated dry were compared from the table above it may be observed that the value of irrigated dry land was more (i.e. Rs. 23,745/acre) than the irrigated land value (i.e. Rs. 8,888/ac). The reason attributable for increasing the land value was may be the irrigated dry land holdings of the farmers were getting the water assuringly and ensuringly after formation of WUAs where as the increase for irrigated land was slightly increased as the drainage facility was slightly improved by WUAs. Hence the increase in the land value was observed, as informed by the respondents of WUA-192 and WUA-59 in the Krishna district.

The net result of broken legitimacy between irrigation authority and beneficiaries was that the tailenders did not get water when they need (in WUA-192) and had .their fields water logged when no water is required (in WUA-59). But after formation of WUAs the intimacy has been raised, and above 53 acres of land has been protected from being water logged in *kharif* season in WUA-59, whereas in WUA-192 operational area, 245 acres of land was given assurance of water to the respondent farmers. So the farmers could get two fold advantage here. This support the statement

that irrigatable area in SRSP in AP was extended by 25 to 35 per cent after pipe committees were introduced (Singh).

5.3.3.2 Productivity levels

Table 5.8 : Productivity levels in major crops grown after, before and after formation of WUAs

Sl. No.	Time	Rice (bags/Ac)	Cotton (Qtls/Ac)	Chillies (Qtls/Ac)	Ground-nut (Qtls/Ac)	Mango (Tons/Ac)
1.	Before WUAs	32.0	10.0	12.0	9.0	3.0
2.	After WUAs	35.0	12.0	11.0	11.0	4.0
	Increased	3.0	2.0	1.0	2.0	1.0

From the Table 5.8, it can be observed that there was an increase in the productivity levels of major crops grown in Krishna district. The increase in the productivity of rice by 3 bags (i.e. 210 kgs/Ac) in cotton it was 2.0 quintals/Ac, in chillies 1.0 quintals/Ac, in groundnut 2.0 quintals/Ac and for mango orchards, it was 1.0 tones/Ac.

The comparative productive levels of different crops before and after formation of WUAs, shown that there was an increase in productivity levels, the reasons attributable for production levels may be due to the following reasons viz.,

1. There was an assured and equitable supply of water to crops.
2. The farmers were confident of getting water at the critical stages of the crops.
3. The farmers were using the water as per the requirement of crops.

4. There may be saving of the water by judicious supply of water and extra land might have been brought under cultivation of various crops.

Hence, the increase in the produce had been observed after formation of WUAs.

5.3.3.3 Additional income

Table 5.9 : Income of the respondents before and after formation of WUAs

Sl. No.	Crop	WUA-59		WUA-192		Total		Difference
		After	Before	After	Before	After	Before	
		(Rs. in lakhs)						
1.	Rice	18.77	13.80	35.02	30.41	53.79	44.21	9.58
2.	Cotton	-	-	38.30	29.34	38.30	29.34	8.96
3.	Chilli	-	-	16.94	22.77	16.94	22.77	-5.83
4.	Groundnut	-	-	7.60	6.95	7.60	6.95	0.65
5.	Mango	-	-	17.80	27.30	17.80	27.30	-9.50
	Total	18.77	13.80	115.66	116.77	134.43	130.57	3.86

From the Table 5.9, it was estimated that about 3.86 lakhs additional income from different crop enterprises was attained by respondents totally in the study area. In case of paddy it was highest i.e. 9.58 lakhs, whereas in case of mango it was the lowest i.e.,-9.50 lakhs.

Benefits of farmers involvement in irrigation management were very clear because with the same quantity of water, the farmers by using proper seeds, fertilisers can obtain good crops and sustain better standard of living

for their family from their small holdings (Bhandari). The results also concluded the above statement. There was totally an additional income of 3.86 lakhs had been accrued after formation of WUAs and the major contribution was from paddy (9.58 lakhs) followed by cotton (8.96 lakhs). Eventhough there was an enhancement in productivity levels of chilli, groundnut and mango, they did not yield additional income because of price fluctuations.

