Socio Economic Status of Farmers and their Awareness on Irrigation under Sri Ram Sagar Project Command Area, Andra Pradesh, India

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Abstract

Improvement in irrigation efficiency of projects is vital for the development of country's economy. For improving irrigation water use efficiency a clear understanding of socio- economic condition and constraints from the point of famers is paramount importance as it regulates the decision making and option behavior of farmers and in order to assess the status on these aspects, a study was taken up under Sri Ram Sagar Project command (2R minor of D51) during 2008-09. The results indicated that 68% farmers were above 40 years of age having good farming experience and 71% were educated. The average per capita land holding size of farmers was 2.05 ha. Farmers were not aware of different water saving technologies as they were not trained on agricultural water management aspects. Non-availability of water in time and prior information about the release of canal water were the major problems perceived by majority of the farmers. Costs associated with accessing, availability water and distance of the land from water source influenced labour input for distributing water. There was tendency to over irrigate the crops in each term of irrigation because of either availability of water is plenty or as a measure of risk avoidance in the wake of uncertainty and unavailability of water in next turn. Majority of the farmers were of the opinion that poor operation and maintance of the irrigation system was the major reason for low water use efficiency and tail end farmers expressed that head reach farmers were using more water than required and it was suggested that bringing awareness on water use and management under canal commands through trainings and exposure visits was important in addition to extensive interaction between irrigation, agricultural and extension activities with the framers to improve on farm water use efficiency, there by project irrigation efficiency.

1. Introduction

Improvement in efficiency of Irrigation Projects is vital for the development of country's economy as Indian irrigated agriculture has been fundamental to its economic development and poverty alleviation, since about 28% India's gross domestic product and 67% of employment is based on agriculture. Food production is the largest water user and is directly constrained by water scarcity (Yang et al., 2006). One of the main factors that limits further expansion of food production for the increasing population will be water (Playan and Mateos, 2006). In India, 84% of Water Resources are used for Agriculture and farm efficiency is 20-50%. The project irrigation efficiencies in Andhra Pradesh are also low (<50%) compared to other projects in India. Among different projects in Andhra Pradesh, Sri Ram Sagar Project (SRSP) has lowest project irrigation efficiency. Lack of awareness among the farmers about consequences of inefficient water application and lack of application tools and instruments for regulated and uniform application of the desired quantity of water at the appropriate time are among the major cause of low water use efficiency at the field level (Kaur et al., 2009). Lack of proper on- farm development works in the command areas of irrigation projects often results in poor water use efficiency at the farm level (Chandran and Chackacherry, 2004). For improving irrigation water use efficiency and crop productivity through technological interventions, a clear understanding of socio-economic condition of the farmers, present cropping systems and constraints from the point of view of farmers is required. Hence, a study was taken up in the villages under command area of 2R minor of D51 distributory,

Kakatiya canal, Sri Ram Sagar Project command(SRSP) during November, 2008-April, 2009 in order to assess the status of socio – economic conditions and knowledge level on water management technologies of the farmers.

2. Material and Methods

2.1. Study area

Sri Ram Sagar Project (SRSP) is constructed across the Godavari river, in Andhra Pradesh (A.P.), with storage capacity of 90 TMC for a command areas of 6.824 lakh ha. covering the districts of Adilabad through Saraswthi canal, Nizamabad through Laxmi canal and Karimnagar, Warangal, Khammam and Nalgonda through Kakatiya canal. The Kakatiya main canal taking off from the SRSP dam after traversing about 146 km outfalls into Lower Manair Dam (a balancing reservoir built across the river Manair) and irrigates 1.9 lakh ha with its 82 distributaries covering 519 villages in 35 mandals of Karimanagar district. The present study was taken up under 2R minor of D51 distributory by selecting three villages one each from head, middle and tail reach viz.,. Katlakunata, Thumabar-raopeta and Mythapur in Raikal manadal of Karimganagar district, Andhra Pradesh, India (Figure 1). From each village 10 farmers were selected, whose fields were under canal command area by following random sampling method.

