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GEOGRAPHICAL ANALYSIS OF IRRIGATION FACILITIES AND CHANGING CROPPING PATTERN IN MAHARASHTRA (INDIA)

Dr. Dattatray D. Shinde
Assistant Professor, Adarsh College,Vita

ABSTRACT:

Agriculture is the main stay of the people of Maharashtra. The present research paper is giving emphasis on the irrigation facility is must for agricultural development. The physical, climatologically, socio - economical, technological, organizational, factors and farmers attitude etc. determinants closely influenced on the cropping pattern in the study region, but in the study area irrigation is an important determinants affected on the general land use and cropping pattern. Irrigation plays an important role in agrarian structure of a region which transforms the agricultural landscape. The impacts of irrigation are reflects in the form changes in quality of soil, water level, cropping pattern etc. In other words the irrigation plays central role for the changes in land use status and consequently on the socio – economic condition of an area. In the study region has well and surface irrigation facilities. The main objective of the study is to analyze the change of agricultural cropping in Maharashtra state due to increasing the facilities of irrigation from 1960-61. The study found certain kind of structural changes in all crops. The area under cereal crop like jowar and bajra crop are decreased as compare to cotton, oilseed and sugarcane.

Key words: *Irrigation facilities, Cropping pattern, Land use*

INTRODUCTION:

Irrigation has become an important aspect of agriculture and is influencing the cropping pattern. If water is adequate, cropping pattern can be changed. Water is critical input that largely determines the cropping pattern of a region. When the government creates irrigation facilities, the farmers are tempted to cultivate more land. In the some piece of land, they grow more than one crop. Naturally irrigated land give more outputs as compared to the other unirrigated lands.

With the increased irrigated area is increasing and advances in agriculture science, most of the cropping pattern are giving way to intensive

cropping. Mr. Y. K. murthy has rightly pointed out that irrigation is the basic factors to improve the income of the cultivators by helping to after their cropping pattern. The term cropping pattern is generally used to mean the proportion of area under varies crops at a point of time. The concept is a dynamic one as it is subjected to change with the change of its environment (Ram Mohan Rao, 1989). As observed by the National Commission on Agriculture, the cropping pattern may be different depending upon varies conditions. In low rainfall areas, the dominant crops are mainly millets, jowar and bajra. Mixed cropping pattern in the heavy rainfall areas show the dominance of paddy over tuber crops. In areas where there are irrigation facilities multiple cropping is possible, even to the extent of three or four crops.

OBJECTIVES:

1) To highlight the irrigation facility in the study area.
2) To analyses the land use and cropping pattern of the study area.
3) To study the impact of irrigation facilities on changing land use and cropping pattern of the study area.

DATA COLLECTION AND METHODOLOGY:

For the present study related data is obtained from the secondary source which is collected from Economic Survey of Maharashtra 2017 - 18 and reference books etc. The collected data has been processed, tabulated and interpreted. Processed data is represented through various cartographic techniques.

STUDY AREA:

Forming part of famous Deccan plateau, Maharashtra state lies between $15^{0}50'$ to $22^{0}12'$ North latitude and $72^{0}35'$ to $80^{0}53'$ East longitude. It is surrounded by the Arabian Sea to the west, Gujarat to the North West, MP to the North, Chhattisgarh to the east, Telangana to the south east, Karnataka to the south and Goa to the south west. Administratively the study region has six division, 36 districts and 357 talukas, Comprising 3,07,713 sq. km. area of supporting 11,23,72,333 population according to 2011 census which is about 9.28

percent of total population of India. Agriculture is the most important occupation of the rural people. The state enjoys a tropical monsoon climate. The annual temperature of the state is minimum 16^0c and maximum 32^0c. The annual rainfall is 400 to 600 mm.

AREA IRRIGATED BY SURFACE AND WELL IRRIGATION:

Irrigation is essential for cultivation and better yield especially in the areas where rainfall is uncertain and scanty. The cropping pattern of a region will depend upon the nature and availability of irrigation facilities wherever water is available not only can a different crop can be grown but even double or triple cropping will be possible when new irrigation facilities are provided. Varies sources of irrigation are practiced in Maharashtra. Wells and other sources plays a key role especially in rain fed areas and all over Maharashtra.