So if the prices were stable or high, the additional income after formation of WUAs may touch a figure of 18 lakhs for the total respondents of both associations. Here we can draw a conclusion that there was additional income of 3 lakh Rs. for 80 respondents out of total 3300 and for only 720 acres of land out of 18,998 acres of operational area of both associations.

Eventhough there was an enhancement in productivity levels, farmers were not willing to change cropping pattern because of many reasons. The operational area of 59 was traditionally rice belt and the area comes under 192, there may be slight shifting in cropping pattern between cotton, chilli and pulses and some land was under mango orchards.

5.3.3.4 Distribution of water

Table 5.10: Response of farmers towards the equity in distribution of water by WUAs

N = 80

Sl. No.	WUAs No.	Irrigated			Irrigated dry		
		Before (Rs.)	After (Rs.)	Increased (Rs.)	Before (Rs.)	After (Rs.)	Increased (Rs.)
1.	Equity in distribution	33	82.3	36	90.0	69	86.25
2.	No equity in distribution	7	17.5	4	10	11	13.75
	Total	40	100.0	40	100.0	80	100.0

The analysis of the response of the farmers towards equity in distribution of water revealed that 86.25 per cent farmers were of the opinion that WUAs were distributing water equally, as per their share in the area of their operation and only 13.75 per cent said that the water was not distributed equally to all the farmers in the area of their operation.

From the above it can be inferred that the WUA's were involved in distribution of water equally to all the farmers as per their share in the period of their operation in the Krishna district.

The findings of various scholars indicated that the bigger and greater farmers were greater beneficiaries of canal irrigation facility in the state managed irrigation systems (Pant). But in contrast to this, the results shown that farmers of different categories were agreed that there was equity in distribution after formation of WUAs, eventhough, here and there, some unscrupulous practices were taking place.

There by one of the goals of irrigation management transfer had been achieved, which was not possible in the previous management.

5.3.3.5 Disputes among farmers

Table 5.11 : Response of the farmers towards the disputes after formation of WUAs

Sl. No.	Disputes among farmers	WUA-192		WUA-59		Total	
		F	%	F	%	F	%
1.	Increased	-	-	-	-	-	-
2.	Decreased	38	95.0	35	87.5	73	91.25
3.	Remained as it was in past	2	5.0	5	12.5	7	8.75
	Total	40	100.0	40	100.0	80	100.0

The Table 5.11 revealed that 91.25 per cent of the respondents have been confirmed that disputes were decreased after formation of WUAs in the area of operation. Whereas just 8.75 per cent opined they were still existing.

So it can be concluded that the legal power that was vested with WUAs, was able to solve many of the disputes among the farmers and the water was distributed among them equally as per their holding and even tailend areas were also in receipt of the water as the WUA's one of the responsibility is to solve the water disputes if any among them and to supply water even to the last farmer in the command.

They can charge an amount that should be adequate enough to rectify the tampering and damaging in the system and injury caused to

others. Farmers were able to manage the water allocation and distribution and conflicts were prevented and controlled through these orgainsations (Alberts). The results were in accordance with this statement.

5.3.3.6 Transparency of works

Table 5.12 : Dissimination of information on works undertaken by WUAs

N = 80

Sl. No.	Information	WUA-192		WUA-59		Total	
		F	%	F	%	F	%
1.	Disseminated to farmers	37	92.5	38	95.0	75	93.75
2.	Not dissiminated to farmers	3	7.50	2	5.0	5	6.25
	Total	40	100.0	40	100.0	80	100.0

From Table 5.12, it can be inferred that 93.75 per cent of the farmers were informed about the operation and maintenance works undertaken by the WUAs in advance and only 6.25 per cent of the farmers were not informed about the various works undertaken by the WUAs.

It can be concluded that the WUAs were dissiminating the information on the various operation and maintenance works undertaken by the Managing Committee of WUAs in the area of their operation in Krishna district. This is the evidence of the transparency existing in the works undertaken by WUAs.

