Research Paper Geography

Spatio-temporal Distribution of Surface Water for Irrigation in Satara District of Maharashtra: An Analytical Study

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ABSTRACT

Elements of geography are determining the regional development. In the present paper the attempt has been made to reveal the Spatio-temporal distribution of surface water for irrigation in Satara district. Principal objective of this study is to look into the pattern of Spatio-temporal distribution of surface water for irrigation purpose at tahsil level for that secondary data of 2000 and 2010 had been taken into consideration and duly verified on standard deviation and 'Zi' score (Smith 1975). For the development of irrigation in the district there is need of to take some special efforts. In the backward region to develop irrigation area give priority to complete major irrigation projects such as Urmodi, Tarali, Nira-Devdhar, Jihe-Kathapur etc. There is need of to adopt modern irrigation techniques such as sprinkler, drip irrigation to increase irrigation area. Due to unfavorable physical condition to Javali, Mahableshwar, Man, Khatav, Khandala there is need of watershed development programme.

Keywords : Agriculture, Surface Water, Irrigation

Introduction:
Being most important economic sector agriculture provides livelihood for majority of population in India. Development of agriculture influences by natural, economic and social elements although, there is dissimilarity in these factors. Surface water projects have minimized the effect of this dissimilarity. However, irrigation as such gets influenced by natural and socio-economic factors. The present paper focuses the dissimilarity in surface water distribution for irrigation in Satara district where, much of the development has been taken place in irrigation projects although there is no such development at par. Rainfall distribution meteorologically controlled. East part of district receives comparatively less rainfall than that of west. It is therefore the development of agriculture in the eastern part of the district depend on the irrigation facility.

Study Area, Objective and Methodology:
Since agriculture is principal activity of Satara district, more than 67.02 per cent population engaged directly or indirectly in this activity. Satara district situated in the western part of the state and lies between north latitudes17° 05" and 18° 11' and east longitude 73 ° 33' and 74° 54', covering 10,480 km² of an area out of that 1375 km² occupied by forests. The gross cultivable area is 7992 km², whereas net area sown is 5576 km².

Principal objective of this study is to look into the pattern of Spatio-temporal distribution of surface water for irrigation purpose at tahsil level for that secondary data of 2000 and 2010 had been taken into consideration and duly verified on standard deviation and 'Zi' score (Smith 1975).

$$Zi\ Score = \frac{x - \bar{x}}{SD}$$

Where Zi = Standard score for the i'th observation

x = Original value of the observation

$\bar{x}$ = Mean values of observations

SD = Standard deviation of observation

Value of 'Zi' score obtained from the data generated various surface irrigation sources and aggregated by composite standard score as:

$\sum zij/N$

Zij = Standard score of the i'th to j'th indicators

N= Number of indicator

To indicate the level of surface irrigation composite score separated into four categories like a) High c) Medium d) Low and e) Very low

Discussion:
Western part of Satara districts facilitated an ideal geographical condition in respect to physiography and amount of rainfall it is therefore, storage of surface water in respective dams constructed on Krishna and it's tributary like Koyana, Urmodi, Tarali, Mand, Yerala etc. It is seen that there is uneven distribution and development of surface irrigation in study region.

Spatio-temporal Pattern of Surface Irrigation Development:
Present surface irrigation data treated by stastically calculated and classified levels of irrigation development. As per calculation levels are classified as below.

High level of Development
There are three tahsils namely Karad, Koregaon and Satara comes under this class. Percentage value of this class is more than 15 percent. Karad tahsil percentage to total district is 26.01 percent land under irrigation is 52616 hect. in 2000. Next to Karad Koregaon and Satara tahsils irrigation area is in that order 17.17 and 15.76 percent. The irrigation development of Karad tahsils due to Krishna and Koyana river catchment area. In the Karad tahsils all type irrigation projects are developed and physiographic condition is ideal for development. Area under irrigation in Koregaon and Satara is depend on the major projects namely Dhom and Kanher.

Moderate level of Development

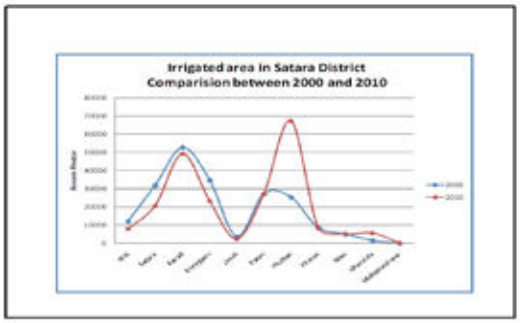
This category percentage is between 10 to 15 and Patan and Phaltan tahsils comes under this category. Patan tahsils share of irrigation in district was 13.45 percent in 2000. The development of irrigation in Patan tahsils is due to high rainfall and share of lift irrigation is high because the physiographic condition is not favorable for canal irrigation. In the Phaltan tahsils Nira canal covers maximum area for irrigation and it is 12.47 percent in the total district.

