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Research Paper

Tribal Funambulism between Socio-Economic and Agricultural Changes in Eastern Tribal Districts of Gujarat

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Abstract

The agricultural transformation in the eastern districts of Gujarat has had an impact on its socio-economic development of tribes during the last few decades. The paper is an outcome of investigation and examination of the phenomena related to agricultural changes and the development of tribal communities. Tribal regions in India, particularly in Gujarat have an economy based on natural resources like forests, rivers, mountains, fertile soil and climate, which perform important functions. The change or growth in agriculture can bring change in the equilibrium between humans and the environment in hilly regions populated by tribes. Whether it is difficult to maintain the tribal funambulism between supporting economic growth and meeting the demand of food? Development in the tribal regions has to focus on economic growth without interfering with the natural equilibrium or social livelihood. Therefore, it is pertinent to study tribal communities and assess their socio-economic changes to reconstruct their future welfare trajectory. The paper presents analysis in two sections, the first section describes the socio-economic background of twelve districts of Gujarat populated by Scheduled Tribes (ST). The Kendall's Ranking Coefficient and Fitted Plot Analysis have been used to analyse the relation of different variables in the second section.

Keywords: *Tribes, livelihood, economy, work-participation, adaptation.*

Introduction

Reviewing and reinstating the corrections of the natural resources to improve the livelihood of the tribal communities of Gujarat, and assessment of socio-economic background is the dais. Landlessness, poor irrigation facilities and deteriorating soil quality hinders the agricultural growth (Deshpande, 2016: 16). Various factors such as demographic, social, infrastructure etcetera together affect the economic growth of regions. The changes in these also impact the agricultural and work participation ratio in the eastern hilly region/districts of Gujarat. The paper

presents the factors responsible for shaping the livelihood of tribal communities, particularly relating to development of amenities and agricultural changes. The geographical characteristics of the region, demographic changes and agricultural yields together present a distinctive facet of changes. The tribal societies are caught between a phenomenon to maintain a tight balance (funambulism) betweeen the socio-economic development and agricultural transformation. An attempt has been made in this paper to explore how this could be addressed using the variables closely linked to agricultural changes and socio-economic development to formulate the future welfare strategy.

Study Area

The paper investigates the northern and eastern districts (Fig.- I) of Gujarat, which have been the traditional habitat of the tribal population of the State. The majority of the ST population of the State resides in its twelve eastern districts. The region comprising of the hilly, forested and riverine tracts in the least developed blocks of these twelve districts have been part of the Tribal Area Sub Plan. The socio-economic development in the region has been spatially uneven and sporadic due to difficult terrain as well as inherent poverty induced by economic backwardness and poor agricultural growth. The development activities in the study region have been resulting in varied changes in agricultural practices as well as access to main stream market.

Demographic Changes

Most of the ST population of the State is clustered and concentrated in the eastern part. However, the distribution and density of the region are not the same. The data on population density reveals that very low density exists in Narmada, Tapi, The Dangs and Banas Kantha districts. At the same time, more than 90 per cent of the tribal dominated villages are in the districts of The Dangs, Dohad and Narmada. The districts of Surat, Navsari and Valsad have high population density of 500 to 900 persons per square km. According to the Cenus of 2011, the population of Gujarat was 6,04,39,692, which incorporated 89,17,174 or 14.75 per cent of ST population. Decadal variation of population density in these tribal districts recorded marginal increase. The highest decadal ST population growth rate of nearly 43 per cent was recorded in Amirgadh *taluka* of Banas Kantha district and Dhanpur *taluka* of Dohad district. In the eastern margin of the State, it is observed that there is decennial growth of urban population mostly in the *talukas* of Danta, Chikhli, Mangrol and Umbergaon. Central and south-western parts of the tribal region show 17 to 58 per cent change in urban share in the total population, perhaps due to in-migration from the neighbouring villages in search of employment opportunities outside the farming sector (Census of India, 2001 & 2011).

