Review Article

Socio-economic Impact of Batch–V (2013-14) PMKSY – Watersheds Programme in West Godavari District of Andhra Pradesh

Abstract:

The watershed development programmes influence quantity and quality of natural resources and thereby bring changes in the socio-economic conditions of people.The study mainly aimed to assess the impact of the Pradhan MantriKrishiSinchaeeYojana (PMKSY) Watersheds in the pre-post socio-economic impact of watershed based developmental interventions in Ganapavaram, Lakshmi NarayanaDevi Peta (LND Peta) and Alliveru mega watershed projects in West Godavari district of Andhra Pradesh. As part of Entry Point Activities (EPAs) component,129 works under Integrated Water Management Program (IWMP) are executed with an expenditure of Rs.68.65 lakhs which is 4.06 per cent(Ref.IWMP AP MIS R.13.3 2022)of the project cost in three project areas. Besides, as part of Natural Resource Management (NRM) component,413 works under Integrated Water Management Program (IWMP) are executed with an expenditure of Rs.730.57 lakhs, which is 43.15 per cent of the project cost (Ref.IWMP AP MIS R.2.1(A) 2022) in project areas and as part of PSI component, 856 implements under Integrated Water Management Program (IWMP) are executed with an expenditure of Rs.77.67 lakhs, which is 4.59 per cent of the project cost (Ref.IWMP AP MIS R.10.6 (A) 2022) in the project areas.This paper discuss the impact of watershed interventions on socio-economic indicators. The majority percent (70.26%) of sample respondents were scheduled tribes. The average Illiteracy rate of selected respondents was declined from 65.83% to 42.75%....why it declined?.The safe drinking water supplies improved by 26.54% in post project period from 1,33,619l/day to 1,69,081 l/day…..what about the cost of per litre supply ….Ex ante or Ex post facto?.The mean gross income ……is it real income or nominal……..? of households increased by 58.65 per cent from Rs.96,736/- to Rs.1,53,473/- at the end of project period.Number of person days/yr/family in agriculture and non-agriculture related activities during projectimplementation period increased by 24.34% (31 person days) and 19.71% (22 person days) respectively. Wage earnings also increased on an average by Rs.90/- (32.93%) per day for men from Rs.273/- to Rs.363/- and Rs.42/- (25.77%) per day for women from Rs.162/- to Rs.203/- during the project period.Migration of workers from rural to urban areas was declined. The major share of the total income during pre and post periods of the project was from agriculture alone. An increased from pre to post project periods in case of tractors in case of farm implements and machinery and also increased in the standard of living from pre to post periods among the respondents.

Keywords: Employment, Income, Migration, Socio-economic Impact, Literacy, Scheduled Tribe (ST), Watershed.

Introduction:

India is predominantly a rural based agrarian country where agriculture alone provides employment to more than 50% of the total population. Agriculture and allied sectors such as horticulture, livestock, forestry, and fisheries together contribute 17.8% of the country's Gross Value Added for the year 2019-20 (Economic Survey, 2020-21). Therefore it is understood that for the economy of the country to thrive and remain healthy, agriculture must be duly taken care of. For sustainable agricultural production of the country irrigation through a permanent water source or rainfall needs to be available. As per the Indian Statistics 53% of the net sown area in the country is rainfed(GoI,2018). Therefore it implies that all efforts need to be aimed to address

the problems of the rain fed areas. Despite India ranking first in rainfed agriculture globally in terms of area and production, productivity is among the lowest in the world. This is due to issues like reduction of natural resources, rain water runoff, soil erosion, poor quality of soils and water. In order to address these issues an Integrated Watershed Management approaches is found to be appropriate solution worldwide. It is one of the most effective interventions used to stabilize rainfed agriculture by providing sources of water for small scale irrigations. It is one of the flagship programmes of the Government with substantial budget allocation for poverty alleviation of rain fed farmer. The Integrated Watershed Management Programme (IWMP) subsequent to approval of PMKSY (Pradhan MantriKrishiSinchaee Yojana) is subsumed as one of its components and IWMP is now implemented as WDC-PMKSY w.e.f. 01.07.2015. Department of Land Resources (DOLR) under the Ministry of Rural Development (MoRD) has been implementing the PMKSY-Watershed Programme since 2009. In Andhra Pradesh, the Department of Panchayat Raj and Rural Development through the State Level Nodal Agency (SLNA) isimplementing 372 watershed projects covering an extent of 15.83 lakh hectares in five batches from 2009-10 to 2013-14.