The 2R minor takes off at 2.995 km away from the head regulatory of D51 distributor of Kakatiya canal and runs over a distance of 5.017 km, irrigating an area of 871.6 ha (2179 acres). The designed of discharge of 2R minor is 0.7404 Cumecs with the vent size of 155x122m.There are 86 wells by study area with a depth raising from 5.8 to 8m. The water from, well (dug) is used for irrigation using electric motors during water scarce periods as supplementary to canal irrigation or for growing the crops completely with this water when canal water is not available.

The randomly selected farmers of 2R minor, D51distributory, Kakatiya canal, SRSP were interviewed in a face to face situation with a pre-tested questionnaire to collect the data that allow analyses for addressing the pre-determined objectives. Given the objectives of the study, the economic components have been focused on elaborating a methodology that is capable of assessing the socio economic status of the farmer's under the minor and also their awareness about the water management technologies and need for improving the irrigation system. Descriptive statistics including frequency, mean and percentage of analaysis (Thangaraja et al., 2008) in addition to technique of tabular analysis (Goutham et al., 2009) were employed for analysis and presentation of results.

3. Results

3.1. Socio economic status of farmers

3.1.1. Age composition

There were 68% farmers above 40 years of age and rest of the farmer's (32%) were between 21-40 years (Table 1). Similar results of lower percentage of farmers in middle age category

Table 1: Age-composition of farmers in study area

S.No	Age years	No. (frequency)	Percentage to total
1	<20	0	0
2	21-40	10	32
3	41-60	16	52
4	>60	5	16
	Total	31	100

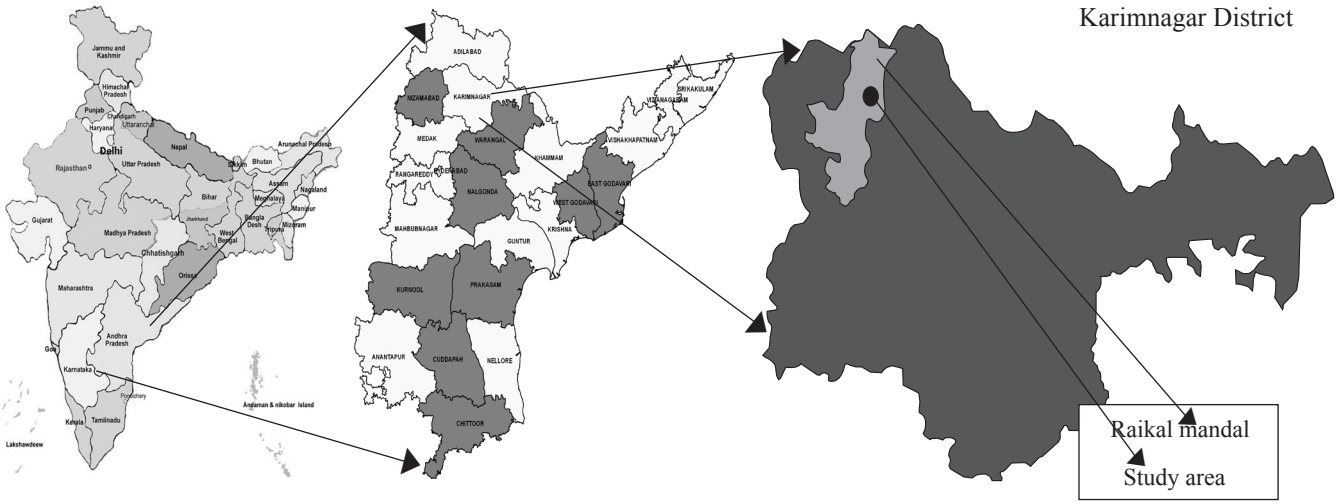

Figure 1: Location of study area in Karimnagar district of Andhra Pradesh, India

Table 2: Education status of farmers in study area

S. No	Level of Education	No.	Percentage to total
1	Illiterate	9	29
2	Primary (upto 7th)	16	52
3	Secondary	4	13
4	College	2	6
	Total	31	100

were reported by Ghosh et al. (2002) and Thangaraja et al. (2008). The advantage of middle aged farmers is that they are more skilled and have good experienced in crop production.

