

Chapter Four

Changes in Land Use Pattern



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4.1 Introduction:

Land is mainly utilized for residences and economic activities. Among all economic activities, agriculture is the most important. Producing different type of crops not only feeds the population but also serves and supports other economic sectors. Through ages, dynamics of population and food production have always been interwoven. To determine what number and which type of crops are to be produced are definitely critical research problems. Changing patterns of agriculture and the challenges which surface, certainly can be observed through patterns of land use changes.

4.2 Land Use - The Concept:

Land use is the surface utilization of all developed and vacant land on a specific location and at a given time (Mandal, 1982: 1). Land use refers to the classification of land according to what activities take place on it or how humans occupy it (ESRI, n. d.). According to Jasbir Singh, the existing pattern of land use is the resultant product of land exploitation with land cover modification by irrigation, land efficiency improvement and growth of population (Singh, 1990: 140).

Land cover modification for the purpose of crop production has both physical and cultural issues. Further, degradation of land which was once forested and changing livelihood patterns may perhaps be the problems of land utilization. It is intended in this chapter to explore these and other problems of land use in the ITDP *talukas* of eastern tribal region of Gujarat.

4.2.1 Nine-Fold Classification of Land Use:

Land can be utilized for a single purpose like farming, mining, transportation, residential, industrial or uncultivable waste (Mandal, op.cit.: 1). To overcome the different demands put forward by increasing population, land utilization mesh is continuously changing both in rural and urban areas. There are nine categories of land utilization, each having its own credibility. To meet the demand of food, barren and uncultivable lands and fallow lands are also being brought under cultivation, resulting in less production and poverty despite desirable labour input. The following nine categories are generally used to classify land utilization in India.

1. Forest area: Land under forest (state owned or private), wooded or potential forest land.
2. Area under non-agricultural uses: Land occupied by building, roads, railways etcetera.
3. Barren and unculturable land: Land like mountains, desert, and lake etcetera, which cannot be cultivated without drastic alterations involving huge cost.
4. Permanent pastures and other grazing land: Including village common grazing land, all grazing land permanent or temporary.
5. Land under miscellaneous tree crops: Cultivable land not under net area sown but are under some agricultural use like trees, grasses, bamboo and fuel wood etcetera.
6. Culturable waste land: This includes land available for cultivation but not taken up for more than five years including current year. Such lands can also be within cultivated holdings which may or may not be accessible.
7. Fallow lands other than current fallow: Cultivated land which is temporarily uncultivated for one to five years.
8. Current fallow: All cropped areas not cultivated during the current year.
9. Net sown area: Total area sown including orchards (MOSPI, 2023).

Table - 4.1
Decadal Change in Agricultural Land Use of All Social Groups: Chhota Udepur District
(2001-2011)

Taluka	Year	Total Area of Holding	Net Area Sown	Area under Current Fallow	Net Cultivated area	Other Uncultivated area excluding Fallow Land	Fallow land other than current Fallow	Culturable Waste Land	Total Uncultivated Land	Land not available for Cultivation
		Area in Hectares								
Chhota Udepur	2000-01	29558	29556	2	29558	0	0	0	0	0
	2010-11	34386	33949	438	34386	0	0	0	0	0
	% Change	16	15		16					
Jetpur Pavi	2000-01	48269	47917	351	48268	0	0	0	0	0
	2010-11	46152	41859	4294	46152	0	0	0	0	0
	% Change	-4	-13		-4					
Kavant	2000-01	34536	34216	167	34383	5	94	2	100	53
	2010-11	33258	27647	5611	33258	0	0	0	0	0
	% Change	-4	-19		-3					
Nasvadi	2000-01	29623	28604	213	28817	27	0	554	580	225
	2010-11	25301	22993	2308	25301	0	0	0	0	0
	% Change	-15	-20		-12					
Sankheda	2000-01	50143	49891	211	50102	14	24	0	37	4
	2010-11	45702	44390	1313	45702	0	0	0	0	0
	% Change	-9	-11		-9					

Source: District Census Handbook Vadodara, 2001 and 2011.

For all social groups, a negative decadal change in Net Sown Area (NSA) has been observed in all the *talukas* of Chhota Udepur district except in Chhota Udepur *taluka*. Maximum change in land use has occurred in Nasvadi (-20%) followed by Kavant (-19%), Jetpur Pavi (-13%) and Sankheda (-11%) *talukas*. Only 15 per cent increase in NSA could be traced in Chhota Udepur *taluka*. Simultaneously, the least area under current fallow is in the Chhota Udepur *taluka* followed by Sankheda, Nasvadi, Jetpur Pavi and Kavant *talukas* for all social groups.

Table - 4.2
Decadal Change in Agricultural Land Use of Scheduled Tribes: Chhota Udepur
District (2001-2011)

Taluka	Year	Total Area of Holding	Net Area Sown	Area under Current Fallow	Net Cultivated area	Other Uncultivated area excluding Fallow Land	Fallow land other than current Fallow	Culturable Waste Land	Total Uncultivated Land	Land not available for Cultivation
		Area in Hectares								
Chhota Udepur	2000-01	27558	27556	2	27558	0	0	0	0	0
	2010-11	32813	32410	403	32813	0	0	0	0	0
	% Change	19	18		19					
Jetpur Pavi	2000-01	6340	6320	20	6340	0	0	0	0	0
	2010-11	6671	5967	705	6671	0	0	0	0	0
	% Change	5	-6		5					
Kavant	2000-01	32822	32503	166	32669	5	93	2	100	53
	2010-11	32219	26778	5442	32219	0	0	0	0	0
	% Change	-2	-18		-1					
Nasvadi	2000-01	20418	20418	0	20418	0	0	0	0	0
	2010-11	19034	17541	1492	19034	0	0	0	0	0
	% Change	-7	-14%		-7					
Sankheda	2000-01	9879	9704	175	9879	0	0	0	0	0
	2010-11	11371	11026	346	11371	0	0	0	0	0
	% Change	15	14		15					

Source: District Census Handbook Vadodara, 2001 and 2011.

In case of the STs, the NSA has registered positive increase in Chhota Udepur and Sankheda talukas. Tribal farming in Kavant taluka has experienced the highest reduction in NSA (-18%) followed by Nasvadi (-14%) and Jetpur Pavi (-6%). In Chhota Udepur and Sankheda talukas, temporal changes in NSA are positive (18% and 14% respectively) between 2001 to 2011. At the same time, land not cultivated for the current year or not left as current fallow is the minimum in Sankheda taluka followed by Chhota Udepur, Jetpur Pavi, Nasvadi, and Kavant talukas. Lack of irrigation forces the tribal farmers to seasonally move to the neighbouring districts as migrant labourers leaving the cultivable land as current fallow to earn money for the next summer cropping season. Provision of irrigation with electricity possibly could help to hold back the farmers from migrating out.

Table -4.3
Change in Agricultural Land Use of Scheduled Tribes: in Chhota Udepur District
(1995-96 to 2015-16)

Taluka	Year	Total Area of Holding	Net Area Sown	Area under Current Fallow	Net Cultivated area	Other Uncultivated area excluding Fallow Land	Fallow land other than current Fallow	Culturable Waste Land	Total Uncultivated Land	Land not available for Cultivation
		Area in Hectares								
Chhota Udepur	1995-96	57070	56246	174	56420	157	198	32	387	263
	2000-01	27558	27556	2	27558	0	0	0	0	0
	% Change	-52	-51		-51					
	2005-06	31704	31387	295	31682	12	0	0	12	10
	% Change	15	14		15					
	2010-11	32813	32410	403	32813	0	0	0	0	0
	% Change	3	3		4					
	2015-16	32748	32734	14	32748	0	0	0	0	0
% Change	-0.2	1		-0.2						
Jetpur Pavi	1995-96*									
	2000-01	6340	6320	20	6340	0	0	0	0	0
	2005-06	6694	6686	7	6694	0	0	0	0	0
	% Change	5.6	6		5.6					
	2010-11	6671	5967	705	6671	0	0	0	0	0
	% Change	-0.3	-11		-0.3					
	2015-16	4765	4765	0	4765	0	0	0	0	0
	% Change	-28.6	-20		-28.6					
Kavant	1995-96*									
	2000-01	32822	32503	166	32669	5	93	2	100	53
	2005-06	33469	33442	27	33469	0	0	0	0	0
	% Change	2.0	2.9		2.4					
	2010-11	32219	26778	5442	32219	0	0	0	0	0
	% Change	-3.7	-20		-3.7					
	2015-16	32256	32256	0	32256	0	0	0	0	0
	% Change	0.1	20		0.1					
Nasvadi	1995-96	21071	20981	83	21064	0	1	0	1	6
	2000-01	20418	20418	0	20418	0	0	0	0	0
	% Change	-3.1	-2.7		-3.1					
	2005-06	20688	19595	1090	20685	4	0	0	4	0
	% Change	1.3	-4		1.3					
	2010-11	19034	17541	1492	19034	0	0	0	0	0
	% Change	-8.0	-10		-8.0					
	2015-16	19524	18769	754	19524	0	0	0	0	0
% Change	2.6	7		2.6						

Sankheda	1995-96	10129	9747	106	9853	10	89	84	183	93
	2000-01	9879	9704	175	9879	0	0	0	0	0
	% Change	-2.5	-0.4		0.3					
	2005-06	12576	12555	21	12576	0	0	0	0	0
	% Change	27.3	29		27.3					
	2010-11	11371	11026	346	11371	0	0	0	0	0
	% Change	-9.6	-12		-9.6					
	2015-16	8099	8099	0	8099	0	0	0	0	0
	% Change	-28.8	-27		-28.8					

*In 1995-96, both Jetpur Pavi and Kavant *talukas* were part of Chhota Udepur *taluka*.

Source: Agricultural Census, <https://agcensus.dacnet.nic.in/>

Considering temporal changes of NSA from 1995-96 to 2015-16, Sankheda *taluka* is showing -27 per cent change or decrease. Nasvadi *taluka* has shown an increase of 7 per cent NSA for the same time period. Land under current fallow decreased significantly in Sankheda, Jetpur Pavi and Kavant *talukas*. At the same time, land under current fallow was relatively more in Chhota Udepur and Nasvadi *talukas*.

