Original Research Article

Impact of Mission Kakatiya on area under tank irrigation in Southern Telangana Zone

ABSTRACT:

Aim: The study was done with an aim to find out whether there is any shift in major crops in Southern Telangana Zone with respect to area, production and yield due to the restoration of tanks with the Mission Kakatiya program and to study the growth in tank irrigated area.

Data description: Time series data of 15 years from 2005-10 to 2015-20 which consists of area, production and yield of major crops (Paddy, Maize, Cotton and Groundnut) and area under tank irrigation in Southern Telangana Zone were utilized for the study and was collected from Statistical Year Books published by Directorate of Economics and Statistics.

Methodology: Analysis was done with the help of analysis platforms like SPSS and Excel using statistical tools which include linear and compound growth rates.

Result: Results revealed that there was a considerable and significant growth observed in area under tank irrigation (29.69%) in Southern Telangana Zone after Mission Kakatiya. With the increase in tank irrigated area, this zone showed a shift towards irrigated and commercial crops like Paddy, Cotton and Maize from the rainfed crops.

Conclusion: During the period before Mission Kakatiya there was a negative growth observed in tank irrigated area whereas both the growth rates have turned to positive in the period after implementation of Mission Kakatiya. This study concluded that there is a positive impact on crop characteristics in this zone due to Mission Kakatiya program. As a whole Mission

Kakatiya is one of the outstanding projects whose achievements are incomparable and is a blessing for the farmers of Telangana State.

Keywords: Major crops, Mission Kakatiya, Growth rates, Tank irrigated area, Shifts in major crops

1. INTRODUCTION:

The new technologies have braced the productive agriculture since the Green Revolution. One of the main factors that limits further expansion of food production for the increasing population will be water [1], The Maintenance of higher relative water content helps in sustaining the photosynthetic capacity of plants which ultimately contributes to higher yield [2]. Irregular monsoons have made agriculture to depend on other sources of irrigation like canals and groundwater. Groundwater is a critical source of irrigation but is becoming rapidly depleted in many regions across the globe. This is particularly true in India, where groundwater provides over 60% of irrigation [3]. Tanks are highly important from an ecological perspective as they help conserve soil, water, and biodiversity and also contribute to groundwater recharge, flood control and silt capture [4]. Tanks have been one of the important traditional sources of irrigation in the southern states of India [5].

Tanks have fewer negative environmental impacts and provide a variety of livelihood options to the rural economy [6] and also serves both as flood moderators in times of heavy rainfall and as drought mitigators in times of long dry spell [7] but their performance has been deteriorating over the years [8]. The fall in efficiency of the tank system could be one or more of the following reasons: Decrease in inflows to the tank, Deterioration of physical system and Poor canal system. There are many factors that influence the existence of tanks for irrigation in

the farming community [9]. Those are mainly, erratic behavior of rainfall and encroachment of tanks for different purposes by the local community. The decline in tanks is evident both in terms of the relative importance of tanks vis-à-vis, other sources of irrigation, as well as the decrease in the actual area irrigated by tanks [10].

The tank system has four different functions in irrigated agriculture viz., soil and water conservation, flood control, drought mitigation and protection of environment of surrounding area [11]. After the bifurcation of the state, the government of Telangana started the concept of Mission Kakatiya in the year 2014. This Programme was inaugurated on 12 March 2015 by chief minister Kalvakuntla Chandrashekar Rao. The main objective of Mission Kakatiya is to revive and boost minor irrigation in the region by increasing the water storage capacity of tanks through de-siltation and repair of sluices, weirs and irrigation canals [12].

Out of 3 Agro-climatic Zones of Telangana, tanks are more in number in Southern Telangana Zone hence it was selected for the study.

In the present study, an attempt was made to know the reliability of the project Mission Kakatiya in the Southern Telangana Zone. And to know, weather the farmers really benefited in terms of increase in cropping area, production and yield of various crops also about the shifts in crops. Hence, a systematic evaluation of impact would be useful in providing valuable insights. With this view the present paper deals with

1. Study the changes in crop characteristics of major crops in the Southern Telangana Zone due to the Mission Kakatiya.

2. Study the growth in the area under tank irrigation during the period before and after Mission Kakatiya.

2.MATERIALS AND METHODS:

In the present work, as a primary study temporal changes in the major crops grown in the Southern Telangana Zone such as, Paddy, Maize, Cotton and Groundnut percentage change over the base year was used conveniently for time series data pertaining to area, production and yield of major crops. And to achieve the specified objective of growth in the area under tank irrigation, linear growth rates (LGR) and compound growth rates (CGR) were calculated.