3.1.2. Education status

The education status is an indication of the progressive and positive bent of mind of the farmers towards the modern technological interventions. There were 29% illiterate farmers indicating great need for motivation and create awareness on improved technologies through training and exposure visits. Of the 71% educated, 6 % were collegiate and 13% have secondary education and remaining 52% had primary education, indicating a need for planning training programmes differently, in ways to suit to education level. The higher level of education indicate that print media can be easily utilized for the training of farmers. This results are in agreement with Ghosh et al.(2002) and Thanagaraja et al. (2008). While Arya et al. (2012) reported low education status under canal command area Som-Kagdar project of Rajasthan. Ajrawat and Kumar (2009) concluded that the education was positively and significantly related with farmer's knowledge level. Hassan et al. 2002 also found a significant relationship of age and education of respondents with the adoption of improved production technology.

3.1.3. Size wise distribution of land holding

Size wise distribution of land holding (including area out side the pilot area) highlights both the number and area distribution under different size categories of study area farmers. The average per capita land holding size of farmers was 2.05 ha. Large category stood first with 45% of total number of land holdings followed by medium and small categories of farmers with 42 and 13%, respectively (Table 3). However, cultivated area was more among large category of farmers followed by medium and small categories. These results corroborates findings of Ghosh et al. (2002) and Goutham et al. (2009). Further, Mahmood et al. (2012) reported that farm size was directly proportional to the adoption of water saving interventions. All the farmers (100%) posses owned land and primary occupation was farming. Similar results were reported by Ghosh et al. (2002) and Arya et al. (2012). The value of land was ₹ 4,25,000 and ₹ 4,75,000 ha^{-1} for irrigated and irrigated dry land, respectively during 2008-09. There was no system of leased in and leased out as farming was main occupation.

Table 3: Size-wise distribution of land holdings in study area farmers

S. No	Size-Class	No.	Area (ha)	Per capita
1.	Small (<0.80 ha)	4 (13)	2.02 (3)	0.51
2.	Medium (0.81 to 2.00 ha)	13 (42)	18.32 (29)	1.41
3.	Large (>2.01 ha)	14 (45)	43.1 (68)	3.08
	Total	31 (100)	63.44 (100)	2.05

(Figures in the parentheses are percentage to total)

3.1.4. Asset position of the farmers

All the farmers (100%) had own residential accommodation (Table 4). However, the agricultural implements number was quite low, as the farmers belong to small and medium categories. Ghosh et al. (2002) and Singh et al. (2004) reported that 66% of the farmers head medium asset holding and 20% had relatively high holding of tools and implements. The farmers often share their equipment / implements on mutual / hire basis for carrying out the agricultural operations in time.

3.1.5. Farm labour utilization in cultivating different crop enterprises

In rice (transplanted) the number of man days of employment $hectare^{-1}$ was nearly four 122 days (Table 5). The number of man days ha^{-1} of maize, maize + turmeric intercropping, groundnut and sesame were 110, 165, 86 and 52, respectively. Weeding operation needs more number of labour followed by harvesting operations and transplanting in rice. The employment of women labour found more significant in cultivation of different crops as their participation was more as compared with men labour. However, the wage rates, they vary from operation to operation and for the same operation, men wage rate was more compared to women. For rice, the farmers are employing

Table 4: Asset Position of the farmers in study area

Asset	No.	Percentage
1. Residential accommodation	31	100
2. Cattle sheds	20	65
3. Tractors	1	3
4. Hand Sprayers	5	16
5. Power sprayers	1	3
6. Pump sets	20	65
7. Ploughs	30	97
8. Cultivators	1	3
9. Any other	12	39

Table 5: Operation-wise human labour utilization in major crops (ha^{-1}) at study area

Operation	Rice		Maize		M + T		Groundnut		Sesame	
	M	W	M	W	M	W	M	W	M	W
Land Preparation	-	-	5	3	5	3	5	3	3	-
Application of FYM	2	2	2	2	5	5	-	-	-	-
Puddling	Tracto									
Bunding and leveling	5	-	5	-	2	-	2	-	-	-
Nursery raising	5	3	-	-	-	-	-	-	-	-
Sowing	-	-	3	5	8	10	3	5	3	-
Fertilizer application	3	-	5	-	5	-	3	-	-	-
Transplanting	5	25	-	-	-	-	-	-	-	-
Weeding	-	38	-	35	-	38	5	28	-	10
Irrigation	15	-	10	-	16	-	15	-	10	-
Spraying	3	3	3	-	3	3	-	-	3	-
Bird Scaring	-	-	-	15	-	15	-	-	-	-
Harvesting	8	20	5	10	3	8	5	5	3	10
Threshing	Tractor	-	8	10	8	8	-	-	5	8
Dehusking and stripping	-	-	-	18	-	8	-	25	-	-
Cleaning and bagging	8	11	3	3	-	3	3	5	3	3
Digging					10	18				
Curing and drying					13	11				
Total	54	102	49	101	78	130	39	71	31	31
Average*	122		110		165		86		52	

