International Journal of Humanities and Social Science Invention (IJHSSI)
ISSN (Online): 2319 – 7722, ISSN (Print): 2319 – 7714
www.ijhssi.org ||Volume 7 Issue 11 Ver. I ||November 2018 || PP 41-45

A Study on Irrigation Facilities In India With Special Reference To Tamilnadu

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ABSTRACT: *Irrigation is one of the vital role in the agricultural activities. It is more helpful and prevents many unexpected problems. In case the development of irrigation facilities increases its lead to develop the agriculture sector, to prevent floods and drought and also encourage food security. In India as well as Tamilnadu tube well and other wells irrigation are highly used, in their situations are continued the groundwater level is low, its create water scarcity problem in tubewell irrigation and it draws a lot of groundwater from the land and it is only suitable for more groundwater availability areas. The central and state governments also encourage other types of irrigation facilities for agriculture through proper construction of dams, proper maintenance of canals and tanks and to create awareness of saving rainwater for future use and it is helpful to decrease the usage of tube well and other well irrigation. The government provides subsidies to farmers for fixed various irrigation sources and also to complete all incomplete major and minor irrigation projects like dams, canals, and other sources. Hence, this paper mainly focused on the facilities of irrigation in India and Tamilnadu.*

KEYWORDS*: Irrigation, Groundwater, Agriculture.*

Date of Submission: 12-11-2018 Date of acceptance: 26-11-2018

I. INTRODUCTION

An irrigation system is one of the most predominant factors for agriculture activities. Many types of irrigation facilities like dams, canals, tanks, tube wells, and other sources are followed by agricultural activities in India. It is very useful for agricultural development and production. Irrigation sources are avoided water scarcity in monsoon failure, to encourage food security, to increase electricity capacity, to help growing activities for all crops, to provide drinking water supplies and prevent droughts. Groundwater is also helpful to all irrigation sources. Canals are the main source of irrigation in India. Canals are big water channels taken out from rivers to carry water to places far away from the river. Wells are also used for irrigation purposes and its one of the low-cost irrigation sources. In agricultural land, groundwater is available the farmers are fixed in tube wells or open wells in the agricultural area. Tank water irrigation is also used for agricultural activities and it's an artificial reservoir of any size. Tanks are part of an ancient tradition of harvesting and preserving the local rainfall.

Objectives

1. To study the various sources of irrigation facilities in India.
2. To analyse irrigation facilities in India with reference to Tamilnadu.

II. STATEMENT OF THE PROBLEM

Irrigation sources are more demanded in day-by-day for agricultural production in India as well as Tamilnadu. Irrigation facilities mostly used during monsoon failure, dry region areas and some crops required more water for growing activities. In the situation, the irrigation facilities are well developed in our country. In India and Tamilnadu some irrigation projects are not completed in particular planning period and it has created some problems in floods, unexpected rainfall and drought. Some major projects take over cost and time for completing this system. Groundwater is one of the best supports of the irrigation system in India but sometimes over-exploitation of groundwater create environmental damages and also create soil degradation and pollution.

III. METHODOLOGY

The present study is related to sources of irrigation in India. The data is collected from secondary sources like Statistical Year Book of India and Directorate of Economics and Statistics. The Simple Linear

Regression model, Compound Growth Rate and Annual Growth Rate these tools are applied to this study. The sources of irrigation are dependent variable and Year is taken independent variable.

IV. REVIEW OF LITERATURE

Many authors have been studied the sources of irrigation in India and they have pointed out many reasons for the process of sources of irrigation in our country. They also suggested some improvement activity for the irrigation process in the agricultural process.