4.3 Significance of Land Use in Tribal Agriculture:

According to Rasskazova and Sinits, the economic development of any agricultural region directly depends on its land and resource potential. Management of agricultural land use is systematically done by planning, land supervision, monitoring and forecasting. Forecasting is the most important activity for agricultural land use, which aims at achieving judicious use of available resources and protection of the land (Rasskazova and Sinits, 2019: 1). Realization of the importance of land use in the tribal areas had led the Government of India to initiate multipurpose development plans for the tribal blocks in the initial years of Independence. The task was entrusted to the Ministry of Home Affairs and Ministry of Community Development and a committee was constituted with Dr. Verrier Elwin as its Chairman in 1959 to coordinate the activities (Bhowmick, 1981: 52).

Agriculture is the predominant economic activity of the tribal people of Gujarat, but it is in the gambling hands of rainfall. Along with it the land itself is not surplus generating or self-sustaining. Sometimes their household sizes are bigger than their farm size (Pathy, 1984: 111). Due to less availability of alternative economic opportunities, their life is

bounded between seasonal farmer and seasonal migrant labourer, adjusting and adapting to the coercive factors of land use development.

4.3.1 Factors Affecting Land Use:

Land and people, or production and consumption jointly function and change the land use scenario of an area. Demographic changes push economic demand which influences natural environments like forest, barren and unculturable land, waste land, fallow land. All natural land uses which transform into agricultural land use depict the physio-socio-economic changes of the region. Improvements in the communication sector and implementation of various awareness programmes in the recent past have encouraged tribal farmers to produce more crops from the same field which in turn has resulted in land degradation. With reference to this situation in the tribal areas, the cultural factors, both locational and institutional, like literacy, transport and infrastructural amenities affecting land use have been analysed in the previous two chapters. An attempt has been made here to address the effects of physical factors like geology, forest and soil on different agricultural characteristics of the study area mentioned below.

- 1) Land size changes, change in net sown area
- 2) Spatio-temporal change in cropping pattern
- 3) Changes in irrigated area
- 4) Changes in gross cropped area
- 5) Changes in farm inputs, such as fertilizers
- 6) Cropping intensity
- 7) Crop diversification

4.4 Factors Affecting Agricultural Land Use of Vadodara / Chhota Udepur District:

Chhota Udaipur district was carved out of Vadodara district on 15th of August, 2013. All the four tribal ITDP *talukas* namely, Chhota Udepur, Jetpur Pavi, Kavant, and Nasvadi of erstwhile Vadodara district are now part of the newly formed Chhota Udaipur district which have been considered along with Sankheda *taluka* for detailed investigation in this research. The newly formed district of Chhota Udepur lies within the coordinates of 20^o.49' to 22^o.49' north latitudes and 72^o.51' to 74^o.13' east longitudes with Chhota Udepur town as its district head-quarters. The

district has eastern limits with Madhya Pradesh, and western boundary with Vadodara district. The western margins of Vindhyaçal and Satpura ranges manifest their topographical characteristics respectively in the northern and southern parts of Chhota Udaipur district. Mahi, Orsang, Dev and Narmada are the main rivers flowing through the district.

4.4.1 Change in Forest Cover:

Chhota Udepur district extends over a total geographical area of 3,455.26² kms. of which, 720.71² kms. or 20.86 per cent is under forest cover. The district accounts for 3.29 per cent of total forest area of the State (District Profile, 2022: 16). As is evident from Map - 4.1, the forest cover is nil or negligible (less than 25%) in most of the villages of the district. Most of the villages in the western part of the district are devoid of forest cover. It is only in the eastern part of the district; a few villages have forested areas equal to or more than the prescribed one-third proportion.

Map - 4.1
Village Level Percentage of Forest Area: Chhota Udepur District

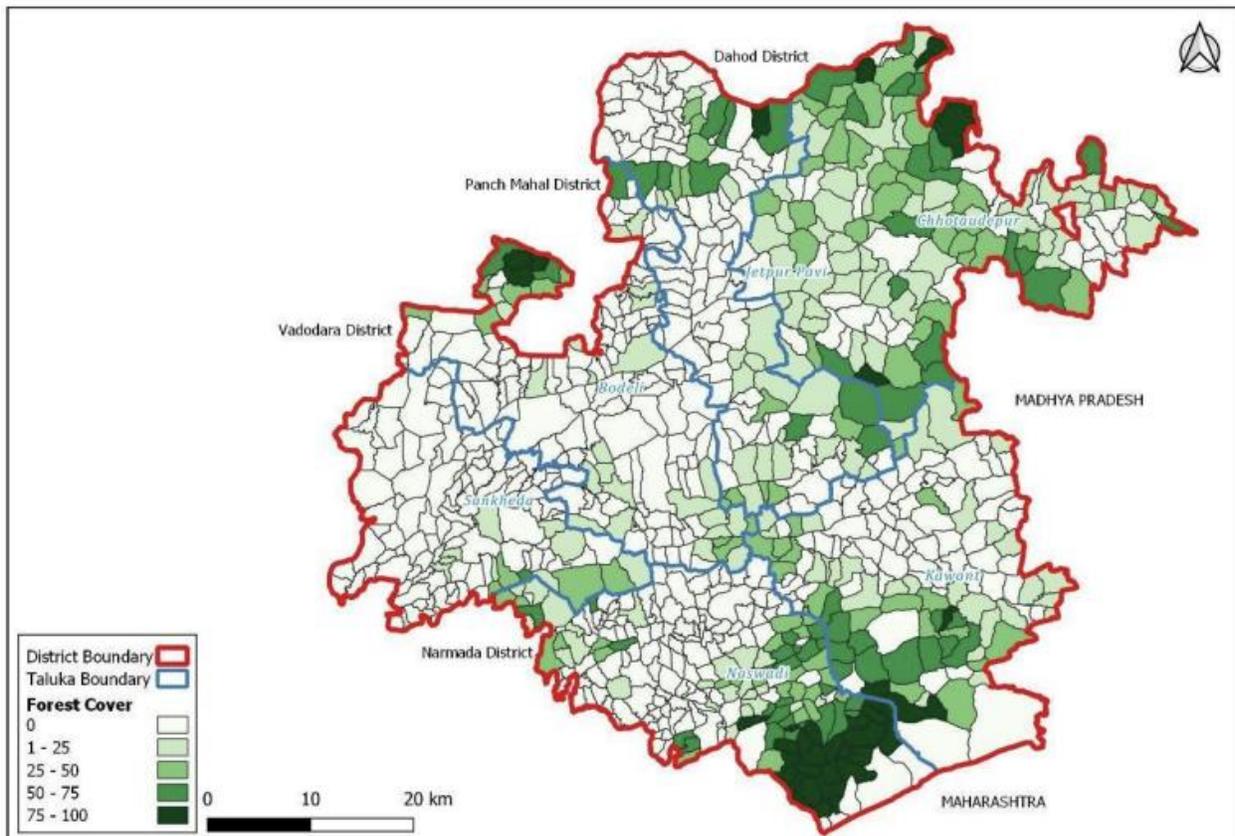


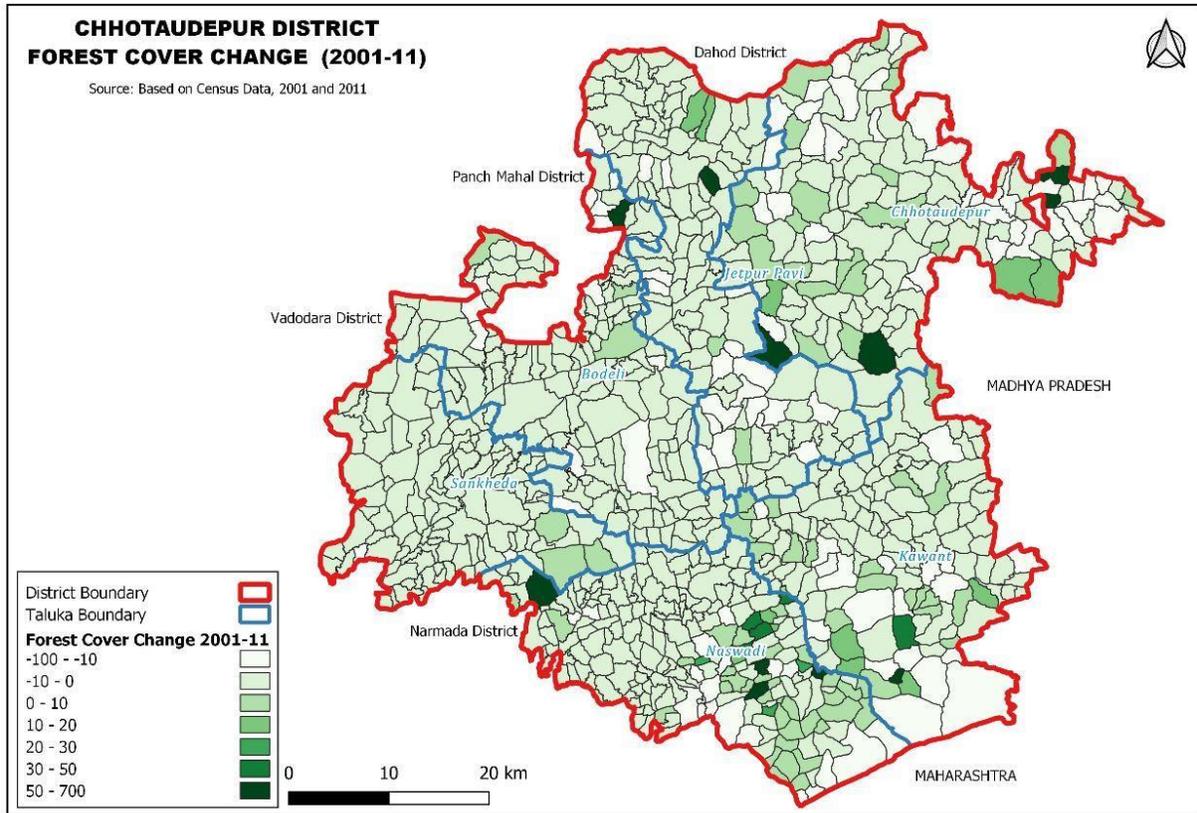
Table - 4.4
Change in Forest Cover: Chhota Udepur District
(2001-2011)

<i>Taluka</i>	Forest Area (in Ha.)		Decadal Change in Forest Cover	
	2001	2011	Area (in Ha.)	Percentage
Sankheda	4,006.90	4,045.70	+ 38.80	0.97
Nasvadi	15,660.40	12,890.80	- 2,769.60	-17.7
Jetpur Pavi	9,247.60	8,639.00	- 608.6	-6.6
Chhota Udepur	23,345.20	20,673.50	- 2,671.7	-11.4
Kavant	16,830.10	9,543.40	- 7,286.7	- 43.3

Source: District Census Handbook, Vadodara, 2001 and 2011

Declining trend of forest cover over the 2001-2011 decade can be observed in almost all *talukas* except Sankheda. The highest reduction in land under forest cover of more than seven thousand hectares is observed in Kavant *taluka* (- 43.3%) followed by Nasvadi (-17.7%), Chhota Udepur (-11.4%), and Jetpur Pavi (-6.6%) *talukas*. Significant reduction in the forest area of majority of the *talukas* is a matter of serious concern not only from the point of view of the environment in general, but also in particular from the point of view of the life and livelihood of the tribes, which has always had intrinsic relationship with the forest and its resources. It is heartening to notice an increase in forest area though negligible (0.97%) in Sankheda *taluka*.