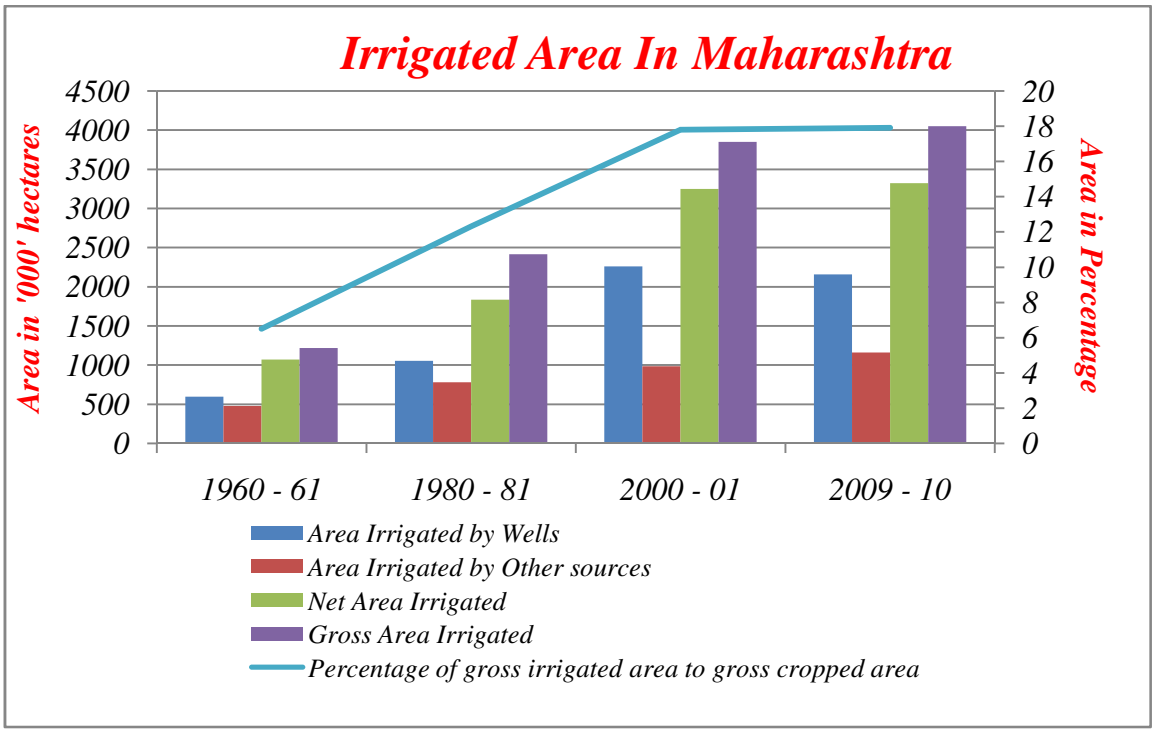
Table: 1 Area under irrigation in Maharashtra (Area in '000' hectares)

Year	Area Irrigated				Gross cropped area	Percentage of gross irrigated area to gross cropped area
	Wells	Other sources	Net	Gross		
1960 - 61	595	477	1072	1220	18823	6.5
1980 - 81	1055	780	1835	2415	19642	12.3
2000 - 01	2262	987	3249	3852	21619	17.8
2009 - 10	2159	1162	3321	4050	22612	17.9
Change over base year						
1980 - 81	77.31	63.52	71.17	97.95	4.35	89.23
2000 - 01	280.16	106.91	203.07	215.73	14.85	173.84
2009 - 10	262.85	143.60	209.79	231.96	20.12	175.38

Source: *Commissione rate of Agriculture, GoM*

The table no. 1 reveals that the area irrigated by well and other sources irrigation like tube wells, tanks, dam, canals, farm ponds etc. The total well irrigated area in Maharashtra was about 5,95,000 hectares in 1960 - 61, which has increased up to 21,59,000 hectares in 2009-10 with 262.85 percent during this period. In Maharashtra, about 4,77,000 hectare of land was irrigated by other sources of irrigation in 1960 - 61 and it has increased up to 11,62,000

hectare in 2009 - 10 with 143.60 percent. This is clearly indicated by proportion of other sources of irrigation which increased due to government of Maharashtra and zilla parishad have constructed number of percolation tanks and canals in this region under the employment guarantee scheme.



The table shows that the changes in both net and gross irrigated area in Maharashtra. The net irrigated area in Maharashtra was about 10,72,000 hectares in 1960-61, which has increased up to 33,21,000 hectares in 2009 - 10 with 209.79 percent during the last fifty years. The gross irrigated area has also increased from 12,20,000 hectare in 1960-61 to 40,50,000 hectare in 2009 - 10 with 231.96 percent during the study period. This means that the irrigated area has significantly increased in Maharashtra. The area under gross cropped area has increased from 1,88,23,000 hectares to 2,26,12,000 hectares with 20.12 percent during the period 1960 – 61 to 2009 – 10. The percentage of gross irrigated area to gross cropped area of net irrigated area has increased from 6.5 percent in 1960-61 up to 17.9 percent in 2009 - 10. The percentage of gross irrigated area to gross cropped area has increased with 175.38 percent during the period 1960 – 61 to 2009 – 10.