Transparency which was lacking in state managed irrigation systems was clearly shown in the works undertaken by WUA. Eventhough small fraction of respondents expressed their disconcern regarding transparency. The dissemination of information was mainly through public meetings, which were conducted and organised by WUAs in association with competent authority.

5.3.3.7 Quality of works

Table 5.13 : Response towards the quality of works undertaken by WUAs

N = 80

Sl. No.	Quality of works	WUA-192		WUA-59		Total	
		F	%	F	%	F	%
1.	High	30	75.0	35	87.5	65	81.25
2.	Medium	5	12.5	5	12.5	10	12.5
3.	Low	5	12.5	-	-	5	6.25
	Total	40	100.0	40	100.0	80	100.0

When the response of the farmers towards the quality of works undertaken by the WUAs was analysed, it was revealed that 81.25 per cent of the farmers were of the opinion that the high quality of the works had been maintained by WUAs. The negligible per cent (6.25 %) of the farmers revealed their opinion that the works under taken by WUAs were of low quality in the area of their operation.

From the above, it can be evaluated that the high quality of works was maintained by WUAs when compared to the works undertaken by the

contractors through government agencies in the area of operation of WUAs in Krishna district.

The conveyance losses in canals as well as in the fields are high. The conveyance loss varied from 30 to 60 per cent depending upon the distance and conditions of canals and channels (Jain *et al.*). So if these problems attended quickly this loss may be prevented. This can be achieved through immediate repairs to channels, sluices and, they should last for longterm. So it was interesting to note that most of the respondents have satisfied with the quality of works undertaken by WUAs with the assistance of competent authority. The channels built by farmers were better than average quality and done four months ahead of schedule.

5.3.3.8 Utilisation of funds

Table 5.14 : Response of farmers towards the utilisation of funds

N = 80

Sl. No.	Funds utilisation	WUA-192		WUA-59		Total	
		F	%	F	%	F	%
1.	In precised manner	38	95.0	40	100.0	78	97.5
2.	Not in precised manner	2	5.0	-	-	2	2.5
	Total	40	100.0	40	100.0	80	100.0

The observation of Table 5.14 above reveals that 97.5 per cent of the respondents were of the opinion that the funds allotted to WUAs were utilised in precise manner in undertaking works by WUAs where as only

2.5 per cent of the farmers were of the opinion that the funds were not used in precised manner by WUAs.

From the above, it can be concluded that the funds, allotted to WUAs for under taking operation and maintenance works were used as per the conditions laid by the Government in the area of operation of WUAs.

5.3.4 Farmers participation in the management of irrigation systems

5.3.4.1 Electing the water user association

Table 5.15: Farmers used their voting power in electing WUAs

Sl. No.	Category	WUA-192		WUA-59		Total	
		F	%	F	%	F	%
1.	Farmers used their voting power	20	68.9	25	83.4	45	76.27
2.	Farmers not used their voting power	9	31.10	5	16.6	14	23.73
	Total	29	100.0	30	100.0	59	100.0

From the above, it can be said that 76.27 per cent of the farmers had used their voting power in electing their president and territorial constituency members of WUAs to form the managing committee of WUAs whereas 23.73 per cent of the farmers had not used their voting power to elect the managing committee of WUAs in the area of their operation in Krishna district.

Farmers participation in large numbers in using their voting right may be due to the discontent in the minds of farmers over the government

managed irrigation systems and their desire to manage the system through farmers organisation (WUA) at local level (Jayaraj 1997).

5.3.4.2 Social auditing

Table 5.16: Response of farmers towards the auditing of funds utilised by WUAs

N = 80

Sl. No.	Response category	WUA-192		WUA-59		Total	
		F	%	F	%	F	%
1.	Audit is essential	36	90.0	40	100.0	76	95.0
2.	Audit is not essential	4	10.0	-	-	4	5.0
	Total	40	100.0	40	100.0	80	100.0

The Table 5.16 reveals that 95.0 per cent of the farmers were of the opinion that funds utilised for under taking works by WUAs should be audited by an appointed auditor by the Government and whereas only 5.0 per cent of the farmers were of the opinion that the funds utilised by WUAs need not be audited. Eventhough there was some discontent in the TC members, who were opined that the funds should be distributed among TC members as per the requirement in place of direct investment by president of water users association.

