IOSR Journal Of Humanities And Social Science (IOSR-JHSS)
Volume 22, Issue 8, Ver. 13 (August. 2017) PP 36-48
e-ISSN: 2279-0837, p-ISSN: 2279-0845.
www.iosrjournals.org

Regional Disparity in Agriculture Development and Food availability Status- An inter-district study of West Bengal.

[*]Mr. PrasenjitBarik,
PhD scholar at Tata Institute of Social Sciences (Mumbai).
Corresponding Author: Mr. PrasenjitBarik

Abstract: The issue of widening regional disparities in agriculture is a growing concern for balanced development especially those state's economy directly depends on agriculture activity. The balanced agriculture development is retarded due to the wide geographical condition and modern infrastructure facilities. In view of this, the present study has an attempt to measure the inter-district disparity in agriculture development of 18 districts from West Bengal. This study also attempts to find out the food availability status of the state. The geographical concentration ratio and GIS(geographical information system) tools has been used to findoutthe disparity configuration. Simultaneously the study find out the impact of agro-climatic condition, infrastructure facilities and population growth on agriculture development and food availability status. The study also measure the trends of regional disparity wither it diverge or it converge. The result suggests large disparity exist across the districts and the regional disparity diverge over the time periods which is the barrier of balanced development. Thus, to minimizing the inter-district disparities and promote the balanced agriculture development and improve the food availability status, the infrastructure facilities should be distribute on the basis of equity, gross cropped area, productivity, and sustainability.

Keywords: Regional Disparity, Food Availability(Security), Geographical Concentration Ratio.

Date of Submission: 10-08-2017 Date of acceptance: 26-08-2017

I. INTRODUCTION

Agriculture is one of the dominant sectors of developing countries in terms of food security, poverty reductionand creating employment opportunities. Agriculture has a crucial role to national development through the economic and social contribution.Simultaneously agriculture operates as an important social welfare infrastructure in a remote location tocreating development opportunities and producing basic necessities for isolated communities. Agriculture provides subsistence occupations for millions and permits people to supply themselves with the three fundamental human needs; food, clothing, and shelter. The agriculture activity and development extremely dependent on both environmental and economic condition. The uneven distribution of environmental condition and capability to the adaptation of modern technology led to agriculture disparity in the world. The disparity in agriculture, especially in agriculture production has a direct and indirect effect on the availability of sufficient food, creating employment opportunity and over all development. Agriculture has the potential role to dominatesocioeconomic condition of a nation, especially those societiesdepend on agriculture activity. Thus the disparity in agriculture creates a lot of difference from one region to another and one society to another society through the economic and social way. The term "Regional Disparity" is defined as the difference between economic performance and welfare between countries or regions- OECD 2002 (Spiezia, 2002). The present study unfolds the regional "Disparity" of agriculture as theinter-districtdifference in productivity, land use pattern and food availability status.Nowadays it seems the issue of food security and availability of subsidizing food becomes significant more in the developing country where the population growing rapidly. Food security is to define as the availability of food and one's access to it, the World Food Summit of 1996, defined food security as existing when all people at all times have access to sufficient, safe, nutritious food to maintain a healthy and active life(Justice, 2013). Food security in present got topmost priority by the government and over the various plan periods, it seems that our country has working to increase agriculture production and providing food to every person. Agriculture is the only source of subsidizing food for a country. The present study is an attempt to find out the regional disparity in agriculture and food security of West Bengal, the state of India.The state is not a traditionally backward but accelerated growth of population has also been registered in recent decades. Simultaneously this state is diverse in its agro-climatic and geographical environment those have directly influencedbythe nature and distribution of agriculture development. Thus this study is an attempt to counter the contemporary disparity issues through addressing

those questions- Do the agriculture development and food availability equally distribute in the state? What are the food surplus and what are the food deficit districts in the state?

II. LITERATURE REVIEW.

2.1. The Disparity in India.

The previous research papers have been carried out disparities at the regional level, with using different methods and indicators. Those studies are explored the regional disparities in agriculture. A study reveals, over the time periods Uttar Pradesh has remained polarized in the Western region followed by the central region. The Western and central region witness of commercialized agriculture, adoption ofthe advanced technology and that region much influenced by green and technology revolution (Kumari, 2012). This study explains the polarization of Uttar Pradesh as the result of uneven used of fertility, adaptability of advance agro-technology and crop selection makes a huge disparity in Uttar Pradesh.

The modern agriculture development depends on high technology and infrastructure facilities. Agriculture growth analyzed considering three distinct periods since 1970-71 to 1979-80, second from 1980-81 to 1990-91 and last one from 1991-92 to 2007-08, it has been revealing the wide inter-state disparity exist in infrastructure facilities in India. On the other hand, due to uneven agro-climate, physical resource endowment, and infrastructural facilities, a huge disparity exists in the regional output of agriculture production. The studysuggesting that Punjab, Haryana, Uttar Pradesh, Tamil Nadu and Andhra Pradesh, in top position where Assam, Himachal Pradesh, and Orissa lagged behind due physical and technical differences (Banerjee, 2015).

The most of the Indian farmers are economically very poor or marginalized. On the other side, the modern agriculture extremely depends on high-yield seeds, fertilizer, and adoption of modern technology which is expensive for poor and marginalized farmers. Agriculture credits in state level in India have been distributed unequally over the time periods. The major commercial and nationalized banks credit distributed not equitably on basis of total cropped area, gross cropped area, and net irrigated area etc. Therefore uneven credit distribution influence on the adoption of technology, and use of high-yield seeds and it affected on agriculture growth and development in regional level in India (Kumar, 2012).

It has been established that agricultural infrastructure across states is highly uneven in the country. Moreover, the disproportionate distributions of public and private investment in favor of agriculturally developed states are found to be responsible for the wide disparity in agricultural performances in India, which in turn, is considered to be responsible for the wide disparity in the per capita net state domestic product across states in India (Kuri, 2015).

2.2. The Disparity in West Bengal.

There has few previous study attempts the district and block level disparity in West Bengal. A recent study presented constitute the interfluve of Ajay-Mayurakshi River, parts of Birbhum district, showing the block level disparities. The GIS (Geographical Information System) tools and statistical methods adopted in the study to explain the food availability and nutritional density. It has been suggesting that within this region there have huge disparities and the trend of disparity diverge over time periods. This region became more deficit in food, due to rapid population growth and pressure on arable land (Ghosh, 2014). This study explains theuneven growth of population and production creates the food insecurity and disparity.

Undoubtedly the trend of agriculture diversification changes the cropping pattern to contribute the agriculture development. A study examines the trend and pattern of crop diversification in West Bengal since 1980-81 to 2009-10, and suggest crop diversification have an impact on agriculture growth. During 1980-81 to 2009-10, the growth of gross cropped area in West Bengal was 0.73 per cent while the growth of net cropped area was negative (-0.16 per cent per annum). During this period almost 54 percent of growth has been contributed by yield growth, followed by cropping pattern changes (18.73%). This change in cropping pattern is largely due to increasing yield rates of food grains. Mostly the diversification seems to have taken in high-value crops or which provide a higher relative return to the farmers (Dasgupta&Bhaumik, 2014). Though the net cropped area has been decreased, the agriculture growth and productivity became high, and this is due to crops rotation and mono crops cultivation.