2.1. Growth rate Analysis:

2.1.1 Linear Function:

The function $y = a + bx$ fitted using the Ordinary Least Square method is called linear function,

Where, y = trend value of the dependent variable

t = independent variable i.e., time in years

a and b are the constants or parameters

And the linear growth rate is estimated by using the formula:

$$\text{Linear Growth Rate (LGR)} = \frac{b}{\bar{y}} \times 100$$

2.1.2 Compound Function:

Generally, the exponential curve given below is used to estimate the compound growth rate

$$\mathbf{y = a\ } b^t$$

In logarithmic form**: log y = log a + t log b**

where, y = trend value of the dependent variable (area, production and yield of major crops)

t = independent variable (time in years)

a and b are parameters

These parameters are estimated by the method of Ordinary Least Squares (OLS).

The Compound Growth Rate can be calculated as below:

$$\text{Compound Growth Rate (\%)} = (b-1) \times 100$$

The significance of these growth rates can be tested using student t-test i.e.,

t = r/SE(r) with (N-2) d. f

where, r is the growth rate,

N is the total no of years taken under study,

SE(r) is the standard error of growth rate.

2.2 Study Area:

The present study is carried out on the Southern Telangana Zone, that includes three districts as Ranga Reddy, Mahbubnagar and Nalgonda. Analysis was carried out by taking the data related to crop characteristics such as area, production and yield of major crops grown in the zone over 30 years. The annual data on area (Lakh ha), production (Lakh Tonnes) and yield (Tonnes/ha) of major crops were taken as a sum of the values recorded in both the seasons

such as kharif and rabi. Major crops were selected based on their relative importance in the zone. Paddy, Maize, Cotton and Groundnut are the main crops in the zone.

2.5 Data Collection:

The present study is based on the secondary data related to crop characteristics for the past 15 years i.e., from 1990-91 to 2019-20. The data was collected from different sources like agriculture at a glance of Telangana and Andhra Pradesh State, Statistical year books and DES (Directorate of Economics and Statistics), Telangana and Andhra Pradesh states; Statistical abstracts. The data on the area under tanks were collected from the Directorate of Economics and Statistics, Andhra Pradesh and Telangana. Analysis was carried out with the help of SPSS software and MS-Excel.

3. RESULTS AND DISCUSSION:

The findings obtained from the present study are presented below:

3.1 Changes in area, production and yield of major crops:

The crop production is determined by agro- climatic factors such as soil type, temperature and rainfall pattern [13]. Besides the agro- climatic factors, one of the most crucial inputs for any crop to grow is irrigation facility. With the various agricultural development programmes had resulted into changes in area under major crops in Southern Telangana zone during last three quinquennials. One of those is Mission Kakatiya program introduced by the Telangana government for increasing the irrigation facilities by rejuvenating the tanks. The magnitudes of the changes in the crop characteristics such as area, production and yield of major crops (rice,

maize, cotton, groundnut) before and after Mission Kakatiya are presented in Tables 1, 2, 3 and 4.

3.1.1 Ranga Reddy District:

The area of groundnut crop decreased from 0.002 lakh hectares (2005-10) to 0.0004 lakh hectares (2015-20) within period of 15 years. On the contrary area under rice had increased after Mission Kakatiya (2015-20) over the base year (2005-10) i.e., 0.20 to 0.25 lakh hectares. The area under maize and cotton crops also increased from 0.26 to 0.75 lakh hectares and 0.19 to 1.12 lakh hectares respectively during the same period.

The production of groundnut crop was declined from 0.0018 lakh T during 2005-10 to 0.0011 lakh T during the period after Mission Kakatiya. The production of rice, maize and cotton crops were 0.55, 0.80 and 0.36 lakh T during 2005-10 increased to 0.74, 2.23 and 2.38 lakh T during the period after Mission Kakatiya (2015-20) in this district.

The critical examination of Ranga Reddy district revealed that rice, maize and cotton crops had shown a considerable increase in area, production and yield after implementation of Mission Kakatiya.