From the above it can be concluded that the funds allotted by the Government for undertaking works should be audited by an auditor appointed by the Government. Getting the funds audited by auditor in the presence of water users may help in creating the confidence in people that funds were not misused by the WUAs in the area of their operation.

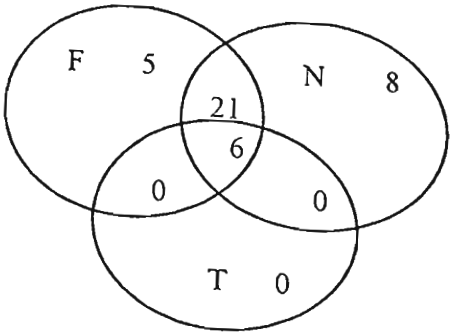
At the end of each financial year, and not latter than three months after the commencement of the new financial year, each of the farmers organisation shall cause its accounts to be audited as prescribed (APFMIS Act-1997). The funds of the farmers organisation shall compose of grants received from Government, resources raised from any financing agency income from the properties and assets attached to the irrigation system etc.

5.3.4.3 Prioritising of O and M works

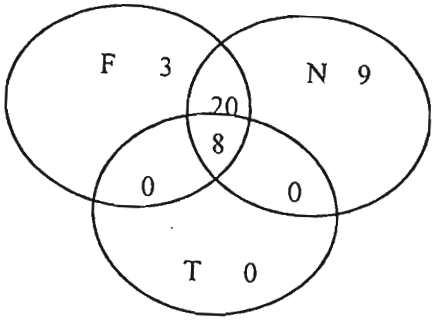
From the observation of the ven diagrams, it can be inferred that majority (77.5) per cent of the farmers were of the opinion that the operation and maintenance works in the area of operation were prioritised on need and 17.5 per cent of the farmers in WUAs were of the opinion that the need based operation and maintenance works based on resources and time requirement were undertaken by WUAs and 10.0 per cent of the farmers were of the opinion that the operation and maintenance works so undertaken based on the funds available in the Joint Account of WUAs in the area of their operation.

The redeeming feature about the WUAs was works were under taken on need base. Majority of the respondents have confirmed this fact and few members expressed that besides need, due consideration also given to availability of funds and time period required for that works. The farmers have best insight as how the simple scheme should be operated (Nes-A-Van).

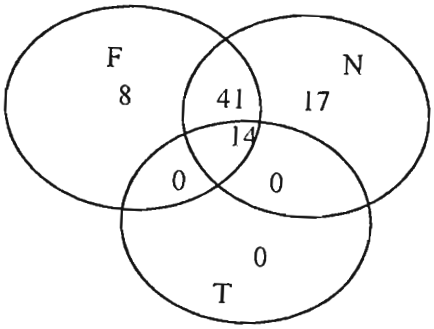
WUA-192



WUA-59



TOTAL



Note : F = Funds available
N = Need based works
T = Time frame for undertaking works

Fig. 4 : Farmers opinion regarding the prioritisation of operation and maintenance of works in the area of operation.

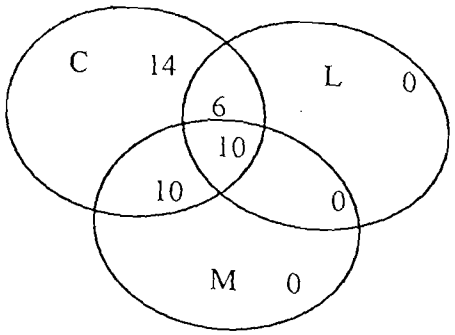
5.3.4.4 Form of participation by respondents

The analysis of the ven diagrams above revealed that 72.5 per cent of the farmers involvement was by means of providing cash in the form of paying water cess for undertaking works in the area of operation and 27.5 per cent of the farmers involvement was by means of providing machinery for undertaking works in addition to above one.