Infrastructure development requires for sustainable agriculture growth. Agriculture development is essential for economic development and rural poverty alleviation in developing and underdeveloped countries even in very regional context. A study on DamodarValley in West Bengal, on the uneven distribution of infrastructure facilities, suggest agriculture disparities. Though this region is highly alluvial still comprehensive infrastructure disparities causing a downfall in agriculture sector leading to disguised unemployment. Purulia, Bankura district is low facilitated in infrastructure compare to Howrah, Hooghly and this is causes of Agriculture disparities in productivity (Kumar &Sen, 2013).

A study in Nadia, show flower concentration zone of the district. The study unfolds the block level disparities existdue to the micro level regional variation of the agroclimatic environment, economic status of the

farmer, technological application in agriculture, marketing facilities, transport system, and trade system are responsible for the development and backwardness of floriculture (Biswas, 2013).

The above literature constructed a frame of disparities and its causes in the regional level in India and West Bengal. The more of the previous study explain the national and state level agriculture disparities is the result of agro-climatic variation, uneven distribution of the government facilities, agriculture credit, and infrastructural facilities. The implementation of regional policy is framed by the government by thinking the state as a homogenous unit which is not true. Thus it is much more needed a study which should find the disparities in agriculture and food availability status in very regional context. Simultaneouslythe measuringof regional disparities would help area specific plan and policies in a better manner. There have a gap and no such study which can focus on the whole scenario of disparity in agriculture and food availability of West Bengal. Hence this study is an attempt to build an understanding of district-level variation and its causes in the point of theagro-climaticcondition, infrastructure facilities and it would bring the relationship between population growth and availability of sufficient food. The study also focuses on the causes behind regional disparity which is already responsible for national and regional level, how much it effects in district level in West Bengal.

III. RESEARCH PROBLEMS AND NEEDS FOR THE STUDY.

3.1. Regional Inequality a Global Challenge.

Nowadays it seems inequality as a global challenge and an important aspect of the academic study. It liesattheheartof currentdebatesaboutopportunityandequity,implicatingnumerous contemporarypolicyissues. The equality is necessary as national income does not improve the development after a certain point, but the greater equality does. WorldmoreunequalcountrylikeUSA,UK,Portugal,and Singaporehave existedmore socialproblems than the equal country likeJapan, Norway, Sweden (Pickett, 2010). It isnottruethatinequalityisaproblemforpoor–indifferentways,peoplebecameworsein highlyunequalsocieties,andcrimeratesarehigher.Sogenerallythereismorechanceofbeingrobbed, trustis lower. Peopletrusteachotherlessinunequalsocieties.Greaterincomeinequalitiesincreasestatuscompetitionanditprovidesfertilesoilforthegrowthofmistrustandisolation(*ibid*).

From theclassicalperiodstopresent,thereisageneralbeliefthatdevelopmentisbound tobeundemocraticbecauseitdoesnottakeplaceineverydimensionof acountryornation simultaneously.Sinceallthenationsor countriesareneverunifiedon boththeparts-physicalandhumanresources,sotheimbalanceintheprocessofgrowthanddevelopmentiswidelypresentin theworld,moreover,in thedevelopingcountries,itisseenwidely(Saikia, 2012). The present study area West Bengal have the same diversity in thephysical environment. Hence it's the time to explore the balance among environmental condition, agriculture development, and food security.

3.2. The Importance of Agriculture.

Agriculture is one of the major fields where more than 75% rural population engaged. It plays a vital role in the Indian economy. Over 70 percent of the rural households depend on agriculture. Agriculture is an important sector of Indian economy as it contributes about 17% to the total GDP and provides employment to over 60% of the population. Indian agriculture has registered impressive growth over last few decades. The food grain production has increased from 51 million tons (MT) in 1950-51 to 250MT during 2011-12 highest ever since independence (Arjun, 2013).

Now almost 70% population's livelihood depends on agriculture. Before Neo-liberalization Indian farmers across the country had access from domestic institutions but after the liberalization, India's seed market opens to global agriculture business. This also opens in fertilizers and pesticide market and it makes a huge change in Indian agriculture. Liberalization and its resulted government policies had direct and indirect effectson agriculture (Pradhan, 2014). Hence it is important to unfold how the agriculture productivity changed after implementation ofNeoliberal policy in West Bengal and simultaneously to known the regional configuration of agriculture development as agriculture is the dominant sector of West Bengal economy.

3.3. The Food Security(availability).

The National Food Security Act, 2013 (also right to food security act) is an act of Parliament of India which aims to provide subsidized food grains to approximately two-thirds of India's 1.2 billion people (Justice, 2013). Food security in present got topmost priority by the government. Over the various plan periods, it seems that our country has working to increase agriculture production and providing food to every person. Food security is the availability of food and one's access to it- the World Food Summit of 1996, defined food security as existing when all people at all times have access to sufficient, safe, nutritious food to maintain a healthy and active life (FAO, 2006). The present study trying to examine district level food availability of West Bengal and find out the food surplus and food deficit district.

3.4. Influence of Geographical Environment.

Geographyis a master key behind the disparity in economic development. Worldwide the countries in the geographical tropics are nearly all poor, And almost high-income countries are located in the mid-high latitudes. Also, it seems that coastal economies are generally higher income compare to landlocked economies. Even after two centuries of modern economic growth, a large portion of the world remains mired in poverty. Some benefit of this, especially gain life expectancy and reduced infant mortalityhas spread to nearly all parts of the world. Of course, it is not everything. But there are 23 countries with the most favored combination of geography and politics- Northern Hemisphere, temperate zone, coastal, non- socialist and non-war torn- with an average income of $5,190. (Gallup et al, 1999). Similarly India's great mass of the population, for example, lives in the Genetic valley, often hundreds of kilometers from the coast. Hence this pattern prompts the questions that how much geography matter for economic development and regional disparities? If geography is mattered in the past, how much does it still today? Is there have an equal development within a same geographical condition or there have disparity? Similarly, the study area is one of the diverse states in its physical and agro-climatic condition. Thus this study would find out the environmental condition and how much effect on the agriculture production in West Bengal.

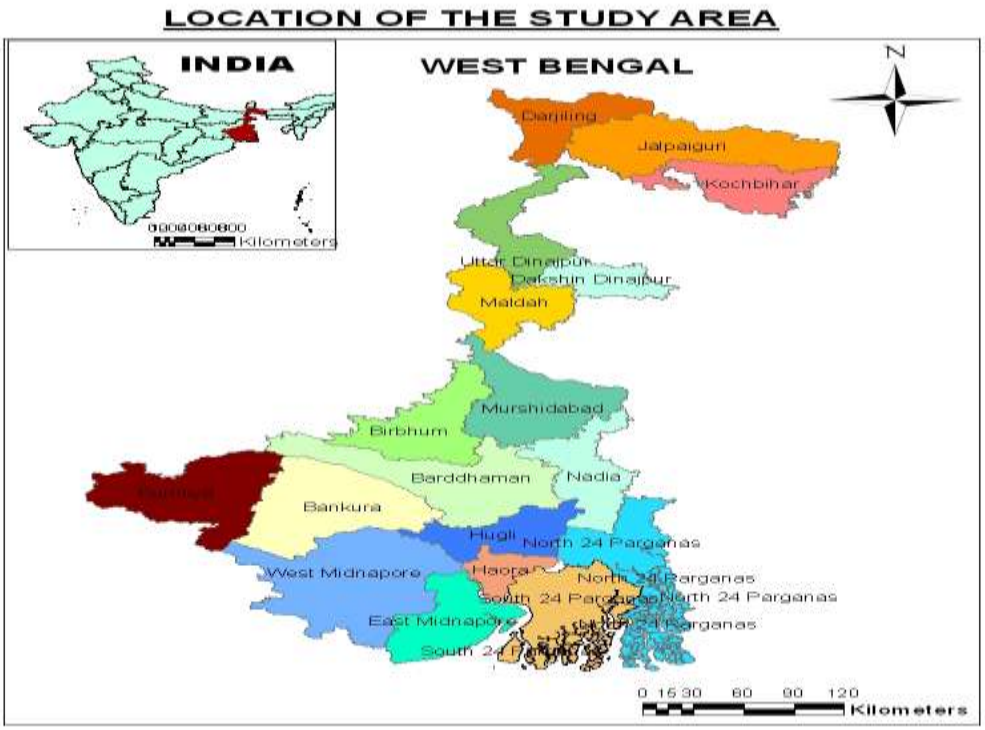
IV. OBJECTIVES OF THE STUDY.