The main objective of the PMKSY-Watersheds is to improve water conservation, irrigation facility and land use pattern which would lead to improved biophysical and socio-economic environment through increased agriculture productivity in rainfed areas. The benefits due to watershed development activities include improved crop yields, employment generation and augmentation of income of the project areas inhabitants. In the project areas, there is an increased focus on sustainable use of water and other natural resources.

The main objectives of the present study are to analyze socio-economic impact of watershed based developmental interventions in Ganapavaram, Lakshmi Narayana Devi Peta and Alliveruwatershed projects of West Godavari district, Andhra Pradesh. The socio-economic indicators viz. employment, migration from rural to urban areas, wage structure, drinking water supply and household income were studied for impact assessment of watershed interventions. The gross returns per annum of households based on size of land holding of beneficiary farmers from farming, dairying and wage labour is calculated. The main reason in selecting the watersheds of Batch-V (2013-14) in West Godavari district isthe projects have completed, project period of treatment with various interventions.

I. Implemented activities under IWMP in West Godavari District, A.P

1 Entry Point Activities (EPAs):

Introducing watershed development programme to the community has always been recognized as an important activity for not only improving the natural resources but also for livelihood development. In Pradhan MantriKrishiSinchayeeYojana (PMKSY) Projects, Entry Point Activities (EPA) are carried out to establish togetherness with the community and strengthening and sustaining it throughout the programme and beyond. The details of physical and financial achievements under EPA component are detailed in Table-3. In the project of Ganapavaram, 53works under Integrated Water Management Program (IWMP) are executed with an expenditure of Rs.22.03 lakhs, which is 3.91 percent of the project cost. Besides, 31 works are executed with an expenditure of Rs.23.34 lakhs, which is of 4.31 percent of the project cost in LND Peta project, 45 works are executed with an expenditure of 23.28 lakhs, which is 3.96 percent of the project cost in Alliveru project respectively. In all 129 works under Integrated Water Management Program (IWMP) are executed with an expenditure of Rs.68.65lakhs, which is 4.06 per cent(Ref.IWMP AP MIS R.13.3 2022)of the project cost(Table-1).

Table-1: Entry Point Activities (EPAs) Physical and Financial achievements

Sl. No.	Name of the Project	Name of the Activity	Executed	
			Phy (No.)	Fin (Rs. Lakh)
1	**Ganapavaram**	Cattle/goat/sheep trough	24	4.77
		Extension of pipe line for drinking water	1	0.59
		Glsr	1	1.91
		Installation ~~of trevices~~	2	0.3
		Ohsr	5	10.99
		RO plants	2	3
		School related like furniture,shed,buildingrepair,lab	18	0.47
		Total	**53**	**22.03**
2	**LNDPeta**	Cattle/goat / sheep trough	10	1.59
		Extension of pipe line for drinking water	4	3.3
		Mini water tank	7	9.24
		RO plants	4	8.25
		School related like furniture,shed,buildingrepair,lab	6	0.96
		Total	**31**	**23.34**
3	**Alliveru**	Cattle/goat / sheep trough	19	3.85
		Extension of pipe line for drinking water	3	2.2
		~~Glsr~~	1	2
		~~Ohsr~~	4	8.84
		RO plants	3	6
		School related like furniture,shed,buildingrepair,lab	15	0.39
		Total	**45**	**23.28**
		Grand Total	**129**	**68.65**
		Total Project area:	**14108 ha**	
		Total Project cost	**1692.96 Lakhs**	

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2. Natural Resource Management (NRM):

Natural Resource Management (NRM) is the major thrust area of watershed program for the works such as land development, soil moisture conservation, water harvesting structures and afforestation etc. The details of physical and financial achievements under NRM component are detailed in Table-4.In the project of Ganapavaram 93works under Integrated Water Management Program (IWMP) are executed with an expenditure of Rs.207.89 lakhs, which is 36.85 percent of the project cost. Besides 169 works are executed with an expenditure of Rs.291.00 lakhs, which is of 53.79 percent of the project cost in LNDPeta project151 works are executed with an expenditure of 231.68 lakhs, which is 39.41 percent of the project cost in Alliveru project respectively. In all 413 works under Integrated Water Management Program (IWMP) are executed with an expenditure of 730.57 lakhs which is 43.15 per cent of the project cost (Ref.IWMP AP MIS R.2.1(A) 2022). Effective management of natural resources (soil, water and vegetation)supported byother interventions of watershed project resulted in increased cultivation of agriculture and horticultural crops with enhanced productivity per unit area (Table-2).