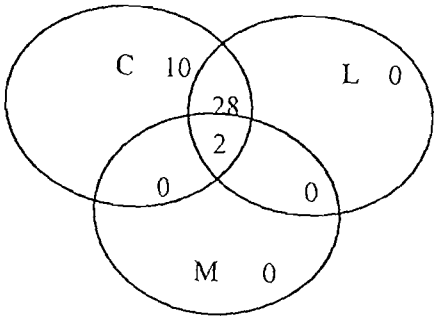
From this it can be inferred that most of the works undertaken by the WUAs in the area of operation were carried out without active involvement of members of WUAs. There was a little labour provided by the farmers in undertaking works. The farmers involvement in undertaking works was negligible in the area of their operation.

Findouts of the study regarding the role of farmers excluding presidents of WUAs and TC members, were very distressing and need to be addressed by concerned authorities. Most of the respondents were demanding rights but not ready to share the responsibilities. Most of them were of opinion that mere contribution of funds in the form of water cess charges endup their duty. This may be concreted by the results i.e. only small fractions (15 %) of the respondents were taking participation in the works undertaken by WUA by means of providing labour and machines in addition to regular payment of water cess and 42.5 per cent of respondents by means of providing labour in addition to paying the water cess. Many cases, it was the president who was actively participating in the works. TC members were also not involving actively in some areas. Political

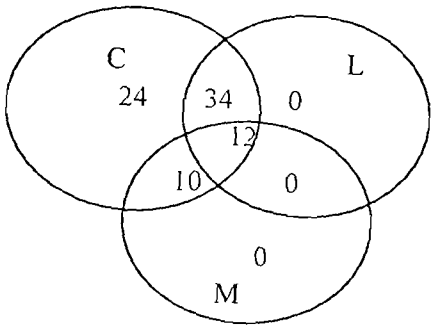
WUA-192



WUA-59



TOTAL



Note : F = By means of providing cash
N = By means of providing labour
T = By means of providing machines

Fig. 5 : Farmers involvement in undertaking works in the area of operation

interference and groupism may be the separating forces of the unity of members. The existence of non-formal institutions in Tirunelvell district concluded that the traditional institutions of Kinship, caste, village, religion and party were not only organising forces in Indian rural society, but also necessarily obstacles to co-operation for economic purposes (Meinzen, 1996).

SUMMARY AND CONCLUSIONS

CHAPTER VI

SUMMARY AND CONCLUSIONS

High levels of agricultural production and income are not possible in command areas under various irrigation projects without any effective management supported by suitable agricultural and irrigation engineering technology based on the needs of the farmers. A dynamic management requires involvement of water users or their organisations for effective execution of the irrigation water management programmes in the command areas.

Farmers participation has moved from a peripheral issue in irrigation management to centre stage. The conventional wisdom that dominated much official irrigation development in the 1950s and 1960s was that the irrigation systems require centralised control. Water was a strategic resource over which the state assumed ownership, and water control was a public good, which the state provided. The discovery of elaborate farmer managed irrigation systems (FMIS) in many parts of the world in the 1960s and 1970s challenged assumptions regarding the limitations of farmers involvement and the necessary role of the state.

Programmes to promote farmers involvement range from participatory irrigation management with farmer input as a supplement to agency management to irrigation management, to irrigation management transfer, in which farmers assume full responsibility for O & M of specific units of system. In Andhra Pradesh based on a pilot project on farmers organisation

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in irrigation management which was initiated in early nineties, irrigation management transfer has been done. This has been implemented in eight stages. A novel and revolutionary legislation and first of its kind in India i.e. APFMIS Act was introduced in the year 1997 to facilitate the entire process. Some of the important provisions made under this act are delineation of area of operation, election to the WUAs, fixing a tenure for WUAs, provision of resources to the WUAs to carryout O & M works, involvement of irrigation department as competent authority, legal powers etc.,

The present study is therefore designed to study the success of the water users' associations programme in Andhra Pradesh and to critically examine the farmers involvement with the following objectives.