The major objectives of the study as follows- 4.1. To find out the regional disparity in agriculture productivity, land used and food availability status.4.2. To examine the trends of regional disparity in West Bengal since 1990 to 2011.4.3. To explain the major causes of regional disparity.

V. METHODOLOGY.

5.1. Study Location.

West Bengal is only one state of the India which is extended from Himalaya to the Bay of Bengal. This is situated in the eastern part of the country. The latitudinal extension of the state is between 21o20' and 27o32' north and in longitudinal extension is 85o50' and 89o52' east. The area of the state is 88,752 sq km which is 2.7 % of theCountry's total area. The state has two distinct natural divisions - the Northern Himalayan region and the Southern Alluvial plains. In the north three main rivers, namely, Teesta, Torsa, and Jaldhak flow which are tributaries of Brahmaputra's. The other two important rivers passing through the state are Ganga and Hooghly.



Source- Maps are extracted and prepared from reliable sources and others compiled by the author.

The Ganga drains into the Bay of Bengal forming the famous delta of Indian Sunderbans (Bengal, 2010). The state is diverse in its physical structure and agro-climatic condition from the upper part to lower coastal region.

5.2. Database.

The entire study based on secondary and quantitative data. All data collected and tabulated from different sources. The study used district as a unit and focus on 1990-91 to 2010-11. Agriculture related data and population data are collected from the statistical abstract, published by the Bureau of Applied Economics and Statics, Government of West Bengal.

5.3. Methods of Inquiry and Analysis.

5.3.1. Disparity Pattern- The pattern of regional disparity in agriculture and food securityexamine with different parameters. The study included the agriculture production,Gross cropped area, Net cropped area,

PD $= \frac{TP}{TCA}$ PD = Physiological Density (Nutrition density). TP= Total Population. TCA = Total cultivated Area.
Food Security (Food availability status by GCR method) $\boldsymbol{FS = CIAP - CIP}$ **CIAP** = Concentration Index of Agriculture Production **CIP**= Concentration Index of Population **CIAP** = $\frac{TAPD/TCAD}{TAPS/TCAS}$ **GCR**= Geographical Concentration Ratio**.** **TAPD**= Total Agriculture Production of District. **TCAD**= Total Cultivated Area of the District. **TAPS**= Total agriculture production of the state. **TCAP**= Total Cultivated Area of State. **CIP** $= \frac{TPD/TCAD}{TPS/TCAS}$ **TPD=** Total Population of District. **TCAD=** Total Cultivate Area of District. **TPS=** Total Population of State. **TCAS=** Total Cultivate Area of State.

Production of principle crops, Cropping intensity, Productivity, and per capita production. The food security is examined by calculating the food availability status and finally identify which are the food surplus and food deficit districts. Food availability (Measured by the Geographical Concentration ratio) status define by the deference between Concentration Index of Agriculture Production and the Concentration Index of Population Index.

5.3.2. The Trend in Regional Disparities- The simple graphical technique used to measure the trends of regional disparities. The trends of regional disparities defend the question- Does the regional disparity converged or it diverged? The trends of regional disparities calculated from 1990-91 to 2010-11 based on three-decade data.

5.3.3. Causes of Regional Disparities.

Geographical environment and disparities-The studytries to find out the geographical relationship with agriculture and how the different environment effect on agriculture disparities. To bring out the relationship has been analyzing the Agro-climatic Division of West Bengal, and trying to find out which geographical condition represent high productivity and surplus in food availability.

Infrastructural Facilities and Disparities- Generallywe can assume there must be asimilarity in agriculture outcomes within an agro-climatic region. But the study reveals therehas a huge disparity even within an agro-climatic region. So obviously the question raise if there exist the disparities within an agro-climatic region then what are the causes behind it? To address this question here the infrastructure role and disparity has been discussed.

Population Growth and Food Availability- The growth of population have an impact on agriculture land and food availability.The final section finds out the impact of population growth on theavailability of sufficient food and rapid population growth how influence on food availability status and per capita production.

VI. RESULT AND DISCUSSION.

6.1. Disparities in Agriculture Production and Land Utilization.

The word "regional"is used to indicate the administrative division of each district. This section contains district level disparities, with the help of GIS (Geographical Information System) tools the regional configuration has been computed. This section unfolds the disparities of the state's 18 district.

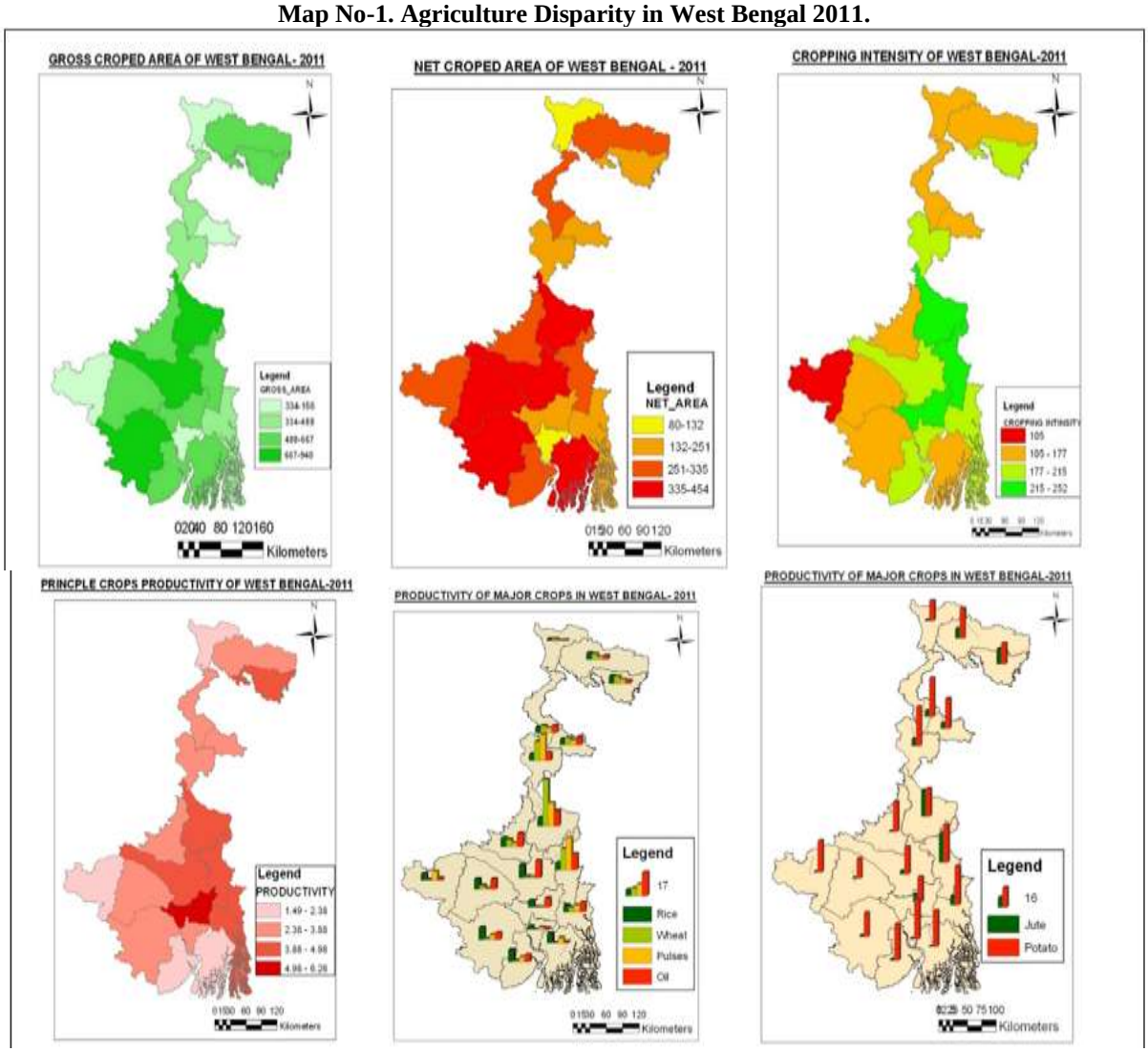
Table No-1. District wise Agriculture Condition 2011.