Table-2: Natural Resource Management (NRM) Physical and Financial achievements

Sl. No.	Name of the activity	Ganapavaram		LND Peta		Alliveru	
		Expenditure		Expenditure		Expenditure	
		Phy (No.)	Fin (Rs.lakh)	Phy (No.)	Fin (Rs.lakh)	Phy (No.)	Fin (Rs.lakh)
1	**Land development works**						
	Threshing floor in community lands	0	0.00	4	5.13	0	0.00
	Total	**0**	**0.00**	**4**	**5.13**	**0**	**0.00**
2	**Soil moisture conservation works**						
	Staggered trenches(hillock areas)	0	0.00	1	0.38	0	0.00
	Water absorption trench at foot hills	0	0.00	7	6.06	0	0.00
	Loose boulder structure	7	1.34	68	25.13	45	19.00
	Gabion smc	9	4.51	1	0.61	8	1.36
	Sand bag structures	0	0.00	1	0.18	0	0.00
	Total	**16**	**5.85**	**78**	**32.36**	**53**	**20.36**
3	**Water harvesting structures**						
	Farm pond	1	0.36	0	0.00	6	2.26
	Mini percolation tank	5	4.74	1	0.70	2	1.70
	Dugout pond	1	0.61	0	0.00	0	0.00
	Percolation tank	34	93.15	37	110.31	44	95.39
	Check dam	32	92.24	34	124.66	43	111.77
	Gabion whs	0	0.00	8	7.21	3	0.14
	Total	**73**	**191.10**	**80**	**242.88**	**98**	**211.26**
4	**Repairs to existing WHS**						
	Repairs to existing percolation tank	4	10.94	3	9.74	0	0.00
	Total	4	10.94	3	9.74	0	0.00
5	**Afforestation works**						
	Raising of Udyanavanam	0	0.00	0	0.00	0	0.06
	Total	**0**	**0.00**	**0**	**0.00**	**0**	**0.06**
6	**Livestock related works**						
	Cattle troughs	0	0.00	4	0.89	0	0.00
	Total	**0**	**0.00**	**4**	**0.89**	**0**	**0.00**
	Grand total	**93**	**207.89**	**169**	**291.00**	**151**	**231.68**
	Total Project area:	**14108 ha**					
	Total Project cost	**1692.96 Lakhs**					

3. Production System Intervention (PSI):

Production System Intervention (PSI) activities to establish custom hire centers, provide implements and high cost farm machinery to individual farmers, and supply micro-irrigation system and water carrying pipes. The details of physical and financial achievements under PSI component are detailed in Table-4. In the project of Ganapavaram, 372 implements under Integrated Water Management Program (IWMP) are executed with an expenditure of Rs.27.33 lakhs, which is 4.84 percent of the project cost. Besides 242 implements are executed with an expenditure of Rs.27.38 lakhs which is of 5.06 percent of the project cost in LNDPeta project

242implementsare executed with an expenditure of Rs.22.96 lakhs, which is 3.91 percent of the project cost in Alliveru project respectively. In all 856 implements under Integrated Water Management Program (IWMP) are executed with an expenditure of Rs.77.67 lakhs which is 4.59 per cent of the project cost (Ref.IWMP AP MIS R.10.6(A) 2022).Effective management of natural resources (soil, water and vegetation) supported by other interventions of watershed project resulted in increased cultivation of agriculture and horticultural crops with enhanced productivity per unit area (Table-3)

