Vol 6 Issue 6 Dec 2016 ISSN No :2231-5063

International Multidisciplinary Research Journal

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RNI MAHMUL/2011/38595 **ISSN No.2231-5063**

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GRT Golden Research Thoughts

ISSN: 2231-5063 Impact Factor : 4.6052(UIF) Volume - 6 | Issue - 6 | December - 2016

CROP CONCENTRATION IN BARAMATI TEHSIL, DISTRICT-PUNE (MAHARASHTRA) : A GEOGRAPHICAL ANALYSIS

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ABSTRACT

The present research is carried out to study cropping pattern of Baramati tehsil by highlighting areal concentration of principal crops. The regional dominance of any crop has been determined by ratio of particular crop proportion to total cropped area in the component areal unit compares to a similar ratio for the entire region. It is also an attempt to analyze the spatial variation of crop concentration in the study region during two different periods to better understanding and planning for the development of agriculture. The study region shows remarkable changes in the cropping pattern as well as concentration of crops in 2014/15 as compare to 2000/01. The dominance of cereals like jawar, wheat and bajara all over the region becomes limited to the central and north of the region whereas the concentration of oilseeds and pulses shifted to south in 214/15. While, the concentration of sugarcane remain same in the south between merging zone of Karha and Nira Rivers where adequate irrigation facilities are available during the period of investigation. The indices of crop concentration are calculated by using Bhatia's (1965) method for two different periods i.e. 2000-01 & 2014-15 for all eight administrative circles includes; Baramati, Malegaon, Pandare, Vadgaon Nimbalkar, Loni Bhapkar, Morgaon, Supe and Undavadi Kade Pathar. In order to calculate as well as compare crop concentration index data of two different periods i.e. 2000/1 and 2014/15 has been used, which further grouped into three categories: high, moderate and low to demarcate crop concentration areas.

KEYWORDS: *Cropping pattern, Crop concentration.*

INTRODUCTION

Crop concentration is generally defined as the variation in proportion of any crop in the region at a given period of time. The concentration of crops in any region is largely associated with local geo-climatic, socio-economic conditions as well as technological use. The ideal condition for the growth differs from crop to crop. Some crops like wheat requires temperature 140C to 180C, high temperature is harmful for the cultivation of wheat, whereas Jawar is cultivated in those areas where the mean monthly temperature does not fall below 15.50 C. The rich farmers with high land holding and technologically developed used to grow single crop whereas the poor farmers used to grow various crops in their farm due to tendency of sustainable farming. Therefore tendency to have higher the degree of crop concentration is observed in those areas where ideal geo-climatic conditions and technological use in agriculture is done while declines where such conditions are not favorable. The crop concentration generally measured by the technique using location

quotient or coefficient of localization. The number of geographers has made attempt to determine crop concentration by using location quotient method. By using location quotient method J.Singh (1969-70) and Dhillon (1984) identified rice concentration regions of India. The crop concentration is considered as one of the most important indices which give detailed information about cropping pattern of any region; therefore it is needed to study crop concentration for agricultural development.

STUDY AREA

The study region is located in eastern part of Pune district of Maharashtra state. It extends between $18^{0}2'44''$N to $18^{0}23'19''$North latitudes and $74^{0}13'8''$E to $74^{0}2'47''$East longitudes. It is located at an altitude of 538 m from mean sea level (Fig.1). It is surrounded by Daund tehsil to the north, Satara district to the south, Indapur tehsil to the east and Purandar tehsil to the west. It has an area of 1382.48 square kilometer. The tehsil is drained by two non-perennial rivers namely, Nira river and its tributary river Karha. The river Nira flows from west to east forming the southern boundary of the tehsil as well as district while, Karha river flows from north-west to south-east. It is located in Karha river basin and between merging zone of the Nira and Karha rivers. The study region has 116 villages with total population 429600 persons with 221094 Males and 208506 Females as per the 2011 census, which contributes 4.5 per cent to the total population of district. Population density of study area is 311 persons per square km. as per the 2011 census. The study area experiences intensive heat in the summer season which starts from March to May. The average annual temperature of the study area is 25.7 ° C. With an average of 30.7 °C May is the warmest month, followed by April with an average temperature of 30.1 ° C. During winter season in the month of December, the average temperature is 21.5 °C. The study area received average annual rainfall of 478.9 mm in 2001 and 364 mm in 2011. About 80 to 90 per cent of the annual rainfall receives in the monsoon season during June to September.