*2 men = 3 women; M + T = Maize + turmeric intercropping

machinery for ploughing and threshing operations, as it saves time and labour costs due to higher demand of labour. Maize shelling is done with the shellors. The labour used for irrigation varied from 10% to 16% of total labour force used in different crops depending upon the situation. Norman et al. (2008) reported that costs associated with accessing water influenced labour input, costs associated with accessing water influenced labour input, because when they were low the farmers tended to increase the irrigation rate and reduce the amount of time they spent distributing the water within their fields. Conversely when water costs were high, lower flow rates and more time spent in water distribution were observed, and this resulted in more uniform irrigation and higher irrigation efficiency. Also, opportunities and demands for farmers to use their labour for activities other than irrigation can lead them to modify operational or physical aspects of the system so that they can reduce the time they spend distributing water within the farm, particularly when the water is relatively cheap. Awareness and better understanding of how farmers may allocate their labour for water management will lead to more effective planning, design and management of irrigation systems.

3.2. Awareness on irrigation management

3.2.1. Awareness on irrigation

Only few farmers (35%) were aware about the critical moisture sensitive stages. No farmer received training on water management in agricultural crops and hence they were not aware about different water saving crop production technologies. All the farmers do not have awareness about cost of different water management structures. Similar results of lack of awareness on water management aspects were reported by Singh et al. (2004) and Kaur et al. (2009).

3.2.2. Problems in present irrigation water delivery system

Non-availability of water in time was the important problem perceived by majority (77%) of the farmers as a result the irrigation service became not dependable as perceived by 84% of the farmers (Table 6). This was affecting the farmers planning their production programme in advance. As the farmers were not trained in practicing water saving production technologies, they were adopting age old practices only. There was tendency among the farmers to over irrigate the crops in each term of irrigation, because of either their fields were in head reach of

Table 6: Opinion of the farmers on problems in present irrigation water delivery system

Problems	Yes	Percentage to total
Not Receiving any information regarding supply of water	25	81
Non availability of water in time	24	77
Inadequate availability of water	26	84
Present irrigation service was not dependable	26	84
Conflicts arising with other farmers regarding water distribution.	20	65

N=31

channel and availability of water in plenty by head reach farmers or as a measure risk avoidance in the wake of uncertainty and unavailability of water in next turn by the tail enders. Similar results were reported by Pandaria et al. (2002). With the late release of canal water, the timely crop sowings and performance were affected, besides declining the area under *kharif* season. The farmers (81%) were not receiving any prior information about the release of canal water. This was mainly due to lack of coordination between the agricultural department and irrigation department in the study area. Further, no action plan was also prepared to plan the actual water requirement. Higher knowledge on irrigation information would facilitate in better crop and water management practices adopted by the farmers and the different components of irrigation information available to the farmers would facilitate in decision making on various aspects of crop and water management such as time of land preparation, selection of variety with different duration, scheduling of planting sowing, scheduling of irrigation there by increased on farm water use efficiency (Sampat Kumar et al., 2011).

3.2.3. Opinion of the farmers for the decline in water supply from the present irrigation sources in study area

The farmers felt that the decline in water supply from the present irrigation sources was due to, in the order of excess use of water by head reach farmers followed by weed infestation, poor maintenance of field channels and lack of water in reservoirs (Table 7). Similar results were reported by Pandaria et al. (2002).

