Research Paper   **Geography**

Spatial Variations in Agricultural Productivity of Dharwad District in Karnataka State

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ABSTRACT

Agriculture is not only an important economic activity but also a farm of social heritage and a way of life for the millions of Indian farmers. The agricultural sector in India contributes nearly half of the national income, provides jobs to about 3/4th of the population and supplies bulk of the goods and raw materials required by the non-agricultural sectors. Transport, marketing, processing and other aspects of agriculture production and utilization have also high bearing on the national economy. Therefore, the agriculture in India continues to be an area of vigorous research interest for the social and natural scientists. In some parts of India, progress in irrigation and farm practices have touched the basic problems of low agricultural productivity and rural poverty. Climate is one of the major physical factors influencing on Indian agriculture. Due to uncertainty of monsoonal rains, agriculture in India is not developing uniformly besides other constraints such as life quality of soil and infrastructural facilities. Therefore, Geographers can certainly play their role in understanding the problems of land use and agriculture of all the regional level like micro, meso and macro. In this regard Dharwad district which is a conglomeration of wet and dry weather features and also the mixture of different soils and irrigated and dry cropping system represents a typical region to study the agricultural geography in general and agricultural productivity in particular.

Keywords : Food, poverty, production, productivity, malnad, maidan

STUDY AREA: Dharwad district is located in the western sector of the Northern half of Karnataka state. The district encompasses an area of 4263 sq km laying between the latitudinal parallels of 15°-01 N to 150-451 North and longitudes of 740-451 to 750-301 East. The district is bound on the north by the district of Belguam, on the east by the district of Gadag, on the south Haveri and on the west by Uttar Kannada district. All these districts, which surround Dharwad district, belong to Karnataka state itself (Fig 1). The district lies approximately about 800 meters above the Mean Sea Level, that is why it enjoys a moderate and healthy climate. The district may be divided into 3 natural regions, viz., the Malnad, Semi-Malnad and Maidan. These regions, on an average, receive moderate to heavy rain fall and have dense vegetation. Kalghatagi taluk and Alnavar of Dharwad taluk in particular receive more rain fall than other taluks of the district (Fig 2). Administratively it consists of 5 taluks viz. Dharwad, Hubli, Kalghatgi, Kundgol and Navalgund, 6 urban agglomerations, 127 village panchayatas, and 372 inhabited villages As per the 2011 census the total population of the district is 1846993, out of which 939127 male and 907866 is the female population, while 45.02% of rural and 54.97% urban population, the density of the population of Dharwad district is 434 persons/per sq km. The literacy rate in Dharwad district is 80.30%, while sex ratio is 967 females per 1000 males. The district is a place for people belonging to various religions like Hinduism, Islam, Jainism and Christianity. The study area is distributed in three important river basins viz. the Bennihalla basin which covers Navalgund and Hubli taluks, and Bedti and Tatti hall covers Dharwad and Kalghatgi taluks. These three tributaries drain about 27 per cent of the total area under study, and play an important role in the irrigation facilities of the area. On the agricultural front, the presence of black soil helps in raising crops like cotton, wheat, ragi, jowar and oilseeds and that of red soil is more suitable for paddy.

OBJECTIVE OF THE STUDY
1. In order to know the spatial variation of the yield levels of important crops which highlight the productivity of different crops in Dharwad district during 2007-08
2. To examine the taluka wise spatial variations in agricultural productivity during 2007-08

3. To regionalize the agricultural productivity in Dharwad district

METHODOLOGY:
In this study an attempt has been made to determine agricultural productivity of major food crops in Dharwad district by applying M. G. Kendall's ranking coefficient method. Since this method is well suited to the study of agricultural productivity than any other methods mentioned below. The sources of date of the present study depends upon the secondary data, collected from the District Statistical Office , Dharwad for the year 2008-09, published by the Directorate of Economics and Statistics, Government of Karnataka.