Map - 4.2
Village Level Decadal Forest Area Change (in %): Chhota Udepur District
(2001-2011)



Source: Census 2001 and 2011.

Forest cover change is the outcome of increasing demand for food from the existing land resources. Continuous pressure from land utilization in the name of food production, infrastructure development and mining, has reduced the area under forest cover. From Map - 4.2, it is observed that within a span of 10 years, the percentage of forest area to total area has reduced a lot. Comparing Map - 4.1 and Map - 4.2, it becomes clear that the 75 to 100 per cent category of forest area in the Chhota Udepur, Kavant and Jetpur Pavi talukas degraded to 50 to 70 per cent of forest area category. Even in Bodeli taluka 75 to 100 per cent forest cover range is missing in a decadal gap.

To support tribal people in the country, the Government of India first introduced The Forests Rights Act (FRA) 2006, which envisages registering and conferring traditional habitat,

social, economic and livelihood rights of the ST and other Traditional Forest Dwellers in Scheduled and Non-Scheduled Forest areas of the State (forests.gujarat.gov.in).

Table 4.5
FRA Area: Chhota Udepur District
(2015-16)

District	Taluka	Number of Village	Claims Approved (Number)	Area (in Ht.)
Chhota Udepur	Chhota Udepur	83	2,369	1,300.62
	Kavant	36	1947	1,358.79
	Jetpur Pavi	22	396	206.31
	Bodeli	4	58	27.49
	Nasvadi	77	1,775	1,109.25
	Sankheda	-	-	-
	Total	222	6,545	4,002.26

Source: forests.gujarat.gov.in

From the above table, the number of approved claims under FRA was maximum in Chhota Udepur *taluka* followed by Kavant, Nasvadi and Jetpur Pavi *talukas*. Number of approved claims as well as area registered by ST people under FRA 2006 in Bodeli *taluka* is the lowest.

Second positive support under the guidance of Hon'ble Supreme Court is Compensatory Afforestation Fund Management and Planning Authority (CAMPA) (www.forests.gujarat.gov.in). Many development and industrial projects like construction of dams, or roads require forest land. Requests for forest clearance are submitted to the Ministry of Environment and Forests (MoEF) via the forest department. Compensation for the lost forest land is collected from the user agencies and the amount is decided by the Ministry. To envisage the proper afforestation programme and fund management for the benefit of forest and forest dwellers in the long run, CAMPA has been established in 2009 (<https://fed.gujarat.gov.in/campaintroduction.htm>). In Chhota Udepur district afforestation programmes like Gram Van, Social Forestry and Sanskrutik Van (Cultural Forest) are taking place. These initiatives or programme orientations are more to support and assist tribal people who desire to linger in and around the forest (Govt. of Gujarat, 2021b: 96, 86, 99).

4.5. Soil Cover:

Major soil cover of the District falls under two categories, medium black soil (61%) and sandy loam soil (21%) in the plain region. Another category of soil type (18%) is hilly light soil (Govt. of India, 2019: 2). There is a paradigm shift in the approach towards agriculture of the whole country from output centric policies to farmer centric sustainable approach. With the three dimensions in the approach, financial, ecological and social development, the Ministry of Agriculture was renamed as Ministry of Agriculture and Farmers Welfare. Many new schemes have been taken up by the Ministry since the 12th Five-Year Plan like, correction of land use pattern, seed quality, restoration of soil health, customized mechanization, improvement of agricultural insurance etcetera (Govt. of India, 2018b: 1). Restoring soil health in the tribal region must be at par with the mainstream farming to ensure the tribal farmer's welfare. In all *talukas* of Chhota Udepur district, the land holding sizes range between marginal to semi-medium. To increase production, tribal farmers use excessive fertilizers and pesticides in their holdings. Pre-harvest treatment with chemicals, though an important vision of the Ministry of Food and Agriculture, deteriorates soil health if done without proper knowledge, water and adequate land. An NPK ratio of 4:2:1 (N:P₂O₅:K₂O) is generally considered ideal and accepted for macro level monitoring of consumption of plant nutrients for the country as a whole (NAAS Report, 2009: 1). For example, in Gujarat plains and hills for Wheat and Groundnut (N: P₂O₅:K₂O) ratio should be 4:2:0 and 1:1.6:0 or 120-60-0 and 15-25-0 kgs/hectare respectively. At the same time, in southern Gujarat for Cotton Hybrid/Bt the preferred (N: P₂O₅:K₂O) ratio as 4.4:1:0 or 220-50-0 kg/hectare (ibid.: 16). Knowledge of agro-climatic region-based uses of fertilizers is needed for tribal farmers. To ensure and support soil health and to prevent overuse of fertilizers, a Soil Health Management (SHM) component was implemented under National Mission for Sustainable Agriculture (NMSA) during the 12th Plan period to promote soil test based balanced use of fertilizers through setting up or strengthening of soil testing laboratories, training and demonstrations on balanced use of fertilizers and introduction of Soil Health Card (Govt. of India, 2018b: 132). Besides, fertilizer is a crucial input in the cultivation of high-yielding crop varieties in the present day. There is an effective distribution system of fertilizers up to the village level. Farmers are well aware of the availability, cost and demand of various fertilizers but have little knowledge about the balanced use of these

fertilizers for crop production. They focus mainly on the application of nitrogen, phosphates and zinc fertilizers. Meanwhile, there is deficiency of potash, sulphur and micro-nutrients which reduces the quality of the soil ultimately affecting the crop yield. The overall status of Chhota Udepur district soil pH, is alkaline, and its electrical conductivity and organic carbon are low. There is acute deficiency of sulphur (limiting factors for oilseed production). To protect the soil health and enhance crop yield under this soil condition, awareness programmes are required to educate farmers on the usage of potash, sulphur and micro-nutrients (Govt. of Gujarat, 2020: 47, 53). Soil Health Card Programme (SHCP) is an online programme of technology transfer, which provides the fertilizer recommendations on the basis of soil analysis and the nutrient requirements of the crop as well as of the field. There are a total of 4 soil testing laboratories in the District with an annual capacity of 20,000 soil sample testing (District Agricultural Report, Chhota Udepur, 2017-18 to 2019-20: 48).

Table - 4.6
Taluka-Wise Fertilizer Consumption
(2011-12)

<i>Taluka</i>	Consumption of Fertilizer (in Metric Tons)						
	Urea	DAP	MOP	SSP	Complex	Mixture	Total
Jetpur Pavi	16,445	3,380	1,848	925	2,419	2,459	25,838
Chhota Udepur	10,911	1,711	1,017	606	2,205	1,611	16,921
Kavant	10,468	1,607	949	580	2,188	1,541	16,193
Nasvadi	8,750	1,195	686	476	1,761	1,266	13,296
Sankheda	16,016	1,528	1,873	912	2,110	2,423	25,461
Total	62,590	9,421	6,373	3,499	10,683	9,300	97,709

Source: Govt. of Gujarat, 2020: 55

Out of all sorts of fertilizers, uses of Urea were maximum in Chhota Udepur district in 2011-12 and consumption of Single Super Phosphate (SSP) was minimum. Di-Ammonium Phosphate (DAP) and Muriate of Potash (MOP) was less in quantity.

Table - 4.7
Taluka-Wise NPK Consumption: in Chhota Udepur District
(2016-17)

<i>Taluka</i>	Fertilizer Consumption (in Metric Tons)							
	N		P		K		NPK Consumption (in kg/ha)	
	Kharif	Rabi	Kharif	Rabi	Kharif	Rabi	Kharif	Rabi
Jetpur Pavi	5,580	4,962	4,400	3,012	800	390	25.66	34.92
Chhota Udepur	2,250	1,569	5,500	4,001	900	712	27.10	38.91
Kavant	4,600	3,210	3,500	2,200	930	790	26.67	41.81
Nasvadi	1,560	782	2,980	2,010	850	982	33.80	49.58
Sankheda	3,800	2,965	1,560	1,250	750	850	38.78	48.62
Total	17,790	13,488	17,940	12,473	4,230	3,724	-	-

Source: Govt. of Gujarat, 2020: 54

Per hectare consumption of fertilizer is highest in Sankheda *taluka* followed by Nasvadi *taluka*.

From the farmer's point of view, to get subsidies under Direct Benefit Transfer (DBT), there is a need for an Aadhar Authentication System. As subsidy on fertilizer is the second largest subsidy after food subsidy provided by the Government, Government of India (GOI) has brought fertilizer subsidy under the DBT system from 1st October, 2016. Government remits subsidy to fertilizer companies only after fertilizer retailers submit biometric authentication of the farmers through a Point of Sale (PoS) machine. Declaration, failure of authentication, network related issues and lack of farmer's awareness are some of the constraints of getting fertilizer subsidies (AERC Report, 2020: 112). So, there is a close relationship between awareness of farmers and the receipt of fertilizer subsidies.