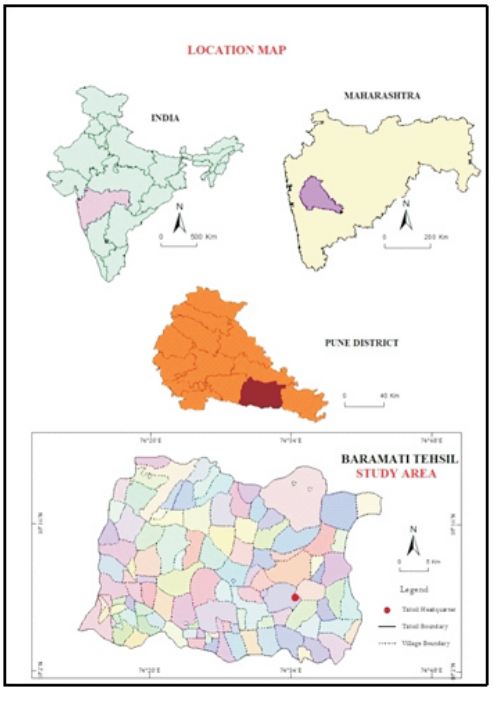

Fig 1: Location Map of the Study Area

OBJECTIVES

1) To identify crop concentration areas in study region.
2) To analyze crop concentration and its spatial variation in the study region during the period of investigation.
Database and Methodology

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The present study is based on secondary data collected by published and unpublished materials from various sources such as socio economic review of Pune district, Agriculture department of Baramati tehsil and Baramati Panchayat Samiti. In order to determine the administrative circle wise concentration of principal crops, Bhatia's (1965) method is used for the calculation of location quotient. In this technique crop concentration is calculated by relating ratio of particular crop proportion to total cropped area in the component areal unit compares to a similar ratio for the entire region. In order to determine the regional concentration of selected crops, an index value is calculated. The index values of crop concentration calculated for two different periods i.e. 2000-01 & 2014-15 and demarcated as high, medium and low. The maps which shows variation in the concentration of different crops are prepared with the help of Global Mapper 15 (64-bit), whereas statistical work has been done with the help of Microsoft excel. The following formula is used to calculate index values of concentration of crops in Baramati tehsil.

$$\text{Index of determining concentration of crop 'X'} = \frac{\text{Area of crop 'X' in the component areal unit}}{\text{Area of all crops in the component areal unit}} \div \frac{\text{Area of crop 'X' in the entire region}}{\text{Area of all crops in the entire region}}$$

PHYSIOGRAPHY AND DRAINAGE

The study area is located in eastern plateau region of the Pune district which falls under Deccan trap of Maharashtra. The highest elevation 712 meter is observed in the north-west part of the study areas and the lowest elevation of 520 meter above MSL is observed in south-east part of the region. The average height of the study region is 538 meter from mean sea level. The slope decreases from north-west to south-east. The study area has two water divides; first one is in between Karha River and Bhima River from north-west to east direction and other one is in between Nira River and Karha River from west to east direction (Fig.2). The hilly zone of north-west part with altitude ranging between 620 m to712 m coupled with shallow coarse soil remains unfavorable for agriculture. Therefore such hilly zone remains covered by shrubs and bushes.

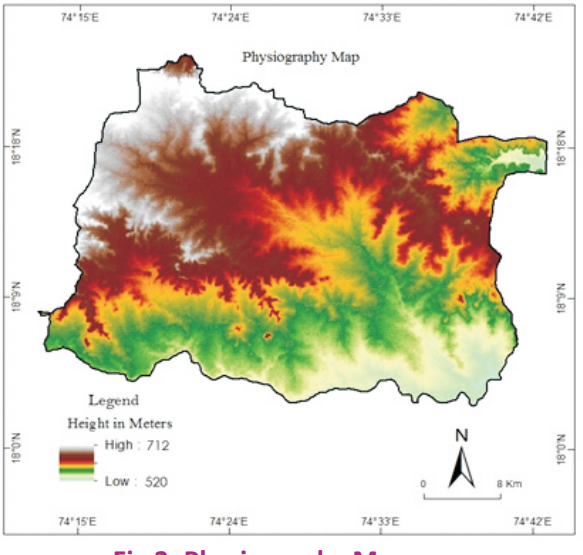

Fig 2: Physiography Map

The zone of altitude between 520 m to 600 includes riverine belts of river Karha and Nira coupled with deep black soil offers favorable conditions for agriculture. The study area is drained by two rivers namely; Nira river and its main tributary river Karha. The river Nira is main tributary of Bhima River and flows from west to east