Table-3: Production System Improvement (PSI) Physical and Financial achievements

Sl. No.	Name of Activity	Ganapavaram		LNDPeta		Alliveru	
		Physical (Beneficiaries)	Financial (Rs. in Lakhs)	Physical (Beneficiaries)	Financial(Rs. in Lakhs)	Physical (Beneficiaries)	Financial (Rs. in Lakhs)
1	**Diesel Engines**	82	16.41	99	18.09	71	14.85
2	**Sprayers**	92	3.64	38	1.45	69	2.73
3	**Tarpaulins**	165	2.35	60	0.99	72	1.29
4	**Water Carrying Pipes**	25	3.28	31	4.06	28	3.68
5	**Cultivators**	8	1.65	14	2.79	2	0.41
	Total	**372**	**27.33**	**242**	**27.38**	**242**	**22.96**

Study area:

The Ganapavaram, Lakshmi NarayanaDevi Peta and Alliveru mega watershed projects of PMKSY sanctioned for 2013-14 was implemented by Government of Andhra Pradesh in Buttaigudem and Polavarammandals of West Godavari district with sanctioned area of 14108 hectares encompassing 14 Micro Watersheds with a fund allocation of Rs.1,69,296/-lakhs.The projectsare completed after seven (7) years of implementation in three(preparatory, work and consolidation) phases. The total geographical area of three megawatersheds are 26,639 hectares. TheGanapavaram mega watershed project is located between latitude 81°15'31" and longitude 17°17'30" at ridge point and between latitude 81°15'59" and longitude 17°16'07" at valley point,Lakshmi Narayana Devi Peta mega watershed project is located between latitude 81°31'41" and longitude 17°19'27" at ridge point and between latitude 81°31'34" and longitude 17°19'23" at valley point andAlliveru mega watershed project is located between latitude 81°20'15" and longitude 17°17'47" at ridge point and between latitude 81°19'53" and longitude 17°17'47" at valley point.

II Material and methods

Sample selection:

Sample Households were randomly selected from watershed community including OC, BC, SC, ST, and minorities, women headed households, landless households, marginal, small and big farmers representing all hamlets/villages in each micro watershed.

Sample size:

The household survey covered 100% of mega project areas with five per cent of total Households in each micro watershed. Out of 10,948 HHs in three projects, a total of 548 HHs (5%) are selected (Table-4).

Table-4: Sample design:

Sl. No.	Name of Project	Number of the MWS covered	No. of householdsevaluated duringpre-project period	5% of households randomly assessed during post project period
1	**Ganapavaram**	3	**3232**	**162**
2	**LND Peta**	6	**5059**	**253**
3	**Alliveru**	**5**	**2657**	**133**
	Total	**14**	**10948**	**548**

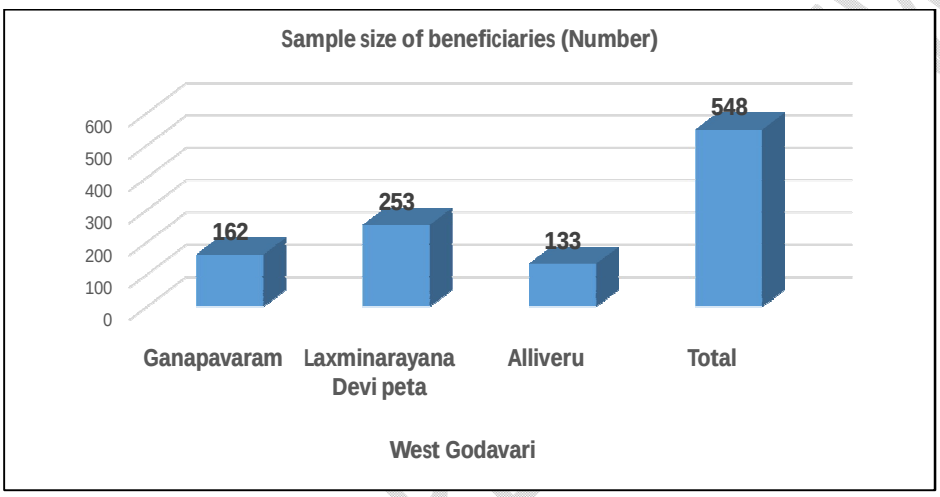

Figure 1: Sample size distribution of beneficiaries in West of Godavari

Data collection:

The survey based approach was adopted in the present study conducting during 2021 for data collection, comprising open-ended questionnaires. Two independent sets of questionnaires were used to collect data, which were developed by Monitoring, Evaluation Learning and Documentation (MEL&D) Agency as per the indications/parameters suggested by the State Level Nodal Agency (SLNA). Two questionnaires were prepared to find out changes occurred due to the interventions implemented in the PMKSY watershed. Two participatory methods used in the data collection were survey and focused group discussions.