Low level of Development

Low level of development category in between 5 to 10 percent and in this class Wai tahsil comes in this class. Wai tahsils surface irrigation share in whole study region is 5.98 percent. The western part of Wai is hilly region and area on the bank of Krishna river and Dhom canal command area is irrigated.

Very low level of Development

Maximum part of study region comes under this category and percentage is in Khatav,Man,Javali,Khandala and Mahableshwar tahsils irrigation development below than 5 percent. Khatav , Man and Khandala tahsils comes under rainfall shadow region and up and downs surface. Average annual rainfall in these tahsils is below 500 mm. Javali and Mahableshwar is high rainfall region in study area but due to hilly region and steep slope irrigation development is very low.



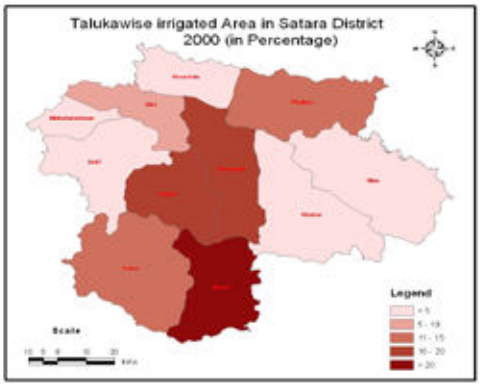


Table 1: Area under surface irrigation in Satara district Yr. 2000 (Area in Hectare).

Taluka	Major	Lift	Medium	>250 Hect.	100-250 Hect.	Total	Percentage
Wai	12104	0	0	0	0	12104	5.98
Satara	28033	0	0	3181	660	31874	15.76
Karad	12062	27006	8607	3436	1505	52616	26.01
Koregaon	32345	0	0	2045	328	34718	17.17
Javali	3410	0	0	0	100	3510	1.74
Patan	0	20241	1109	4198	1657	27205	13.45
Phaltan	21688	0	0	1744	1779	25211	12.47
Khatav	0	0	5823	1365	1362	8550	4.23
Man	0	0	2591	1408	973	4972	2.46
Khandala	576	0	0	370	548	1494	0.74
Mahableshwar	0	0	0	0	0	0	0.00
Total	110218	47247	18130	17747	8912	202254	100.00
Percentage	54.49	23.36	8.96	8.77	4.41	100.00	

Source: Based on statistical analysis (Satara dist. Irrigation report).

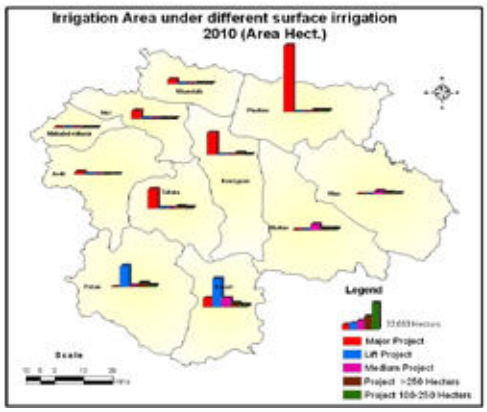


Table 2: Surface Irrigation Development Yr. 2000-2010(Area in Hectare).

Taluka	Major	Lift	Medium	<250	101-250	Total	%
Wai	-4295	0	0	-346	0	-4641	-38.74
Satara	-9787	0	0	-216	183	-9820	-81.97
Karad	-3474	-6563	1806	3381	513	-4337	-36.20
Koregaon	-11346	0	0	-84	163	-11267	-94.05
Javali	-1210	0	0	0	-57	-1267	-10.58
Patan	0	-2081	-2499	955	1471	-2154	-17.98
Phaltan	42124	0	0	-198	139	42065	351.13
Khatav	0	0	1573	-6	110	1677	14.00
Man	0	0	-2793	536	26	-2231	-18.62
Khandala	3989	0	0	-332	298	3955	33.01
M'war	0	0	0	0	0	0	0.00
Total	16001	-8644	-1913	3690	2846	11980	100.00

Source: Based on statistical analysis (Satara dist. Irrigation report).