District	GCA	NCA	TAP	CI	Pr	PCPr	PrR	PrW	PrP	PrO	PrJ	PrP
Bardwan	864.98	454.11	3604.7	190	4.17	0.47	3.34	2.72	0.96	1.05	21.27	22.34
Birbhum	528.61	322.23	1894.3	164	3.58	0.54	3.31	2.87	1.20	0.99	18.89	24.46
Bankura	514.28	350.15	1557.2	147	3.03	0.43	2.77	1.97	0.67	0.81	NA	16.13
Medinipur(E)	554.32	289.05	1046.4	192	1.89	0.21	2.23	2.60	1.43	2.07	12.25	29.58
Medinipur(W)	940.16	364.39	3157.3	167	3.36	0.53	2.43	2.37	0.94	1.00	15.78	19.97
Howrah	156.53	80.22	584.5	195	3.73	0.12	2.53	2.00	1.11	2.27	21.47	32.55
Hooghly	540.04	214.25	3381.4	252	6.26	0.61	2.82	2.00	1.25	1.24	21.10	20.82
N 24pargana	472.18	219.63	1978	215	4.19	0.20	3.05	2.83	0.88	1.45	18.62	31.95
S 24Pargana	523.84	357.54	1153.6	147	2.20	0.14	2.51	2.83	0.82	1.34	21.07	29.48
Nadia	667.67	290.74	3326.2	230	4.98	0.64	3.07	3.36	0.93	1.24	17.37	30.80
Murshidabad	932.05	397.47	4186.3	234	4.49	0.59	3.18	2.76	1.02	1.08	14.79	22.65
Uttar Dinajpur	488.59	275.51	1897.7	177	3.88	0.63	2.44	2.55	0.73	0.76	13.39	31.41
DakshinDinajpur	308.37	185.71	1014.2	166	3.29	0.61	2.86	3.11	0.80	1.08	15.22	24.60
Malda	443.09	216	1502	205	3.39	0.38	3.54	2.95	0.99	1.08	16.10	32.30
Jalpaiguri	545.05	335.77	2040.4	163	3.74	0.53	2.28	2.32	0.66	1.01	12.03	24.70
Darjeeling	194.46	132.27	290.5	147	1.49	0.16	2.25	1.40	0.69	2.00	13.07	16.49
Cooch Behar	520.74	251.36	2398	207	4.60	0.85	2.67	2.05	0.57	0.71	12.04	16.99
Purulia	334.72	319.41	798.1	105	2.38	0.27	2.41	2.25	0.28	0.87	NA	25.71

Source – Author's compilation and calculation from Statistical Abstract of West Bengal (2013).

(*GCA-Gross Cropped Area, NCA- Net Cropped Area, TAP- Total Agriculture Production, CI- Cropping Intensity, Pr-Productivity, PCPr- Per capita Production, PrR- Production of Rice, PrW- Production of Rice, PrP- Production of Pulses, PrO- Production of Oilseeds, PrJ- Production of Jute, PrP- Production of Potato, NA- Data not available*).

Map No-1. Agriculture Disparity in West Bengal 2011.



Source – Author's compilation and calculation from Statistical Abstract of West Bengal (2013).

The table (No-1) contains the district wise agriculture condition of the state which is represented on the map (No-1). A cursory look at the maps reveals wide disparity exist in the state. Agriculture disparity in productivity have been measured with using major crops like rice, wheat, pulses. **Gross cropped area** is the totalarea shown once as well as shown more than one in a particular year. The study reveals there has a huge disparity exists in gross cropped area, where the districts like West Medinipur (940), Murshidabad (932), Burdwan (864) occupied very high, on the other sideit is very low in Howrah (194), Darjeeling (156) thousand hector. This is followed by **Net shown the area** also which diverse in the context of different districts. But a wide difference has been seeming in Gross cropped and Net cropped area. Net cropped area is very high in Burdwan (454), Murshidabad (379) and it is very low in Howrah (80), Jalpaiguri (132). This is due to the difference in cropping intensity. Cropping intensity is the number counted by (Gross croppedarea / Net sown area) x 100. High cropping intensity represents more cultivation in a year. In this context Hooghly (252), Nadia (234), Murshidabad (230) is very high compared to following other districts like Purulia (105), Darjeeling and Bankura (147) is very low. The result suggests those districts shown high cropping intensity, also high in productivity.**The productivity** of crops defines by total production divided by total agriculture area in a year. The study area witnessed wide disparities in productivity. Hooghly (6.26), Nadia (4.98), Murshidabad (4.49) are very high productive district compare to very low in West Medinipur (1.89), Darjeeling (1.49), Purulia (2.38) thousand ton per hector. The individual crops in the different district also have same disparities in productivity.
On the other side **per capita, production** is calculated by dividing the total production with the total population. In per capita production, Coochbehar (0.85) on the top where Howrah (0.12) in the bottom of the state. This value suggests there have difference exist in the pressure on agriculture land due to uneven distribution of total population to the district and productivity.

The above maps showing huge disparity exist in agriculture productivity, per capita production and land utilization of different crops in West Bengal. From the figure, it coming out the eastern middle region of the state covering by Burdwan, Hooghly, Nadia, Birbhumis the more developed district in terms of agriculture productivity compare the Purulia, Bankura lagging behind occupied the western side of the state.