Focused group discussion (FGDs) were conducted in all the 14 micro watersheds of three (3) watershed projects with the support provided by the staff of respective micro watersheds. The participants in the discussion were Sarpanches, Members of Gram Panchayat, Watershed Committee, User Groups, Village Organizations and Watershed Assistants. Wherever necessary, the support of RBKs (RytuBharosaKendras) was taken to improve the accuracy of the data. The opinion of the participants was collected on three main indicators/parameters viz. cropping pattern, yield and landholdings of selected House Hold before and after IWMP interventions through interaction in group discussions and transact walk in watershed areas as well as in the villages. Primary data was collected from five (5) percent sample households from the families in Detailed Project Report (DPR) for both pre and post project periods. Primary information was recorded from

respective Sarpanches, Members of Gram Panchayat, Watershed Committee, User Groups and Watershed Assistants. Secondary information was collected from the unpublished records of WCCs. The data thus collected was analyzed. The pre and post project changes have been attributed to the impact of the interventions implemented during the project period. West Godavari District has been assigned the following three projects under Batch-V (2013-14) PMKSY-Watersheds.

Analytical Techniques and Methods:

The present study used average and percentage techniques to study the impact of watershed development programmes on socio-economic indicators viz. employment, migration from rural to urban areas, wage structure, drinking water supply and household income were studied for impact assessment of watershed interventions. The gross returns per annum of households based on size of land holding of beneficiary farmers from farming, dairying and wage labour is calculated.

Results and Discussion:

The present study is focused mainly on socio-economic impacts of different interventions of watershed projects. The impact of PMKSY-Watersheds Implementation was assessed and the results are presented below under different categories for discussion to arrive at valid conclusions.

III. Socio-economic Impact:

The socio-economic status of the sample households in regard to the social composition of their families, education, drinking water, household income, employment, wage structure,farm implements and assets across watersheds.

1. Caste wise particulars:

The caste wise details of all the three PMKSY-watersheds are presented in Table-5. An examination of the table revealed that Scheduled Tribes (ST) are predominant in the selected watersheds as this region is also called as tribal zone. Hence (70.26%) percent were Scheduled Tribes followed by Scheduled Caste households (11.86%), back-ward classes (11.50%) and a meagre percentage of (6.39%) belonged to other castes. Among the watersheds Alliveru watershed has the highest population of scheduled tribes while the backward caste households were more in Lakshmi Narayana Devi Peta compared to others(Table-5)

Table-5: Caste wise details for selected Households (Number)

Sl.No.	Name of the Project	Caste				
		OC	BC	SC	ST	Total
1	**Ganapavaram**	8	10	22	122	162
	%	4.94	6.17	13.58	75.31	100
2	**LND Peta**	16	44	32	161	253
	%	6.32	17.39	12.65	63.64	100
3	**Alliveru**	11	9	11	102	133
	%	8.27	6.77	8.27	76.69	100
	Total	**35**	**63**	**65**	**385**	**548**
	%	**6.39**	**11.5**	**11.86**	**70.26**	**100**

2 Change in Literacy Status:

Literacy status is the important consideration for evaluating the impact of watershed development programme. The information regarding the educational status of the farmers was obtained. The average illiteracy rate of selected respondents was 65.83% during the project initial period. However the same was reduced to an extent of 42.75%. At the same time it was found an increase in the primary, secondary and higher education among the beneficiaries.

The members said that the increased income and awareness has motivated them to educate their child. Previously they do not have employment due to which all the members of the family have to earn. Now as the employment is provided in the village itself with the help of agricultural and allied sectors, they can have more income. Thus the need to send the children for work is not very urgent. The beneficiaries send their children to the school.Hence it can be concluded that the literacy have positive impact on the adoption of watershed development programme. The data is presented in (Table-6)

Table-6: Educational Status – (Number)