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forming southern boundary of the study region. It also forms boundary between Pune district and Satara district. The river Karha originates near Garade village in Saswad tehsil and flows from north-west to south-east direction in the study area. These two rivers are non-perennial rivers remains dry throughout the year except monsoon season. The riverine belt of the river Karha and Nira covers about 40 to 45 percent of the total geographical area of the study region. This riverine belt provides alluvial soil coupled with irrigation facilities leads development of agriculture. Therefore 70 to 80 percent of NSA belongs to merging zone of these two riverine belts (Fig.3).

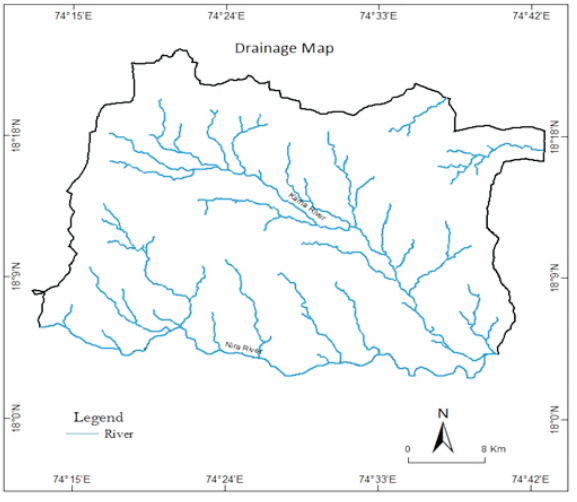

Fig 3: Drainage Map of the study area

Soil

The study area has four types of soils namely; deep black soil, slightly deep black soil, shallow coarse soil and shallow clayey soil (Fig.4). The deep black soil found only along the bank of Nira River in south-west parts of the study area. The presence of humus in the soil imparts its black or dark brown color. This soil is moderately well drained, fine calcareous soil with high retentive capacity, which means it is rich in moisture. The depth of this soil is more than 100 cm. It does not contain adequate nitrogen but it contains sufficient phosphorous required for the growth of the plants. This soil is considered as most fertile soil and suitable for commercial farming like sugarcane, vegetables, and wheat. The second type of soil is slightly deep black soil, found in southern part of the study area and surrounding areas of the Nira and Karha River. It is well drained, moderate black in color, fine and calcareous soil having depth of 75 to 100 cm. It covers 50 per cent of the total geographical area of the study region and suitable for the cultivation of cash crops like sugarcane. It is also suitable for the cultivation of wheat, pulses and oil seeds. The shallow coarse soil is found in the hilly parts of north-east and along the northern boundary of the study region. This soil is found in the depth of 25 to 50 cm and characterized by slight stoniness. It is reddish brown in color due to oxidation and poor in humus content. Therefore, it does not support agriculture thus remain barren or covered by shrubs and thin grass. The last one type of soil is shallow clayey soil. It is light brown to reddish brown in color and clayey in texture having depth of 25 to 50cm. This soil is found in the surrounding areas of Karha River next to slightly deep black soil zone. It does not support agriculture because poor humus content in it, therefore it is less fertile in nature.

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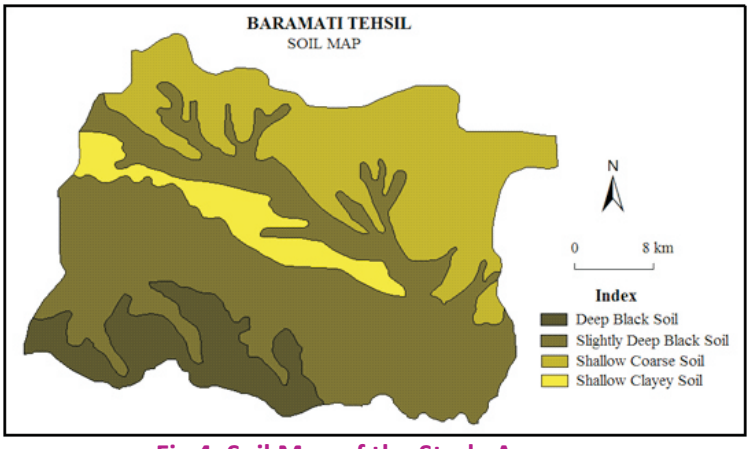

