



Impact Analysis of Andhra Pradesh Water Management Project on livelihood of Farmers in Pilot Area of Musilipedu Southern zone of Andhra Pradesh

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ABSTRACT

Andhra Pradesh Water Management Project has come into operation since November, 2003 for a period of five years i.e up to October 2008 and extended up to October 2010 located at Regional Agricultural Research Station, Tirupati as a Network center to address irrigation water management in tank ayacut supported with bore wells. To implement "Operational Research", the Musilipedu tank ayacut (Musilipedu Village) in Yerpedu mandal of Chittoor district was identified. The impact of the project was scientifically evaluated and statistical analysed in terms of Socio-economic conditions, water use efficiency etc., in the pilot area. The statistical analysis revealed that the increased literacy status helped the APWAM project in effective dissemination of technologies related to water and land productivity enhancement in pilot areas. There was an overall increase in the per capita availability of land from 1.08 ha in 2005 to 1.29 ha in 2010. The land value was also increased due to the increased land productivity after the installation of lock gates to the tank, slush repairs, rehabilitation of supply channel and use of less water technologies. Similarly the net benefit per ha.mm of water increased from 4.6 kg in 2005 to 6.8kg in 2009 and the benefit-cost ratio was increased from 1.53 to 1.71 for rice crop. The statistical hypothesis based on t-test, the effect of Vishnu puddler on water saving in low land transplanted rice is showed significant difference when compared to farmers practice. The awareness and perception capacity of farmers on water and land management technologies was increased significantly with the capacity building programmes of APWAM Project in pilot areas.

Key words : Benefit-cost ratio, Operational Research, Socio-economic conditions, t-test, Water and land productivity.

Rice is the principal food crop cultivated throughout the state providing food for its growing population and employment to the rural masses of Andhra Pradesh. To meet the growing demand and sustain our self sufficiency in food without increase in prices the average rice yield in irrigated ecosystems must increase to a level of 6.5 to 7.1 t ha⁻¹ and sugarcane yield 72 to 86 t.ha⁻¹ by 2020. But the irrigated agriculture is facing problems like inefficient and unequal distribution of water, besides water logging and maintenance of supply channel and tank bed areas (Palaniswami et al., 2004). With the prime objectives of land and water productivity enhancement, the Andhra Pradesh Water Management (APWAM) Project has started functioning in Andhra Pradesh located at Regional Agricultural Research Station, Tirupati since November, 2003 for a period of five years and extended up to October 2010. With this background, the present study on 'Impact Analysis of Andhra

Pradesh Water Management Project on livelihood of Farmers in Pilot Area of Musilipedu, Southern zone of Andhra Pradesh' has been taken up.

MATERIAL AND METHODS

The Musilipedu pilot area in Chittoor district, A.P has been selected for taking up water and land productivity enhancement activities. A sample size of 90 farmers from Musilipedu command area and 30 from non-pilot area as a control were identified.

The data pertaining to the 2005 were collected from the bench mark survey report of pilot areas of the Project. The information on socio economic conditions and capacity building on water and land productivity enhancement were collected through pre-tested questionnaire through personnel interviews from sample farmers (Kumar et al., 2002). The data that were not available in the bench mark survey report were collected from the

Table a. Age Composition.

Age Group	Pilot Area (2010)	Control (2010)	Before APWAM Project
< 40	29 (32.2)	9 (30)	16 (17.77)
41-60	48 (53.3)	17 (56.66)	56 (62.2)
>60	13 (14.44)	4 (13.33)	18 (20.0)
Total	90	30	90

Table b. Education Status.

Education level	Pilot area (2010)	Control	Before APWAM Project
Illiterate	08 (8.88)	6 (20.0)	14 (15.55)
Primary	33 (36.6)	15 (50.0)	38 (42.2)
Matriculation	21 (23.3)	5 (16.6)	22 (24.4)
Intermediate	19 (21.1)	3 (10.0)	12 (13.3)
Degree	9 (10)	1 (3.3)	4 (4.4)
Total	90	30	90

Table c. Community wise distribution of land holdings.

Community	Pilot area						Control (2010)		
	Number		Area(ha)		Per capita land (ha)		Number	Area (ha)	Per capita land (ha)
	2005	2010	2005	2010	2005	2010			
OC	34 (37.8)	36 (40.0)	52.7	56.40	1.55	1.4	11 (36.66)	14.30	1.3
BC	44 (48.8)	45 (50.0)	33.73	53.35	0.77	1.18	16 (53.33)	15.68	0.98
SC & ST	12 (13.3)	9 (10.0)	10.32	6.75	0.86	0.75	3 (10.0)	1.86	0.62
Total	90	90	96.75	116.50	1.08	1.29	30	31.84	1.06

sample farmers on memory recall basis to the maximum possible extent

The data for the year 2005 was collected as 'Before implementation of the project' situation and the average of five years from 2006 to 2010 was taken as 'After the implementation of project' situation. The data were collected for the year 2010 from the sample farmers of non-pilot areas so as to analyse the impact of the project by comparing 'Implementation of Project' and 'Without implementation of Project'. Tabular analysis and Garrett scoring technique were used to analyse the data. Further, t-test was used to know the effect

of implement of new technologies viz. Alternate Wetting and Drying (AWD) and Vishnu Puddler on Water use efficiency.