CHANGES IN THE LANDUSE PATTERN:

The pattern of land use is complex and dynamic. The analysis of land use devotes the status of land utilization for different purpose in an area. It is observed from Table 2 that, in year 1986 – 87, out of total reported area of Maharashtra, maximum area was under various crop (58.54 percent), followed by area under forest (17.39 percent), area not available for cultivation (9.20 percent), other uncultivable land and fallow land.

Table: 2 Changes in land use pattern in Maharashtra

(Area in '000' hectares)

Land use categories	Year				Change over the base year		
	1986-87	1995-96	2005-06	2015-16	1995-96	2005-06	2015-16
Total Geographical Area	30,758 (100.00)	30,758 (100.00)	30,758 (100.00)	30,758 (100.00)	00	00	00
Area Under Forest	5,350 (17.39)	5,148 (16.74)	5,212 (16.94)	5,194 (16.88)	- 3.77	- 2.57	- 2.91
Area Not Available For Cultivation	2,831 (9.20)	2,893 (9.41)	3,127 (10.17)	3,251 (10.57)	2.19	10.45	14.83
Other Uncultivable Land	2,607 (8.48)	2,418 (7.86)	2,415 (7.85)	2,386 (7.76)	- 7.24	- 7.36	- 8.47
Fallow Land	1,966 (6.39)	2,320 (7.54)	2,531 (8.23)	2,731 (8.88)	18.00	28.73	38.91
Net Sown Area	18,004 (58.54)	17,979 (58.45)	17,473 (56.81)	17,196 (55.91)	- 0.13	- 2.94	- 4.48

Source: *Commissionerate of Agriculture, GoM*
Note: *Figure in bracket indicates percentage*

Considering change in land use, increasing share was observed in case of fallow land and area not available for cultivation during the period 1986 – 87 to 2015 – 16 due to urbanization and industrial expansion. However in case of other uncultivable land decreased proportion was observed. Another reason for this is expansion in irrigation project and roads which is supporting infrastructure for agricultural growth in particular region. The area under forest was continuously decreased during this period.

CHANGES IN THE CROPPING PATTERN:

Cropping pattern means the proportion of area under various crops at a point of time. A variety of crops are grown in Maharashtra. However, traditionally, jowar, rice, wheat, bajra, pulses, sugarcane, oilseeds, tobacco and cotton etc. are grown in the Maharashtra.

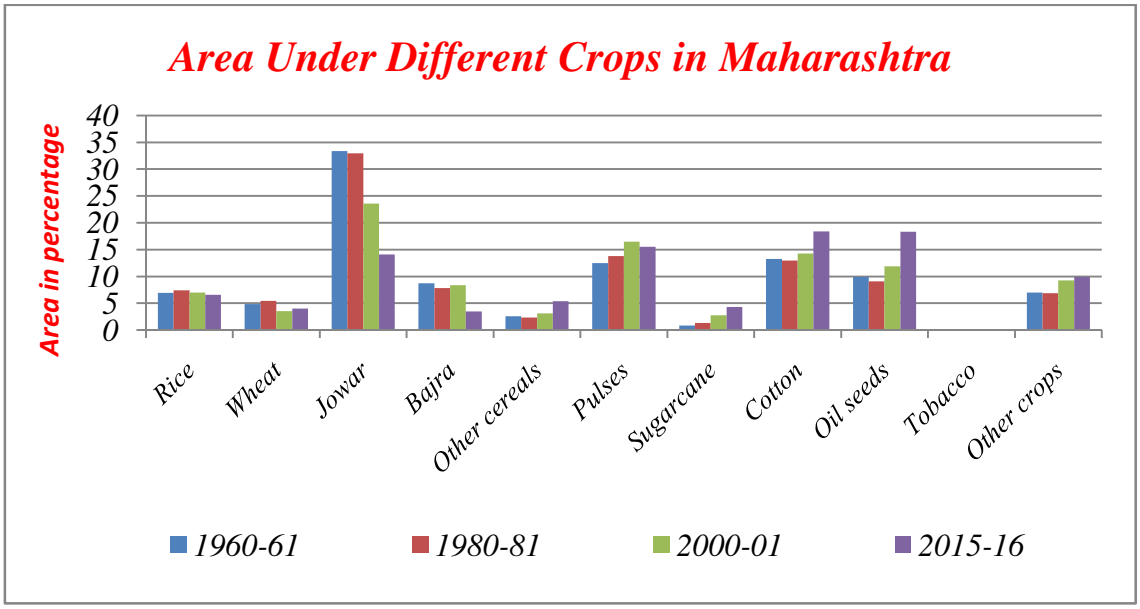
Table: 3 Changes in cropping pattern in Maharashtra
(Area in '000' hectares)