With enhancement of the educational facilities and sustained campaign (*Sarva Shiksa Abhiyan*), literacy rates have improved between 2001 and 2011 to some extent. The highest literacy rates were recorded in Navsari (74.55%), The Dangs (74.45 %), Surat (67.27 %), Valsad (67.26 %), and parts of Sabar Kantha (65.23 %) district. The sex ratio in the tribal regions is better than the State average, wherein the districts of Tapi (1022), The Dangs (1009), Valsad (1002), Navsari (1001), Dohad (993) and Surat (983) have more than 990 females per 1000 males.

The ST population is primarily rural by residence, with multiple dependence on nature. Traditionally, their life and living are closely linked to their immediate surroundings or natural habitat (Ahmad, 1999: 133, Dash, 1998: 25). Agriculture is their primary occupation along with

collection of Non-Timber Forest Products (NTFP) for fuel and other domestic uses. Eventually, they have preferred to live near forests and in rural set-ups.

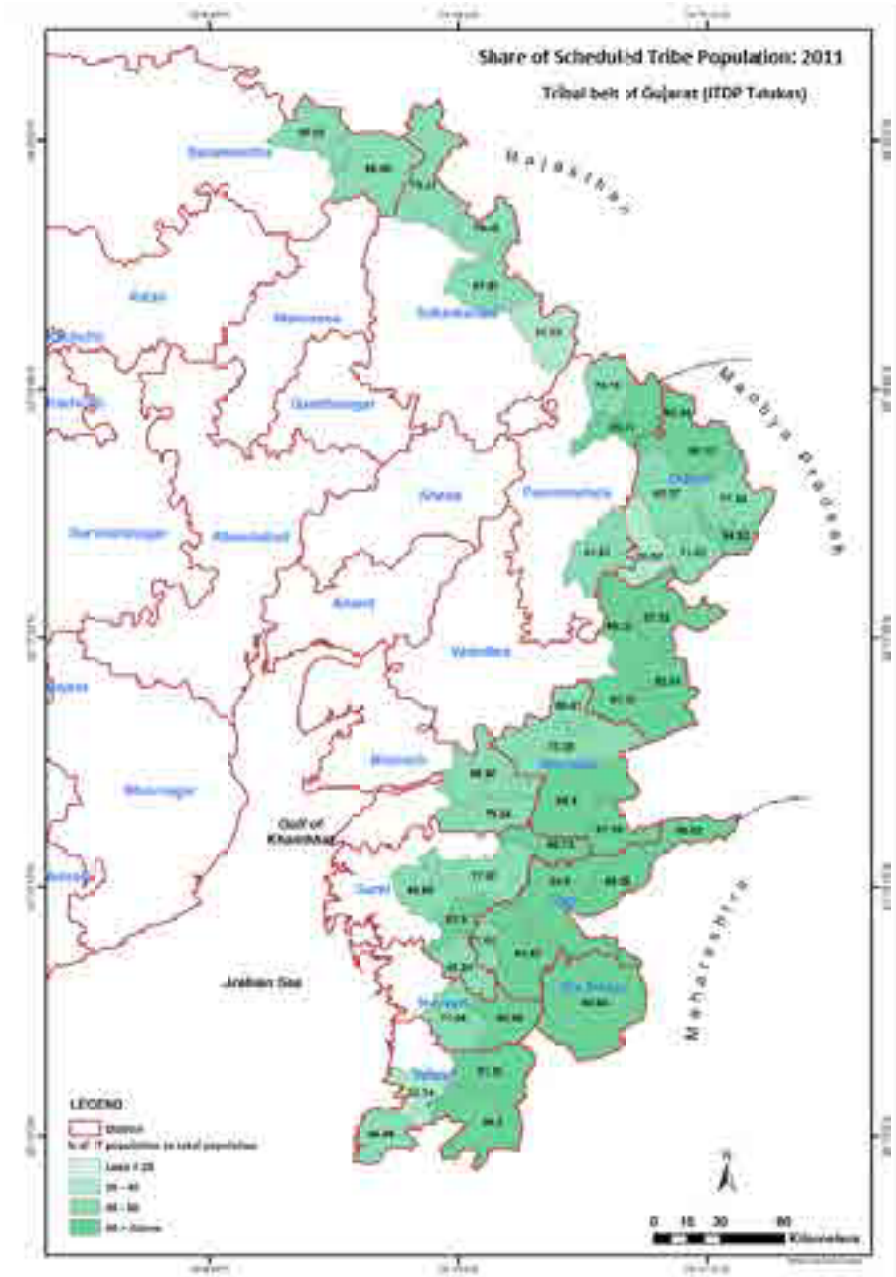

Figure- 1. Share of Scheduled Tribe Poulation, 2011 in the tribal belt of Gujarat

The northern and eastern tribal region of Gujarat is home to STs and Primitive Tribal Groups (PTGs), mostly dependent on forest and subsistence farming. However, with the progress of development programmes, particularly Tribal Area Sub Plan since 1974 and Vanbandhu Kalyan Yojna (VKY - CM's 10-point programme) since 2007, substantial changes have resulted (https://vky.gujarat.gov.in/). The development impact has been varied and can be ascribed to geographical compulsions resulting in advantages and disadvantages on agricultural transformations in cropped area and yield.

Agricultural Area Changes

The total geographical area of the Gujarat state is about 196 lakh hectares. Out of this, 99.66 lakh hectares or 50.8 per cent is under Net Sown Area (NSA). The number of operational holdings with the ST population has decreased by 1.22 per cent from 5.04 lakh in 2010-11 to 4.98 lakh in 2015-16. The total area of the operational holdings of the STs has also decreased by 1.05 per cent from 9.68 lakh hectares to 9.58 lakh hectares during the period in reference (Agricultural Census, 2015-16: 5). The Agricultural Census data reveals that in Sabar Kantha, Panch Mahals and Vadodara districts the number of operational holdings and their area has reduced from 2001 to 2015 due to administrative subdivision. Rest of the districts show increase in the number of operational holdings but decrease in their area during 2001 to 2015, perhaps due to increase in population and consequential fragmentation of holdings among family members. Fragmentation of holdings into smaller sizes may adversely affect the level of productivity of the operational holdings (Rudra and Sen, 1980: 394).

