

Cost Effective use of water Resources for Sustainable Agricultural Development Jyotiram More

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Abstract

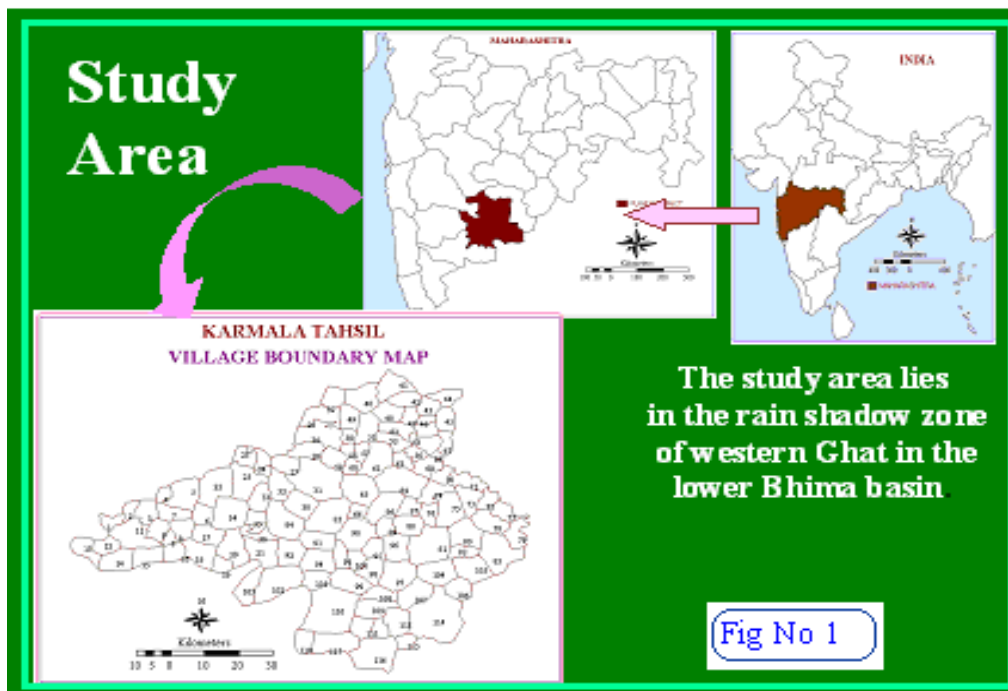
In this paper an attempt has been to explain Cost Effective Use of water Resources To Sustainable Agricultural Development and changing land-use cropping pattern in Karmala tahsil of Solapur District. Cropping pattern has been taken into account for understanding the agriculture a major claimant of the water resource in the tahsil. Appropriate GIS techniques have been employed for understanding the distribution of some crops and its relationship with the given physiographic set up. There are about 20 major crops village-wise distribution of which is given, analysed and suggesting new cropping pattern.

Introduction:

In this paper an attempt has been to explain changing land-use cropping pattern in Karmala tahsil of Solapur District. Cropping pattern has been taken into account for understanding the agriculture a major claimant of the water resource in the tahsil. Appropriate GIS techniques have been employed for understanding the distribution of each crop and its relationship with the given physiographic set up. There is about 20 major crops village-wise distribution of which is given below.

The Study Area:

The Karmala tahsil of the Solapur district (Fig. No.1) has been selected for the proposed work. The tahsil comprises of 118 villages and only one urban centre. The absolute location of the study area can be expressed as from $18^{\circ} 6'$ to $18^{\circ} 32'$ N latitude and from $74^{\circ} 47'$ to $75^{\circ} 24'$ E longitude. The Karmala Tahsil lies in the rain shadow zone of the 'Western Ghat in the lower Bhima basin.



The Tahsil has 139755.98 hectares of total cultivable land out of 161609.89 hectares of total geographical area and 116442.54 hect. of net sown area (NSA). The tahsil has only 7.91 % NSA under irrigation. The major crops grown in the tahsil are jowar, bajara, wheat, sunflower, sugarcane, vegetables etc.