DHARWAD DISTRICT   LOCATION MAP
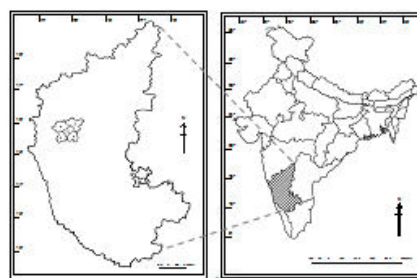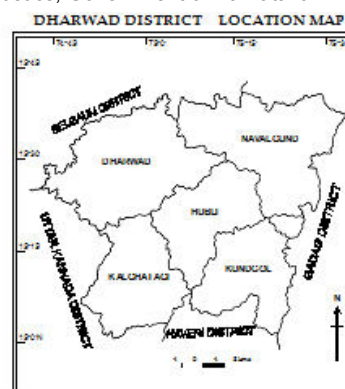
DHARWAD DISTRICT AGRICULTURAL ZONES
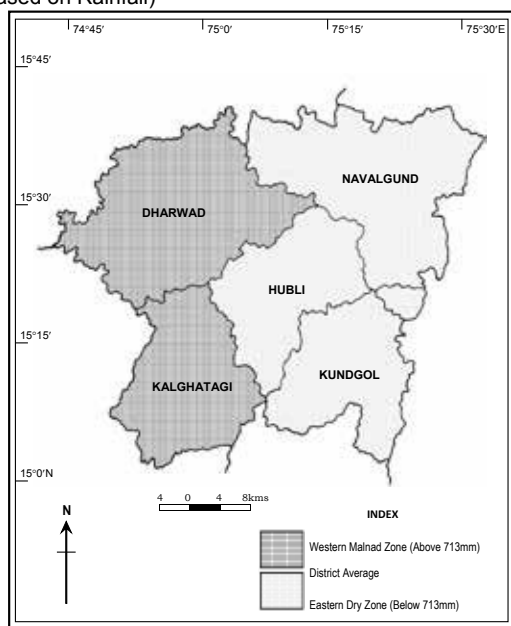(Based on Rainfall)

Fig. 2

ANALYSIS: The district has total Geographical area of 427329 hectares. Out of which 8.24% of land under forest. The net sown area accounts for 72.53% the non-agriculture land is 6.08%, the fallow land is 12.23% and cultivable waste land is 1.50%. From the above data it reveals that, the district has good percentage of land under agriculture. The forest land is more concentrated in Kalaghatagi taluk (28.39%), Dharwad (12.23%) and Hubli (2.75%) taluks have land under forests. There is no forest land in Kundagol and Navalgund taluks (Table 1& Fig 3). It is a known fact that, forests play an important role in maintaining the environmental and ecological balance of an area. The only malnad zone consisting of Kalaghatagi and Dharwad (Part of it) taluks has monsoonal deciduous forest. In the rest of the part of Dharwad District the forest is bushy, thorney and desert type. It is advisable that in the district more land under forests can be brought by making a wise plan of reallocation of existing land use. In this regards the land which is fallow 8.05%, cultivable waste land 1.50%, and land not available for cultivation 6.08% can be utilized for forest growth of different botanical varieties, depending upon rainfall distribution and soil type. If this is materialized the district will have 23.81 % land under forest, which is an almost approved figure for maintenance of ecological setting of a region. However, while making this plan the taluks that have very less percentage of land under forest should be considered on top priority for afforestation. The general land use in the district exhibits that 72.53% of land is devoted for cultivation and with a good sign for the development of agriculture.

DHARWAD DISTRICT
Table No.1 GENERAL LAND UTALIZATION IN-2008-09
(Area in Hectares)(Figures in Brackets represent percentage)

Sl No	Name of Taluks	Geographical Area	Net sown Area	Forest Area	Non-Agril. Area	Culti-Waste Land	Fallow Land
1	Dharwad	111788	71740 (64.17)	13676 (12.23)	9188 (8.21)	3490 (3.12)	13694 (12.27)
2	Hubli	73707	50449 (68.44)	2033 (2.75)	6300 (8.54)	776 (1.05)	14149 (19.19)
3	Kalghatagi	68757	41407 (60.22)	19526 (28.39)	4634 (6.73)	1504 (2.18)	1686 (2.45)
4	Kundgol	64859	60667 (93.53)	- -	1783 (2.74)	581 (0.89)	1828 (2.81)
5	Navalgund	108218	83804 (77.43)	- -	3397 (3.13)	69 (0.06)	20948 (17.79)
	Dist Total	427329	308067 (72.09)	35235 (8.24)	25802 (6.08)	6442 (1.50)	52305 (12.23)