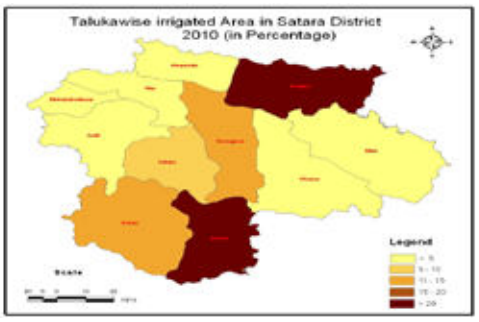


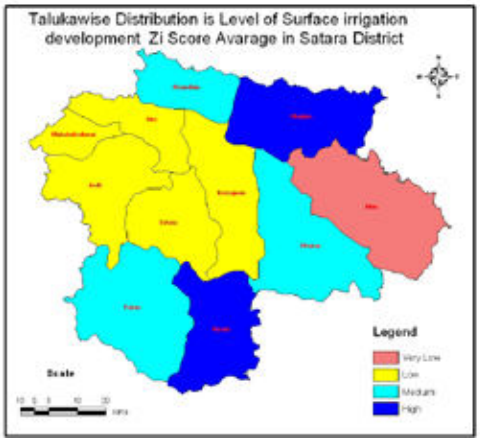
Table 3: Tahsil level irrigated area of different surface irrigation sources in Satara district during Yr.2000-2010.

Taluka	Major	Lift	Medium	>250 Hect	100-250 Hect	Total	Avg
Wai	-0.42	0.4	0.13	-0.66	-0.63	-1.18	-0.24
Satara	-0.83	0.4	0.13	-0.53	-0.18	-1.01	-0.20
Karad	-0.36	-3	1.49	2.95	0.62	1.7	0.34
Koregaon	-0.94	0.4	0.13	-0.4	-0.23	-1.04	-0.21
Javali	-0.2	0.4	0.13	-0.32	-0.76	-0.75	-0.15
Patan	-0.11	-0.67	-1.75	0.6	2.94	1.01	0.20
Phaltan	3	0.4	0.13	-0.51	-0.29	2.73	0.55

Khatav	-0.11	0.4	1.31	-0.33	-0.36	0.91	0.18
Man	-0.11	0.4	-1.97	0.19	-0.56	-2.05	-0.41
Khandala	0.19	0.4	0.13	-0.64	0.1	0.18	0.04
M'war	-0.11	0.4	0.13	-0.32	-0.63	-0.53	-0.11

Source: Based on statistical analysis (Satara dist. Irrigation report).

High Level of Irrigation Development :
Present categories of two tahsils namely Phaltan and Karad and development index value is + 0.55and + 0.34. In this class the Phaltan tahsils Nira canal irrigation project is completed so the irrigation area is increased. In Karad tahsils area under major and lift irrigation project is decreased but the medium and small surface irrigation project completion total area under surface irrigation increased.



Medium Level of Irrigation Development:-
Medium level of irrigation development is occurred in Patan, Khatav and Khandala tahsils. In the Patan + 0.20, Khatav +0.18, Khandala + 0.4. The location of these tahsils is not uniform geographical condition. In these Khatav and Khandala tahsils total area from beginning is very less and it is also increased in 2010. In the Patan tahsil lift and medium project irrigation area decreased but small project irrigation area is developed.

Low Level of Irrigation Development:
In this development category Koregaon -0.21, Satara-0.20, Javali – 0.15, Mahableshwar - 0.11 and Wai – 0.24 tahsils included. In the last 10 years only irrigation development took place in only lift and medium project and it is very less. Another Satara and Wai tahsil irrigation development recorded negative growth. Javali and Mahableshwar regions could not took development in this period.

Very Low Level of Irrigation Development:
Present category only one Man tahsil recorded very low irrigation development. In the Man tahsil only lift and more than 250 hect. Irrigation project irrigation area is positive growth. But comparative to district and another irrigation project development is very low -0.41.

Conclusion:
All observation taken under consideration the surface irrigation development level is uneven. The physiographic and climatic condition of district is not equal. So eastern drought prone Khatav, Man and Khandala tahsils is low development. In the Mahableshwar, Javali, Khandala and Patan these tahsils hilly region development is low. The government of Maharashtra not invested maximum budget to complete major projects in the study region. Taking consideration all account of irrigation fact in western Maharashtra the Projects transfers' water to Sangli district. In the Sangli district Takari, Maishal and Arphal canal irrigation projects completed and It causes to negative irrigation growth in Satara district. Apart from this causes some farmers develop the wells and bore wells irrigation area increased for regular and saving money.

For the development of irrigation in the district there is need of to take some special efforts. In the backward region to develop irrigation area give priority to complete major irrigation projects such as Urmodi, Tarali, Nira-Devdhar, Jihe-Kathapur etc. There is need of to adopt modern irrigation techniques such as sprinkler, drip irrigation to increase irrigation area. Due to unfavorable physical condition to Javali, Mahableshwar, Man, Khatav, Khandala there is need of watershed development programme.

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