Demographic synergies of North East India and Geo-temporal transformation in agriculture

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ABSTRACT

The study was conducted based on available secondary published data collected from various sources pertaining from the period of 1991-92 to 2013-14. The study is an attempt to examine the demographic pattern and changes of cultivators and agricultural labourers in the states, changes of land utilization, shift in technology and state income. It was observed that the states of NE India were thinly populated except in Assam and Tripura. Migration was one of the factors of shift of population in the region. The increase of agricultural labourers was higher which might be due to marginalization and crowded pattern of agriculture. Stagnation of area for agricultural use indicated a slow progress of agricultural development in the states during the last twenty-five years. The cropping pattern as a group in the region inclined towards fruits, vegetables and oilseeds while it declined for spices. The percentage share of cereals did not change during this period; it was higher in Assam and Tripura while it was quite low in other states. Agricultural income did not grow faster and was found to decline in Arunachal Pradesh, Nagaland and Tripura which needs the attention of the planners. Agriculture in NE India is still subsistence in nature.

Keywords: Population, cultivators, land utilization, technology and change of state agricultural income

NE region is comprised of eight states, *viz.* Assam, Meghalaya, Manipur, Mizoram, Nagaland, Arunachal Pradesh, Tripura and Sikkim. The states like Meghalaya, Nagaland, Arunachal Pradesh and Sikkim are hilly while Assam, Manipur and Tripura have both terrain and plains. Tribes dominate the hill states. There is change in demography in the hill states due to the migration of people from other states and the neighboring country of Bangladesh in the recent years. Jhuming is the main system of farming in the hills and its cycle is reducing due to population pressure (Talukdar: 2009). However, settled and semi settled cultivation is also practiced in the plain areas of the hill states. Farming is almost organic by default in the hill states and use of technologies like

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HYV seeds, irrigation and chemical fertilizer are not so encouraging in increasing productivity of the crops especially in the hill states. This has effect on the state income and the contribution of the agricultural sector to the state income. The study is an attempt to examine demographic pattern and changes of cultivators and agricultural labourers in the states, changes of land utilization, shift in technology and state income. The study was conducted based on available secondary published data collected from various sources pertaining from the period of 1991-92 to 2013-14. The parameters were estimated using tabular analysis so that it reflects the true ground situations which will be comprehensive to all concerns.

Shift of demographic structures in NE region

Except in Assam, other states in NE India are thinly populated. In 1901, the total population of Assam, Manipur, Meghalaya, Mizoram, Nagaland and Tripura were 32.90, 2.80, 3.40, 0.82 1.02 and 1.73 lakhs respectively which increased at an annual rate of 7.71,7 .32, 7.00, 11.25, 16.72 and 18.40 per cent during 2011. Population growth in Arunachal Pradesh grew at the rate of 6.21 per cent since 1961. It was observed that there was an abrupt change in the population structure in the states of NE India from 1961 due to influx from neighbouring countries. During 1901 the region had 42.72 lakhs population which increased to 454.81 lakhs in 2011 with a regional annual growth of 7.06 per cent. The density of population was also examined for the states of NE India. It was found that during 1991 density of population per square kilometer was higher in Assam (286) and Tripura (263) and it was lowest in Arunachal Pradesh (10) followed by Mizoram (33). The other states like Manipur, Meghalaya and Nagaland, had 73 to 82 persons per square kilometer. In the year 2011, annual growth of population density was found to increase substantially over 1991 in all the states. In Assam and Tripura it increased to 398 and 350 at the rate of 1.96 and 1.65 per cent respectively. In other states like Manipur, Meghalaya and Nagaland it was found to increase at the annual rate of 2.01 per cent, 3.35 per cent and 3.15 per cent respectively. Shift of Population density in Arunachal Pradesh was almost negligible which might be due to low influx and migration from other states and inaccessible terrain. The annual growth of population density in the region excluding Sikkim was 2.40 per cent during this period.