RESULTS AND DISCUSSION

The data collected from the sample farmers were analysed as per the objectives. Data on age compositions revealed that the number of farmers in <40 years age group was increased during 2010 i.e after the APWAM Project in Musilipedu pilot area which might be due to the inheritance of land by legal heirs, who opted Agricultural occupation(Table (a)). But the number of farmers

Table d. Annual expenditure of Farm-families.

Expenditure Range (Rs./year)	Pilot area (2010)	Control	Before APWAM Project (2005)
Below 25,000	5 (5.55)	2 (6.66)	32 (35.55)
25,000-50,000	18 (20.0)	11 (36.66)	38 (42.22)
50,000-75,000	42 (46.66)	15 (50.0)	16 (17.77)
> 75,000	25 (27.77)	2 (6.66)	4 (4.44)
Total	90	30	90

Table e. Asset position.

Assets	Pilot area (90)	Control (30)
Residential accommodation	88	29
Cattle sheds	39	6
Tractors	4	1
Hand sprayers	2	1
Power sprayers	18	4
Pump sets	32	6
Ploughs	12	4
Two wheelers	10	3
Four wheelers	3	1
Household appliances (Rs.10000)	77 (86)	21 (70.0)

Table f. Size-wise distribution of land holdings.

Classes - Size	Pilot area						Control (2010)		
	Number		Area(ha)		Per capita land (ha)		Number	Area (ha)	Per Capita Land (ha)
	2005	2010	2005	2010	2005	2010			
Marginal (<1.00ha)	51 (56.7)	46 (51.1)	37.15	39.10	0.73	0.85	16 (53.33)	11.24	0.70
Small (1.00 -2.00 ha)	32 (35.5)	40 (44.4)	40.0	64.00	1.25	1.60	11 (36.66)	13.88	1.26
Large (>2.01 ha)	7 (7.8)	5 (5.55)	19.60	13.40	2.80	2.68	3 (16.66)	6.72	2.24
Total	90	90	96.75	116.50			30	31.84	

Note: Figures in parentheses indicate percent to respective total

Table g. Land holding particulars of sample farmers in pilot area (2010).

Item	Musilipedu		
	Irrigated	Irrigated dry	Total
Owned (ha)	79.50	28.50	108.00
Leased out (ha)	8.50	—	8.50
Present value of land (lakh.Rs/ha)	13.50	10.00	
Value of land in 2005 (lakh. Rs/ha)	2.50	1.60	

Note: Figures in parentheses indicate percent to respective total

in 41-60 years age group and >60 was decreased. There was an increase in the percent of educated farmers during 2010 over 2005, which might be due to the various governmental programmes aimed at promoting basic education in rural areas (Table (b)). The analysis of community wise distribution of land holdings revealed that the area under cultivation increased with BC & OC category of farmers in the pilot area. The per capita land availability was also increased in the BC category along with the overall increase in per capita land of 1.08 ha in 2005 to 1.29 ha in 2010. However, the per capita land availability was the same for pilot area (2005) and control (Table (c)). As indicated by the increased number of farm families in higher expenditure range (Table (d)), it could be inferred that the farmers financial position has been considerably increased due to intervention of APWAM project over a period of 5 years in pilot area and control as well.

The data on various economic parameters revealed that the number of farmers having owned residential accommodation (Table (e)) in both pilot and control areas were almost same. However the number farmers having own cattle sheds, pump sets and power sprayers and also household appliances are more in pilot area as compared to control. The analysis of size wise distribution of land holdings (Table (f)) among the sample farmers revealed that the percentage of marginal and large category has been decreased, while the number of farmers under small was increased in 2010 over 2005. The irrigated land value has been increased from Rs. 2.50 lakh to Rs.13.50 lakh/ha in 2010 and for irrigated dry agricultural land has been increased from Rs. 1.60 lakh to 10.00 lakh/ha (Table (g)). The significant increase in land value can be attributing to the increased yields after intervention of APWAM as this created infrastructure facility for irrigation and also the pilot area is nearer to holy place Tirupati.

Regarding cropping intensity the APWAM introduced rainfed crops and green manure crops in pilot area. Earlier farmers used to keep the land fallow in kharif. This intervention has increased income of the farmers and due to green manuring soil fertility has increased. Sunflower was also introduced in place of groundnut for late *Rabi* season. Some of the rice area was replaced by the

sugarcane for short period as it was more remunerative compare to rice. The data on cost of cultivation and profitability revealed that the per hectare total cost of cultivation for rice was almost on par with the control but increased enormously from Rs.19667 to Rs.29810 per ha. over a period of 5 years from 2005 to 2010 (Table (h)) and the benefit-cost ratio for rice crop in the pilot area was increased from 1.53 during 2005 to 1.71 during 2010 as against 1.58 in control.