Source: Dharwad District at a Glance, 2008-09

DHARWAD DISTRICT GENERAL LAND UTILIZATION 2008-09

Fig.3

AGRICULTURAL PRODUCTIVITY:
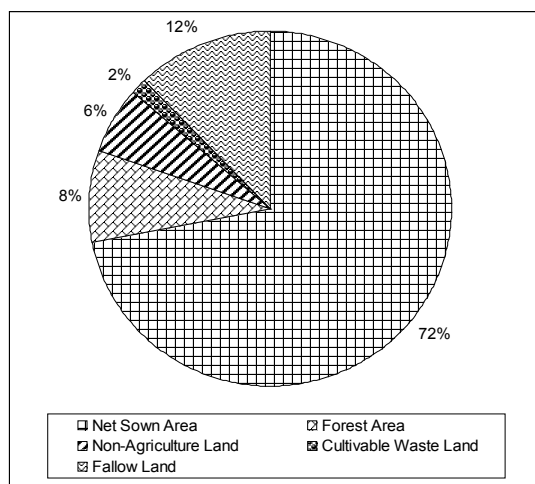Agricultural productivity is an important indicator to show the spatial pattern of agricultural development in Dharwad district. A study would help the planners in preparing the future perspectives in agricultural development on a rational basis and to reduce the regional disparities. Studies on crop productivity are very important in the countries where food requirements need constant attention to feed its teeming millions. Increasing in crop production is inevitable in a country like India as the areal spread of cropland has already reached its saturation limit. Studies on agricultural productivity are significant in countries like India where the food problem is acute and horizontal expansion of agriculture is impossible. It may even be noted here that after more than a decade of "Green Revolution" Indian agriculture has yet not been able to break the chains of under development and food shortage persist in some parts of the country. In recent years many attempts have been made to define the connotation of agricultural productivity and hence a considerable amount of literature exists on these subjects. Agricultural productivity may be defined as the ratio of output to the input used in form production. V. K.R.V. R.ao explained that the "productivity is a physical phenomenon rather than a value concept and it describes the changing relation between output and the major inputs like land, labor and capital". S.S.Bhatia equated agricultural productivity with agricultural efficiency and defined agricultural productivity as "The aggregate performance of various crops in regard to their output per acre, but the contributions of each crop to the agricultural efficiency would be related to its share

of the crop land". Therefore, agricultural productivity is more important and is closely related to per hectare yield. Thus it is the actual performance of the land in terms of per unit area yields of crops.

Agricultural productivity is measured in the following methods:
1) Output per unit of labour applied or man hours.
2) Output is a relation to input or output input relation.
3) Output per unit area.
4) Output as expressed in terms of grain equivalent per head of population.
5) Output in terms of calories.
6) Output in terms of monetary value.

Several statistical methods have been adopted by social scientists in determining the agricultural productivity. On the basis of per hectare yield of different crops, M.G.Kendall (1939) attempted to major agricultural productivity and called as "Ranking co-efficient method" to obtain the ranking co-efficient, first the enumeration units were ranked according to acre yield for each the selected crops and then the sum of the ranks occupied by the unit was divided by the number of crops to obtain the average rank of the unit. The lower is the rank value higher is the productivity and its vice-versa. L.D.Stamp (1960) made an international comparison of agricultural productivity of twenty countries by applying Kendall's method obtain the ranking co-efficient based on the acre yield of the selected crop. In India Professor M.Shafi (1960) used this method for determining agricultural productivity of Uttar Pradesh by considering per acre yield of eight food crops.

There are as many as seven methods which can be considered for determining the agricultural productivity of Dharwad district. They are as follows:

M.G.Kendall's ranking co-efficient method, S.S.Bhatia's acre yield and share of crop land method, M.Shafi's overall yield index method, N.B.Gangully's yield index method, Sapre and Deshapande's weighted ranking co-efficient method, G.Y.Enyedi's per hectare yield index method, and E.Dayedi's land productivity and labour productivity method.