Table 1: Geo-temporal shift of cultivators and agricultural labourers

Year	AP	Assam	Manipur	Meghalaya	Mizoram	Nagaland	Sikkim	Tripura
1991	235987	3559117	437499	395804	178101	371597	---------	305523
Cultivator	(27.30)	(15.88)	(23.81)	(22.30)	(25.82)	(30.72)		
Agril. labourer	20054	844964	47350	89492	9527	7233	---------	187538
	(2.32)	(3.77)	(2.58)	(5.04)	(1.38)	(0.60)		
2001	234847	2680092	113630	380321	202875	458677	101200	276132
Cultivator	(21.40)	(10.05)	(4.95)	(16.40)	(22.82)	(23.05)	(18.71)	(8.63)
Agril. labourer	10649	636351	96920	94938	10840	12059	9081	35292
	(0.97)	(2.40)	(4.22)	(4.10)	(1.22)	(0.60)	(0.17)	(1.10)
2011	302723	4061627	457891	494675	229603	537702	117401	295947
Cultivator	(21.90)	(13.02)	(17.81)	(16.67)	(20.93)	(27.18)	(19.23)	(9.25)
Agril. labourer	36171	1845346	111061	198364	41787	62962	25986	353618
	(2.61)	(5.91)	(4.32)	(6.68)	(3.80)	(3.18)	(4.26)	(9.63)
Annual pc change								
Cultivator	1.41	0.70	0.23	1.24	1.44	2.23	5.28	-3.13
Agril. labourer	4.01	5.91	6.72	6.08	16.93	38.52	51.60	4.42

Figures in parenthesis indicate percentage of cultivators and agricultural labourers to total population.

Temporal shift of cultivators and agricultural labourers

Changes of cultivators and agricultural labourers were examined during 1991 to 2001 in NE states (Table 1). It indicated that changes of a number of cultivators were high in Sikkim (5.28%) and it declined in Tripura (-3.13%). In case of agricultural labourers Sikkim experienced the highest change of 51.60 per cent during this period while it was the lowest (2.41%) in Assam. Nagaland also experienced a higher shift of 38.52 per cent followed by Mizoram. Distribution of cultivators to total population tend to decline in all states of NE India during this period. In contrary the shift in number of agricultural laborers was higher than the shift in number of cultivators. This might be due to transformation of higher category farm size to lower categories and its marginalisation leading to crowded agriculture. Migration of labour from other neighbouring states also added to the number of agricultural labourers in the states. This situation was observed in the states like Mizoram, Nagaland, and Sikkim. It was low in Arunachal Pradesh, Assam, Manipur, and Tripura.

Decadal change of land utilization

Land utilization and the net area sown were also examined for NE states (Table 2). It was observed that during 1990-91 to 2010-11 decadal changes of land use was quite negligible and declined for Arunachal Pradesh with a slow improvement in 2010-11. The change was marginal in Nagaland while it remained stagnant in Tripura. It was found to decline in Sikkim. Decadal changes of net area sown improved in Arunachal Pradesh, Manipur, Meghalaya, and Mizoram. This indicated that net area sown did not increase or remained stagnant in most of the states of NE India. This further indicated that agricultural progress was quite slow in the region during the last twenty-five years.

Table 2: Geographical area, land utilisation and net area sown in NE states of India

State	GA ('000 Sq Km)	1990-91		2000-01		2010-11	
		LU	NAS	LU	NAS	LU	NAS
AP	8374	5544	149	5498 (-0.08)	164 (1.01)	5661 (0.30)	212 (2.93)
Assam	7844	7852	2706	7850 (Neg)	2734 (Neg)	7850 (Neg)	2811 (0.02)
Manipur	2236	2211	140	2211(const)	140(const)	2010 (-0.09)	233(0.66)
Meghalaya	2243	2239	202	2227 (0.05)	230 (1.39)	2229 (Neg)	283 (2.30)
Mizoram	2108	2102	65	2108 (Neg)	94 (4.65)	2101 (Neg)	361 (28.40)
Nagaland	1658	1532	190	1589 (0.37)	300 (5.79)	1621 (0.20)	123 (-5.90)
Sikkim	710	-----	----	710	95	693 (-0.24)	77 (-1.89)
Tripura	1049	1049	270	1049 (const)	280 (0.37)	1049 (Const)	280 (const)

Figures in parentheses indicate annual decadal change

LU= Land Utilisation in '000 ha NAS= Net Area Sown in '000 ha GA=Geographical area

Table 3: Shift in irrigated area under different states of northeast india

States	Area under irrigation('000ha)			PC annual change
	1990-91	2000-01	2010-11	
AP	32(28.49)	42(25.61)	56(26.41)	3.75
Assam	572(21.14)	170(6.22)	162(5.76)	-3.58
Manipur	65(46.43)	65(46.43)	73(52.14)	0.61
Meghalaya	46(22.77)	54(23.48)	63(22.26)	1.84
Mizoram	8(12.31)	9(9.57)	12(12.76)	2.50
Nagaland	59(31.05)	72(24.00)	83(67.47)	2.03
Sikkim	----	17(17.90)	20(25.97)	1.76
Tripura	41(15.18)	37(13.21)	122(43.57)	9.87

Figures in parentheses indicate percentage of NAS

Shift in irrigated area

Agriculture in NE states is mainly rainfed and nominal irrigation is also needed in the dry seasons to supplement enough moisture to soil. It is considered as a complementary input to boost productivity of crops in modern agriculture. It was observed that irrigated area in NE states varied from 46.43 per cent of Net Area Sown in Manipur to 12.31 per cent in Mizoram during 190-91 (Table 3). It was also observed that irrigated area was found to increase in Manipur, Nagaland, Sikkim and Tripura in 2010-11 while it declined in Assam and remained almost stagnant in Meghalaya and Mizoram. Annual percentage change during these two decades was higher in Tripura, Arunachal Pradesh, Mizoram and Nagaland.