The population of the tahsil according to the census (2001) is 233316. About 45.02% people have classified as the main workers. Of the total working force 80.79% has been engaged in agriculture. Thus, the study of agricultural planning for the given geographical conditions may find its place in the rural development.

Objectives:

1. To study the physiographic and socio-economic environment of the tahsil at the village level. This is essential to understand geographical feasibility of any suggested cropping pattern.
2. To study the cropping pattern at village level and to examine the temporal changes in cropping pattern in the tahsil. This may give the idea of the agriculture in the tahsil.
4. To carry out the cost benefit analysis of the major crops in the region.
5. To apply suitable methods to evolve cost effective cropping pattern based on available
land, soil and water resources
6. To understand the response of the people for the suggested Cropping pattern.

Hypothesis:

The problems of agricultural development in the Karmala tahsil are mainly associated with drought prone conditions and development of irrigation; both canal and well, has its own limitations. Therefore it is necessary to develop a planning strategy to use properly the available water resources. Thus, the study has the hypothesis that proper agricultural planning may mitigate the problems of drought prone zone in the tahsil.

Database and Methodology:

The data collection from primary and secondary sources, namely, namuna-20 (Tukada-20), socio-economic review, District Gazetteers, Census Handbook, Various types of Government report. Along with them, micro level analysis is based on information and data generated through sample survey of 1000 hectares through out the karmala tahsil.

Area under Cereals:

The net sown area in Karmala tahsil has been to 116864 hect. in year 2004-05. of this, maximum area has been occupied by cereals 93060.94 hect. The 79.63% NSA is under different cereals like jowar (70.35 % NSA), wheat (2.55 % NSA), bajara (5.65 % NSA) and maize (1.26 % NSA) as depicted in the table (Table No. 34). Jowar is the most important staple foodgrain in the tahsil. Jowar and wheat are rabi crops while bajara is the kharip crop. Maize is raised in any season as in case of most of the areas of the state. It has also been observed that wheat is grown in the irrigated areas. In short, the dominance of cereals especially rainfed jowar indicates that the tahsil has subsistence agriculture. The present study by adopting micro level approach attempts to understand intraregional

variations. For this, village wise data regarding areal strength of each crop has been taken into account as the attribute data to prepare distribution maps using GIS technique. On the basis of these maps and field observations the understanding of the present cropping pattern has been attempted.

Table No. 3
Area under Cereals (2004-05)

Sr. No.	Crop	Tahsil (Hect)	% of NSA	% of Cereals
1	Jowar	81664.70	70.35	87.80
2	Wheat	2981.70	2.55	3.20
3	Bajara	6608.00	5.65	7.10
4	Maize	1806.50	1.26	1.90
Total		93649.00	80.09	100.00

Source: Socio-economic review and district statistical abstract. Solapur

Pulses:

Pulses are an important ecologically as well as economically in the tahsil. There are variety of pulses grown in the tahsil, the chief among them being hulga, tur, gram, mataki, mug and others etc. (Table No. 4). The minor pulses include chavali, vatana, wal, mug etc. Pulses have covered the area of about 9318.19 hectares during 2004-05. Pulses account for 7.97 per cent of the cropped area in the tahsil. Local varieties of pulses are cultivated in the tahsil. Almost all the pulses, except gram are cultivated in kharip season. If soil conditions are suitable the farmers prefer pulses after bajara in the same field. The field observation reveals that the area under pulses broadly resembles with. The zone of light soils, locally called as malran. The village wise distribution of area under different pulses have been compiled and shown in the table. The major advantages of pulses are:

- i) The pulses being leguminous plant increase fertility of soils.
- ii) They provide proteins in the diet of poor people.
- iii) They utilize marginal resources both physical and human.