Srivastava et al (2013) study examined the trend in irrigation development and impact of agricultural productivity in India. In India, irrigation has played a catalytic role in providing food security to millions of people by positively affecting agricultural productivity. Therefore, irrigation has received massive government support in the successive FYPs and has witnessed significant growth during the past fifty years, though with inter-regional variations. The potential for irrigation development varies across geographical regions due to topographical, hydrological and other constraints. Consequently, different regions have performed differently in the development of irrigation. Further, the increasing gap between irrigation potential created and its utilization over the years has raised efficiency issues in the execution of irrigation projects. As about 88 per cent of UIP has already been developed, irrigation infrastructure can be improved further by bridging this gap. Improved irrigation infrastructure has led to increased cropping intensity and crop diversification towards high-value crops. The irrigation exerts a positive and significant impact on crop yield with varying degree across different crops. The agricultural productivity can be improved further by increasing irrigation efficiency, evolving institutional rearrangements, developing sustainable groundwater supply and emphasizing on completion of the on-going irrigation projects efficiently rather starting new ones.

Dinesh Kumar et al (2013) study analysed the faulty and wrong inferences of minor irrigation statistics in India. the irrigation potential of wells also could change drastically. While the shallow open wells in the alluvium irrigate 1-2 ha of land, the irrigation potential of deep tube wells could be as high as 30-40 ha. In the case of hard rock area, just the opposite usually happens. While the large open wells could irrigate 2 ha, the borewells will hardly be able to irrigate 1 ha. The conclusion of this paper is true that the aggregate area irrigated by wells far exceeds area irrigated by other MI sources (tanks and river lift schemes), the authors' concern with the number of groundwater structures to prove the point is difficult to comprehend. From the point that the surface MI structures account for only 6% of the total MI structures in the country, it is not correct to conclude that we can ignore the surface structure. Many tanks irrigate hundreds of hectares of land, often 50-100 times the land irrigated by wells. The second conclusion from the study is that the rate of growth of India's groundwater structures is slowing down. In states like Karnataka, TamilNadu, Rajasthan, Andhra Pradesh, and Gujarat, water is a major constraint in expanding well irrigation. In contrast to this, in states such as West Bengal, Bihar, and Assam, the land is a constraint in irrigated area expansion.

Narayan Prasad Paudyal (2010) study focused on the role of tube well and canal irrigation in the crop production and productivity in Kanchanpur district. The study mainly finds out the changes in production and productivity and the living standard of the people in Shreepur VDC after the introduction of canal and tubewell irrigation facility. The researcher took the sample of 113 households out of the total 750 households in the VDC using a simple random sampling procedure. It is found that there have been changes in production and productivity after the provision of irrigation facility. Most of the baries (non-irrigable land) where maize, mustard, and gram were grown have been utilized to grow paddy and wheat like in khets (irrigated). Paddy production has increased by 68.75 percent and wheat production has increased by 193.0 percent. The living standard in terms of house type, type of toilet, use of pure drinking water, use of consumer accessories has also been improved. Overall the current agriculture productivity is positive compared to that of before irrigation in the surveyed households.

Amarasinghe et al study pointed out trends and turning points of irrigation facilities in Tamilnadu. Rainfall within the state is a key determinant for both surface and groundwater irrigation. Irrigation is a vital input for food security in the State of Tamil Nadu. Rice is the major staple food, accounting for three-fourths of the consumption of food grains. Irrigation covers most parts of the rice area. In 2000, 96 per cent of the rice production was carried out under irrigation conditions. Groundwater contributes to a major part of the irrigated area. In general, groundwater irrigation is conducive to adopting micro-irrigation. Groundwater is the source for a large part of an irrigated area of non-grain crops such as vegetables, fruits, and sugarcane. These crops and areas have the largest potential for adopting drip and sprinkler irrigation in India. Providing a reliable irrigation supply to support paddy growing in this area will be a key challenge. Water saving techniques, such as the system of rice intensification (SRI) or aerobic rice (AR), reduce the irrigation demand and, in most cases, improve crop productivity. With increasing water scarcities, the demand for introducing water saving techniques in paddy cultivation will increase.

Amarasinghe et al (2009) study analyzed the strategic issues in Indian irrigation. Increasing reliance on groundwater and declining area under surface irrigation are the prominent recent trends in Indian irrigation.