6.2. Food Availability.

Thepopulation and production data has been used to find out food availability status of the state. First, the total population is multiplied by the arable agricultural land (it called physiological density or nutrition density). The high value suggests the more pressure on agriculture land and may reach output limit sooner than a district has a lower physiological density.The result showing a wide disparity in physiological density, where it is very low in Coochbehar (5.42), Bankura (6.99), Burdwan (6.63) Jalpaiguri (7.1), Nadia (7.4), and very high in Howrah (30.93), North24

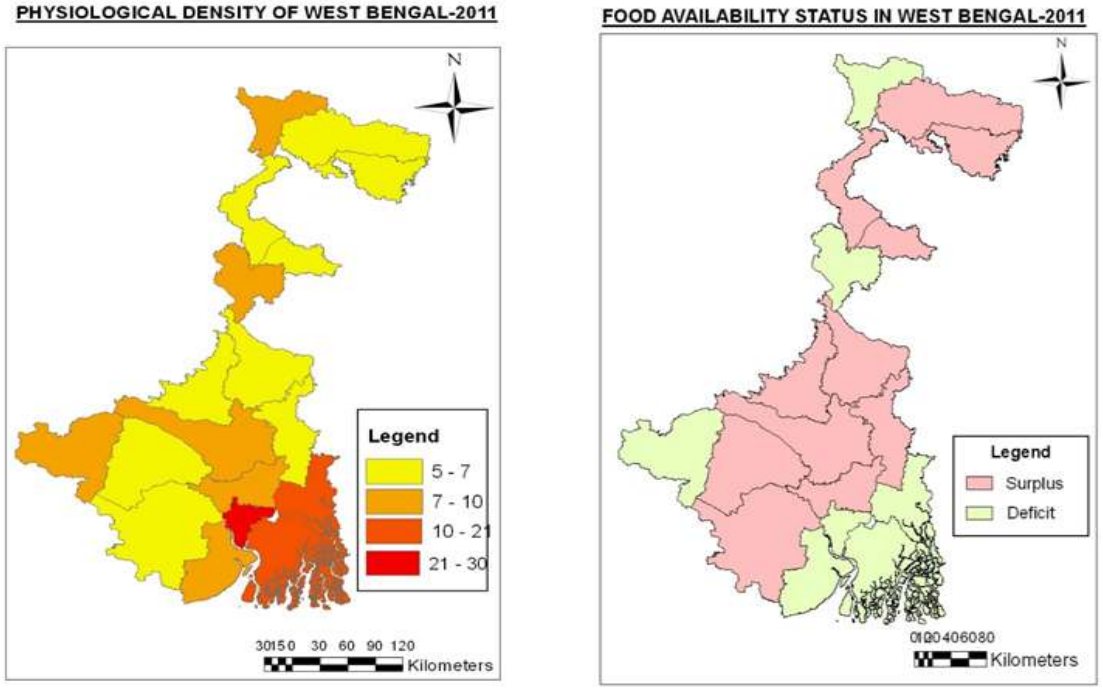
Table No-2 Nutrition Density and Food Security (Availability).

District	ND-2011	PrCI-1991	PrCI-2001	PrCI-2011	PCI-1991	PCI-2001	PCI-2011	FS-1991	FS-2001	FS-2011
Bardwan	8.93	1.4	1.16	1.1	1.00	0.97	0.94	0.40	0.19	0.16
Birbhum	6.63	0.2	0.8	0.85	0.71	0.72	0.62	-0.51	0.08	0.23
Bankura	6.99	0.99	0.98	0.78	0.63	0.67	0.71	0.36	0.31	0.07
Medinipur(€)	9.19	0.77	0.86	0.55	0.82	0.81	1.06	-0.05	0.05	-0.51
Medinipur(W)	6.32	0.77	1.05	0.78	0.82	0.69	0.58	-0.05	0.36	0.20
Howrah	30.93	0.92	1.04	1.01	2.84	1.23	3.28	-1.92	-0.19	-2.27
Hooghly	10.22	2.28	1.73	1.61	1.23	1.21	1.03	1.05	0.52	0.58
N 24pargana	21.35	1.13	1.06	1.22	2.13	1.98	2.46	-1.00	-0.92	-1.24
S 24Pargana	15.56	0.04	0.78	0.58	1.48	1.56	1.62	-1.44	-0.78	-1.04
Nadia	7.74	1.5	1.28	1.27	0.75	0.78	0.78	0.75	0.50	0.49
Murshidabad	7.62	1.34	1.4	1.18	0.80	0.93	0.79	0.54	0.47	0.39
Uttar Dinajpur	6.14	0.69	0.83	0.97	0.68	0.55	0.60	0.01	0.28	0.37
DakshinDinajpur	5.42	0.69	0.77	0.92	0.44	0.56	0.59	0.25	0.21	0.33
Malda	9.02	0.73	0.75	0.96	0.69	0.87	1.00	0.04	-0.12	-0.04
Jalpaiguri	7.1	0.6	0.87	1.27	0.90	0.92	0.95	-0.30	-0.05	0.32
Darjeeling	9.47	0.57	0.86	0.88	1.28	2.16	2.16	-0.71	-1.30	-1.28
Cooch Behar	5.42	0.84	1.04	1.22	0.60	0.56	0.56	0.24	0.48	0.66
Purulia	8.75	0.45	0.48	0.53	0.75	0.83	0.77	-0.30	-0.35	-0.24

Source – Author's compilation and calculation from Statistical Abstract of West Bengal.

Pargana (21.35). The value suggests the number of population per hector arable land. It seems those districts are high in productivity also the good situation in physiological density, on the other side district is moderate or low productivity and high population density lagging bottom in this field.The food availability status is measured by calculating Production concentration index (PrCI) and Population concentration index (PCI) the methods already discussed in previous methodology portion. Finally, food availability measured by PrCI- PCI. Those values are in positive, suggesting to food surplus, on the other hand, negative value suggesting to deficit condition of the district (Ghosh, 2014). This is called Geographical concentration ratio method which is used to find out the status. This is an agriculture based measurement, which explains the man land relation. The second map (No-2) showing that 7 districts out of 18 districts are adeficit in terms of food availability and 11 districts are food surplus. The map shows the coastal part and western part including the Purulia district, in upper part, Darjeeling and Malda district are the deficit district of the state. If we look at the philological density and per capita production, the middle central region becoming polarized followed by the Middle Western region including the districts like Hooghly, Burdwan, Murshidabad, Nadia, Birbhum in agriculture development.

Map No-2, Physiological Density and Food Security(Availability).

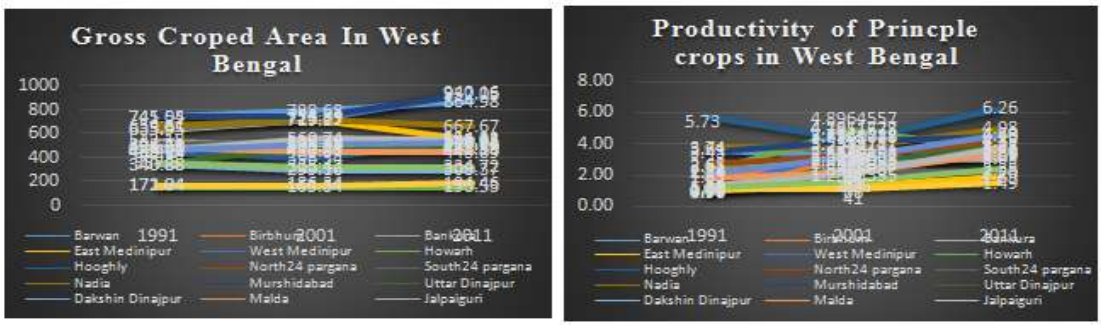


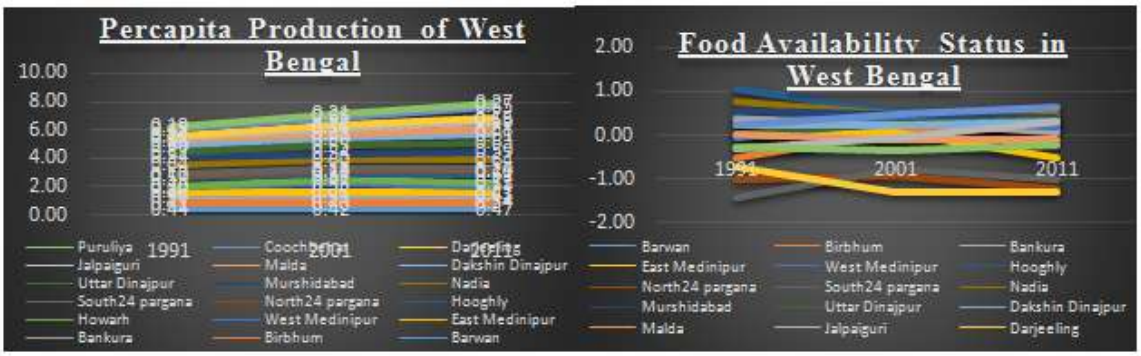
Source – Author's compilation and calculation from Statistical Abstract of West Bengal (2013).