Fig 4: Soil Map of the Study Area

Jawar

It observed from the table: 1 that, high to moderate level of change in the concentration of Jawar is observed in Loni Bhapkar whereas moderate to low concentration change is recorded in Baramati, Pandare and Vadgaon Nimbalkar during the period of investigation. All these circles shows decrease in the concentration of Jawar because farmers tends to grow cash crops like sugarcane, fruits and vegetables due to availability of favorable conditions like irrigation facilities and alluvial soil. No change in the concentration of Jawar is recorded in Malegaon, Morgaon, Supe and Undavadi Kade Pathar in 2014/15 as compare to 2000/01. Jawar is the crop which can be grown in both the seasons that is kharif and rabbi. Out of the all cereals larger proportion of the study area is covered by Jawar because it is considered as rain fed crop of dry farming, therefore it is known as staple crop in the study region (Fig.5).

Wheat

There is high to low level of change in the concentration of wheat is observed in Baramati and Vadgaon Nimbalkar while high to moderate concentration change is recorded in Malegaon and Pandare during the period of investigation(Fig.5). Whereas Supa and Undavadi Kade Pathar recorded positive growth i.e. low to moderate change in the concentration in wheat in 2014/15 as compare to 2000/01. No change in the concentration of Wheat is found in Loni Bhapkar and Morgaon during 2000/1 and 2014/15. The study region shows shift of crop concentration of wheat from south towards the north.

Bajara

The study region shows high to low level of change in the concentration of Bajara in Baramati and Pandare whereas moderate to low concentration change is recorded in Malegaon and Vadgaon Nimbalkar during the period of investigation (Fig.6). Moderate to high changes in the concentration of Bajara observed in the Loni Bhapkar and Undavadi Kade Pathar. There is no change in the concentration of Bajara is found in the areas of Morgaon and Supe.

Sugarcane

High to low level of change in the concentration of Sugarcane is observed in Loni Bhapkar while high to moderate concentration change is recorded in Baramati during the period of investigation. Out of these two circles, Baramati shows decrease in the concentration of sugarcane in 2014/15 as compare 2000/01, due to urbanization as well as industrial development. There are no changes in the concentration of Sugarcane found in the areas of Malegaon, Pandare, Vadgaon Nimbalkar, Morgaon, Supe and Undavadi Kade Pathar because above circles are situated in the Southern part of study region where conditions are favorable for the growth of sugarcane ex. deep to slightly deep black soil and irrigation facilities from Nira river and Nira left canal (Fig.6).

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Table 1: Administrative Circle wise Crop Concentration in Baramati Tehsil

Revenue Circles	Years	Crops							
		Jawar	Wheat	Bajara	Sugarcane	Oilseeds	Pulses	Fruits	Vegetables
BARAMATI	2000/1	0.66	2.15	1.26	4.16	0.75	0.43	2.09	0.47
	2014/15	0.33	0.92	0.27	1.86	0.09	0.91	4.60	0.43
MALEGAON	2000/1	0.38	2.60	0.73	3.30	0.65	0.28	2.33	0.51
	2014/15	0.04	1.22	0.08	2.62	5.29	1.49	0.89	0.19
PANDARE	2000/1	0.52	2.16	1.21	3.1	0.62	0.27	1.20	0.39
	2014/15	0.06	1.87	0.11	2.54	1.35	1.04	0.82	0.35
VADGAON NIMBALKAR	2000/1	0.56	2.73	0.88	2.49	0.83	0.28	1.27	1.33
	2014/15	0.36	0.86	0.41	2.21	0.91	1.00	0.65	0.76
LONI BHAPKAR	2000/1	1.13	0.54	0.84	3.35	1.67	1.26	0.76	0.93
	2014/15	0.53	0.50	1.00	0.30	0.33	1.02	0.71	1.17
MORGAON	2000/1	1.25	0.60	1.30	0.30	0.74	0.81	0.58	0.99
	2014/15	1.68	0.40	1.59	0.18	0.63	0.88	0.34	0.94
SUPA	2000/1	1.19	0.27	1.00	0.26	1.12	1.61	0.81	1.03
	2014/15	1.35	1.02	1.96	0.08	0.99	0.95	0.72	1.91
UNDAVADI KADE PATHAR	2000/1	1.21	0.44	0.89	0.22	0.87	1.28	0.55	1.51
	2014/15	1.45	1.31	1.27	0.23	0.22	0.95	0.89	1.04