The Dangs district has over 65 per cent of its geographical areas under forests, and meagre area under cultivation. It is interesting to note that 100 per cent of the cultivated area of the district belongs to the tribes. Similarly, Dohad, Narmada, Tapi and Valsad districts have considerable area under forest and have between 55 to 81 per cent of the cultivated area with the ST population. On the other hand, the proportion of cultivated land operated by the ST population is insignificant in the districts of Panch Mahals (17%), Bharuch (15%), Sabar Kantha (12%), and Banas Kantha (3%). While proportion of cultivated area with the ST population has markedly increased from a meagre 23 to 53 per cent in Vadodara district, the same has recorded a decrease in the districts of Panch Mahals (20 to 17%), Surat (47 to 29%) and Valsad (64 to 55%) districts during the last 15 years.

Irrigation Issues

Surface water resources of Gujarat account for 68.5 per cent of total water resources, but spatial distribution is uneven. Gujarat's agriculture is predominantly dependent on ground water. The issues regarding irrigation are:

- Due to over-exploitation of ground water in Banas Kantha and Sabar Kantha districts, the water level goes deeper, creating hurdles for irrigation. The shallow water level can be observed in the southern districts of the The Dangs, Surat and Bharuch districts due to excessive rainfall.
- Water transmission by canal irrigation suffers losses due to leakage, seepage, evaporation, operational loss and theft. Eventually, these losses reduce the quantity of water for irrigation and indirectly affect the crop yield. (State of Environment Report, 2017: 58, 62).

- Jyotigram Scheme (JGS), launched in 2006, has advantages of restriction of ground water irrigation and control of subsidized power supply through electrified tube-wells. But, JGS also shows adverse effects on marginal farmers, tenants and landless farm labourers, who were previously dependent on tube-well for irrigation (Shah et. al., 2008: 1237).
- Threat of contamination: The nature of water contamination in different districts of the State becomes clear from Table I.