Table1: Changes in area, production and yield of major crops in Ranga Reddy district

S.no	**Particulars**	**2005-2010**	**2010-2015**	**2015-2020**
1.rice	**Area**	20363	28038 (37.69)	25450.4 (24.98)
	Production	55005.6	67521.6 (22.75)	74491.6 (35.42)

	Yield	2.70	2.41 (-10.66)	2.88 (6.87)
2. Maize	**Area**	26740.2	39256.8 (46.80)	75200.8 (181.23)
	Production	80938	112960 (39.56)	223664.4 (176.34)
	Yield	3.02	2.76 (-8.35)	3.03 (0.49)
3. Cotton	**Area**	19233.8	36200.4 (88.21)	112686.2 (485.87)
	Production	36200.4	98316 (171.59)	238549.4 (558.97)
	Yield	1.93	1.83 (-5.07)	1.97 (2.07)
4. Groundnut	**Area**	201.32	107.42 (-46.64)	49.2 (-75.56)
	Production	183.08	90.14 (-50.77)	112.8 (-38.39)
	Yield	0.96	0.85 (-11.82)	1.92 (99.95)

3.1.2 Mahbubnagar District:

The information regarding the changes in area, production and yield of major crops this district is presented in Table 2.

The area under rice, maize and cotton crops increased from 0.88 to 0.90 lakh hectares, 1.20 to 1.32 lakh hectares and 0.74 to 2.31 lakh hectares respectively, during the period under study i.e., 2005-10 to 2015-20. However, the area under groundnut was decreased by 66.90 per cent over the base year 2005-10.

The production of cotton observed to be increased after 2005-10 till 2015-20 (from 1.05 to 4.17 lakh T), rice (2.32 to 2.43 lakh T). The empirical evidence in respect of area, production and yield of rice and cotton had witnessed the improvement in area, production and yield during the period after Mission Kakatiya (2015-20) as compared to the period before Mission Kakatiya (2005-10).

Table2: Changes in area, production and yield of major crops in Mahbubnagar district

S.no	**Particulars**	**2005-2010**	**2010-2015**	**2015-2020**
1.rice	**Area**	88383.6	112656.6 (27.46)	90863.6 (2.81)
	Production	232478.8	293551.4 (26.27)	243308.8 (4.66)
	Yield	2.61	2.61 (0.10)	2.61 (0.19)
2. Maize	**Area**	120586.4	139125.6 (15.37)	132803.4 (10.13)
	Production	260998	387047.2 (48.30)	212093.4(-18.74)
	Yield	2.23	2.81 (26.14)	1.79 (-19.50)
3. Cotton	**Area**	74496	207366.4 (178.36)	231676.2 (210.99)
	Production	105167.2	395084.4 (275.67)	417765.6 (297.24)
	Yield	1.44	1.88 (30.78)	1.78 (24.33)
4.groundnut	**Area**	31890.6	11577.2 (-63.70)	10555.2 (-66.90)

	Production	26482.4	13576.4 (-48.73)	19917.4 (-24.79)
	Yield	0.84	1.27 (52.06)	1.94 (132.46)

3.1.3 Nalgonda District:

In Nalgonda District, the changes in the area, production and yield of major crops at different points of time are presented in Table 3.

The area under cotton crop increased from 1.14 lakh hectares during 2005-10 to 3.45 lakh hectares during the period after Mission Kakatiya i.e., 2015-2020 in the Nalgonda district, rice (2.01 lakh hectares), maize (0.02 lakh hectares), groundnut (0.02 lakh hectares) and sugarcane (1.31 lakh hectares) were other major crops cultivated in this district. In fact, the area of maize and groundnut showed declining trend (-6.92 to -14.25 % & -57.23 to -77.58 %) over the period under consideration.

The production of cotton was only 1.14 lakh T during 2005-10 which had increased to 3.45 lakh T during 2015-20. During study period, cotton and rice were major crops in this district. The acreage under rice was 1.55 lakh hectares during 2005-10 and had increased to 2.01 lakh hectares during the period after Mission Kakatiya in Nalgonda district. Production of rice crop increased from 4.61 lakh T to 6.67 lakh MT during the study period.