4.6 Operational Holding Can Be A Capital:

Development in agricultural practices is a product of both physical and cultural determinants. Land is a limited and scarce resource, but a very basic input. Until and unless cultural and institutional aspects of cultivation are focused and improved, problems in agricultural productivity will sustain. According to Jasbir Singh and S. S. Dhillon, the primary cultural factors are land ownership, limitation of land holding due to size and fragmentation of the land (Singh and Dhillon, 1982: 131). The size of operational holding is influenced by

the law of inheritance which makes the land sub-marginal and uneconomic. Here the study examines the trend of number and area of operational holdings in the tribal *talukas* of Chhota Udepur from 1995 to 2015. In the tribal *talukas* of eastern belt, agriculture is mostly of subsistence type due to small and marginal landholdings. Along with it, land alienation among tribals is very common in this region. Reported estimates of the land alienated farmers is between 7-8 per cent of the total farmers, while unofficial sources report it at about 15 per cent (Behavioral Science Centre, 2009: 2). Among the crucial factors behind the lower agricultural productivity in some parts of the State, are skewed distribution of agricultural land, small size of operational holdings, high incidence of share tenancy and rural poverty (AERC, 2012: 28).

Table - 4.8
Number and Percentage of ST Operational Holdings by Size Category: Chhota Udepur
District (1995-2016)

<i>Taluka</i>	Class (Scheduled Tribe)	Size	1995-96	2000-01	2005-06	2010-11	2015-16	% Change (1995-96 to 2015-16)
Chhota Udepur	Marginal	Below 1.0 Ha	8272	5215	7265	7836	8185	-1.1
	% Marginal to Total no. of Op holding	< 1 Ha	29.8	34.2	39.4	40.8	41.3	
	Small	1.0 to 1.99 Ha	9847	5518	6183	6493	6755	-31.4
	% Small to Total no. of Op holding	1-1.99 Ha	35.5	36.2	33.5	33.8	34.1	
	Semi-medium	2.0 to 3.99 Ha	6185	3143	3480	3476	3536	-42.8
	% Semi Med to Total no. of Op holding	2-3.99 Ha	22.3	20.6	18.9	18.1	17.8	
	Medium	4.0 to 9.99 Ha	3274	1348	1451	1336	1311	-60.0
	% Medium to Total no. of Op holding	4-9.99 Ha	11.8	8.8	7.9	7.0	6.6	
	Large	10 Ha and above	167	39	66	43	45	-73.1
	% Large to Total no. of Op holding	10 Ha and above	0.6	0.3	0.4	0.2	0.2	
	Total number of Holding all		27745	15263	18445	19184	19832	-28.5
	% change	All sizes	0	-45	21	4	3	
Jetpur Pavi	Marginal	Below 1.0 Ha	2573	2997	3307	3407	2098	-18.5
	% Marginal to Total no. of Op holding	< 1 Ha	46.3	55.2	55.9	56.2	52.7	
	Small	1.0 to 1.99 Ha	1767	1524	1667	1754	1295	-26.7
	% Small to Total no. of Op holding	1-1.99 Ha	31.8	28.1	28.2	28.9	32.5	
	Semi-medium	2.0 to 3.99 Ha	930	726	770	769	487	-47.6
	% Semi Med to Total no. of Op holding	2-3.99 Ha	16.7	13.4	13.0	12.7	12.2	
	Medium	4.0 to 9.99 Ha	278	178	164	130	100	-64.0
	% Medium to Total no. of Op holding	4-9.99 Ha	5.0	3.3	2.8	2.1	2.5	
	Large	10 Ha and above	8	3	3	1	3	-62.5
	% Large to Total no. of Op holding	10 Ha and above	0.14	0.06	0.05	0.02	0.08	
	Total number of Holding all size classes		5556	5428	5911	6061	3983	-28.3
	% change	All sizes	0	-2	9	3	-34	

Kavant	Marginal	Below 1.0 Ha	NA	5943	6283	6270	6261	5%	
	% Marginal to Total no. of Op holding	< 1 Ha		33%	34%	34%	34%		
	Small	1.0 to 1.99 Ha	NA	6819	7195	7068	7223	6%	
	% Small to Total no. of Op holding	1-1.99 Ha		0	6	-2	2		
	Semi-medium	2.0 to 3.99 Ha	NA	3431	3545	3394	3440	0%	
	% Semi Med to Total no. of Op holding	2-3.99 Ha		19.2%	19.0%	18.6%	18.7%		
	Medium	4.0 to 9.99 Ha	NA	1634	1585	1480	1427	-13%	
	% Medium to Total no. of Op holding	4-9.99 Ha		9.1%	8.5%	8.1%	7.8%		
	Large	10 Ha and above	NA	76	62	59	61	-20%	
	% Large to Total no. of Op holding	10 Ha and above		0.4%	0.3%	0.3%	0.3%		
	Total number of Holding all size classes			0	17903	18670	18271	18412	3%
	% change	All sizes		0	0	4	-2	1	
Nasvadi	Marginal	Below 1.0 Ha	2725	3180	3437	3365	3321	22%	
	% Marginal to Total no. of Operational holding in taluka	< 1 Ha	29%	31%	33%	33%	32%		
	Small	1.0 to 1.99 Ha	2856	3435	3407	3304	3489	22%	
	% Small to Total no. of Operational holding in taluka	1-1.99 Ha	30.4%	33.3%	32.4%	32.6%	33.8%		
	Semi-medium	2.0 to 3.99 Ha	2492	2591	2550	2441	2506	1%	
	% Semi Med to Total no. of Operational holding in taluka	2-3.99 Ha	26.6%	25.1%	24.3%	24.1%	24.3%		
	Medium	4.0 to 9.99 Ha	1213	1077	1037	979	955	-21%	
	% Medium to Total no. of Operational holding in taluka	4-9.99 Ha	12.9%	10.4%	9.9%	9.7%	9.3%		
	Large	10 Ha and above	96	46	70	40	41	-57%	
	% Large to Total no. of Operational holding in taluka	10 Ha and above	1.0%	0.4%	0.7%	0.4%	0.4%		
	Total number of Holding all size classes			9382	10329	10501	10129	10312	10%
	% change	All sizes		0	10	2	-4	2	
Sankheda	Marginal	Below 1.0 Ha	1356	1330	1589	1609	1153	-15%	
	% Marginal to Total no. of Operational holding in taluka	< 1 Ha	27%	26%	25%	27%	27%		
	Small	1.0 to 1.99 Ha	1125	1171	1533	1488	1150	2%	
	% Small to Total no. of Operational holding in taluka	1-1.99 Ha	22.3%	23.2%	24.4%	25.0%	26.8%		
	Semi-medium	2.0 to 3.99 Ha	2092	2174	2595	2381	1688	-19%	
	% Semi Med to Total no. of Operational holding in taluka	2-3.99 Ha	41.5%	43.0%	41.4%	40.1%	39.3%		
	Medium	4.0 to 9.99 Ha	441	342	512	431	285	-35%	

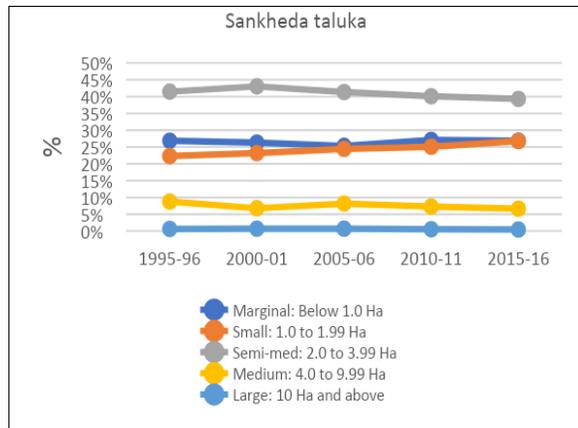
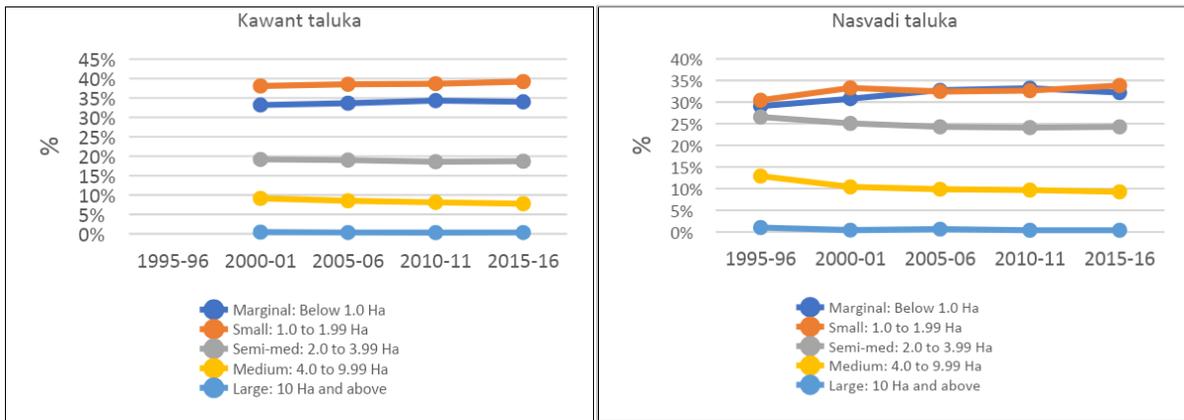
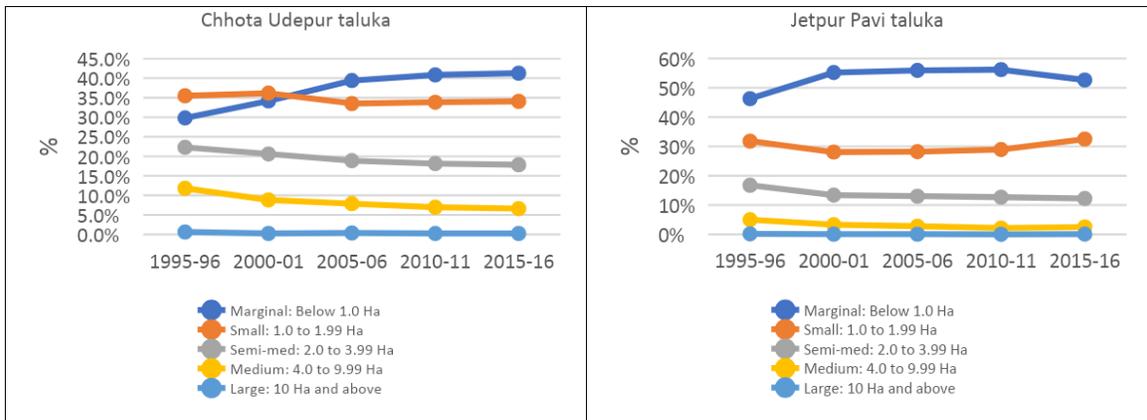
	% Medium to Total no. of Operational holding in <i>taluka</i>	4-9.99 Ha	8.7%	6.8%	8.2%	7.3%	6.6%	
	Large	10 Ha and above	30	34	44	32	19	-37%
	% Large to Total no. of Operational holding in <i>taluka</i>	10 Ha and above	0.6%	0.7%	0.7%	0.5%	0.4%	
	Total number of Holding all size classes		5044	5051	6273	5941	4295	-15%
	% change	All sizes	0	0	24	-5	-28	
District Total	Total number of Holding all size classes		47727	53974	59800	59586	56834	19%
	% change	All sizes	0	13	11	0	-5	

Note: The % change of Kavant *taluka* is calculated based on 2000-01 and 2015-16.