Given this changing face of irrigation, many issues in groundwater and surface irrigation require immediate attention. Recharging groundwater is an immediate requirement for sustaining the present groundwater economy and for distributing irrigation benefits to a larger part of the population. Empowering local institutions on watershed development programs, combining several micro-watersheds within a radius of 400 m with meso-watersheds for development, recharging groundwater through millions of dug wells, converting small tanks to percolation ponds,increasing groundwater irrigation tank commands, and changing irrigation scheduling in canal commands to increase conjunctive water use are some measures for sustaining groundwater irrigation.

V. RESULTS AND DISCUSSION

The present study analyzed the net area under irrigation by sources in India as well as Tamilnadu during the period 2000-2014.

Table:1 Trend Value of Net Area under Irrigation by Sources – India (in per cent)

SI.No	Sources	Model	A	B	SE(B)	R	R^2	Adj R^2	t(B)	Sig	CGR
1	Government Canals	SLR	-149281.407	82.108	60.668	0.364	0.132	0.060	1.353	0.201	-
		Semi - log	-1.326	0.005	0.004	0.373	0.139	0.067	1.391	0.190	1.16
2	Private Canals	SLR	8085.956	-3.930	0.997	0.751	0.564	0.528	-3.942	0.002	-
		Semi - log	47.261	-0.21	0.005	0.768	0.589	0.555	-4.149	0.001	-38.34
3	Tanks	SLR	58033.407	-27.936	12.637	0.538	0.289	0.230	-2.211	0.047	-
		Semi- log	34.772	-0.014	0.006	0.520	0.270	0.209	-2.106	0.057	-3.17
4	Tube wells	SLR	-1153514.758	588.185	49.617	0.960	0.921	0.915	11.855	0.000	-
		Semi-log	-33.713	0.022	0.002	0.953	0.908	0.900	10.864	0.000	5.19
5	Other Wells	SLR	-40081.752	25.156	54.822	0.131	0.017	-0.065	0.459	0.655	-
		Semi- log	3.312	0.003	0.005	0.159	0.025	-0.056	0.558	0.587	0.69
6	Other Sources	SLR	-625615.978	314.593	55.812	0.852	0.726	0.703	5.637	0.000	-
		Semi- log	-112.881	0.061	0.011	0.839	0.704	0.680	5.346	0.000	15.08
7	Net Irrigated Area	SLR	-1902339.099	978.158	92.096	0.951	0.904	0.896	10.621	0.000	-
		Semi- log	-21.240	0.016	0.002	0.946	0.895	0.886	10.120	0.000	3.75

This table explains the trend value of net area irrigation by sources in India during the period 2000-2014. The trend value of the irrigated area is significant in the sources of private canals, tube wells, and other sources, compared with other types of irrigation the trend of an irrigated area are not significant. In total, net area irrigated significant in all periods. During 2000-2014, the b value is high (588.185 per cent) in the source of tube wells, it indicates that tube wells irrigation is highly used in India and the b value of other sources (314.593 per cent) is also high it represents the use of other sources of irrigation also high in India compare with other source of irrigation. The b value of private canals (-3.930 per cent) and tanks (-27.936 per cent) represent negative value and the t value of these sources also negative because the use of these sources are slow down in India. The compound growth rate of all sources of irrigation is positive except private canals and tanks. This table concluded that the percentage of irrigated area is slow down from the source of private canals and tanks.

Table:2 Annual Growth Rate of Net Area under Irrigation by Sources in India (in per cent)

