

**Analysis of Sustainable Agricultural Development in Ahmednagar District of
Maharashtra (India)**

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Abstract:

The green revolution is succeeded only where the irrigation facilities are available. Every possible effort takes by government through five year plans but small farmers could not get the benefit of green revolution. Due to this create large gap between small and big farmers even though increase the gap between irrigated and reinfed area. This situation creates the regional imbalance. To overcome this problem systematic planning in agriculture is more essential. The improvement in agricultural development is generally the result of a more efficient use of the factors of productions. The regional differences in agricultural productivity are the result, partly of the natural advantages of abiotic environment (soil and climate) and partly of farming efficiency as controlled by cultural ecology.

Agriculture is the leading occupation and the main stay of the people living in the Ahmednagar district which is one of developing district of Maharashtra. The present research is a study of measurement of agricultural productivity and its spatial and temporal changes in the Ahmednagar district of Maharashtra state.

Keywords: Productivity, Sustainable Development, Green Revolution, Abiotic Environment, Measurement of Productivity.

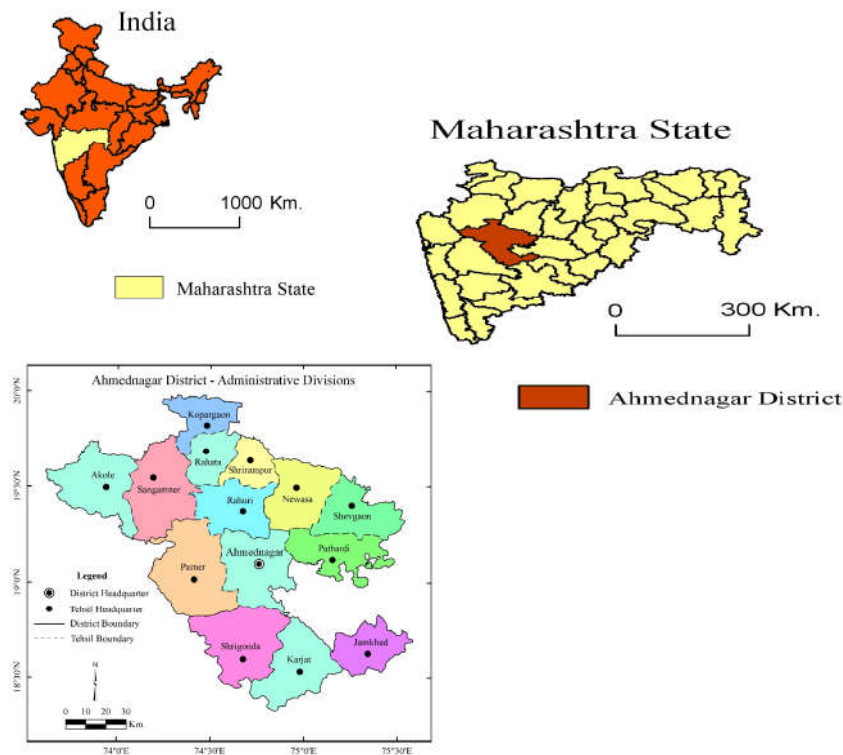
Introduction:

The concept of agricultural development is defined by several scholars and economist. In general, agricultural productivity means output per unit of input or per unit of area respectively. The improvement in agricultural productivity is generally the result of a more efficient use of the factors of productions, viz. environment, arable land, labour, capital and like.

The choice of an area and topic under investigation has been influenced by many considerations. Firstly, study region is located in rain shadow zone of western ghat has remarkably scanty rainfall, it affects on agricultural land use as well as productivity. Secondly, area selected for the study is agriculturally imbalanced region. The valleys of various tributaries of Godavari and Bhima rivers agriculturally advanced and other parts are agriculturally backward.

Study Area:

The present study from Ahmednagar district of Maharashtra has been selected as a study area. It extends between $18^{\circ} 20'$ to $19^{\circ} 59'$ north latitudes and $73^{\circ} 40'$ to $75^{\circ} 43'$ east longitudes. It situated partly in the upper Godavari basin and partly in the Bhima basin. The district is very compact in shape, north- south length of 210 km. and east-west breadth of 200 km.