Sl.No.	Name of the Project	Pre project					Post project				
		Illiteracy	Primary	Secondary	And Above	Total	Illiteracy	Primary	Secondary	And Above	Total
1	**Ganapavaram**	331	142	46	6	525	214	269	65	16	564
	%	63.05	27.05	8.76	1.14	100	37.94	47.7	11.52	2.84	100
2	**LNDPeta**	553	222	67	8	850	428	351	88	22	889
	%	65.06	26.12	7.88	0.94	100	48.14	39.48	9.9	2.47	100
3	**Alliveru**	368	128	26	5	527	216	257	66	15	554
	%	69.83	24.29	4.93	0.95	100	38.99	46.39	11.91	2.71	100
	Total	**1252**	**492**	**139**	**19**	**1902**	**858**	**877**	**219**	**53**	**2007**
	%	**65.83**	**25.87**	**7.31**	**1**	**100**	**42.75**	**43.7**	**10.91**	**2.64**	**100**

3. Drinking Water:

Availability of safe and clean drinking water is necessary for the healthy life. The attempt was made to study the availability of clean drinking water to the beneficiaries. The drinking water supplies improved by 25.38% in post project period from 41,838 l/day to 52,456 l/day in Ganapavaram project. Besides 26.02% in post project period from 57,425 l/day to 72,369 l/day in LND Peta project, 28.82% in post project period from 34,356 to 44,256 l/day in Alliveru project respectively. In all, the drinking water supplies improved by 26.54% in post project period from 1,33,619 l/day to 1,69,081 l/day due to watershed interventions such as creation of new water sources, installation of R.O. plants, laying of water supply pipes and mini water tanks which is adequate to meet the requirement of the population (Table-7)

Table-7: Availability of drinking water (l/day)

Sl.No.	Name of Project	Pre-Project	Post Project	Increased	(%)
		l/day	l/day	l/day	
1	**Ganapavaram**	41838	52456	10618	25.38
2	**LNDPeta**	57425	72369	14944	26.02
3	**Alliveru**	34356	44256	9900	28.82

	Total	**133619**	**169081**	**35462**	**26.54**

4. Gross Income of Households:

The mean gross income of households increased by 58.65 per cent from Rs.96,736/- to Rs.1,53,473/- at the end of project period. The gross income based on size of land holding of beneficiary farmers are presented in Table-7. In all the annual household's income of marginal farmers after the project period is Rs.95,511/- which is 66.42 per cent higher of the pre-project period. The annual gross income of small farmers increased by 59.90 per cent over the pre-project period raising to Rs.1,55,382/- and the gross income of large landholders increased by 55.72 per cent over the preproject period reaching Rs.2,55,591/- Theannual gross income of landless households from subsidiary activities like rearing of milch animals and wage income from agriculture and non-agricultural activities increased to Rs.1,07,406/- in the post-project period showing an increase of 57.38 per cent.

In Conclusion the impacts of watershed management interventions were observed in increase of cultivation area, expansion of water bodies, and better soil moisture in the profile.The water resources improved through soil and water conservation measures, groundwater recharge and harvesting of rain water. Higher crop and milk yields, increase in employment and wage rates helped in reduction of migration and higher income to households in the watershed project. These positive outcomes on successful implementation of the watershed program were translated into sustainable livelihoods (Table-8).

Table-8: Gross income of households (Per anum)

Sl.No.	Name of the Project	Pre-Project				
		Marginal	**Small**	**Big**	**Landless**	**Average**
1	**Ganapavaram**	57924	97256	160125	68456	95940
2	**LNDPeta**	58123	98145	165125	67158	97138
3	**Alliveru**	56125	96125	167147	69125	97131
	Average	57391	97175	164132	68246	96736
		Post-Project				
1	**Ganapavaram**	95123	154258	252125	107975	152370
2	**LNDPeta**	96145	156255	257895	106258	154138
3	**Alliveru**	95265	155632	256754	107985	153909
	Average	95511	155382	255591	107406	153473
		Increased (%)				
1	**Ganapavaram**	64.22	58.61	57.46	57.73	58.82
2	**LNDPeta**	65.42	59.21	56.18	58.22	58.68
3	**Alliveru**	69.74	61.91	53.61	56.22	58.46
	Average	66.42	59.9	55.72	57.38	58.65

5. Impact of Employment:

Number of person days/yr/family in agriculture and non-agriculture related activities during project implementation period increased by 24.34% (31 person days) and 19.71% (22 person days) respectively. The impact of watershed interventions was observed in enhancement of employment opportunities in agriculture and non-agriculture employment due to increased agricultural activities, NRM works, PSIsupport activities and other line departments/schemes. In IWMP24,855 man days were generated for 1585 wage seekers

including 1114 from schedule tribe,133 from schedule caste and 232 from others during the project period(Ref.IWMP AP MIS R.15.1 2022). (Table-9)