1. To assess the need for and the goals of farmers' management of irrigation systems.
2. To analyse the powers and functions of different water user associations constituted at different levels of irrigation system.
3. To estimate the cost of various operations undertaken in the selected operational area and to assess the benefits accrured to WUAs.
4. To critically examine the farmers' participation in the management of irrigation systems.

Keeping in view the above objectives, the literature was reviewed and multiple random sampling was followed in this study and was carried out in Krishna district of Andhra Pradesh. The respondents were water

users in the selected WUAs, and the sampling size was 80, 10 each from eight territorial constituencies and 4 TCs from one WUA.

The data was collected with the help of questionnaire specifically designed for this purpose. The data thus collected was coded, tabulated and analysed.

The following research findings have emerged out of the present study.

1. Government of Andhra Pradesh through enacting a new legislation called Andhra Pradesh farmers management of irrigation systems Act, 1997 (APFMIS Act, 1997) which exclusively empowers their organisations and enables them as decision makers and implementers in management of irrigation systems.

2. Small farmers constituted major percentage of water users association in the selected ones i.e. 57.5 per cent and 86.25 per cent literacy has been observed.

3. 73.75 per cent of respondents were having voting right to elect the WUA presidents and TC members.

4. The total land holding of respondents was 720 acres and in which 248 acres of land was under paddy cultivation and remaining under irrigated dry crops such as cotton, chilli, groundnut.

5. Totally Rs. 18,35,000/- were spent on O & M works by both associations on various categories of works in the financial year 1998-99.

6. Even if it was not possible to measure the benefits in terms of all the valid parameters, WUAs found to be quite good. It is absolutely essential to see the impact interms of some key parameters like area irrigated, total income generated and changes in cropping pattern etc.

All these were examined in terms of a comparision of position before and after formation of WUAs.

I. Quantified benefits

i. Increase in land value was about Rs. 8888/ in case of irrigated and Rs. 23745/- in case of irrigated dry land.

ii. Productivity levels have been increased as mentioned below in various crops.

Rice - 3 bags/acre
Chillies 1 q/acre
Cotton - 2 q/acre
Groundnut - 2 q/acre

iii. There was totally an additional income of Rs. 3.86 lakhs to the respondents after formation of WUAs has been observed, from only 720 acres of land out of total operational area of 18998 acres.

II. Non-quantified benefits

i) Majority of the Farmers have satisfied with distribution of water.

ii) 91.25 per cent of respondents agreed that disputes were decreased after formation of WUAs.

iii) 93.75 per cent of respondents have confirmed the transparency of works.

iv) 97.5 per cent of respondents were satisfied with utilisation of funds.

7. Farmers were not actively involving in the works undertaken by WUAs except presidents and TC members. But they were actively participated in the elections of WUAs, and prioritision works.

Based on the data collected, it was found that WUAs have done exceedingly well. Although the assessment made in this study is not based on wide ranging data, the picture does show WUAs in a favourable light. Short term assessment around the time of turnover may be misleading, either because entire resources are being given in the short run or because farmers (and government) are still on a steep learning curve. Cross sectional and time series data on a range of performance indicators are required to evaluate how farmers participation effects irrigation systems and the factors that contribute to better performance.

Users participation is an essential feature of irrigation system management and it will continue, through formal or informal channels. But it is not the only essential feature. Much of the impact of participation and particularly of management transfer programmes ultimately depends on the ability of the state to provide a receptive partner bureaucracy and enabling conditions for farmers to take a greater role in irrigation system management.

IMPLICATIONS OF THE STUDY

1. Under the cover of APFMIS act, 1997 the farmers organisations have been empowered as decision makers and implementers of management of irrigation systems. However the farmers organisations may not be in position to exercise thus powers unless an assistance to be given to understand, implement and carryout the programmes entrusted to them. The assistance may be in shape of conducting training programmes to facilitate them to increase their knowledge levels to utilise the powers given to them. Further the experienced technical personnel should be made available to them in directing FOs to take positive decisions and implement management programmes of the system already existing.