Source: Socio-Economic Abstract of Pune District, Computed by the researcher.

Oilseeds

The increase in the concentration of oilseeds from moderate to high level is observed in Malegaon and Pandare while decrease in the concentration of oilseeds from high to low and moderate to low recorded in Loni Bhapkar and Baramati, Supa and Undavadi Kade Pathar during the period of investigation (Fig.7). There are no changes in the concentration of Oilseeds found in the areas of Vadgaon Nimbalkar and Malegaon.

Pulses

The circle Supa and Undavadi Kade Pathar recorded decrease in the concentration of pulses from high to moderate whereas increase in the concentration of pulses from low to high level is observed in Baramati, Malegaon, Pandare and Vadgaon Nimbalkar in 2014/15 as compare to 2000/01.No changes in the concentration of pulses found in the areas of Loni Bhapkar and Morgaon during the period of investigation (Fig.7).

Fruits

The Malegaon recorded decrease in the concentration of fruits from high to low while moderate to low level found in the areas of Pandare and Vadgaon Nimbalkar (Fig.8). These are the areas where sugarcane becomes dominant crop due to availability of two co-operative sugar factories situated in Malegaon and Someshwar. There are no changes in the concentration of fruits observed in the areas of Baramati, Loni Bhapkar, Morgaon, Supa and Undavadi Kade Pathar during the period of investigation.

Vegetables

The increase in the concentration of vegetables from moderate to high level is observed only in Loni Bhapkar while decrease in the concentration of vegetables from high to moderate and moderate to low recorded in Vadgaon Nimbalkar and Malegaon respectively during the period of investigation. No changes in the concentration of vegetables found in the areas of Baramati, Pandare, Morgaon, Supa and Undavadi Kade Pathar (Fig.8).

CONCLUSION

Crop concentration in any region is the reflection of local physiography, climate, technology and socio-economic conditions. The study region is located in eastern part of the Pune district, which falls under drought

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prone area of the Deccan trap of Maharashtra state. There is decrease in net sown area about 2.31 percent in 2014/15 as compare to 2000/01. The study region recorded highest concentration of crops in southern part than the rest due to favorable conditions like deep to slightly deep black soil and irrigation from Nira river as well as Nira left canal while northern part records less concentration of crops due to unfavorable conditions like adverse relief conditions, shallow coarse soil and lack of irrigation during the period of investigation. Among all crops, sugarcane and other cash crops like fruits and vegetables replaces cereals in most of the part of study region. The southern part of the study region shows huge increase in the concentration of sugarcane due to two co-operative sugar factories situated in Malegaon and Vadgaon Nimbalkar circles while cereals like Jawar, Wheat and Bajara records decrease in the concentration because most of the farmers tend to grow cash crops in their field. The study region also shows shift in the concentration of pulses and oilseeds from northern part to southern part. The central and northern part of the study region shows increase in the concentration of wheat and bajara as well vegetables. There is decrease in the concentration of crops from south to north in study area; therefore it is needed to make integrated efforts to develop irrigation facilities and general awareness about which crop should grow according to local conditions to reduce regional agricultural disparities.