Location map of study area

The study region is divided into three physical divisions, namely, Sahyadri hill ranges i.e. Kalsubai, Adula, Baleshwar and Harishchandragad, plateau and plains. The average annual rainfall in the district is 578.8 mm. (22.79 inch). The mean daily maximum temperature is 39° centigrade and mean daily minimum temperature is 11.7° centigrade. The district appears four types of soil, namely, deep black, medium black, coarse shallow and red soil. In study region 70.28 percent area under cultivation, out of this 29.42 percent is

irrigated. Cropping pattern of district is different in irrigated and rain fed area. The rivers and its left and right canals is the source of irrigation as well as Well irrigation is commonly used. Sugarcane is the predominant crop in the rivers basin and canal command area. In *kharif* season bajra, maize, pulses, cotton, oilseeds i.e. groundnut and soyabean, etc. are grown and wheat, jowar, maize, gram, onion, sunflower are grown in *rabi* season.

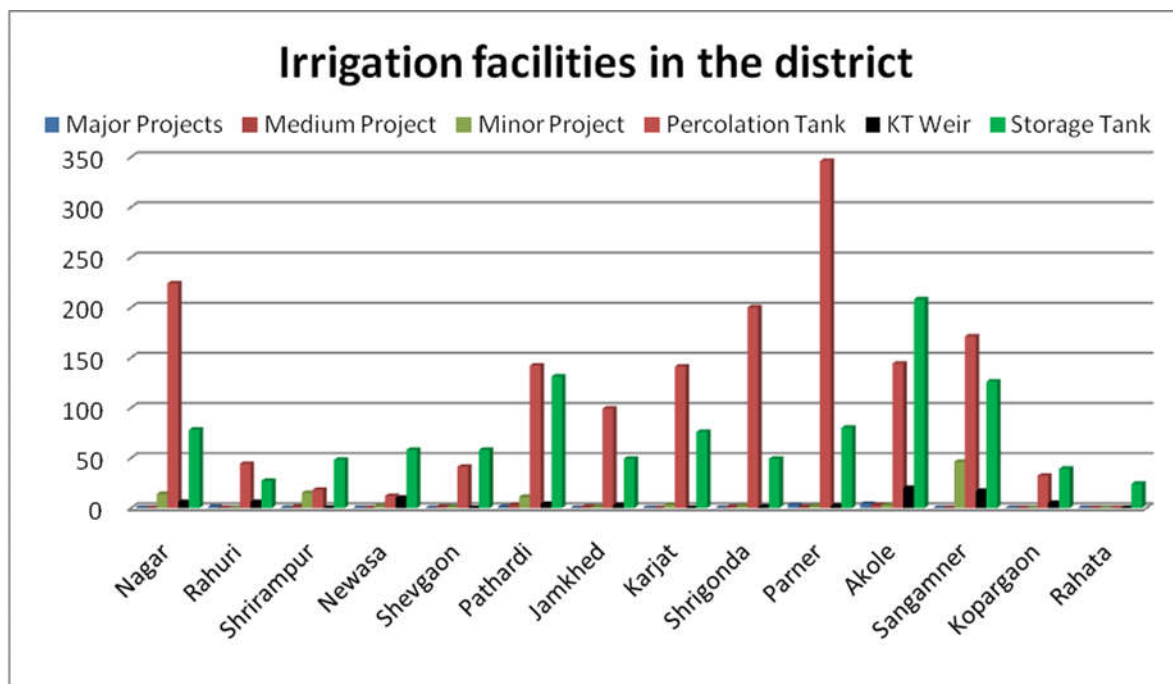
Objectives:

- To study the spatio-temporal changes in the agricultural productivity in Ahmednagar district.
- To assess the spatial and temporal patterns of agricultural irrigation development in the district.
- To study of the agricultural population density and High variety of Yield in the study area.

Database & Methodology:

In the first phase of the research primary and secondary data was collected. The collected data has been analyzed by applying different statistical methods and is presented through tables and figures. The spatial and temporal aspects of general and agricultural land use have studied in depth. To delineation of crop regions Doi’s crop combination technique was applied.

Irrigation System in the District:



Graph no. 1 Graphical presentation of available irrigation facilities in the district.

In district for the purpose of irrigation and drinking water many major, medium and minor projects is constructed. Wilson dam near Bhandardara in Akole tehsil was constructed on river Pravara. This dam impounded about 11 thousand million cubic feet of water behind the dam. The storage feeds two canals, the pravara right and left bank, taking off from a pick-up weir 90 km. downstream of the dam at village Ozar. These canals irrigates an area about 32000 hectares mainly in the tehsils of Sangamner, Rahuri, Rahata, Shrirampur and Newasa.