Table No. 4
Area Under Pulses (2004-05)

11	Crops	Area		
		Hectares	% to NSA	% to Pulses
1	Hulga	2417.40	2.07	25.94
2	Tur	2142.00	1.83	22.99
3	Gram	2122.60	1.82	22.78
4	Other	1182.14	1.01	12.69
5	Mataki	1169.00	1.00	12.55
6	Mug	285.05	0.24	3.06
Total		9318.19	7.97	100.00

Source: Socio-economic review and district statistical abstract. Solapur

Oil Seeds:

Kardai, Groundnut, Sunflower, sesamum, Jawas and Ambadi are the important oil-seeds grown in the tahsil contributing about following by 9.77 percent NSA. Kardai (5.87%), tops the oil seeds Sunflower (3.01%), Groundnut (0.48 %), Til (0.29 %), Jawas (0.01 %) and Ambadi (0.01%) as depicted in the table (Table No.5). The oil seeds are cultivated in the tahsil for local consumption.

Table No. 5
Area Under Oil seeds (2004-05)

Sr. No.	Crop	Tahsil (Hect)	% to NSA	to Oil seeds
1	Kardai	6869	5.87	60.13
2	Sunflower	3517.6	3.01	30.79
3	Groundnut	560.77	0.48	4.91
4	Til	344.30	0.29	3.01
5	Jawas	119.80	0.10	1.05
6	Ambadi and other	12.10	0.01	0.11
Total		11423.57	9.77	100.00

Source: Socio-economic review and district statistical abstract. Solapur

Vegetables:

The major vegetables grown in this tahsil are onion, brinjal, tomato, carrot, sweet potato, lady's finger, radish, fenugreek, cabbage and Chile. They occupied an area of 12378.9 acres in 2004-05 in the tahsil. Table No.6 gives the acreage under vegetables in the years 2004-05 in the tahsil.

Table No. 6
Area Under Vegetables

Sr. No.	Vegetables Distribution	Area Under Vegetables in (Hect).	% of NSA	% to Vegetables
1	Brinjal	87.4	0.07	6.49
2	Tomato	84	0.07	6.24
3	Carrot	71.1	0.06	5.28
4	Lady's finger	52.5	0.04	3.90
5	Radish	32.6	0.03	2.42
6	Sweet P	23.6	0.02	1.75
7	Fenugreek	22.5	0.02	1.67
8	Cabbage	83.2	0.07	6.18
9	Chile	223	0.19	16.55
10	Onion	667.18	0.57	49.53
Total		1347.08	1.15	100.00

Source: Socio-economic review and district statistical abstract. Solapur

Fruits:

The common fruits grown in the tahsil are banana, grape, sweet orange, mango, sour-lime, pomegranate, guava, etc. They occupied an area of 563.95 hect in 2004-05 in the tahsil, according for very small area for 0.48 percent of the NSA. Table No. 4.7 gives the area under fruits in the tahsil during the period 1994-95 to 2004-05.

Table No. 7
Area under fruits (Hect) 2004-05

Sr. No.	Name of the Fruits	Area under Fruits (Hect)	% of the NSA	% of the Fruits
1	Citrus Fruits	172.90	0.15	30.66
2	Guava	91.36	0.08	16.20
3	Banana	81.11	0.07	14.38
4	Mango	63.00	0.05	11.17
5	Pomegranate	40.67	0.03	7.21
6	Grapes	114.91	0.01	20.38
Total		563.95	0.48	100.00

Source: Socio-economic review and district statistical abstract. Solapur

Cost-Benefit-Analysis of Rabi Unirrigated Jowar Cultivation

Table No. 8

Sr. No.	Operations	Male Days	Cost (Rs)	Female Days	Cost (Rs)	Total Cost of H P (Rs)	Other Cost (Rs)	Total Cost (Rs)
1	Ploughing	07	630	00	00	630	366.1	996.1
2	Harrowing	08	720	00	00	720	100.7	820.7
3	Sowing /Seeding	06	540	00	00	540	280	820
4	Fertilizers/Pesticides	02	180	02	100	280	30.2	310.2
5	Wining	00	00	14	700	700	00	700
6	Irrigation	00	00	00	00	00	200	200
7	Harvesting	11	990	14	700	1690	00	1690
8	Threshing	13	1170	18	900	2070	00	2070
9	Shetsara (Tax on landholding)	00	00	00	00	00	140	140
10	Packing	03	270	00	00	270	00	270
Total		50	4500	48	2400	6900	1117	8017

Source: The Field Survey Data (2004-05).