The methods mentioned above suffer from one or other weaknesses. In fact there is a wide controversy over the concept, controversy and approaches to major agricultural productivity

as if is not only a natural phenomena but also a product of human ingenuity which is reflected in the individuals subjectivity and perforce in selecting the criteria in determining the agricultural productivity of a region.

REGIONS OF AGRICULTURAL PRODUCTIVITY:
As per M. G. Kendall's method the results have been grouped into three broad categories of agricultural productivity regions based on the mean and standard deviation techniques (Tables 2&3).

HIGH AGRICULTURAL PRODUCTIVITY REGIONS:
During 2008-09 two taluks viz. Hubli and Navalgund appears in this category. These two taluks fall under dry farming regions. The facilities extended by the government might have influenced the farmers to grow more food /cash crops. Besides this, the fertile soil, use of fertilizer pesticides and insecticides have also played an important role to bring these taluks under high productivity regions. In Navalagund and Hubli taluks, the irrigation facility extended by right bank canal of Malaprabha river project has influenced the farmers of these taluks to grow more than three crops a year. Assured irrigation facility, black cotton soils use of HYV seeds, fertilizers, pesticides and the use of modern farm technology have made in these taluks as high productivity. Besides this, timely arrival of monsoon rain also plays an important role to bring these taluks under high productivity region.

MEDIUM AGRICULTURAL PRODUCTIVITY REGIONS:
In the medium range of agricultural productivity region, during 2008-09 there are two taluks viz Dharwad and Kundagol. Because the low fertility of soil, lack of irrigational facility in these taluks and storage of rain water or ill distribution of rainfall must have caused this taluks to fall in this medium productivity region.

LOW AGRICULTURAL PRODUCTIVITY REGIONS:
During 2008-09 only one taluk i.e. Kalaghatagi fell under low agricultural productivity region, because the farmers are in traditional minds. This kind of situation in Dharwad district calls for further investigation. However as the researchers are aware of the situations of this taluk (Kalaghatagi), it is to be noted that the availability of irrigation and intensity of modernization in agriculture have profoundly played their role for very high yield (Table 4 & Fig 4).

DHARWD DISTRICT
SELACTED CROP LAND USE 2008-09
Table 2 (Area in Hectares)
(Figures indicates in Bracket Percentages)

Sl No	Taluks	Paddy	Ragi	Jowar	Wheat	Sugar Cane	Maize	Other Cereals	Gram	Tur	Other Pulses	Spices	Oil seeds	Cotton
1	Dharwad	11627 (11.37)	18 (.01)	17402 (17.65)	7526 (7.6)	2185 (2.21)	6295 (6.38)	1225 (1.24)	14326 (14.53)	1358 (1.37)	9433 (9.57)	952 (0.96)	22290 (22.61)	3931 (3.98)
2	Hubli	349 (0.44)	4 (.05)	10566 (13.34)	6700 (8.46)	43 (0.05)	3896 (4.9)	908 (1.14)	4176 (5.22)	863 (1.08)	6632 (8.37)	10411 (13.14)	13355 (16.86)	21280 (26.87)
3	Kalgatagi	10617 (21.19)	3 (.05)	6897 (13.76)	156 (0.31)	402 (0.80)	1629 (3.25)	491 (0.98)	102 (0.20)	200 (0.39)	5053 (10.8)	309 (0.61)	15338 (30.62)	8893 (17.75)
4	Kundagol	283 (0.28)	110 (.11)	9231 (9.21)	7453 (7.49)	00	761 (0.76)	281 (0.28)	2338 (2.34)	650 (0.65)	5435 (5.4)	26974 (21.08)	20821 (20.92)	25154 (25.28)
5	Navalgund	27 (0.02)	00	14330 (10.94)	17072 (13.04)	00	18188 (13.89)	00	15626 (11.93)	103 (0.07)	21942 (16.76)	8529 (6.51)	17358 (13.25)	17731 (13.54)
	District	22903 (5.57)	135 (.02)	58426 (12.76)	38907 (8.49)	2630 (0.57)	30769 (6.71)	2905 (0.63)	36568 (7.98)	3174 (0.69)	48495 (10.58)	47175 (10.29)	89162 (19.45)	76994 (16.20)