Table-9: Employment in farm and non-farm activities in the study area (Man-days per year per household)

Sl.No.	Name of the Project	Pre-Project		Post-Project		Increased man-days		Increased (%)	
		Ag	Non-Ag	Ag	Non-Ag	Ag	Non-Ag	Ag	Non-Ag
1	**Ganapavaram**	126	112	156	134	30	22	24	20
2	**LND Peta**	127	113	158	134	31	21	24	19
3	**Alliveru**	125	110	156	133	31	23	25	21
	Average	126	112	157	134	31	22	24.34	19.71

6. Wage structure:

Wage earnings increased on an average by Rs.90/- (32.93%) per day for men from Rs.273/- to Rs.363/- and Rs.42/- (25.77%) per day for women from Rs.162/- to Rs.203/- during the project period. In lean months, the persons were engaged in NRM and MGNREGS works, where they received more wages compared to agricultural operations (Table-10)

Table-10: Gender wise wage structure in the study area (Rs. /Per day)

Sl.No.	Name of the Project	Pre-Project		Post-Project		Increased		Increased (%)	
		Male	**Female**	**Male**	**Female**	**Male**	**Female**	**Male**	**Female**
1	**Ganapavaram**	275	160	360	200	85	40	30.91	25.00
2	**LND Peta**	275	165	370	210	95	45	34.55	27.27
3	**Alliveru**	270	160	360	200	90	40	33.33	25.00
	Average	**273**	**162**	**363**	**203**	**90**	**42**	**32.93**	**25.77**

7. Impact on out-migration:

The status of migration is one of the indicators of assessment of a rural development project. The increase in migration indicates the failure of the project in the project area and decrease shows the otherwise. Moreover, the migration status implies the level of drudgery amongst the respondents due to project activities intervention. In the study area there is a reduction in migration from rural to urban areas to an extent of ranging from 24.49% in Alliveru with a low of 33.33% LNDPeta during the project period. Earlier, the villagers used to go either to Hyderabad or Visakhapatnam in search of work and at present due to creation of on-farm and off-farm employment in the project area people have slowly stopped migrating to other places (Table-11).

Table-11: Reduction in migration from Rural to Urban area

Sl.No.	Name of the Project	Pre-Project	Post-Project	Reduction in Migration	%
1	**Ganapavaram**	35	24	11	31.43
2	**LNDPeta**	48	32	16	33.33
3	**Alliveru**	98	74	24	24.49

	Total	**181**	**130**	**51**	28.18

8. Income from Different source:

Generally, agriculture plays a major role in contributing to the income of a farmer. Similarly, in the study area also the major share of the total income during pre and post periods of the project was from agriculture alone to the extent of 64.35% and 58.08% respectively followed by wages from agricultural crops, MGNREGS, watershed programs, horticulture etc. Another important feature noticed in the study area was the increase in the incomes from dairying and goat/sheep during the post project compared to the pre-project period. This increase is due to the supply of milch animals and goat/sheep in the study area. The project also generated on-farm and off-farm employment in the form of petty business, construction works etc. Thus, the project played a major role in generating additional incomes to the households by not solely depending on agriculture but following the farming systems approach (Table-12)

Table-12: Income from Different source

Sl. No.	Name of Project	Pre-Project						
		Agriculture	**Wage Agriculture/ EGS/Watershed**	**Dairy**	**Livestock**	**Petty Business**	**Others**	**Total**
1	**Ganapavaram**	64.25	22.53	5.45	1.78	2.54	3.45	100
2	**LNDPeta**	65.25	22.42	5.26	1.17	2.45	3.45	100
3	**Alliveru**	63.54	23.21	5.12	1.21	2.36	4.56	100
	Average	**64.35**	**22.72**	**5.28**	**1.39**	**2.45**	**3.82**	**100**
		Post-Project						
1	**Ganapavaram**	58.56	24.12	10.23	2.56	3.26	1.27	100
2	**LND Peta**	58.23	24.56	10.03	2.14	3	2.04	100
3	**Alliveru**	57.45	23.95	10.1	2.45	3.89	2.16	100
	Average	**58.08**	**24.21**	**10.12**	**2.38**	**3.38**	**1.82**	**100**