Table3: Changes in area, production and yield of major crops in Nalgonda district

S.no	Particulars	2005-2010	2010-2015	2015-2020
1.rice	**Area**	155148.6	181867.8 (17.22)	201924 (30.15)
	Production	461726.4	550714.2 (19.27)	667930.6 (44.66)
	Yield	2.99	3.05 (1.97)	3.27 (9.26)
2. Maize	**Area**	2978.8	2772.6 (-6.92)	2554.2 (-14.25)
	Production	6941	3806.2 (-45.16)	4796.2 (-30.90)
	Yield	2.11	1.5 (-28.75)	1.98 (-5.95)
3. Cotton	**Area**	114104.2	262447.8 (130.01)	345880.8 (203.13)
	Production	210197.6	479031 (127.90)	749266 (256.46)
	Yield	1.85	1.76 (-4.39)	2.12 (15.02)
4. Groundnut	**Area**	12065	5160.6 (-57.23)	2705 (-77.58)
	Production	9725.8	4692 (-51.76)	4305.4 (-55.73)
	Yield	0.78	0.93 (19.63)	1.71 (119.53)

3.2 Results for Growth rates of tank irrigated area in Sothern Telangana Zone:

The linear and compound growth rates of the irrigated area under tanks have been calculated before and after implementation of Mission Kakatiya and presented in **Table 4**. The negative linear growth rate of -4.25% was recorded in irrigated areas under tanks before implementation of Mission Kakatiya, which was significant at 5% level and a positive linear growth rate of

29.69% was recorded in irrigated areas under tanks after implementation of Mission Kakatiya, which shows the positive impact on the irrigated area under tanks.

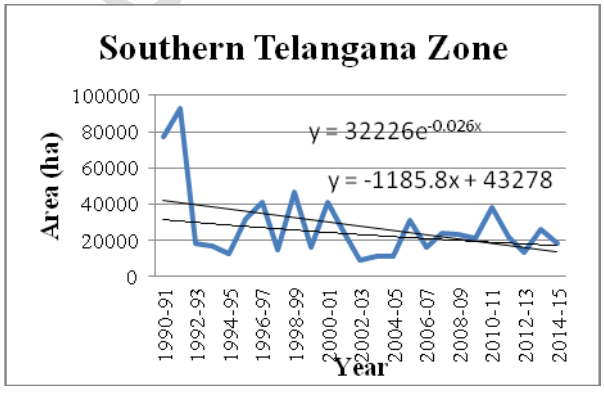
Before implementation of Mission Kakatiya, a significant negative compound growth rate of -2.56% at 5% level of significance was recorded in irrigated area under tanks in the Southern Telangana Zone, which shows that there was a deterioration of irrigated area under tanks during this period, where as it was recorded a significant positive compound growth rate of 57.77% at 1% level of significance after implementation of Mission Kakatiya in the Southern Telangana Zone.

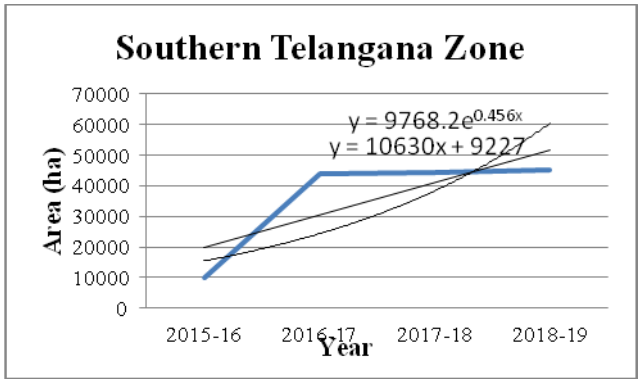
Table4: Linear and compound growth rates of tank irrigated area in Sothern Telangana Zone:

Particulars	**Before Mission Kakatiya (1989-90 to 2014-15)**	**After Mission Kakatiya (2015-16 to 2018-19)**
Linear growth rate (%)	-4.25*	29.69
Compound growth rate (%)	-2.56*	57.77**

*Significant at 5% level, ** Significant at 1% level

Fig.1 Irrigated area under tanks in Southern Telangana Zone before and after Mission Kakatiya:





4. CONCLUSION:

By observing the results of Linear and Compound growth rate analysis related to area under tank irrigation in the Southern Telangana Zone. During the period before Mission Kakatiya there was a negative growth observed in tank irrigated area whereas both the growth rates have turned to positive in the period after implementation of Mission Kakatiya. With the increase in tank irrigated area, this zone showed a shift towards irrigated and commercial crops like Paddy, Cotton and Maize from the rainfed crops. We can conclude that there is a positive impact on crop characteristics of major crops in this zone due to Mission Kakatiya program.

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