DHARWD DISTRICT
AGRICULTURAL PRODUCTIVITY 2008-09
Table 3 (As per the M. G. Kendall's Ranking Co-efficient method) (Productivity in Kg per Hectare Yield)

Sl No	Taluks	Paddy	Ragi	Jowar	Wheat	Sugar Cane	Maize	Other Cereals	Gram	Tur	Other Pulses	Spices	Oil seeds	Cotton	Total Ranks	Average Ranks
1	Dharwad Ranks----→	2282 1	230 4	1177 1	160 4	43660 1	3550 3	1709 1	321 1	421 5	270 4	576 3	1085 1	910 5	34	2.61
2	Hubli Ranks----→	1888 3	260 2	830 2	480 1	36340 2	3635 2	1066 3	122 3	689 1	385 3	580 1	577 3	941 2	31	2.38
3	Kalghatagi Ranks----→	1942 2	210 5	450 5	120 5	31850 3	1748 5	1603 2	94 4	681 2	506 1	534 4	71 5	965 1	44	3.38

4	Kundagol	1084	242	950	510	--------	2258	736	81	600	470	580	1044	938	35	2.91
	Ranks---→	4	3	2	2		4	4	5	3	2	1	2	3		
5	Navalgund	1022	268	520	532	--------	5575	--------	281	592	116	579	524	928	33	2.53
	Ranks---→	5	1	4	1		1		2	4	5	2	4	4		

AGRICULTURAL PRODUCTIVITY REGION 2008-09
Table 4 (As per the M. G. Kendall's Ranking Co-efficient-method)

Sl No	Productivity Regions	Range of Index	No of Taluks	Name of Taluks
1	High	Below-2.60	2	Hubli and Navalagund
2	Medium	2.61-3.00	2	Dharwad and Kundagol
3	Low	Above-3.01	1	Kalaghatagi

CONCLUSION:

In identifying the productivity of a taluk the yield, area sown, labour involved and price of the agricultural products are considered. Navalagund and Hubli taluks appeared in high agricultural productivity during 2008-09. These two taluks have shown an improvement in productivity due to the influence of Malaprabha river project. Dharwad and Kundagol taluks have appear in medium agricultural productivity region due to extremely dryness and humidity etc. The Kalaghatagi taluk falls under the low agricultural productivity region due to lack of irrigation facility lack of fertile soil and dryness conditions. Overall the agricultural productivity region in Dharwad district is under developed with the influence of Government facilities and progammes to be adopted.

AGRICULTURAL PRODUCTIVITY REGION 2008-09
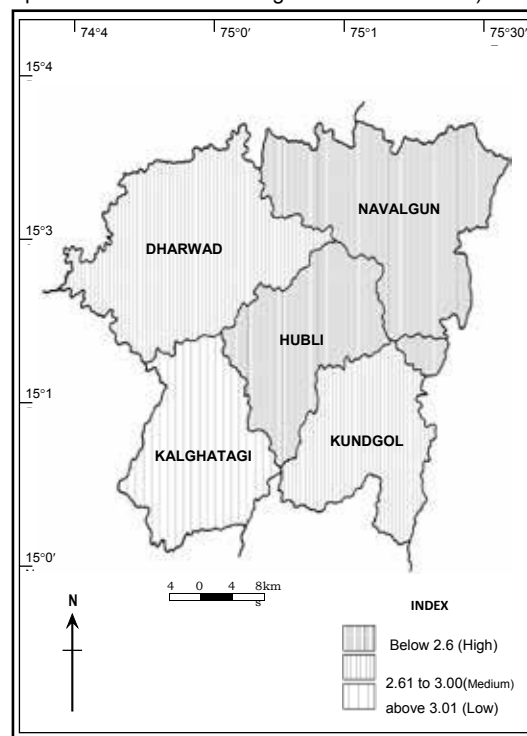(As per M.G. Kendall's Ranking Co-efficient Method)

Fig 4

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