Crops	Year				Change over the base year		
	1960-61	1980-81	2000-01	2015-16	1980-81	2000-01	2015-16
Rice	1300 (6.91)	1459 (7.43)	1512 (6.99)	1503 (6.57)	12.23	16.30	15.61
Wheat	907 (4.82)	1063 (5.41)	754 (3.49)	911 (3.98)	17.19	- 16.86	0.44
Jowar	6284 (33.39)	6469 (32.94)	5094 (23.56)	3217 (14.07)	2.94	- 18.93	- 48.80
Bajra	1635 (8.69)	1534 (7.81)	1800 (8.33)	801 (3.50)	- 6.17	10.09	-51.00
Other cereals	480 (2.55)	451 (2.30)	664 (3.07)	1236 (5.41)	- 6.04	38.33	157.7
Pulses	2349 (12.48)	2715 (13.82)	3557 (16.45)	3544 (15.50)	15.58	51.42	50.87
Sugarcane	155 (0.82)	258 (1.31)	595 (2.75)	987 (4.32)	66.45	283.87	536.77
Cotton	2500 (13.28)	2550 (12.98)	3077 (14.23)	4207 (18.40)	2	23.08	68.28
Oil seeds	1868 (9.92)	1780 (9.06)	2559 (11.84)	4195 (18.35)	- 4.71	36.99	124.57
Tobacco	25 (0.13)	12 (0.06)	08 (0.04)	02 (0.01)	- 52	- 68	- 92
Other crops	1320 (7.01)	1351 (6.88)	1999 (9.25)	2260 (9.89)	2.34	51.43	71.21
Gross cropped area	18823 (100.00)	19642 (100.00)	21619 (100.00)	22863 (100.00)	4.35	14.85	21.46

Source: *Commissionerate of Agriculture, GoM*
Note: *Figure in bracket indicates percentage*

Table no. 3 reveals that the changes in general cropping pattern in Maharashtra during the period of 1960-61 to 2015-16. The area under rice has been increased from 13,00,000 hectare to 15,03,000 hectare with 15.61 percent during the study period. Wheat crop slightly increased with only 0.44 percent during the period of 1960-61 to 2015-16. Area under jowar and bajra is also decreased with - 48.80 percent and -51.00 percent respectively during last fifty five years.

Out of total cultivated area, the area under other cereals, pulses, oilseeds, sugarcane, and cotton is increased in Maharashtra. Area under pulses, cotton and oil seeds have increased with 50.87 percent, 68.28 percent and 124.57 percent during the period of 1960 - 61 to 2015 - 16.



Surprisingly cash crop like area under sugarcane showed tremendous increased. It was 1,55,000 hectares in 1960-61 and increased up to 9,87,000 hectares in 2015-16. Due to opening the number of sugar factories, also increasing the irrigation facilities cultivation of sugarcane has been steadily increased. Sugarcane cultivation has helped in bringing about many changes in rural economy. The extension of irrigation facilities are important factors responsible for increase in cultivation of sugar cane, cotton, oil seed etc. Maharashtra state shows that the positive change in rice, oilseeds, sugar cane, cotton and pulses cultivation whereas, cereals crops like jowar, bajra are shows negative in change.

CONCLUSION:

Irrigation plays significant role in agrarian structure of a region which transforms the agricultural landscape. The impacts of irrigation are reflects in the form changes in quality of soil, water level, land use and cropping pattern etc. In other words the irrigation plays central role for the changes in land use status and consequently on the socio – economic condition of an area. In the study region has well and other sources of irrigation facilities. In the present

study the data reveal the land use pattern and irrigation practices in Maharashtra state.

The study region has well and other sources of irrigation facilities. The total well irrigated area in Maharashtra was about 5,95,000 hectares in 1960-61, which has increased up to 21,59,000 hectares in 2009-10 with 262.85 percent during this period. In Maharashtra, about 4,77,000 hectare of land was irrigated by other sources of irrigation in 1960-61 and it has increased up to 11,62,000 hectare in 2009 - 10 with 143.60 percent. This means that the irrigated area has significantly increased in Maharashtra. Cropping pattern has shown the positive and negative change during the study period. Maharashtra state shows that the positive change in rice, oilseeds, sugar cane, cotton and pulses cultivation whereas, cereals crops like jowar, bajra are shows negative in change.

Surprisingly cash crop like area under sugarcane showed tremendous increased. It was 1,55,000 hectares in 1960-61 and increased up to 9,87,000 hectares in 2015-16. During this period data reflects the cash crop existence in agricultural pattern, i.e. the availability of irrigation facilities increased the farmer's interests towards such type of crop. The agricultural land use pattern in Maharashtra has influenced by irrigation facilities. The positive co - relation is observed in cropping pattern and irrigation facilities during the study period in the study region.

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