The analysis regarding WUE (Table (i)) revealed that the water use efficiency increased in pilot area during 2005 to 2010 and it was worked out to 4.6 kg/ha.mm to 6.8 kg/ha.mm and the net returns also increased Rs.10591 to Rs.21040 per hectare for rice crop (Pawar et al., 2001). During Kharif 2009, Rice cultivation under AWD consumed 1017 mm water compared to 1508mm water under farmers practice. There by, the yields and WUE were more under AWD. The result indicates that AWD recorded 5.7% more yields compared farmers practice. The paired t-test used for testing of significance on WUE in AWD with Check (t-stat: 16.82). Hence, there is significant difference of WUE in AWD as compared to farmers practice (Table j).

The effect of Vishnu puddler (Developed by APWAM, Tirupati) on water saving in low land Transplanted Rice during Kharif 2009 reveals that, the usage of the Vishnu puddler consistently gave the significant saving of 30% water (Ramana et al., 2010). The paired t-test used for testing of significance on WUE by using Vishnu puddler with the check (t-stat: 23.95). Hence, there is significant difference on WUE by using Vishnu puddler with the check (Table (k)).

For Capacity building of stake holders the APWAM Project has organized various trainings on different aspects and the farmer's perception on different technologies before and after the Project period was analysed. It was observed that the highest number of trainings have been organized on Soil and Water management aspects (14) followed by crop production (8) and plant protection (6).

CONCLUSIONS:

The increase in socio-economic status, crop productivity and WUE can be attributed to the creation of infrastructure facilities in the ayacut area

Table h. Cost of cultivation and income measures of Rice in pilot area.

Sl. No.	Particulars	Rice		
		Before APWAM Project (2005)	After APWAM Project (2010)	Control (2010)
1	Operation Costs (Rs./ha)	8181 (42.0)	15650 (52.0)	16880 (56.0)
2	Sub toatal - Fixed Costs (Rs./ha)	11486 (58.0)	14160 (48.0)	13265 (44.0)
3	Total Cost of cultivation	19667	29810	30145
4	Yield(t/ha)	4.2	5.6	4.95
5	Gross Income (Rs/ha)	30258	50859	47571
6	Net Income (Rs/ha)	10591	21040	17426
7	B:C Ratio	1.53	1.71	1.58
8	Cost of production(Rs./t)	4683	5323	6090

Table i. Water use efficiency of rice in Musilipedu pilot area.

Sl.No	Particulars	2005-06	2006-07	2007-08	2008-09	2009-10
1	Yield(kg/ha)	4580	5780	5800	5550	5600
2	Net returns (Rs./Ha)	10591	18600	25800	26900	21040
3	Water Use efficiency (kg/ha.mm)	4.6	3.9	7.2	7.3	6.8

Table j. Water use efficiency of selected farmers in Musilipedu tank ayact(khrif 2009, rice crop).

Farmer (Sl.no)	AWD			Check		
	Yield (kg/ha)	Depth (mm)	WUE (Kg/ha-mm)	Yield (kg/ha)	Depth (mm)	WUE (Kg/ha-mm)
1	5680	1100	5.16	5400	1560	3.46
2	6150	1140	5.35	5800	1560	3.72
3	5750	1050	5.57	5500	1520	3.62
4	6100	1075	5.72	5850	1520	3.85
5	6375	1150	5.56	6100	1560	3.91
6	6320	1125	5.60	6000	1480	4.54
7	6050	1100	5.050	5700	1520	3.75
8	5600	1150	4.87	5300	1440	3.54
9	5450	1175	4.364	5100	1440	3.54
10	5250	1100	4.77	4900	1480	3.31
Mean:	5883	1017	5.3*	5565	1508	3.74

*Significant at 5% level of significance.

1k: Effect of Vishnu Puddler on water saving in low land Transplanted Rice during Khrif 2009.

Farmer (Sl.no)	Vishnu Puddler			Check		
	Yield (kg/ha)	Depth (mm)	WUE (Kg/ha-mm)	Yield (kg/ha)	Depth (mm)	WUE (Kg/ha-mm)
1	6300	1040	6.06	6100	1520	4.01
2	6700	1080	6.20	6500	1560	4.16
3	6100	1000	6.10	5900	1480	3.99
4	6000	1120	5.36	5700	1520	3.75
5	6100	1080	6.65	5800	1520	3.82
6	6150	1080	5.69	5950	1560	3.81
7	5900	1040	5.67	5600	1600	3.50
8	5200	1080	4.81	4950	1440	3.44
9	5800	1000	5.80	5400	1480	3.65
10	6100	1120	5.45	5850	1520	3.85
MEAN:	6035	1064	5.68*	5775	1520	3.80

*Significant at 5% level of significance.

like repairs to slush, arrangement of lock gates, reducing the water conveyance losses apart from implementing the improved agronomic practices.

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