6.3. Trends in Regional Disparities.

The mapshowing the trends of productivity and gross cropped area has grown high in almost every district. If we look on the figure (No-3) below, it clearly showing the trends of regional disparities over the time periods has diverged in thecase of gross cropped area, productivity and per capita production as the difference gone extend between themaximum and minimum value. There only convergence occurs in food availability status.

Map No-3, Trends in Regional Disparities.





Source – Author's compilation and calculation from Statistical Abstract of West Bengal.

Over the time periods, it seems that the food availability status in West Bengal changed remarkably. In 1990-91 there was 9 district out of 18 under food deficit but this situation changed in 2000-01 with decreasing the number to 7 but it still remaing same in 2010-11. It seems that districts are under food deficit alsolow in agriculture productivity and dense populated. So the fact of the study reveals there hasexist a huge disparity in agriculture and its related subject. Even the agriculture development and food security in district level became worst with increasing the divergence which is a diverse indication of balanced growth. The trends of regional disparity showing the state aregrowing to develop in agriculture but it is unequal among the districts.Those districts were develop in agriculture initially still dominating, only very low develop district catchup previous districts but the unequal growth rate in productivity and population keep the extension between maximum and minimum.

6.4.Causes of Regional Disparities.

6.4.1.Geographical Environment.

The extension from upper Himalaya to Bay of Bengal influence on the physiographic and agro-climatic of the state. The geographical condition of the state differs from one part to another part due to its long extension. The difference in agro-climatic condition influence on the agriculture development in Bengal. This portion trying to bring the responsible causes behind the disparity and divergence in it. The below physiographic and agro-climatic condition discuss with food security.

Relief features-The state is divided mainly three broad parts in terms of land surface. 1. The Eastern Himalayas. 2. Eastern Plateau. 3. Alluvial and Deltaic plains(Research, 1992).

Eastern Himalaya (in the northern part)- Darjeeling and the northern fringe of Jalpaiguri district, compromising the foot-hills of Bhutan is including in the Eastern Himalayas. It extends to Sikkim and Nepal, including several lofty peaks world attraction such the highest pick of West Bengal, Kanchanjungha. The average elevation of Darjeeling district 2000 m from MSL but the inner terrain including the peaks, has an elevation of 4000m or more. Mostly the area is characterized as very rouged. The slope of the ridges is virtually steep.

Eastern or Chhotonagpur Plateau- The eastern plateau compromising peninsular mass, known as Chhota Nagpur plateau, is a tertiary and post-tertiary peneplain surface. The eastern outliers extend across the north-western part of Bardwan, West Medinipur, Bankura, Birbhum, and the whole of Purulia districts. The laterite soil is covered the western part of Bankura, part of Medinipur and Purulia districts. The outerpart having laterite based mainly covered by old alluvial of the Peninsularrivers like Subarnarekha, Mayurakshi, Damodar, and Ajay as observed in Bankura, Hughli, and Burdwan district.

Alluvial and Deltaic Plains- The alluvial plain is called as the Bengal Basin. This Basin compriseseastward extension of indo-Gangetic alluvial plain. The alluvial plain also compromises as old and new alluvial, though it difficult to draw a separation between two. The basin formation extends southward progressively by further branching off the tributaries into a number of sub tributaries to meet the Bay of Bengal. The drainage pattern in generally dendritic while it is mostly subbed dendritic in northern part compromising the Ganga-Tista alluvial plain. This also divided into two part in the north east the Tista alluvial which locally known as Duars and Ganga deltaic plain in southern lower part known as Bengal Basin.

6.4.2. Agro-climatic Condition.

The physiographic diversity influence on the agro-climatic condition. The state is under different micro climatic regions. The different climatic condition, alleviation, soil properties divided the state into different

agroclimaticregions. Which led the agriculture pattern and economic activity, also the economic and socio-political worth of life (NPS Sirohi**).**The state is divided into 6 major agro-climatic regions by NARP.

The Hill Zone- The upper hill region capture the Darjeeling district. This region is heavy rainfall (400 cm) and humid. Mainly rice, maize, potato, Soybean are the main crops, tea is one of the commercial production of this region.

Tarai Zone-Covered by the Jalpaiguri, Cooch Behar, West Dinajpur,SadarMalhabhanga, Siliguri. This region under relatively rainfall (158cm) and the climate is per humid to humid. Major crops in this region are rice, jute, tobacco, tomato etc.

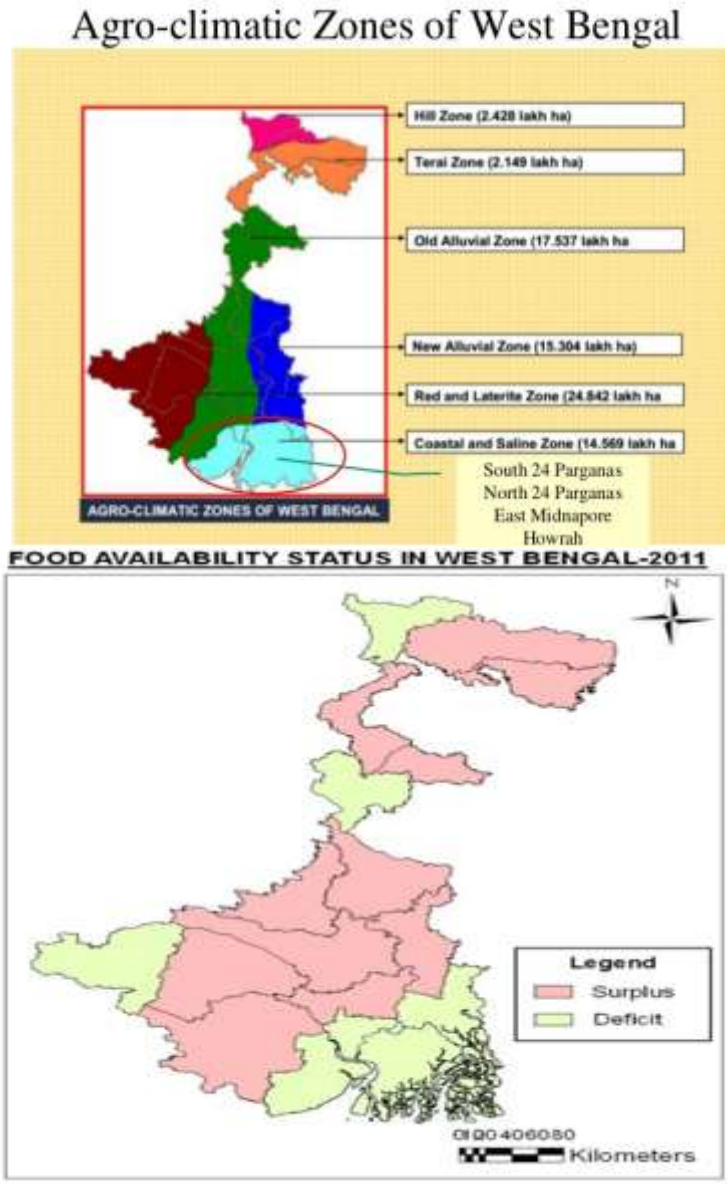
Old Alluvial Zone-The middle northern part of the state is covered by few parts of east and west Medinipur, Haora, Barddhaman, Murshidabad, Birbhum and whole Malda district. Climate is per humid to humid, rainfall area (146 cm) and the agro-climatic planning unit has classified this region having the most potential of the state, showing promise of growth. Mainly rice, sugarcane, jute, wheat are the major crops.