3.2.4 Perception of study area farmers regarding water management

The perception of the farmers on irrigation water usage was that it is a free resource in agriculture and due to top down approach in designing the water management interventions with little / no participatory approach in addition to lack of extension services regarding irrigation water management (Table 8).These

Table 7: Reasons for the decline in water supply from the present irrigation sources in study area

Reasons	Yes	Percentage to total
Lack of water in reservoirs	22	71
Unauthorized outlets	24	77
Excessive usage at head reaches	30	97
No lining of irrigation channel	22	71
Weed infestation in field channel (poor maintenance)	26	84
Poor maintenance of channels	25	84
Lack of knowledge about scientific cultivation practices	24	77

results corroborates the findings of Pandaria et al.(2002) and Singh et al. (2004). It was found that the selected farmers were scheduling irrigation based on personal judgments depending upon availability of water and crop condition. Similar opinion was expressed by Kaur et al. (2009). Socio-economic characteristics such as age, education, farm size and land holdings play a pivotal role in adoption process (Mahmood et al., 2012; Hassan et al., 2012 and Ajrawat and Kumar, 2009). However, Bajwa et al. (2010) argued that personality characteristics of small farmers in relation to their adoption attitude and moti-

Table 8: Perception of study area farmers regarding water management in agriculture

Reasons	Yes	Percentage
Top-down approach i.e. lack of involvement of community / stakeholder in the planning process	29	94
Linkages with other potential partners like NGOs, local entrepreneurs, local bodies, private sector etc., were non-existent	24	77
Water as a free / social good rather than a scarce good.	28	90
Lack of share on the part of the villagers both in installing and maintenance of irrigation structures	20	65
Lack of training on the part of the farmers / villagers to attend maintenance works of the established irrigation structures	25	81
Adoption of non-user-friendly technologies which were difficult to afford and maintain by the villagers	22	71
Unsystematic water allocation	22	71
Lack of extension services regarding the importance of water management.	27	87

vation varied greatly with respect to each of practice, farmers demonstrated patterns of positive, negative and mixed attitudes towards the adoption of different practices.

3.2.5. Problems due to poor irrigation supplies

Majority of the farmers opined that low yields (90%) and low returns (87%) were the important problems in the study area. A significant number of farmers (68%) opined that, due to decline in water supplies, the chances of taking up second crop were low under assured irrigation condition, there by affecting the cropping intensity. More than (58%) of the farmers reported that due to delayed and low water supplies, the weed menace will be severe in their fields, there by increasing their on farm expenditure.

3.2.6. Improving the present irrigation system

Majority of the farmers opined that bringing awareness among the farmers about the importance of water in agriculture through trainings and exposure visits. Further, these initiatives will improve irrigation scenario. They suggested the strengthening the existing WUA in their command, such that, its activities were more transparent and representative from the farmers (Table 9). Further, strengthening extension network was important to mitigate the irrigation problems in addition to strict supervision of gross root level field men (Luskars) who regulate the water. Similar findings were reported by Padaria et al. (2002), Singh et al. (2004) and Arya et al. (2012).

Table 9: Suggestions rendered by the farmers in study area for improving the present irrigation system

Reasons	Yes	Percentage to total
Further empowerment of WUAs	27	87
Community mobilization & Capacity building	30	97
Community ownership & control	25	81
Educating the farmers on proper water management techniques	29	94
Implementation of State Government schemes effectively	28	90
Extension services should be strengthened to overcome present irrigation problems	22	71
Water charges should be raised and they should be linked to the quantity of water used	5	16
Gross root level managers (luskars) should be supervised properly	25	84

4. Conclusions

From this study it has been observed that 68% farmers were above 40 years and 71% were educated. The average land holding size was 2.05 ha with low agricultural implements. Farmers over irrigate crops due to lack of knowledge in water management aspects and also capacity building in water management. The farmers under the project command felt that non availability of water in time and inadequate supply were the important problems. Further, the low efficiencies were due to over use of water at head reach, poor operation and maintenance, and lack of capacity building to farmers and negligible extension services regarding water management were the constraints in improving water use efficiency. The farmers opined that by strengthening the Water Users associations, community mobilization and capacity building, implementation of Govt. programmes effectively and managing the gross root level field men (Luskars) properly will improve efficiency of irrigation system. The study conclusively indicates that involvement of farmers in planning and management is essential for successful performance of on farm water management. The farmers continued following their own irrigation schedule what they desired. The project plan must ensure farmer's preparedness for canal irrigation system through comprehensive training programmes and infrastructural support system for effective on farm water utilization.

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