Table – 1. Type of Water Contamination in the Districts of Gujarat

Districts by Type of Water Contamination				
Salinity (EC above 3000 micro mhos/cm)	Fluoride (Above 1.5 mg/l)	Nitrate (Above 45 mg/l)	Arsenic (Above 0.01 mg/l)	Iron (Above 1 mg/l)
Banas Kantha	Banas Kantha	Banas Kantha	Bharuch	Banas Kantha
Bharuch	Bharuch	Bharuch	Dohad	Narmada
Dohad	Dohad	Dohad	Vadodara	Bharuch
Navsari	Panch Mahals	Narmada		Valsad
Sabar Kantha	Sabar Kantha	Navsari		
Surat	Vadodara	Panch Mahals		
Vadodara	Navsari	Sabar Kantha		
Narmada	Surat			

Source: https://cgwb.gov.in/contaminated-areas.html

Tribal farmers in Gujarat get 50 per cent subsidy and additional 25 per cent subsidy for micro irrigation schemes from Gujarat government. It is expected that farmers in the region would take advantage of the government schemes. Irrigation is the seventh point of the ten-point development programme launched in 2007 under VKY. It covers all ITDP *talukas* of the tribal regions. Atal Bhujal Yojana manages groundwater resources and has been implemented in Banas Kantha and Sabar Kantha districts. Irrigation facilities have been provided by construction of canal under Sujalam Sufalam Yojana in Panch Mahals and Dohad districts. *Talukas* of Bharuch, Surat, Navsari and Valsad districts are expected to benefit from the Sagarkhedu Sarvangi Vikas Yojana. Ambaji to Umbergaon irrigation scheme will be benefitting Vadodara, Panch Mahals and Dohad districts. However, due to topographical characteristics, access to the irrigation facilities varies from district to district. The Dangs, Dohad, Tapi and Narmada districts are having little more than 50 per cent of the cultivated area by STs under irrigation.

In the tribal areas of Gujarat total 1,01,241 hectares of area have been given benefit of irrigation; 58,966 hectares through 14,352 small check dams, 25,038 hectares through 521 big check dams and 17,237 hectares by deepening of 3,548 ponds. Benefits of lift irrigation have been provided to 49,684 hectares under 1,346 schemes (Soc-Eco Review, 22-23: 20). Percentage of area under irrigation has increased only by 2 per cent during 2001-15 in Banas Kantha district. Gujarat government has initiated micro-irrigation systems to increase the area under irrigation over 4.21 lakh hectares in the district. To prevent mixing of brackish tide water in Narmada River, Bhadbhut Yojana has been planned. This project will improve the quality

of water in Bharuch and Ankleswar area for irrigation and also to store potable water. Navsari (32%), Valsad (32%) and Surat (17%) districts have less than one-third of their fields under STs irrigated. The varied geographical characteristics, access to water and facilities developed by district authorities have resulted in changing cropping patterns. In Vadodara (5%), Panch Mahals (7%) and Sabar Kantha (4%) districts, substantial irrigation water is received through Mahi, Orsang, Dev and Karjan River irrigation projects. The Chhota Udepur district (tribal *taluka* separated from Vadodara district), Mahisagar (separated from Kheda and Panch Mahals) and Aravalli (separated from Sabar Kantha) are primarily tribal regions and get ground water irrigation in less than 10 per cent of their cultivated area.

Agricultural Efficiency

The efficiency of agriculture can be more adequately explained on the basis of hectare-yield statistics of crops. The spatial variations in physical output from land are the result of combinations of natural environment and human activities. M. G. Kendall (1939) developed a method of determining agricultural efficiency based on output per unit area and devised a system of Ranking Coefficient. According to Kendall's method, the sum of the ranks is to be divided by the number of crops (Singh and Dhillon, 1984: 229).