Table no. 1 Irrigated Area in Ahmednagar District

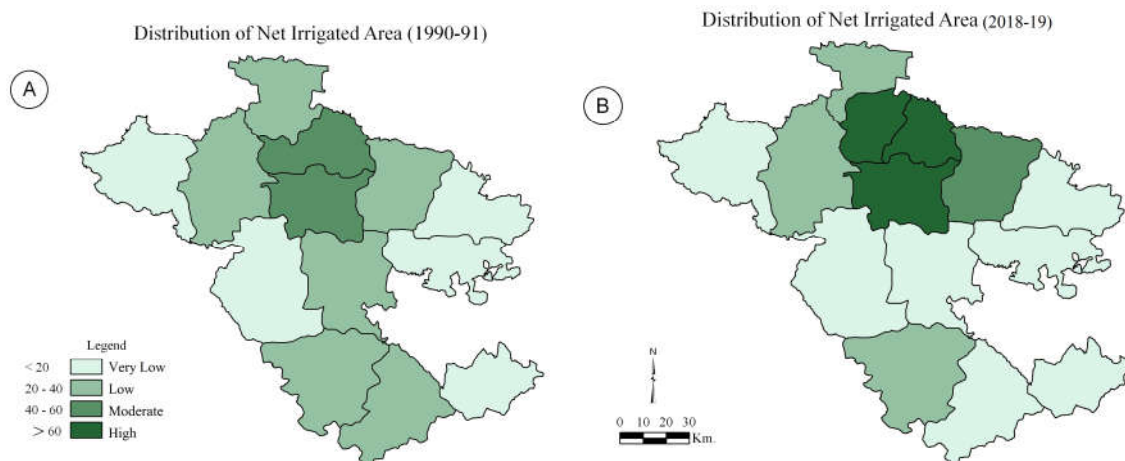
Tehsils	% share of surface irrigation		Volume of Change	% share of underground irrigation		Volume of Change
	1990-91	2018-19		1990-91	2018-19	
Nagar	1.44	2.98	1.54	-1.54	97.02	-1.54
Rahuri	43.85	48.52	4.67	-4.67	51.48	-4.67
Shrirampur	25.33	60.14	34.81	-34.81	39.86	-34.81
Newasa	60.02	35.85	-24.17	24.17	64.15	24.17
Shevgaon	0.77	3.72	2.95	-2.95	96.28	-2.95
Pathardi	3.50	1.00	-2.5	2.5	99	2.5
Jamkhed	1.86	14.66	12.8	-12.8	85.34	-12.8
Karjat	39.13	24.98	-14.15	14.15	75.02	14.15
Shrigonda	35.75	54.88	19.13	-19.13	45.12	-19.13
Parner	28.03	29.11	1.08	-1.08	70.89	-1.08
Akole	28.51	46.33	17.82	-17.82	53.67	-17.82
Sangamner	16.81	8.50	-8.31	8.31	91.5	8.31
Kopargaon	35.09	44.44	9.35	-9.35	55.56	-9.35
Rahata	--	21.78	--	--	78.18	--
Total	29.53	31.41	1.88	-1.88	68.59	-1.88

Source: Calculated by Authors

During the year 1990-91 surface irrigation accounted 70.47 percent of the total irrigated area in district. Spatial distribution pattern reveals the maximum share recorded in those tehsils where surface irrigation share is lowest. During the year 2018-19 share of underground irrigation is recorded 68.59 percent. It share has decline by 1.88 percent during the period of investigation. In study region ground water sources become dry in summer season it adverse effects on agriculture. This calls for rational use of available water through proper water management techniques.

Spatial distribution of net irrigated area for the year 2018-19 has show in fig. B. During this year net irrigated area was 29.42 percent and varies from 10.86 to 95.82 percent. Very low net irrigated area recorded in seven tehsils namely, Nagar, Jamkhed, Karjat,

Shevgaon, Patherdi, Parner, Akole while low net irrigated area registered in southern tehsil Shrigonda and northern tehsils namely, Sangamner and Kopergaon. Tehsil Newasa registered moderate category whereas highest net irrigated area found in northern part of study area consisting tehsils of Rahata, Rahuri and Shrirampur. An analysis shows a marked increase net irrigated area by 5.05 percent during two decade. Except thails of Nagar, Shevgaon, Karjat and Shrigonda rest of the tehsils



Map1 A&B: shows the Distribution of Net Irrigated Area during 1990-91 and 2018-19.