Source: Computed by author from <https://agcensus.dacnet.nic.in/>

Temporal change in the number of operational holdings of tribal population in all the five *talukas* of Chhota Udepur district show a declining trend. For Due to unavailability of 1995-96 data for Kavant *taluka*, per cent change has been calculated from time periods 2000-01 to 2015-16. Number and percentage of operational holdings of all size classes in Chhota Udepur and Jetpur Pavi *talukas* have reduced significantly (-28.5 and -28.3% respectively) during the reference period. It is worthy to note that the share of marginal, small and large land holdings have increased in almost all *talukas* in the last year (2015-16) under consideration. These land size categories have gained from the loss experienced by the medium and semi-medium land holdings. There are however a few deviations from this trend. For example, in Jetpur Pavi *taluka* the proportion of all sizes of operational holdings has declined by 28.3 per cent during the last 20 years (1995-96 to 2015-16). Kavant *taluka* has experienced an overall 2.8 per cent increase in the percentage share of land holdings of only the marginal, small and semi-medium sizes, which is a clear indication of land fragmentation. Similar is the situation in Nasvadi *taluka*, where the marginal, small and semi-medium size classes have gained, and medium and large ones have suffered loss. Except for the small land holdings, all size class holdings have reduced in Sankheda *taluka*. Whether the medium and semi-medium land holdings are getting fragmented or such land owners are shifting towards economic avenues other than agriculture, need to be explored.

Figure - 4.1
Percentage of Number of Holdings of Each Size Class to Total Number of Holdings
of ST: Chhota Udepur District (1995-96 to 2015-16)



The percentage share of operational holdings in Jetpur Pavi and Kavant *talukas* have reduced mainly in favour of small size classes. Nasvadi is the only *taluka*, where the proportion of marginal, small, and semi medium size holdings is showing increase, indicating higher

fragmentation of holdings. Per cent increase in the number of operational holdings in the smallest two categories is more than 20 in this *taluka* in 2015-16. The number of medium and large operational holdings have declined in almost all *talukas*.

Table - 4.9
Percentage Change in Per Capita Number of Holdings: Chhota Udepur District
(1995-2016)

Number of Operational Holding - Chhota Udepur						
<i>Talukas</i>	Class	1995-96	2000-01	2005-06	2010-11	2015-16
Chhota Udepur	Total number of Holding all Classes	27745	15263	18445	19184	19832
	Total Cultivators	29733	30775	30455	30135	29822
	Per Capita number of holding	0.93	0.50	0.61	0.64	0.67
	% change per Capita number of holdings	0	-47	22	5	4
Jetpur Pavi	Total number of Holding all Classes	5556	5428	5911	6061	3983
	Total Cultivators	27459	28659	27872	27084	26340
	Per Capita number of holding	0.20	0.19	0.21	0.22	0.15
	% change per Capita number of holdings	0	-6	12	6	-32
Kavant	Total number of Holding all Classes		17903	18670	18271	18412
	Total Cultivators	29252	31604	30196	28788	27505
	Per Capita number of holding	0.00	0.57	0.62	0.63	0.67
	% change per Capita number of holdings			9	3	5
Nasvadi	Total number of Holding all Classes	9382	10329	10501	10129	10312
	Total Cultivators	30983	30737	32243	33748	35401
	Per Capita number of holding	0.30	0.34	0.33	0.30	0.29
	% change per Capita number of holdings	0	11	-3	-8	-3
Sankheda	Total number of Holding all Classes	5044	5051	6273	5941	4295
	Total Cultivators	18976	20730	19116	17501	16138
	Per Capita number of holding	0.27	0.24	0.33	0.34	0.27
	% change per Capita number of holdings	0	-8	35	3	-22

Source: Agricultural Census, <https://agcensus.dacnet.nic.in> and Census of India 1991, 2001 & 2011. Computed by the author from Census data.

Per capita holdings of all the size classes have reduced or marginally increased in all the *talukas*, perhaps due to reduction in the number of holdings and cultivators, excepting in Nasvadi *taluka*, where number of cultivators has increased. Except Chhota Udepur and Kavant, all other *talukas* show per capita holdings between 0.15 to 0.30. In Chhota Udepur and Kavant, the number of per capita operational holdings is more than 0.60. Jetpur Pavi

(0.15) followed by Sankheda (0.27) have shown a smaller number of holdings possessed by individual farmers.

Figure - 4.2
Change in Per Capita Number of ST Holding of All Size Classes: Chhota Udepur District (1995-2016)

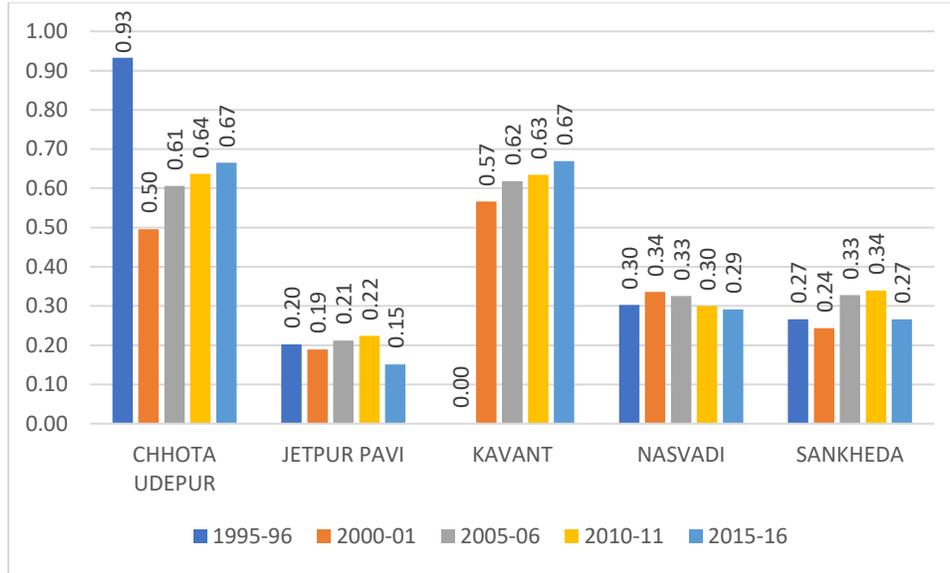


Table - 4.10
Percentage Change in Per Capita Area of Holdings: Chhota Udepur (1995-2016)

Area of Operational Holding - Chhota Udepur						
Talukas	Class	1995-96	2000-01	2005-06	2010-11	2015-16
Chhota Udepur	Total Area of Holding all Classes	57070	27559	31704	32812	32749
	Total Cultivators	29733	30775	30455	30135	29822
	Per Capita area of holding	1.92	0.90	1.04	1.09	1.10
	% change per Capita area of holdings	0	-53	16	5	1
Jetpur Pavi	Total Area of Holding all Classes	7820	6340	6693	6671	4765
	Total Cultivators	27459	28659	27872	27084	26340
	Per Capita area of holding	0.28	0.22	0.24	0.25	0.18
	% change per Capita area of holdings	0	-22	9	3	-27
Kavant	Total Area of Holding all Classes		32822	33468	32219	32255
	Total Cultivators	29252	31604	30196	28788	27505
	Per Capita area of holding	0.00	1.04	1.11	1.12	1.17
	% change per Capita area of holdings			7	1	5
Nasvadi	Total Area of Holding all Classes	21071	20418	20687	19034	19524
	Total Cultivators	30983	30737	32243	33748	35401

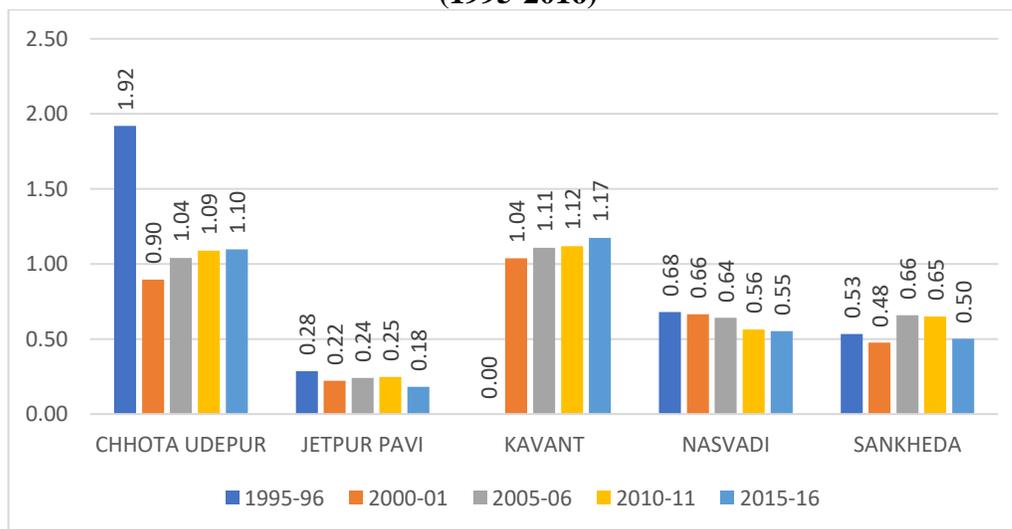
	Per Capita area of holding	0.68	0.66	0.64	0.56	0.55
	% change per Capita area of holdings	0	-2	-3	-12	-2
Sankheda	Total Area of Holding all Classes	10129	9879	12576	11371	8099
	Total Cultivators	18976	20730	19116	17501	16138
	Per Capita area of holding	0.53	0.48	0.66	0.65	0.50
	% change per Capita area of holdings	0	-11	38	-1	-23

Source: Agricultural Census, <https://agcensus.dacnet.nic.in> and Census of India 1991, 2001 & 2011. Computed by the author from Census data.