The Ranking Coefficients of crop yield in the 12 districts, computed on the basis of Kendall's method, in which 'lower the Ranking Coefficient higher is the efficiency' (Singh & Dhillon, 1984: 229; Mahmood, 1977: 89) are presented in Table - II. Following this method, the districts were ranked in order of yield of each of the selected 16 crops, and then the ranks occupied by each district in respect of the selected crops were summed up. Because the number of crops is equal for all the districts, the division of the sum of the ranks of each district by the number of crops as per Kendall's method has not been done in the present exercise purposefully.

Results

From this composite index of Ranking Coefficients, the following observations can be made.

(a) The tribal districts that show better efficiency in Maize, Rice, Sorghum and Millet include Chhota Udepur, Sabar Kantha and Panch Mahals.

(b) The agricultural productivity of Surat is greater than that of the other districts with a score of 64.

(c) The district showing the least productivity among these twelve districts is Dohad with a Ranking Coefficient of 135.

(d) Chhota Udepur has Ranking Coefficient of 80.5, which is comparatively higher than ten out of the twelve districts in efficiency due to its irrigation development.

(e) Sabar Kantha has been one of the most efficient districts due to its access to irrigation, high cash crop yields and productive alluvial plains.

Access to Amenities and Crop Yield:

From the Table - II, it can be inferred that Surat, Vadodara, Sabar Kantha and Narmada districts are having very positive ranks in terms of crop yield. Moreover, it becomes clear from Table - III that Surat, Vadodara and Sabar Kantha districts also experience high growth in banking facilities in rural areas. Narmada and Banas Kantha districts have moderate number of villages

with banking facilities. Access to the financial support services to the farmers have helped them in enhancing the agricultural productivity.

Table -2. Agricultural Productivity - 2015-16 (Kendall's Ranking Coefficient Based on Yield in Kg/Ha)

District / Crop	Banas Kantha	Bharuch	Valsad	Dangs	Panch Mahals	Sabar Kantha	Surat	Dohad	Narmada	Navsari	Tapi	Vadodara/ Chhota Udepur
1. Rice	9	6	3	7	10	1	4	12	11	2	5	8
2. Wheat	2	6	12	10	8	3	4	9	7	5	11	1
3. Sorghum	8	9	5	2	1	7	4	12	10	6	3	11
4. Pearl Millet	3	5	10.5	10.5	7	1	2	4	6	10.5	8	10.5
5. Maize	5	11	6	10	12	4	8	9	7	3	2	1
6. Chickpea	1	12	6	2	8	7	5	11	3	10	9	4
7. Pigeonpea	8	7	10	4	1	11	3	9	6	5	12	2
8. Minor Pulses	11	1	4	5	12	6	3	10	2	7	9	8
9. Groundnut	2	4	9	11	3	1	6	8	10	12	5	7
10. Sesame	8	9	11	11	4	7	1	6	5	11	2	3
11. Rapeseed & Mustard	6	7	11	11	5	8	2	4	3	9	11	1
12. Castor	7	8	11	11	9	3	1	5	2	11	4	6
13. Soyabean	10	10	10	7	2	10	6	5	4	10	3	1
14. Oilseeds	2	5	3	9	7	1	11	12	10	4	8	6
15. Sugarcane	10	5	6	3	10	10	1	10	2	4	7	10
16. Cotton	7	8	11	11	4	2	3	9	5	11	6	1
Ranking Coefficient	99	113	128.5	124.5	103	82	64	135	93	120.5	105	80.5

Source: Computed by the authors.

Table – 3. Decadal Percentage Change in Amenities Related to Agriculture in Tribal Areas (2001 and 2011)

Districts	Percentage Change				
	Storage Capacity in Metric Tons (Civil Supply)	**% of Villages Connected with *Pucca* Roads** (Out of total villages in the district)	% of Villages having Agricultural Credit Societies (Out of total villages in the district)	% of Villages having Banking Facility (Out of total villages in the district)	% of Villages with Transport Communication Facilities
Banas Kantha	-4.08	13.30	17.15	18.00	10.17
Sabar Kantha	6.29	14.39	-30.21	0.00	2.05
Panch Mahals	19.83	17.96	-29.57	-16.42	16.57
Dohad	-28.57	19.15	-41.21	-2.33	16.63
Vadodara	-16.41	20.87	-62.32	152.38	34.94
Narmada	-8.00	29.82	-72.62	-24.24	63.45
Bharuch	-6.67	8.54	-38.83	6.06	10.22
The Dangs	34.78	59.83	-26.42	-69.57	34.51
Navsari	-13.37	2.46	-10.12	-5.59	0.00
Valsad	-3.57	20.75	-51.69	-3.30	6.94
Surat	-45.19	8.22	-79.23	30.86	10.99