As mentioned in the previous chapter jowar is cultivated in two seasons viz. kharip and rabi. Therefore, cost of the crop has been calculated for both kharip and rabi jowar. Following table (Table No. 8 & 9) show the cost-benefit-analysis of rabi jowar. The figures given in the table (Table No. 8) show that cultivation of the rabi jowar may get net profit of Rs. 8017/ hect.

Table No. 9
Cost-Benefit-Details

Sr. No.	Details	Rs.
1	Average on Farm Price / kg Rs.	Rs. 11/-
2	Average grain production / Hectare kg.	439 kg.
3	Average Grains Production / Hectare Rs.	Rs. 8822/-
4	Average Fodder Production / Hectare Rs.	Rs.2710/-
5	Total earnings / Hectare (Grains + Fodder)	Rs. 11532/-

6	Total cost / Hectare	Rs.8017/-
7	Net Profit / hectare (Total earning – Total Cost)	Rs. 3515/-
8	Employment power generated / Hectare man days	50days
9	Employment power generated / Hectare women days	48days
10	Total employment power generated / Hectare	98 days
11	Salary according to local rate man / days	Rs. 90/-
12	Salary according to local rate women / days	Rs. 50/-

Source: The field survey data (2004-05).

In the table (Table No. 8) indicates that the total cost of kharip jowar cultivation is Rs 8017/- per hect and total income from jowar cultivation (included fodder) is Rs. 11532/- per hect. It means that Rs. 3515/- per hect is the net income from unirrigated rabi jowar cultivation in the study area. Hence the field survey reveals that the requirement of employment for per hect. jowar cultivation is 50 males and 48 females. So in this tahsil 73382 hect. as well as 57.27 percent area is under kharip jowar cultivation in 2004-05. It means that employment power requirement is 3669100 male man-days and 352236 female man-days for only kharip jowar cultivation in the study area. The total man-days have been divided by 183 days. The calculation shows that availability of employment, as main worker in jowar production is 20050 male main workers and 19248 female main workers. So total employment power generated from unirrigated rabi jowar is 39298. It is quiet clear that the exactly 17 percent populations as well as 33.22 percent total worker engaged in this crop cultivation in the study area. This crop has very good potential for human power generated in the study area.

Conclusion:

The study of cropping pattern is mainly based on areal strength of each crop. Jowar has maximum proportion of area under crops in the study area (65.28 % NSA). The north-eastern and middle part of the tahsil have high proportion of the area under the jowar. The local variety of jowar grown in rabi season is more popular in the tahsil. The Hybrid jowar is grown in the kharip season. There is a significant difference in the yield of the irrigated and unirrigated jowar. About 16.84% of the area under bajara has irrigation facility and mostly HYV (high yield variety) are sown in such areas. The production capacity of the unirrigated land in dry zone of the tahsil is very low. It earns less than the investment. The area under wheat is concentrated in the irrigated track. The pulses like mug, matki, hulga, tur and gram are grown in the dry zone of the tahsil. The kardai and sunflower have concentrated in the dry zone of the tahsil, while the groundnut in the zone of high rainfall. The water resource availability and accessibility to the market are the major factors affecting the vegetable growing in the tahsil. Sugarcane (6.08 % to NSA) is the popular cash crop in the tahsil. It is observed mainly in the zone of along the rivers, lift and canal irrigated area. About 0.72 % of the NSA has devoted to the horticulture. The fruits in the tahsil are negligible (0.36 % to NSA).

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