Shift in use of chemical fertilizer

Plant nutrients are essential in the soil for healthy plant growth to increase production. Table 4 shows that its use in NE states is much lower in the country. It is observed from the Table 4 that during 1991-92, use of nitrogenous fertilizer was higher in Manipur and Tripura followed by Meghalaya, Assam and Mizoram. Use of phosphatic fertilizer was almost half while potassic

Table 4: Use of chemical fertilizers per gross cropped hectare in NE states (kg/hectare)

States	1991-92				2000-01				2011-12				Annual change (%)			
	N	P	K	Total	N	P	K	Total	N	P	K	Total	N	P	K	Total
AP	1.2	0.6	0.2	2.0	1.4	0.6	0.4	2.4	2.0	0.36	0.11	2.47	1.79	-0.4	-0.45	0.23
Assam	5.1	2.1	2.2	9.5	18.7	9.2	7.8	35.7	36.8	12.0	18.4	67.2	6.21	4.71	7.36	6.07
Manipur	33.4	13.2	1.3	48.0	85.2	10.6	6.2	102.0	28.3	4.2	1.9	34.4	-0.15	-0.68	0.46	-0.28
Meghlaya	6.4	6.1	1.4	13.8	9.0	5.0	0.5	14.5	9.7	3.7	0.7	14.1	0.51	-0.39	-0.5	0.02
Mizoram	5.0	5.5	0.5	11.0	4.7	4.8	2.8	12.4	7.5	1.7	0.5	9.7	0.5	-0.69	0.0	-0.11
Nagaland	1.4	1.8	0.4	3.5	0.8	0.5	0.1	1.4	1.5	1.0	0.4	2.9	0.07	-0.44	0.0	-0.17
Tripura	15.8	6.2	3.1	25.1	15.5	4.0	1.2	20.7	33.7	17.8	8.8	60.3	1.13	1.87	1.83	1.40
All India	44.4	18.3	7.5	70.3	56.7	21.9	8.1	86.7	90.0	41.2	13.1	144.3	1.02	1.25	0.74	1.05

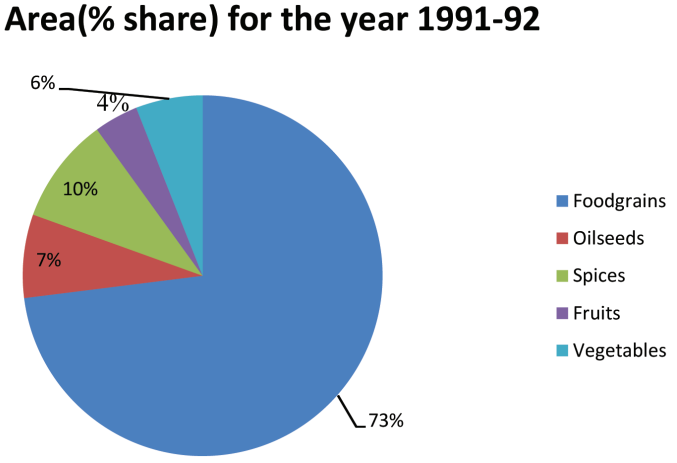
Table 5: Changes of area and production of food grains in different states of NE

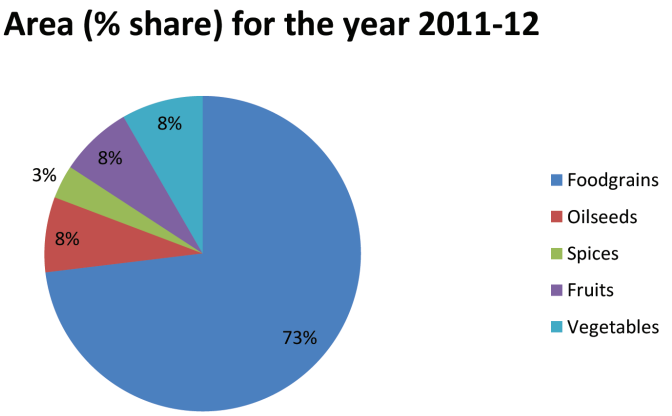
States	1990-91		2000-01		2011-12		Pc annual Change Over 1990-91	
	Area ('000 ha)	Production ('000 tones)	Area ('000 ha)	Production ('000 tones)	Area ('000 ha)	Production ('000 tones)	Area	Production
AP	182.7	214.3 (11.73)	184.0	203.0 (11.03)	205.2	362.5 (17.66)	0.58	3.29
Assam	2718.5	3441.8 (12.66)	2888.0	4167.0 (14.23)	2736.2	4663.3 (17.04)	0.03	1.69
Manipur	162.0	285.2 (17.60)	164.0	378.0 (23.05)	279.2	669.1 (23.96)	3.44	6.41
Meghalaya	133.0	152.6 (11.47)	131.0	203.0 (15.50)	133.0	249.1 (18.73)	No change	3.01
Mizoram	59.1	76.6 (12.96)	61.0	124.0 (20.33)	49.2	68.0 (13.82)	-0.79	--0.53
Nagaland	170.0	197.4 (11.61)	211.0	277.0 (13.12)	295.1	566.5 (19.20)	3.5	8.90
Sikkim	-----	------	-----	-----	69.0	103.2	---	----
Tripura	288.6	514.5 (17.83)	254.0	523.0 (20.60)	275.4	712.4 (25.87)	-0.21	1.83