2. From the study, it is revealed that the majority of the members of WUAs belong to small farmers category. The intensive agricultural development in the small holdings is very complex in nature and hence the research skill oriented activities of crop management to be reflected for increasing the yields in small holdings of farmers.

3. All the land holders who have right over the land were having voting right to select their leaders in the election. But there are many water users in the command area who do not have any voting right. Therefore the government may take steps to involve all the water users by providing voting right, to select their leaders for the farmers organisation. There by we can reduce the social imbalance in the command areas.

4. The total land holdings of the farmers from the study was about 720 acres out of which 240 acres of land was under paddy cultivation from this it is inferred that majority of the land in the command areas is under paddy cultivation. There are many other commercial crops which make the farmers economically viable. Hence, the government may take steps to encourage the farmers to go for the commercial crops rather than paddy, as paddy cultivation requires more water.

5. The government is supporting FOs in shape of arranging the finances for O & M of the systems. Year after year if the government start financing FOs they may look forward towards the government for release of the budget for the maintenance of the project. Therefore government may take steps to make FOs economically viable to maintain irrigation systems on their own so that the budget allocations of the government will be reduced and the farmers involvement in managing of irrigation system on their own will be increased by which FOs may sustain in future.

6. In conclusion it may be advised that FOs may be made multipurpose organisations which serve the farmers in supplying inputs, marketing of agricultural produce etc., so that they can generate the resources on their own for their well being.

LITERATURE CITED

LITERATURE CITED

* Abel Martin E 1977 Irrigation system in Taiwan management of a decentralised public enterprise in water resource problem in developing countries. Economic Research Centre, University of Minnesota pp. 31.

Alberts J, Vuren G V and Nicholaichuk W 1996 Building sustainable water users associations in NWFP, Pakistan sustainability of irrigated agriculture - farmer's participation towards sustainable irrigated agriculture vol. 1-B, Transaction of the 16th International Congress in irrigation and drainage, Cairo pp : 307-328.

Amarnath Chowdary 1990 13th Bhaikaka Memorial lecture on farmers participation in irrigation water management (a lecture of Chief Minister of Gujarath).

Bhandari S S 1990 Farmers involvement in irrigation water management from the point of view of irrigation managers, CWC, New Delhi.

Bottrall Antony F 1981 Comparative study of the management and organisation of irrigation, WAMANA 1(1) : 5.

Chand R 1994 Role of water rights in farmer managed hill irrigation systems. Economic and Political Weekly pp : 26-30.

Goen field 1999 Participatory irrigation management (World Bank). Paper presented in Forth National Conference on Participatory Irrigation Management held in Jan. 1997 at NIRD, Hyderabad.

FAO 1982 Organisation, operation and maintenance of irrigation schemes, USDA/CWC/ New Delhi.

Hassan 1990 Warabandi concepts and problems a paper presented in seminar on 5-2-1990, WALAMTARI, Hyderabad.

Hoshino 1996 Operation and maintenance of irrigation system and strengthening of farmers organisations. pp : 95-111.

Jayaraj M 1997 A study on the impact of APFMIS Act-1997 Andhra Pradesh. Paper presented in Forth National Conference on Participatory Irrigation Management held in Jan. 99 at NIRD, Hyderabad.

Jayaraj M 1997- PIM A joint venture in Irrigation Water Management. WALAMTARI Publication.

Lesbats R, Tardieu H, Herities N and Nicholaichuk W 1996 Irrigator associations in south west france and their relation with CACG. Transaction of the 16th International Congress on irrigation and drainage, Cairo 1 : 67-78.

* Lowdermilk M K, Nabe K C and Sampath R K 1986 Improved irrigation management; why involve farmers. Proceedings of an invited seminar series sponsored by the International School for Agriculture and Resource development. Irrigation Management in Developing Countries, Current Issues and Approaches.

Marria and Saleth R Waterinstituions in India. Economics Law-and policy Commonwealth Publishers, New Delhi.