Chhota Udaipur *taluka* has the maximum per capita area of operational holdings among all other *talukas* of the District. As large as 1.92 hectares was the per capita holding in the *taluka* during 1995-96. After a drastic decrease (-53%) during the next five years, it has started increasing, but has not reached the 1995-96 level yet. The decreasing number and area of operational holdings of all size classes over the period in reference indicates increasing population pressure on land. Seasonal out migrations from the District in search of remunerative avenues in the neighbouring districts and urban centers may be related to this situation.

When operational land holdings in the backward areas decrease in both number and area, it becomes difficult to consider investing in durable capital like iron plough, tractors, irrigation, cattle, cart, farm buildings etcetera (Desai, 1969: 70). There may be negative influences for investment on durable capital for tribal households. Household consumption expenses and availability of loans are influential determinants for capital intensive farming.

Figure - 4.3
Change in Per Capita Area of ST Holdings of All Size Classes: Chhota Udepur District (1995-2016)



Kavant *taluka* shows an increasing trend of per capita area of holdings from 2000-01. Though relatively better irrigated due to the Sardar Sarovar Command Area Canal, Nasvadi and Sankheda *talukas* are having only around 0.55 and 0.50 hectares per capita holdings respectively. Jetpur Pavi has very less land holding area per person ranging between 0.18 to 0.28 hectares during the entire period in reference.

Table - 4.11
Area and Percentage of Operational Holdings by Land Size Category: Chhota Udepur (1995-2016)

Area of Operational Holding: Chhota Udepur district									
<i>Taluka</i>	Class	Size (Hectares)	1995-96	2000-01	2005-06	2010-11	2015-16	% Change between 1995-96 to 2015-16	
Chhota Udepur	Marginal	Below 1.0 Ha	5150	3077	4308	4655	4940	-4%	
	% Marginal to Total area of Op holding	< 1 Ha	9.0%	11.2%	13.6%	14.2%	15.1%		
	Small	1.0 to 1.99 Ha	13914	7823	8763	9168	9532	-31%	
	% Small to Total area of Op holding	1-1.99 Ha	24.4%	28.4%	27.6%	27.9%	29.1%		
	Semi-medium	2.0 to 3.99 Ha	17422	8692	9639	9601	9747	-44%	
	% Semi Med to Total area of Op holding	2-3.99 Ha	30.5%	31.5%	30.4%	29.3%	29.8%		
	Medium	4.0 to 9.99 Ha	18423	7466	7998	7307	7171	-61%	
	% Medium to Total area of Op holding	4-9.99 Ha	32.3%	27.1%	25.2%	22.3%	21.9%		
	Large	10 Ha and above	2161	501	996	2081	1359	-37%	
	% Large to Total area of Op holding	10 Ha and above	3.8%	1.8%	3.1%	6.3%	4.1%		
	Total Area of Holding			57070	27559	31704	32812	32749	-43%
	% change	Total Area classes		0.00	-52	15	3	0	
Jetpur Pavi	Marginal	Below 1.0 Ha	1245	1329	1509	1576	1101	-12%	
	% Marginal to Total area of Op holding	< 1 Ha	15.9%	21.0%	22.5%	23.6%	23.1%		
	Small	1.0 to 1.99 Ha	2501	2136	2339	2460	1809	-28%	
	% Small to Total area of Op holding	1-1.99 Ha	32.0%	33.7%	34.9%	36.9%	38.0%		

	Semi-medium	2.0 to 3.99 Ha	2475	1859	1964	1949	1304	-47%
	% Semi Med to Total area of Op holding	2-3.99 Ha	31.6%	29.3%	29.3%	29.2%	27.4%	
	Medium	4.0 to 9.99 Ha	1504	973	850	676	501	-67%
	% Medium to Total area of Op holding	4-9.99 Ha	19.2%	15.3%	12.7%	10.1%	10.5%	
	Large	10 Ha and above	95	43	31	10	50	-47%
	% Large to Total area of Op holding	10 Ha and above	1.2%	0.7%	0.5%	0.1%	1.0%	
	Total Area of Holding		7820	6340	6693	6671	4765	-39%
	% change	Total Area classes	0.00	-19	6	0	-29	
Kavant	Marginal	Below 1.0 Ha	NA	3734	3946	3945	3986	7%
	% Marginal to Total area of Op holding	< 1 Ha		11.4%	11.8%	12.2%	12.4%	
	Small	1.0 to 1.99 Ha		9545	10129	9944	10155	6%
	% Small to Total area of Op holding	1-1.99 Ha		29.1%	30.3%	30.9%	31.5%	
	Semi-medium	2.0 to 3.99 Ha	NA	9527	9857	9449	9542	0%
	% Semi Med to Total area of Op holding	2-3.99 Ha		29.0%	29.5%	29.3%	29.6%	
	Medium	4.0 to 9.99 Ha		9035	8745	8158	7824	-13%
	% Medium to Total area of Op holding	4-9.99 Ha		27.5%	26.1%	25.3%	24.3%	
	Large	10 Ha and above	NA	981	791	723	748	-24%
	% Large to Total area of Op holding	10 Ha and above		3.0%	2.4%	2.2%	2.3%	
	Total Area of Holding		0	32822	33468	32219	32255	-2%
	% change	Total Area classes	0.00	#DIV/0 !	2	-4	0	
Nasvadi	Marginal	Below 1.0 Ha	1467	1760	1857	1809	1899	29%
	% Marginal to Total area of Op holding	< 1 Ha	7.0%	8.6%	9.0%	9.5%	9.7%	
	Small	1.0 to 1.99 Ha	4189	4980	4898	4746	5004	19%
	% Small to Total area of Op holding	1-1.99 Ha	19.9%	24.4%	23.7%	24.9%	25.6%	
	Semi-medium	2.0 to 3.99 Ha	6866	7021	6830	6532	6675	-3%

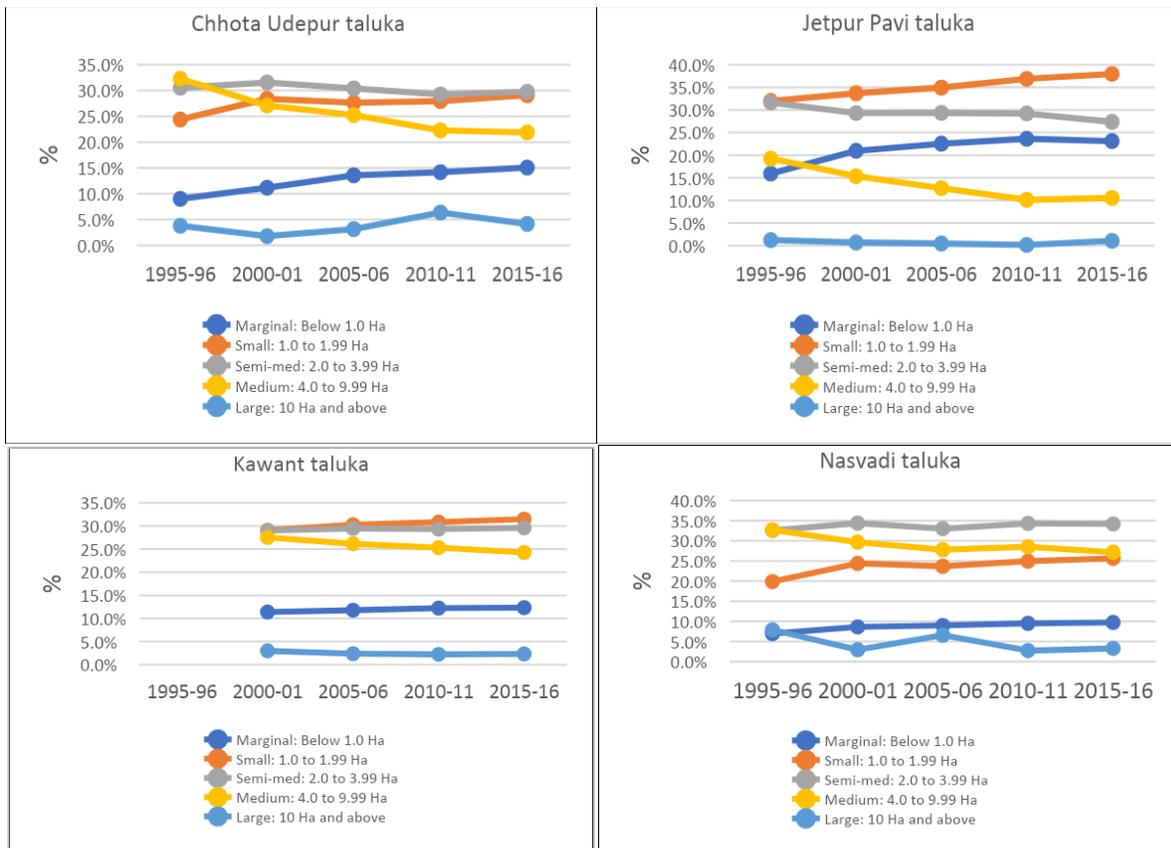
	% Semi Med to Total area of Op holding	2-3.99 Ha	32.6%	34.4%	33.0%	34.3%	34.2%	
	Medium	4.0 to 9.99 Ha	6891	6054	5748	5426	5305	-23%
	% Medium to Total area of Op holding	4-9.99 Ha	32.7%	29.7%	27.8%	28.5%	27.2%	
	Large	10 Ha and above	1658	603	1354	521	641	-61%
	% Large to Total area of Op holding	10 Ha and above	7.9%	3.0%	6.5%	2.7%	3.3%	
	Total Area of Holding		21071	20418	20687	19034	19524	-7%
	% change	Total Area classes	0.00	-3	1	-8	3	
Sankheda	Marginal	Below 1.0 Ha	701	670	832	835	656	-6%
	% Marginal to Total area of Op holding	< 1 Ha	6.9%	6.8%	6.6%	7.3%	8.1%	
	Small	1.0 to 1.99 Ha	1666	1767	2333	2258	1746	5%
	% Small to Total area of Op holding	1-1.99 Ha	16.4%	17.9%	18.6%	19.9%	21.6%	
	Semi-medium	2.0 to 3.99 Ha	4901	5135	6003	5513	3862	-21%
	% Semi Med to Total area of Op holding	2-3.99 Ha	48.4%	52.0%	47.7%	48.5%	47.7%	
	Medium	4.0 to 9.99 Ha	2476	1882	2854	2361	1590	-36%
	% Medium to Total area of Op holding	4-9.99 Ha	24.4%	19.1%	22.7%	20.8%	19.6%	
	Large	10 Ha and above	385	425	554	404	245	-36%
	% Large to Total area of Op holding	10 Ha and above	3.8%	4.3%	4.4%	3.6%	3.0%	
	Total Area of Holding		10129	9879	12576	11371	8099	-20%
	% change	Total Area classes	0.00	-2	27	-10	-29	