8. Farm implements and machinery:

An increase from pre to post project periods in case of tractors, cultivators and marginal increase with regard to oil engines was observed among the respondents during the survey periods because of the shortage in labour availability, high labour wages and adoption of mechanized technology. Moreover, there is a reduction in traditional implements like ploughs, sickles, crowbars etc. at the end of the project in both the watershed areas among the farming community. This is due to the impact of the implementation of the PMKSY-Watershed programme in the selected watersheds due to non-availability of labour and availability of farm implements and machinery for low cost comparing with labour cost (Table-13).

Table-13: Farm implements and machinery

Sl. No.	Name of Project	Pre-Project					
		Tractors	**Sprayers**	**Cultivators**	**Ploughs**	**Oil Engines**	**Others**
1	**Ganapavaram**	4	32	10	118	14	96
2	**LNDPeta**	8	65	16	156	31	105
3	**Alliveru**	5	38	25	115	13	89
	Total	**17**	**135**	**51**	**389**	**58**	**290**
		Post-Project					
1	**Ganapavaram**	12	79	18	61	46	26
2	**LNDPeta**	28	24	29	106	125	61
3	**Alliveru**	13	74	15	148	39	90
	Total	**53**	**177**	**62**	**315**	**210**	**177**

9. Household Assets:

This includes owning of motorcycles, cycles, T.V., Fridge, washing machine and mobiles which are useful in day to day works. Among these some which are considered as luxuries are now become necessities in maintenance of a family. The possession of mobiles increased substantially at the end of the project almost every selected household is having minimum one or more irrespective of land holdings. Similarly, more than 68% of the respondents possess Televisions. There is a reduction in owning cycles and at the same time an increase in motorcycles was observed. This shows an increase in the standard of living from pre to post periods among the respondents. This change could be due to increase in incomes derived from the infrastructure created by the watershed staff in the selected region in the form of agricultural income, dairying, labour wages etc. (Table-14).

Table-14: Household Assets

Sl. No.	Name of Project	Pre-Project					
		Motor Cycle	Cycle	T.V.	Fridge	Washing Machine	Mobile
1	**Ganapavaram**	24	31	25	6	0	31
2	**LNDPeta**	65	102	46	12	0	61
3	**Alliveru**	21	34	22	6	0	28
	Total	**110**	**167**	**93**	**24**	**0**	**120**
		Post-Project					
1	**Ganapavaram**	36	22	72	27	5	168
2	**LNDPeta**	61	86	121	46	12	241
3	**Alliveru**	35	23	69	23	4	156
	Total	**132**	**131**	**262**	**96**	**21**	**565**

Conclusion:

Several socio-economic indicators including changes in Literacy, drinking water, household assets and income, employment generation, out-migration, etc. were considered in the present study for assessing the impact of watershed development programmes to the beneficiary households. The Batch–V PMKSY watershed programmes have shown positive impact on socio-economic indicators in West Godavari district of Andhra Pradesh due to sustainable developmental activities taken up during the project period. The study concludes that after the watershed programme, the beneficiaries are able to take more than single crop on the same piece of land due to the availability of the water. Hence for the farmers there is work on the field throughout the year. Along with agriculture they have started the allied economic activities which have positively resulted in the increased income.The study states that watershed development programme not only helps in the improvement of soil and water conservation but also helps in the development of the beneficiaries socially and economically.The overall findings of the study suggests that watershed development programme has significantly leads to the positive change in their income, other basic infrastructural facilities like availability of drinking water, availability of electricity etc.

Due to the PMKSY watershedprogrammes, the economic as well as their social status has also changed. The decision making power, participation in public activities and awareness about the current schemes and policies of government has also improved. The impact of the watershed development programme can also be seen through that the confidence of the beneficiaries has increased so that they can take risk and start any kind of business. The literacy status of the beneficiaries is also changed positively. The overall conclusion of the watershed development programme can be stated as it has touched almost every part of the beneficiaries life and has leads to the desirable change in the socio-economic parameter of their life.

COMPETING INTERESTS DISCLAIMER:

Authors have declared that they have no known competing financial interests OR non-financial interests OR personal relationships that could have appeared to influence the work reported in this paper.

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