Figures in parentheses indicate the productivity of foodgrains per cropped hectare in quintals

Fertilizer was one-third of nitrogenous fertilizer in the region. During 2011-12, the use of chemical fertilizer was more than double in the region. Its use was found to decline in Manipur, Mizoram and Nagaland. There was a manifold increase in Assam and Tripura. It almost remained stagnant in Arunachal Pradesh, Meghalaya, and Nagaland. The annual percentage change of use of chemical fertilizer per gross cropped hectare was higher in Assam and Tripura and the change was negligible and was declining in many other states. An attempt was also made to examine the shift in area and production of foodgrains in the states of NE India.

It was observed from Table 5 that during 1990-91 to 2011-12 shift in area of foodgrains was slow in the states except in Manipur and Nagaland which experienced a seasonal shift of over 3.00 per cent. It was found to decline in Mizoram and Tripura. The annual shift of production was found to be higher than area shift. Except in Mizoram all other states experienced a positive change. Shift in area and production was low in Assam and Tripura. However, the productivity of foodgrains was found to increase in the states during the last two decades except in Mizoram. The highest productivity of foodgrains was observed in Tripura which might be due to higher use of chemical fertilizer along with irrigation as an additional inputs. Examination of regional shift of cropped area under different crop groups from 1991-92 to 2011-12 indicated that area under foodgrains remained stagnant for the last twenty years (Fig. 1, 2). The area under fruits, vegetables and oilseeds increased marginally while it declined more for spices and condiments in the region.





Net State Domestic Product (NSDP)

Table 6 shows the Net State Domestic Product and share of agriculture in different states of NE India during the last decade. It was observed that annual percentage change of NSDP over 2004-05 was higher in Sikkim followed by Tripura and Mizoram. Annual change of NSDP was low in Manipur and also in Nagaland.

Table 6: Net state domestic product at current prices in NE states

States	1990-91 (₹ in crores)	2004-05 (₹ in lakhs)	2013-14 (₹ in lakhs)	Pc annual change over 2004-05
AP	426	318793 (37 .22)	1246846 (43.83)	32.34 (1.90)
Assam	8905	4718074 (26.76)	14619921 (26.36	23.31 (-0.16)
Manipur	694	460328 (25.08)	1091897 (21.31)	15.24 (-1.67)
Meghalaya	795	584570 (24.45)	1850423 (16.14)	24.06 (-3.76)
Mizoram	281	239960 (24.54)	1183806 (18.73)	43.70 (-2.63)
Nagaland	561	542146 (35.82)	1632759 (27.37)	22.35 (2.62)
Sikkim	-----	151066 (18.75)	1113658 (11.01)	70.79 (-4.58)
Tripura	933	816969 (26.07)	2245260 (22.40)	46.57 (1.56)

Figures in parenthesis indicate the percentage share of NSDP in agriculture

The annual change of agricultural income was quite low in the states. It declined in the states except in Arunachal Pradesh, Nagaland and Tripura which needs attention of the policy makers.

Conclusion

The population density was quite low in the states of NE India except in Assam and Tripura. The shift of population in the region was mainly for migration from other states. There was more shift of agricultural labourer which might be due to marginalization and crowded pattern of agriculture. Net area sown did not increase or remained stagnant in most of the states indicating a slow agricultural progress in the region during the last twenty-five years. Irrigated area also grew slowly and declined in states. Use of chemical fertilizers was higher in Assam and Tripura while it was quite low in other states. There was slow change of agricultural income and was found to decline in Arunachal Pradesh, Nagaland, and Tripura which needs the attention of the planners. This indicated a subsistence nature of agriculture in the region.

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