Source: Census of India, 2001 and 2011.

**On 27th September 2007, the district of Surat was bifurcated into two new districts, viz. Surat and Tapi. Hence, the decadal change for Tapi district is not available for 2001 Census (District Census Handbook Part A, Tapi, 2011:13).*

Percentage of villages connected with *pucca* roads in Chhota Udepur increased by 32.14 per cent during the 2001 and 2011 census, percentage of villages with Agricultural Credit Society dropped by (-)84.26 per cent. On the other hand, percentage of villages having banks and transport facility increased by 165.71 and 56.40 per cent respectively (District Census Handbook, Vadodara Part A, 2001: 68; 2011: 110)

Perhaps the infrastructural change in the north and eastern hilly region itself is changing the farming from traditional subsistence farming to mechanized high yielding crops. These trends are more visible in irrigated plains of the tribal districts, whereas the hilly regions are using alternative measures for agricultural transformation. The cyclic nature of crop loan to farmers from banks located in the area assists the tribal farmers to avail better irrigation facilities and good crop yields. Most of the banks offer crop loan to tribal cultivators for a period of eleven months, and after repaying within time certain percentage of the interest amount is waved off. Therefore, better yield and improved transport facilities with metalled roads again cyclically boost crop income and repayments of loans. Contrarily, inequality in distribution of banks in some of the districts catering to a smaller number of villages and inadequate number of households to support banking service results in moderate to low yield.

Decadal Changes in Work Participation and its Impact

Agricultural changes as well as economic development have resulted in increased employment opportunities within and outside the region. There is a shift in the occupational characteristics with increased secondary employment of the tribal population due to mainstreaming (being connected to developed regions of districts).

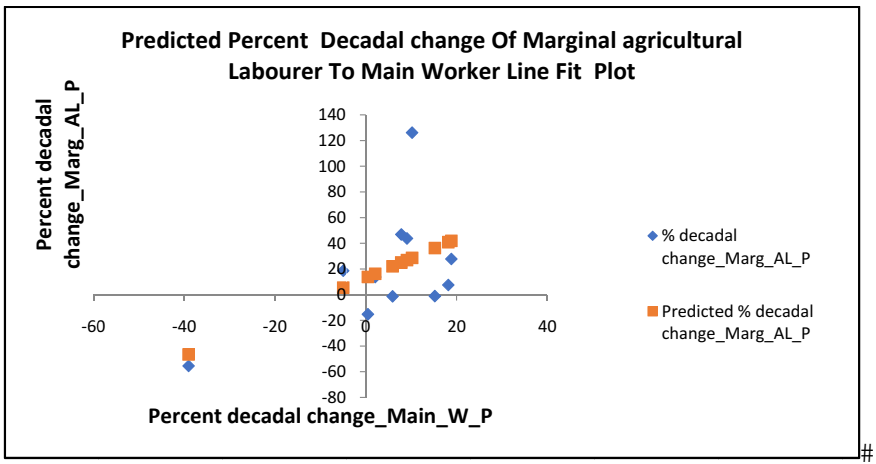

Fig. 2. Predicted percent decadal change of marginal agricultural labourer to main worker line fit plot

Source: Based on Agricultural Census, GoI

Table 4. Summery output

Multiple R	0.540095
R Square	0.291703

	P value	Lower 95%	Upper 95%
% change of Main Worker Population	0.086329	-0.26731	3.322216

Source: Computed by the Authors.