New Alluvial Zone-The eastern district is under of this region mainly climate per humid to humid and rice, sugarcane, jute,wheat is the major crops.

Laterite and Read Soil Zone-The whole Purulia, thewestern part of West Medinipur, few part of Bankura, Barddhaman district covered under this region. Major crops are rice, black gram,mustard,maize.

Coastal and Saline Zone- Both24 Parganas district and lower part of East Medinipur are under this region. It is the upper part of the Bay of Bengal. Rice, black gram, mustard, chili are the major crops.

Map No-4,Agro-climatic Zone, and Food Security.



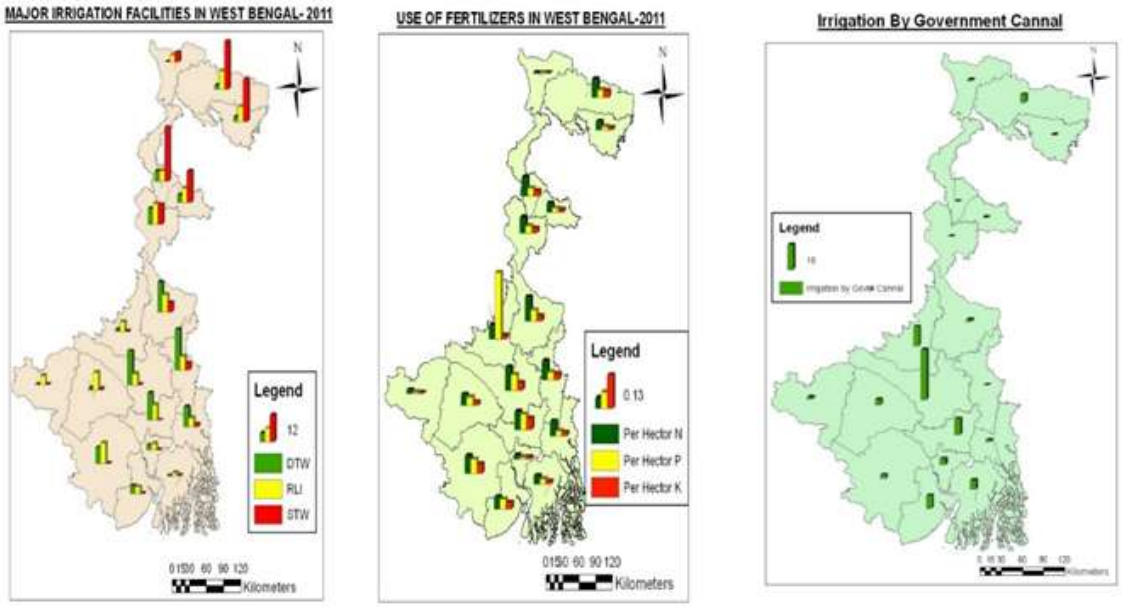
Source- Author's compilation and calculation from Statistical Abstract of West Bengal (2013).

It is quite difficultproperly fit to a district under an agro-climatic region. The study suggests old and new alluvial zone is the highagriculture productive region, but there have disparities within the agro-climatic region in districts level. Productivity is the measurement of agriculture development and it seems that West Bengal is awitness of huge disparities in productivity even within anagro-climatic region. The result suggests alluvial zone is the more developed compared to another agro-climatic zone. The food availability status showing coastal zone (including East Medinipur, North and South 24Pargana, Howrah), one district from Red soil zone (including Purulia), Malda and Darjeeling are the food deficit district in the state from theupper part.Finally, we can say there has a disparity even within a same agro-climatic region so there has another reason of the disparities within agro-climatic zone. So now we should find out the reason behind within disparities in the state.

6.5. Infrastructural Facilities.

The modern agriculture development dependent on infrastructure facilities and technology. Hence to know the infrastructure facilities and district wise distribution, the irrigation facilities, and consumption of fertilizers has been used in the study. The good facilities region in the study area showing high productivity. Burdwan, Birbhum,Hooghly, Nadia, Murshidabad those are the district have well

Map No-5,Infrastructural Facilities in West Bengal.



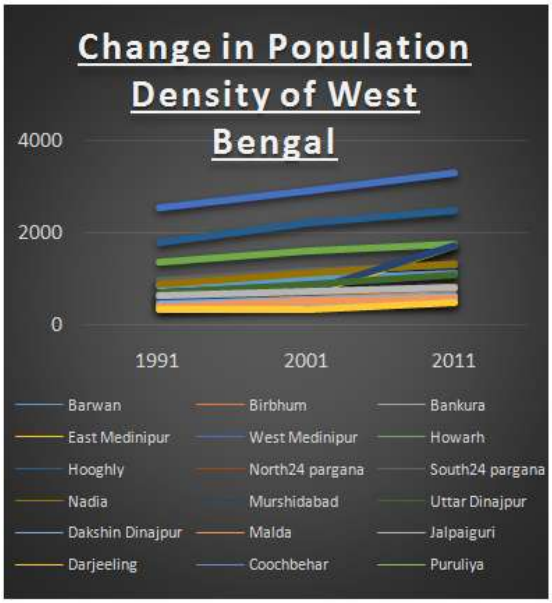
Source – Author's compilation and calculation from Statistical Abstract of West Bengal (2013).

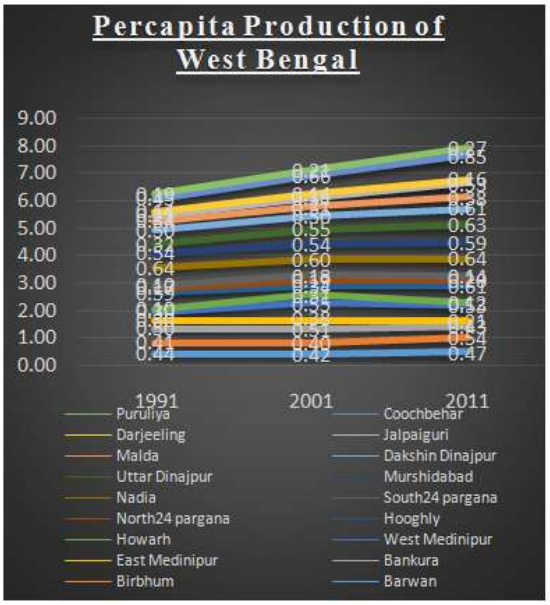
facilities in Government Channel, high per hector consumption of fertilizers. It also seems that those regions are highly developed in infrastructure facilities, also cropping intensity high and difference in gross cropped and net cropped area is very high. So we can say infrastructure facilities influence on cropping intensity and cropping intensity increase the productivity. The disparity in infrastructure facilities bring the disparities within an agro-climatic region. An example, the irrigation facilities by government channel is different in Burdwan, Hooghly, Nadia, and Murshidabad district, but productivity is very different though those districts are under alluvial soil region. So there must need a balance in infrastructure facilities for the reduction of disparity.