Source: Agricultural Census, <https://agcensus.dacnet.nic.in>, computed by author. Note: The percentage change of Kavant *taluka* is calculated based on 2000-01 and 2015-16

Between 85 to 90 per cent of cultivated area of all the *talukas* of the District during all the five time periods in reference is operated under small (1 to 1.99 ha.) to medium (4.0 to 9.99 ha.) sized land holdings (Table - 4.11). While proportion of large land holdings (10 Ha & above) vary

between 0.1 per cent (Jetpur Pavi in 2010-11) and 7.9 per cent (Nasvadi *taluka* in 1995-96), proportion of marginal land holdings (Below 1.0 ha.) vary between 6.6 per cent (Sankheda in 2005-06) and 23.1 per cent (Jetpur Pavi in 2015-16). As has been observed earlier and reflected in Table - 4.11, the area of all the land size holdings has been decreasing over the years. Besides, the proportion of area to total area of all holdings of the marginal and small holdings in all *talukas* has been increasing, and the same for the larger land size categories is decreasing. Increase in the share of large holdings from 3.8 per cent in 1995-96 to 4.1 per cent in 2015-16 in Chhota Udepur *taluka* is the only deviation from this observation.

Figure - 4.4
Percentage of Area of ST Holdings of Each Size Class to Total Number of Holdings:
Chhota Udepur District (1995-96 to 2015-16)



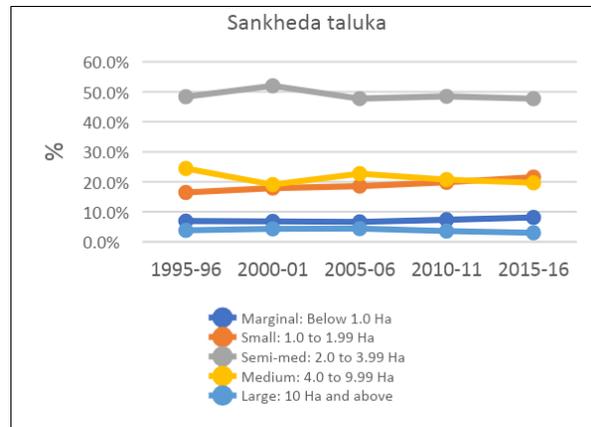
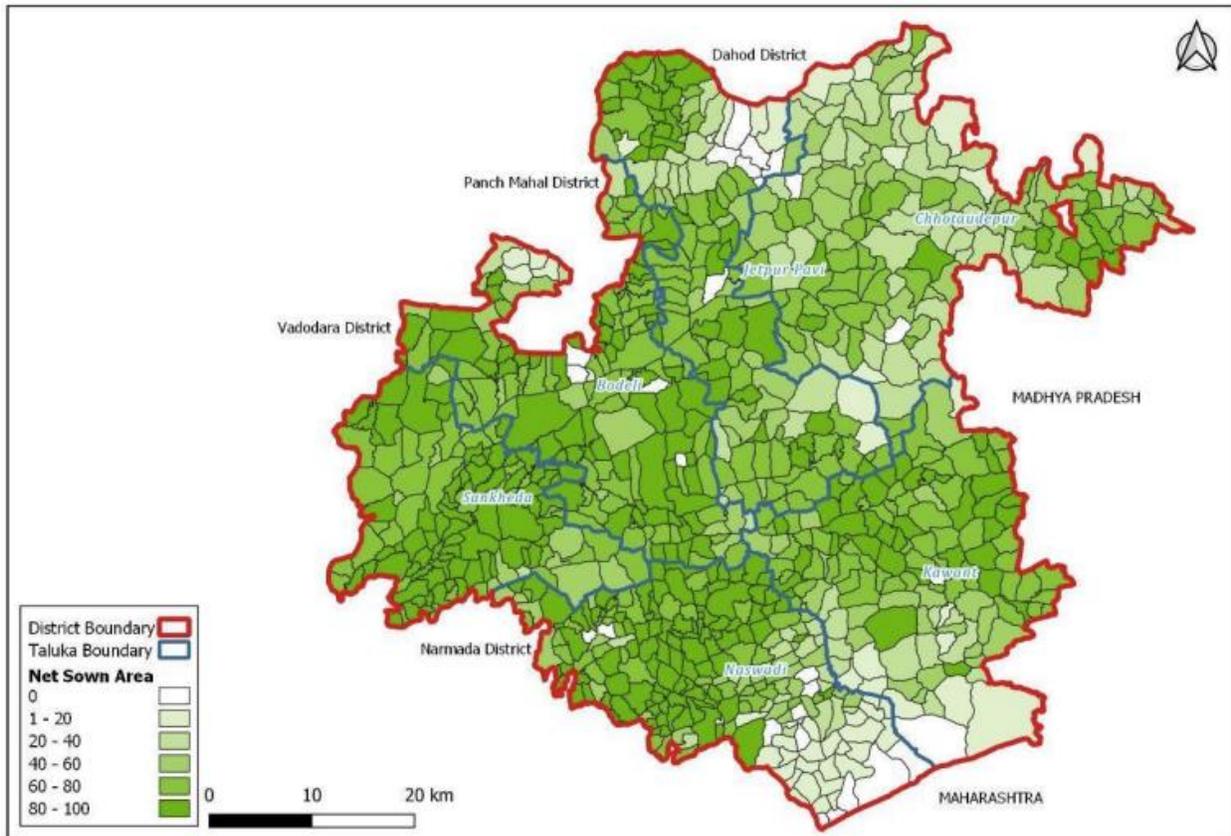


Fig. - 4.4 representing the percentage of area of each land size category to total area under all categories in all the *talukas* of Chhota Udepur district also depicts the above-mentioned trend. Now it is a dual nexus condition for tribal farmers. On the one hand, there are different schemes and programmes which require more operational area, more inputs, more durable capital for improving the output. On the other hand, small per capita, fragmented operational holdings, semi-arid climate, less rainfall and poverty are stagnating the production and impoverishing the farmers. The crucial concern of marginalization of land holding is not only a feature of Chhota Udepur district but for the whole Nation. Due to small and marginal sizes of land holdings, the tribal farmers continue to follow the same cropping pattern and, which tends to influence crop diversity adversely. Such conditions may negatively impact sustainable use of natural resources and crop yield, and cause outbreak of diseases, problems of pests, and malnutrition among the farmers and their families (Chand, 2022: 4).

4.7 Net Sown Area (NSA):

Continuously ploughed area is known as cultivated area which is divided into NSA, fallow land and current fallow. Generally, the river basins and plains of India show higher NSA, and plateaus or highlands have lesser area under cultivation. According to Jasbir Singh, weather conditions, soil and water management, and crop selection are the main factors for inter- and intra-regional spatial variations in the net cultivated area.

Map - 4.3
Net Sown Area: Chhota Udepur District (2011)



Source: Census of India, 2011.

It is clear from Map - 4.3 that there is a good correspondence between irrigated area and NSA in Chhota Udepur district. The western most part of the district represented by Sankheda and Nasvadi *talukas* are well endowed with irrigation water from the canal systems developed after the construction of Sardar Sarovar Dam. Resultantly, these *talukas* have more than 80 per cent of the available land under NSA. On the other hand, north-eastern and south eastern parts of the District have between 1 to 40 per cent of NSA due to the undulating and hilly terrain of the Vindhyan Ranges and the Narmada Gorge.