Meinzen Dick R S 1989 Local management of tank irrigating in South India Organisation and operating. Cornell studies in irrigation. Irrigation Studies Group, BIDS

Meinzen-Dick R, Subramanian A and Nicholaichu W 1996 Incentives for water users associations evidence from experience. Sustainability of irrigated agriculture volume 1-A. Transactions of the 16th International Congress on Irrigation and Drainage, Cairo.

Maloney and Raju K V 1994 Managing irrigation together, practice and policy in India. Sage Publications India Pvt. Limited, New Delhi.

Narayanapanth G, Sivamohan M V K 1986 Farmers involvement in irrigation development, a study of warabandi system in a village setting. Issues in irrigated agriculture and command area development, BIDS 145-190.

Nes-A-Van and Nicholaichuk W (1996) Privatisation, the ultimate form of participation. Transactions of the 16th International Congress on Irrigation and Drainage, Cairo.pp : 79-93.

Nicholaichuk W 1996 Sustainability of irrigated agriculture farmer's participation towards sustainable irrigated agriculture vol. 1A Management aspects. Transaction of the 16th International Congress on Irrigation and Drainage, Cairo.

Niranjan Pant 1981 Study of Kosi command . Economic and Political Weekly 16 : 39.

Palanisami K and Thorunton D S 1981 Research methodologies for improved irrigation system management. Some reflections based on experience in Tamilnadu. Paper presented for improve irrigation system management, College of Agricultural Engineering, Tamil Nadu Agricultural University, Coimbatore.

Pant 1986 Farmers organisation in large irrigation project. Economics and Political Weekly 21 : 52.

Patel A R 1999 Agricultural and rural development implementation calls for action plan. Agricultural Banker, April-June, 1999.

Rakesh Hooja 1999 A strategy for propagating participating irrigation management in India. A paper presented in fourth national conference on participatory irrigation management held in Jan. 99 at NIRD, Hyderabad.

Rao C, Turabul Hassan and Kamuel G 1992 The need of farmers organisation in irrigation system of A.P. Presented in Seminar on Management of Irrigation tanks by farmers in Andhra Pradesh at WALAMTARI, Hyderabad.

Reddy M 1990 WARBANDI Problems and prospects in its implementation - A paper presented in seminar on 15th Feb. at WALAMTARI, Hyderabad, A.P.

Salman 1997 The legal framework for water uses association, a comparative study world Bank Technical paper, No. 360 p. 100.

Sampath P and Sharma S K 1992 ICID 3rd pan American Regional Conference pp : 17.

Acc: No: D 5841
Date: 27-11-99

Sharma D R R 1990 Socio-economic aspects of irrigation project . A paper presented course from 22-27-1-90, WALAMTARI, Hyderabad, Andhra Pradesh.

Singh K K and Sivamohan M V K 1986 Irrigation utilisation in large irrigation projects - the role of irrigation associates and the government. Issues in irrigated agriculture and command area and development, BIDS, 133-144.

Sinha 1996 The conditions for collective action, land tenures and farmer's groups in the Rajasthan canal project. Gate Keeper Series. International Institute for Environment and Development 57 : 17.

SrinivasanV 1970 Impact of agricultural programmes in relation to Panchayat Raj institutions and extension agencies in perur block of Coimbatore district. Tamil Nadu Agricultural University, Coimbatore.

Tankhiwala N R and Nicholaichuk W 1996 Farmers participation in irrigation management. Transaction of the 16th International Congress on irrigation and drainage. Sustainability of Irrigation Agriculture 1 : 45-55.

Vaidyanathan 1994 Transferring irrigation management to farmers. Economic and Political Weekly pp : 2965-2967.

Walker H H, Gupta N L 1993 Organisation of irrigation projects in developing countries (Ed. Gurjar R K. Integrated Wateruse Management pp : 171-201.

Yaqoob M D 1990 Social constraint on water resources development. A paper presented course from 21 : 2-27 Jan, 1990, WALAMTARI, Hyderabad.

* Original not seen