Results of Work Participation Analysis

From the data on correlation between decadal changes of main working population and marginal agricultural labour, the following observations can be made (Fig. 2, Table 4).

(a) The multiple R-values indicate that there is a significant linear relationship between the predictor and response variables.

(b) R squared value shows that there is 29 per cent of variance in the results as shown by the predictor variable.

(c) For 5 per cent significance value, the p-value obtained is slightly higher than 0.05. Also, the 95 per cent confidence interval (-0.26, 3.322) includes 0.

(d) This may prove that per cent decadal change in main worker population is not a significant predictor for per cent decadal change in marginal agricultural labourers' population.

(e) This trend is surprising as, when decadal change of main workers is 10 per cent, the predicted change in marginal agricultural labourers will be nearly 40 per cent.

Findings and Summary

The socio-economic condition of SCs and STs and their households have changed during the 2001 and 2011census. But, the gap between these two communities and of both these two Scheduled communities with all other social groups has widened (Bhagat, 2013: 62).

The socio-economic data of tribal region in Gujarat indicate that except for a few *talukas*, decadal change in population distribution and population density remained more or less the same. Decadal growth rate of population has reduced in most of the tribal *talukas* between 2001 and 2011, perhaps due to migration and/or sub-division of the *taluka*. Maximum number of tribal *talukas* are showing higher sex-ratio in rural areas compared to the State average. Literacy rate varies between 35 to 77 per cent in the tribal districts, but decadal increase in literacy rate of nearly 15 per cent has been the maximum in the southern districts of Bharuch, Surat, Navsari and Valsad. Urban areas in the tribal *talukas* have achieved higher literacy rates for both males and females. Primary health centres in most of the districts are ranging from three to eight for the entire *talukas*. Availability of household water connection is medium to poor in all districts excepting in The Dangs, Surat and Navsari districts where percentage of tribal households having water tap connections is the maximum.

The country in general suffers from the uncertainty of the monsoon rains, and Gujarat is no exception. Ground water and surface run-off meet the major demand of irrigation. Availability of water for irrigation and its management are the main challenges in the eastern districts of Gujarat.

Data furnished here for agriculture incorporates all land size classes from below 0.5 hectares to more than 20 hectares. The traditional agricultural pattern is changing in terms of cropping pattern. Unavailability of irrigation facilities is a major obstacle for tribal agriculture, restricting the farming process to the four months of rainy season. Area under total cereals and pulses remain unchanged or have decreased in most of the districts except in Vadodara and Surat. These two districts show sharp decline in area under all cereals and pulses. But the crop yield has increased in these districts with the help of improved infrastructure. The study finds that, area of pulses, vegetables and oilseeds have not increased much in the ST dominated areas. Perhaps this is due to the shift in the occupation of tribal people from primary, farm occupation to non-farm activities.

Even though work participation rate has increased for total workers and total male workers for the entire State, it has decreased in case of the females. Female participation rate in the non-agricultural sector has increased, as after the short rainy season women workers migrate out in search of work at the cost of their health, education and welfare (Hirway, 2002: 18). Analytically, it is projected that when main workers increase by 10 per cent, marginal agricultural labourers increase by more than 40 per cent. So decadal change of main workers is not a very significant predictor of marginal agricultural labourers. Perhaps the segment of tribal population continuing as agricultural labourers migrate as labourers under '*mukadam*' (labour contractor) to avoid uncertainty of crop failure and to get assured income. More than 15 per cent (decadal change) increase in main workers and main cultivators is projecting a certain positive increase. Perhaps due to inheritance-based fragmentation of land holdings, main workers and main cultivators are showing positive linear increase.

Primitive technology, slow increase in literacy rate for both male and female segments of the ST population, intervention of exogenous factors (bank, roads, APMC, seed banks etcetera), decreasing female cultivator's rate, and single crop cycle are some of the characteristics of tribal agriculture in eastern part of the State. Dohad, Narmada, Tapi, The Dangs and Valsad districts have moderate to high percentage of NSA under ST population compared to area under all social groups. Rest of the districts experience seasonal migration for road construction.

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