6.6. Population Growth.

The 2011 censusreveals, West Bengal is the second largest dense populated state(1029 per sq.km) in India, however, the state is a witnessed of uneven distribution of the population in district level. Howrah, North, and south 24 Pargana, East Medinipur are the high population density district followed by Darjeeling, Purulia,Bankura,WestMedinipur. It seems high population growth and urbanizing captured agriculture field, as the gross cropped area over the time periods increased but net cropped area remarkably decrease in that district. The trend of urbanization in West Bengal growing in district level unequally, like Howrah (13.81), South 24pargana (12.27), Jalpaiguri (11.02) is very high than Bankura (0.05), Cooch Behar (2.46), Purulia (3.30). It seems from 1990-91 to 2010-11, the urbanization in the state has been unevenly changed and its influence on the agriculture. Due to the loss of net cropped area and high urbanization, land man ratio became lower and increase the population pressure on agriculture field.

Map No- 6, Population Change and Per capita Production.





Source – Author's compilation and calculation from Statistical Abstract of West Bengal.

The trend suggests in West Bengal over the time periods uneven growth of population density**.** The high population density influence on the food availability of the individual district and per capita production also influenced by population density. The figure(No-5), the population density increase and inter-district disparity also diverge.Thus the uneven population growth and rate bring the divergence in agriculture development. Simultaneously this situation coming in case of food availability and per capita production.

VII. CONCLUSION AND APPROPRIATE POLICY RESPONSE TO REGIONAL DISPARITIES.

Agriculture is the prime source of economy of West Bengal, where industrial expansion has been limited. But the agriculture pattern and trend at the regional level have been existing wide disparities in the state. The productivity of land is an indicator to measure agriculture development. It has been seeming over the time periods disparities in productivity and others selected indicators suggested huge disparities and it diverges with time. The result suggests there few district like Hooghly, Burdwan, Nadia, Birbhum are the very developed in agriculture and high productivity, on the other side Purulia, Bankura, Jalpaiguri is very low productivity districts.

Disparity is a big threat to growth and development. Agriculture disparity influence on its economic status and economic condition regulate education, health as much as on modern equal societies. And it has been seeming in developing countries where agriculture is the key economic activates, the disparities create the inequality on other socioeconomic condition of that country.The main fast of the study revealsthere has been wide disparities in productivity, per capita production, food availability, irrigation systems, and consumption of fertilizers. West Bengal is a diverging state in agro-climatic condition, we can't change the environmental condition but the important point coming from the study that, there have been disparities in productivity, per capita production and food availability status within an agroclimatic zone. Huge disparity exist within an agro-climatic region and it only for the uneven distribution of infrastructural facilities and uneven population density. So it bounded to establish farming systems and equally infrastructure development which are appropriate and tolerant to the sustainable agriculture. It has been seeming those districtshave well infrastructure facility they are high in cropping intensity, simultaneously high cropping intensity district are also high in agriculture production. Thus it needs to develop the infrastructure equally and it would increase the cropping intensity and agriculture development through increasing the productivity. We should remind that large scale use of chemical fertilizer has reduced soil quality, hence there is need of strengthening indigenous innovation and crop varieties for the development. Modern agriculture system is more water intensive but irrigation facilities are very limited in this study area. Even there are few districts where government irrigation facilities did not reachtill now. Development in government irrigation facilities important in this regard. Designing region wise facilities and crop-specific strategies are needed to demolish the disparities. The state government should formulate, adopt

and implement region-specific plans and a longtime policy to demolish the disparities and give a new direction to the state's agriculture.

REFERENCE.

[1] Arjun, K. M. (2013). Indian Agriculture- Status, Importance and role in Indian Economy. International Journal of Agriculture and Food Science Technology, pp. 343-346.

[2] Biswas, N. K. (2013). Floriculture Concentration Zone of Nadia District, West Bengal. International Journal of Humanities and Social Science Invention, pp. 14-16.

[3] Banerjee, A., &Kuri, P. K. (2015). Agricultural Growth and Regional Disparity in India: A Convergence Analysis. Sri Lankan Journal of Agricultural Economics, 16(1).

[4] Bengal, G. o. (2010). State Action Plan on Climatic Change. Writers' Buildings, Block – G, 2nd Floor, Kolkata.: Government of West Bengal, Department of Environment.

[5] FAO. (2006). Food security. UN: FAO's Agriculture and Development Economics Division (ESA) with support from the FAO Netherlands Partnership.

[6] Ghosh, S. (2014). The impact of Population Growth on Nutritional Density and Food Security - A Spatio-Temporal Analysis of Ajay-Mayurakshi Interfluve, Birbhum District, West Bengal, India. IOSR Journal Of Humanities And Social Science (IOSR-JHSS), PP 27-35.

[7] J Gallup, J. L., Sachs, J. D., &Mellinger, A. D. (1999). Geography and economic development. International regional science review, 22(2), 179-232.Justice, M. o. (10 sep,2013). National Food Security Act. New Delhi: The Gazette of India Extraordinary.

[8] Justice, M. o. (10 sep,2013). National Food Security Act. New Delhi: The Gazette of India Extraordinary.

[9] Kumar, V. K. (2012). State Wise Agriculture Growth and Performance. International Journal of Application or Innovation in Engineering and Management, 18-25.

[10] Kuri, A. &. (2015). Agricultural Growth and Regional Disparity in India: A Convergence Analysis. Sri Lankan Journal of Agricultural Economics, 16(1).

[11] Pickett, R. W. (2010). why inequalitymatters. In Penguin, "The Spirit Level – Why Equality is Better for everyone".Washington:members of My Fair London in association with The Equality Trust.

[12] Pradhan, V. M. (2014, August 25). Impact of Liberalization on Agriculture in India. Retrieved from Adhrit Foundation: admit.in/impact-of-liberalization-on-agriculture-in-India.

[13] Research, I. C. (1992). Soils of West Bengal For Optimising Land Use. National Bureau of Soil Survey & Land Use Planning,NAGPUR-440010.In crop with,Department of Agriculture, West ,Bengal and Bidhan Chandra Krishi Viswa Vidyalaya, West Bengal.: NBSS publ. 27.

[14] Saikia, H. (2012). Regional inequality of social sector development in India. vol-6 No-2.

[15] Suranjan Dasgupta & Sankar Kumar Bhaumik. (2014). Crop Diversification and Agriculture Growth in West Bengal.Ind.Jn.of.Agri.Econ.

[16] Vijesh Kumar V & Joy Sen. (2013). Critical evolution of agriculture infrastructure PRIORITIES OF DEVELOPMCritical evaluation of agriculture infrastructure priorities of development in thescenario of Damodar river basin in West Bengal region. India. JIARM.

IOSR Journal of Humanities and Social Science (IOSR-JHSS) is UGC approved Journal with Sl. No. 5070, Journal no. 49323.

Mr. PrasenjitBarik. "Regional Disparity in Agriculture Development and Food availability Status. An inter-District study of West Bengal." IOSR Journal Of Humanities And Social Science (IOSR-JHSS) , vol. 22, no. 8, 2017, pp. 36–48.