Year	Sources of Irrigation						Net Irrigated Area
	Canals		Tanks	Tube Wells	Other Wells	Other Sources	
	Government	Private					
2000-01	0	0	0	0	0	0	0
2001-02	-5.16	2.95	-10.95	3.01	6.22	49.26	3.13
2002-03	-7.51	-1.43	-17.53	10.25	-26.98	-15.75	-5.34
2003-04	2.77	0	5.79	4.15	11.07	17.52	5.86
2004-05	2.12	3.88	-9.49	-5.45	2.71	75.34	3.81
2005-06	13.31	6.07	20.12	3.13	0.88	-20.85	2.71
2006-07	1.89	-1.32	-0.24	3.52	6.51	0.55	3.18
2007-08	-1.61	-3.12	-5.05	5.77	-7.79	1.80	0.71
2008-09	0.94	-10.14	0.40	-0.46	5.32	-14.09	0.71
2009-10	-11.37	-3.59	-19.88	0.01	-3.82	16.41	2.67
2010-11	4.62	-9.04	24.76	0.61	6.37	-2.05	2.78
2011-12	2.33	0.58	-3.08	4.90	-0.32	5.42	3.20
2012-13	-2.06	-4.06	8.65	2.00	1.58	4.14	0.86
2013-14	3.9	-1.21	5.08	1.91	5.10	0.07	2.76

This table shows that the annual growth rate of the net irrigated area under sources of irrigation in India during the period 2000-2014. The government canals are highly (13.31 per cent) irrigated in 2005-06 and other periods the growth of the irrigated area of government canals are decreased. In the 2000-06 growth of the irrigated area of private canals are positive and it is negatively sloped in followed years. The tank irrigation is high (24.76 per cent) in 2010-11 and 20.12 per cent in 2005-06. The irrigated area of tube- wells and other wells irrigation are more or less positive in all years. In 2004-05 the other sources of irrigation were higher (75.34 per cent) compare with other periods. In total, the net irrigated area is positive in all years except 2002-03 and 2009-10. This table concluded that tube-well and other wells of irrigation yield sufficiently available in India.

Table:3 Trend Value of Net Area under Irrigation by Sources – Tamilnadu (in per cent)

SI. No	Sources	Model	A	B	SE(B)	R	R^2	Adj R^2	t(B)	Sig	CGR
1	Government Canals	SLR	7282.330	-3.270	7.152	0.131	0.017	-0.065	0.457	0.656	-
		Semi - log	12.485	-0.003	0.011	0.074	0.006	-0.077	-0.259	0.800	-0.68
2	Private Canals	SLR	159.549	-0.079	0.023	0.706	0.498	0.457	-3.453	0.005	-
		Semi - log	0	0	0	0	0	0	0	0	0
3	Tanks	SLR	9229.648	-4.352	4.543	0.267	0.071	-0.006	-0.958	0.357	-
		Semi- log	23.926	-0.009	0.010	0.255	0.065	-0.013	-0.915	0.378	-2.05
4	Tube Wells	SLR	-33252.516	16.741	1.850	0.934	0.872	0.861	9.048	0.000	-
		Semi-log	-96.503	0.051	0.006	0.916	0.839	0.825	7.904	0.000	12.46
5	Other Wells	SLR	-17025.879	9.064	4.963	0.466	0.217	0.152	1.826	0.093	-
		Semi- log	-9.147	0.008	0.004	0.466	0.217	0.152	1.824	0.093	1.86
6	Other Sources	SLR	1404.934	-0.695	0.164	0.775	0.600	0.567	-4.243	0.001	
		Semi- log	134.362	-0.066	0.014	0.798	0.637	0.607	-4.591	0.001	-14.09
7	Net Irrigated Area	SLR	-32193.110	17.404	16.176	0.297	0.088	0.012	1.076	0.303	
		Semi- log	-6.081	0.007	0.006	0.304	0.092	0.017	1.105	0.291	1.62

This table denotes the trend value of the net area under irrigation by sources in Tamilnadu during the period 2000-2014. To compare with other types of irrigation the b value of tube wells of irrigation (16.741 per cent) and other wells (9.064 per cent) is positive because these sources of irrigation usage are an increase in Tamilnadu. In total, the b value of net area irrigated (17.404 per cent) is high. The trend of the irrigated area is significant in the source of private canals, tube wells, and other sources and other types of irrigation sources are not significant. The t value of tube wells is positive; its represent Tamilnadu tube wells irrigation is developing in the positive range. The compound growth rate of tube wells irrigation (12.46 per cent) and other wells (1.86 per cent) are positive compared to other types of irrigation. In private canals, there is no change in the irrigation process because of only one private canal in Tamilnadu. This table concludes that the usage of tube well irrigation is more in Tamilnadu compare with other sources of irrigation.