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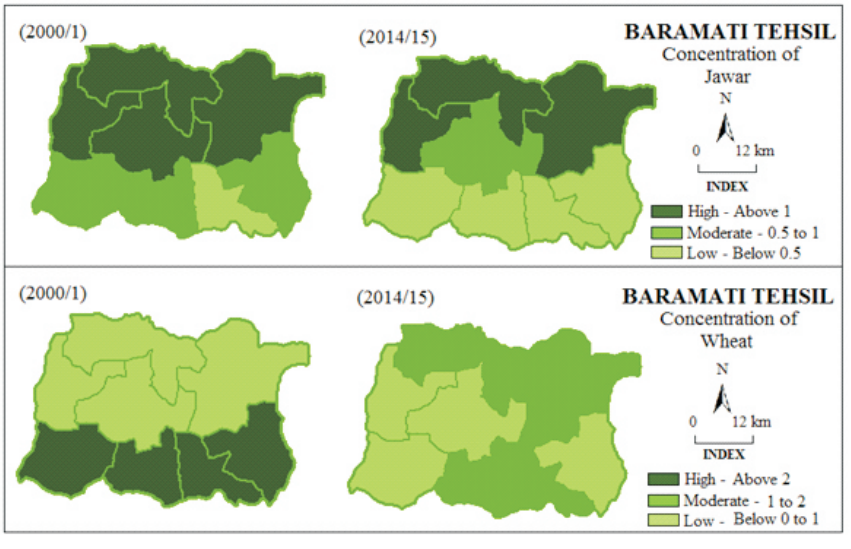
Administrative Circle wise Crop Concentration in Baramati Tehsil



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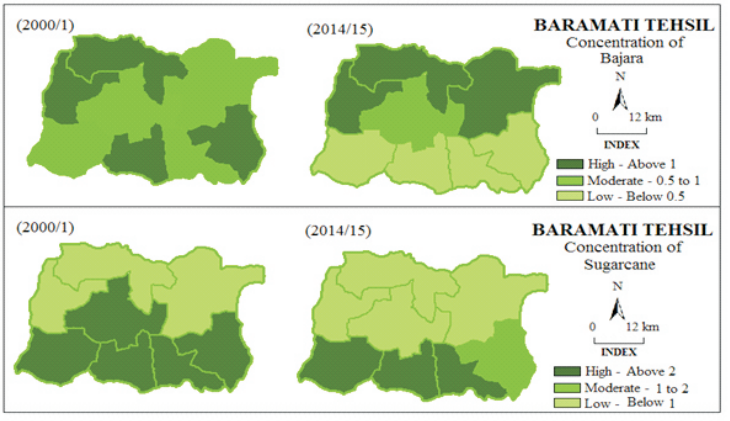

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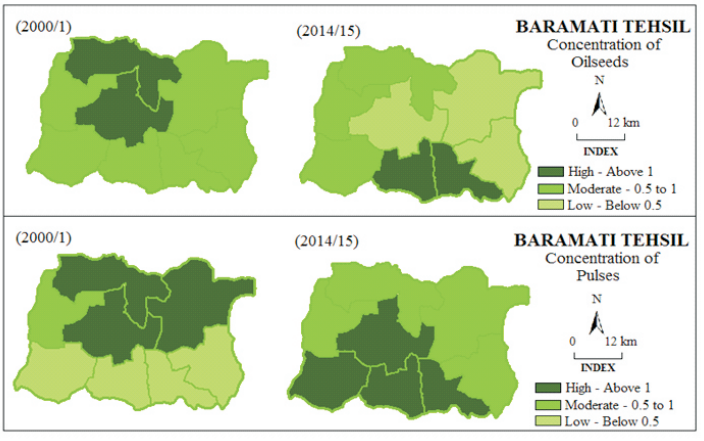

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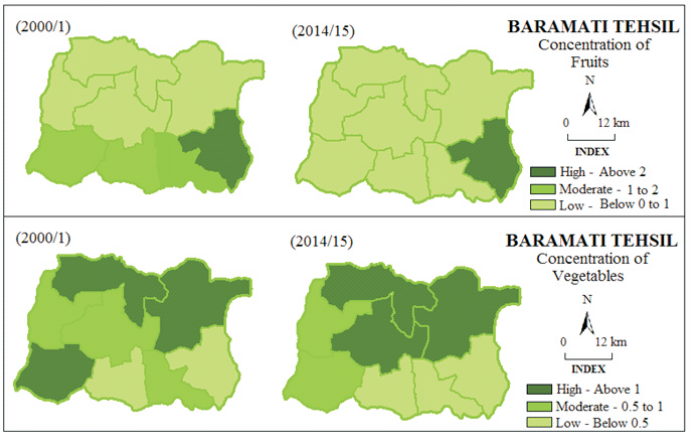

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