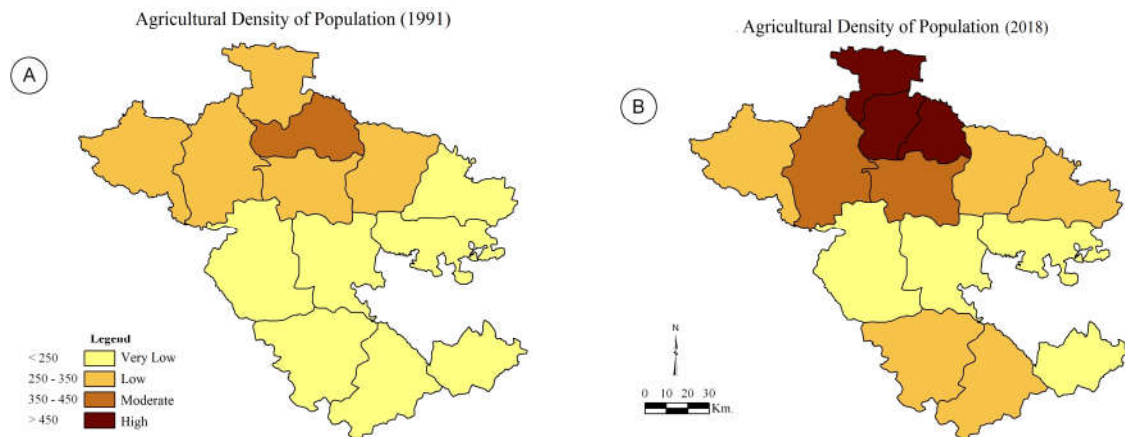
Agricultural Density of Population

Agricultural density means the ratio between agricultural population and agricultural land i.e. net sown area. The crude and physiological density fails to show the actual pressure of population on agricultural land. To overcome this problem agricultural density is worked out for the district for the year 1991 and 2018. It shows the concrete picture of population pressure on agricultural land. Table shows the tehsil wise agricultural density, it was 242 and 303 persons during the year 1991 and 2018 respectively.

Agricultural density of population was worked out and divided into four categories i.e. very low, low, moderate and high. According to census 1991, very low density was found in Nagar, Shevgaon, Patherdi, Jamkhed, Karjat, Shrigonda and Parner tehsils while low (250 to 350 persons) density marked in Rahuri, Newasa, Akole, Sangamner and Kopergaon tehsils. Tehsil Shrirampur recorded moderate category whereas high category was not found in any tehsil.

Fig B reveals agricultural density of population for the year 2018. Very low category was found in low irrigated area comprising tehsils of Nagar, Patherdi, Jamkhed and Parner while low category was marked in Newasa, Shevgaon, Karjat, Shrigonda and Akole. Rahuri and Sangamner tehsils registered moderate category while high category was found in

northern parts of district comprised Shrirampur, Kopergaon and Rahata tehsils. During the period of two decade agricultural density of population has increased in all tehsils of district.



Map 2 A & B shows Agricultural Density of Population

High Yielding Varieties (HYV) of Seeds

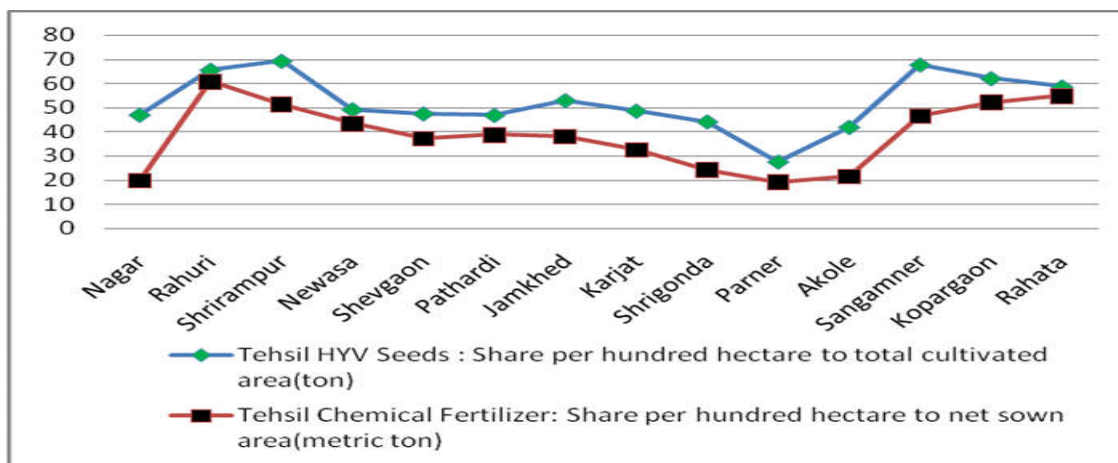
The HYV seeds have played vital role in augmenting agricultural production. These seeds not only help in increasing agricultural production by 10 to 20 percent but introducing new characteristic in the biological structure of the plant like, quick maturing, higher yield and resistant to insects, diseases and drought. In India the success of green revaluation is partly associated with the use of HYV seeds. The adoption of HYV of seed does not require any special skill and farmers of various socio-economic and cultural backgrounds can adopt the new seeds easily. The success of green revolution in the study region is also closely related to the use of HYV of seeds particularly of wheat, bajra, jowar, sugarcane, oilseeds, cotton, pulses, vegetable and other crops. The Government of India proclaimed the new policy on seed development in October, 1988. The thrust of this policy is to protect for the Indian farmer high quality seed available anywhere in the country with a view to maximize the crop yields, boost agricultural productivity and farm income. In study region tehsil Punchyat Sammittee and private distributors distribute the HYV seeds. Punchyat Sammittee of each tehsil is supervising the distribution system of HYV seeds.