Table: 4 Annual Growth Rate of Net Area under Irrigation by Sources in Tamilnadu (in per cent)

Year	Sources of Irrigation						Net Irrigated Area
	Canals		Tanks	Tube Wells	Other Wells	Other Sources	
	Government	Private					
2000-01	0	0	0	0	0	0	0
2001-02	-3.72	0	-8.83	3.95	-0.82	-12.5	-2.97
2002-03	-23.34	0	-21.41	2.53	-15.77	-21.43	-17.49
2003-04	-26.87	0	-8.76	25.10	-2.55	36.36	-7.05
2004-05	67.71	0	20.77	3.94	9.15	20.00	22.81
2005-06	6.24	0	23.65	20.57	6.45	61.11	10.65
2006-07	-2.37	0	-7.65	3.15	1.56	28.57	-1.06
2007-08	-3.71	0	-4.71	-1.02	2.64	22.22	-0.86
2008-09	1.73	0	6.71	-0.51	1.91	0	2.37
2009-10	-1.04	0	-6.85	1.03	-1.95	-18.18	-2.32
2010-11	-1.32	0	5.96	3.07	1.33	0	1.71
2011-12	-0.13	0	-0.93	0.74	4.75	-22.22	1.78
2012-13	-20.91	0	-20.45	3.45	-5.55	0	-10.82
2013-14	10.67	0	-10.00	10.24	-2.24	-14.28	1.36

This table shows that the annual growth rate of net irrigated area under sources of irrigation in Tamilnadu. In this table, government canals are highly (67.71 per cent) irrigated in 2004-05 and 2005-06 & 2013-14 the irrigated area is positively high compared with other periods because in these years all irrigated area was negatively sloped. There is no change in private canals because there is only one private canal in Tamilnadu. The tank irrigation was high (20.77 per cent) in 2004-05 followed by 23.65 per cent in 2005-06 and it had been used at large level because of the conservation of rain water was available in plenty level by heavy

rain. In Tamilnadu, tube-wells irrigation is high compared with another source of irrigation systems because in all years the tube well irrigation is positively high except from 2007 to 2009. Other wells are also high (9.15 per cent) in the year 2004-05. Another source of irrigation was high in 2003-04 and it is negatively sloped in coming periods. In total, the net irrigated area was high (22.81 per cent) in 2004-05 but the percentage of net irrigated area slowly down in all years. This table concluded that tube-wells and other wells are one of the major irrigation sources in Tamilnadu because of the development of tube-wells and other wells are positive in all periods and 2004-05 the sources of irrigation are well because the percentage of irrigated area is positive.

VI. CONCLUSION

Irrigation is one of the vital roles in the agricultural activities. It is more helpful and prevents many unexpected problems. In case the development of irrigation facilities increases its lead to develop the agriculture sector, to prevent floods and drought and also encourage food security. In India as well as Tamilnadu tube well and other wells irrigation are highly used, in their situations are continued the groundwater level is low, its create water scarcity problem in tubewell irrigation and it draws a lot of groundwater from the land and it is only suitable for more groundwater availability areas. The central and state governments also encourage other types of irrigation facilities for agriculture through proper construction of dams, proper maintenance of canals and tanks and to create awareness of saving rainwater for future use and it is helpful to decrease the usage of tube well and other well irrigation. The government provides subsidies to farmers for fixed various irrigation sources and also to complete all incomplete major and minor irrigation projects like dams, canals, and other sources.

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Dr.S.Palani and P.Kohila"A Study On Irrigation Facilities In India With Special Reference To Tamilnadu "International Journal of Humanities and Social Science Invention(IJHSSI), vol. 07, no. 11, 2018, pp. 41-45