Table of Share of HYV Seeds and Chemical Fertilizer (2018)

Tehsil	HYV seeds	Chemical fertilizer
	Share per hundred hectare to total cultivated area(ton)	Share per hundred hectare to net sown area(metric ton)
Nagar	47.00	19.80
Rahuri	65.62	60.89
Shrirampur	69.31	51.37
Newasa	49.20	43.49
Shevgaon	47.50	37.30
Pathardi	46.88	38.84

Jamkhed	52.97	38.04
Karjat	48.63	32.60
Shrigonda	44.16	24.22
Parner	27.53	19.14
Akole	41.89	21.50
Sangamner	67.77	46.55
Kopargaon	62.11	52.22
Rahata	58.65	54.78

Source: Revenue Dept. of each tahasil



The use of HYV seeds data for the year 1990-91 was not available so researcher interpreted only data of the year 2018-19. During this year 27212 and 58552 thousand ton HYV seeds use in *kharif* and *rabi* season respectively (excluding sugarcane and fodder). Change the attitude of farmers, intensive minor irrigation schemes and use of chemical fertilizers has supported the increased use of HYV seeds in district. Use of HYV seeds per hundred hectare of total cropped area was work out (excluding area under sugarcane and fodder crop) and divided into four categories i.e. very low, low, moderate and high having the range below-40, 40-50, 50-60 and above 60 respectively. Table 3.8 and fig. 3.17 revealed very low category was marked in Parner tehsil while Akole, Shevgaon, Newasa, Patherdi, Nagar, Shrigonda and Karjat tehsils noticed low category. Moderate category was registered in Jamkhed and Kopergaon tehsils while high category was found in northern high irrigated parts of district comprised tehsils of Kopergaon, Sangamner, Rahuri and Shrirampur. The northern high irrigated tehsils have used high amount of HYV seeds per hundred hectares to total cropped area compared to south and south-western part of the district. It means that the use of HYV seeds is largely depends on availability of irrigation.

Conclusion:

Agricultural development of any region is governed by various non-physical determinants viz. irrigation, farm implements (traditional and modern), demographic factors,

livestock, high yielding variety of seeds, use of chemical fertilizer, market facilities, agricultural credit and government policy. In study area for the purpose of irrigation many major, medium and minor projects are constructed viz. Bhandardara, Baragaon Nandur, Devthana, Mandohal, and Pargaon Ghatsheel. Canals, rivers, wells and tube wells are the major sources of irrigation in district. During the period of two decade net irrigated area increased by 5.05 percent of net sown area. During the period of investigation traditional farm implements such as wooden plough, cart and oil engines density rapidly declined while modern farm implements such as iron plough, tractors, electric pumps density increased in district.

In Ahmednagar district livestock plays a prominent role agricultural development. Goat and sheep combine occupied first rank while cattle occupy second rank out of total livestock population in district. During the period of investigation cattle and other livestock share was declined by 6.44 and 6.4 percent respectively while buffaloes and goat and sheep share was increase by 4.63 and 8.2 percent respectively.

According to census 1991, 81.18 percent (2839454) population was receding in rural area while in 2011, 79.90 percent receding in rural area. The literacy rate of district was 61.03 percent and male literacy is more than female. Population density of district has 198 and 267 persons per square kilometer during 1991 and 2018 respectively. During the period of two decade density such as crude, physiological and agricultural increased in district. The use of high yielding variety of seeds and consumption of chemical fertilizers was higher in north parts of district compare to southern parts. During 2018-19 in *kharif* season 27212 thousand ton and in *rabi* season 58552 thousand ton HYV seeds used in the district. The total fertilizer consumption was 424662 metric ton in 2018-19. During the period of investigation major, sub and weekly market centers increased by 1, 5 and 40 respectively.

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