Table - 4.12
Net Sown Area by Land Size Category: Chhota Udepur District (1995 - 2016)

<i>Talukas</i>	Size Class (ST)	1995-96	2000-01	2005-06	2010-11	2015-16	% Change between 1995-96 to 2015-16
Chhota Udepur	Marginal	5073	3074	4298	4648	4938	-3%
	% Marginal NSA to Total <i>Taluka</i> NSA	9.0%	11.2%	13.7%	14.3%	15.1%	
	Small	13745	7823	8752	9115	9529	-31%
	% Small NSA to Total <i>Taluka</i> NSA	24.4%	28.4%	27.9%	28.1%	29.1%	
	Semi-Medium	17165	8692	9628	9483	9747	-43%
	% Semi Medium NSA to Total <i>Taluka</i> NSA	30.5%	31.5%	30.7%	29.3%	29.8%	
	Medium	18149	7466	7997	7146	7161	-61%
	% Medium NSA to Total <i>Taluka</i> NSA	32.3%	27.1%	25.5%	22.0%	21.9%	
	Large	2114	501	712	2017	1359	-36%
	% Large NSA to Total <i>Taluka</i> NSA	3.8%	1.8%	2.3%	6.2%	4.2%	
	Total NSA	56246	27556	31387	32409	32734	-42%
% Change Total	0	-51	14	3	1		
Jetpur Pavi	Marginal	1229	1309	1502	1514	1101	-10%
	% Marginal NSA To Total <i>Taluka</i> NSA	15.9%	20.7%	22.5%	25.4%	23.1%	
	Small	2482	2136	2339	2233	1809	-27%
	% Small NSA To Total <i>Taluka</i> NSA	32.0%	33.8%	35.0%	37.4%	38.0%	
	Semi-Medium	2456	1859	1964	1676	1304	-47%
	% Semi Medium NSA To Total <i>Taluka</i> NSA	31.7%	29.4%	29.4%	28.1%	27.4%	
	Medium	1491	973	850	533	501	-66%
	% Medium NSA To Total <i>Taluka</i> NSA	19.2%	15.4%	12.7%	8.9%	10.5%	
	Large	95	43	31	10	50	-47%
	% Large NSA To Total <i>Taluka</i> NSA	1.2%	0.7%	0.5%	0.2%	1.0%	
	Total NSA	7753	6320	6686	5966	4765	-39%
% Change Total	0	-18	6	-11	-20		
Kavant	Marginal	NA	3625	3946	3718	3986	10%
	% Marginal NSA To Total <i>Taluka</i> NSA		11.2%	11.8%	13.9%	12.4%	
	Small	NA	9482	10124	8756	10155	7%
	% Small NSA To Total <i>Taluka</i> NSA		29.2%	30.3%	32.7%	31.5%	
	Semi-Medium	NA	9427	9836	7821	9542	1%

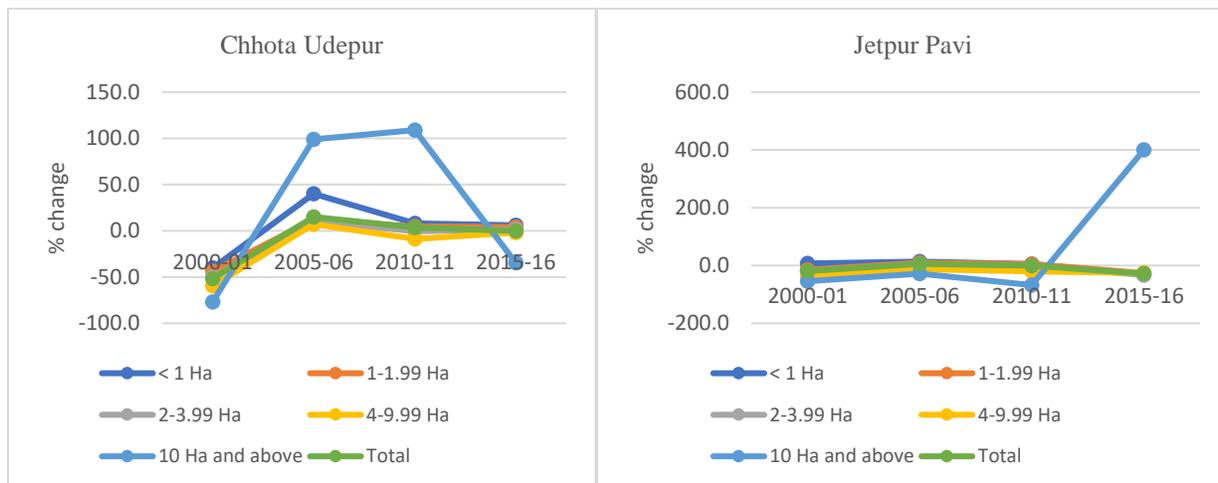
	% Semi Medium NSA To Total Taluka NSA		29.0%	29.4%	29.2%	29.6%	
	Medium	NA	8991	8745	6098	7824	-13%
	% Medium NSA To Total Taluka NSA		27.7%	26.1%	22.8%	24.3%	
	Large	NA	978	791	384	748	-24%
	% Large NSA To Total Taluka NSA		3.0%	2.4%	1.4%	2.3%	
	Total NSA		32503	33442	26777	32255	-1%
	% Change Total			3	-20	20	
Nasvadi	Marginal	1466	1760	1837	1760	1863	27%
	% Marginal NSA To Total Taluka NSA	7.0%	8.6%	9.4%	10.0%	9.9%	
	Small	4183	4980	4825	4514	4959	19%
	% Small NSA To Total Taluka NSA	19.9%	24.4%	24.6%	25.7%	26.4%	
	Semi-Medium	6854	7021	6721	6040	6551	-4%
	% Semi Medium NSA To Total Taluka NSA	32.7%	34.4%	34.3%	34.4%	34.9%	
	Medium	6838	6054	5602	4775	4953	-28%
	% Medium NSA To Total Taluka NSA	32.6%	29.7%	28.6%	27.2%	26.4%	
	Large	1640	603	610	452	444	-73%
	% Large NSA To Total Taluka NSA	7.8%	3.0%	3.1%	2.6%	2.4%	
	Total NSA	20981	20418	19595	17541	18770	-11%
	% Change Total	0	-3	-4	-10	7	
Sankhed a	Marginal	691	495	831	826	656	-5%
	% Marginal NSA To Total Taluka NSA	7.1%	5.1%	6.6%	7.5%	8.1%	
	Small	1606	1767	2323	2228	1746	9%
	% Small NSA To Total Taluka NSA	16.5%	18.2%	18.5%	20.2%	21.6%	
	Semi-Medium	4819	5135	5993	5408	3862	-20%
	% Semi Medium NSA To Total Taluka NSA	49.4%	52.9%	47.7%	49.0%	47.7%	
	Medium	2255	1882	2854	2281	1590	-29%
	% Medium NSA To Total Taluka NSA	23.1%	19.4%	22.7%	20.7%	19.6%	
	Large	376	425	559	283	245	-35%
	% Large NSA to Total taluka NSA	3.9%	4.4%	4.5%	2.6%	3.0%	
	Total NSA	9747	9704	12560	11026	8099	-17%
	% change Total	0	0	29	-12	-27	
Total District	All size classes area	94727	96501	103670	93719	96623	2%

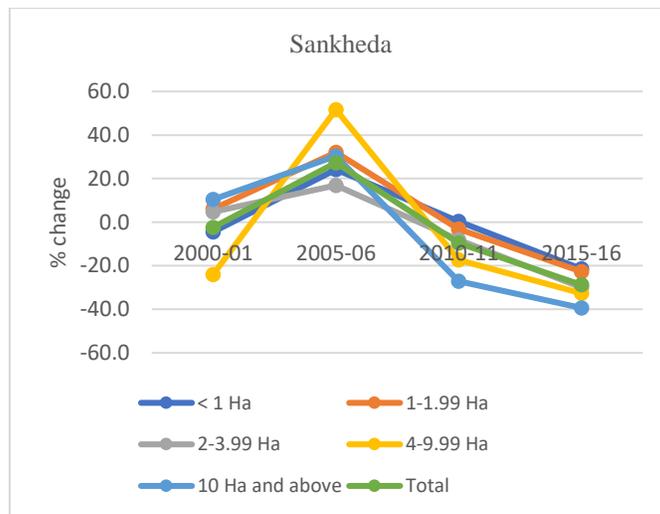
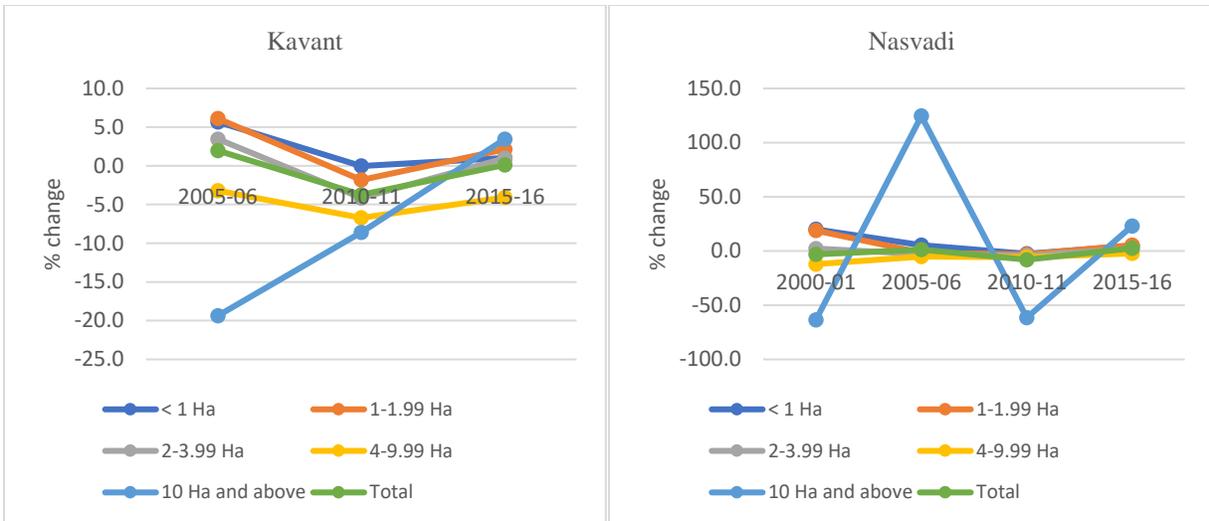
Note: The percentage change of Kavant taluka is calculated based on 2000-01 and 2015-16 data.
Source: Agricultural Census, <https://agcensus.dacnet.nic.in>, computed by author.

Total NSA of the District is 96,623 hectares which is 27.96 per cent of its total geographical area. Marginal, small and semi-medium size classes contribute 69 to 88 per cent of the total area under cultivation in Chhota Udepur district. Around 74 per cent of total cultivated area in Chhota Udepur *taluka* belongs to marginal, small and semi-medium size lands. This percentage for Jetpur Pavi, Kavant, Nasvadi and Sankheda *talukas* are 88, 72, 69 and 76 per cent respectively.

NSA under medium and large size classes (4 to 10 ha+) is 25 per cent of the total NSA. On the whole, share of NSA in the total area of all the *talukas* has registered decrease during the period in reference. This may be due to loss of agricultural land to other types of land uses during the recent years.

Figure - 4.5
Percentage Change of Area of Holding of Each Size Class to Total Number of Holdings of ST: Chhota Udepur District (1995-96 to 2015-16)



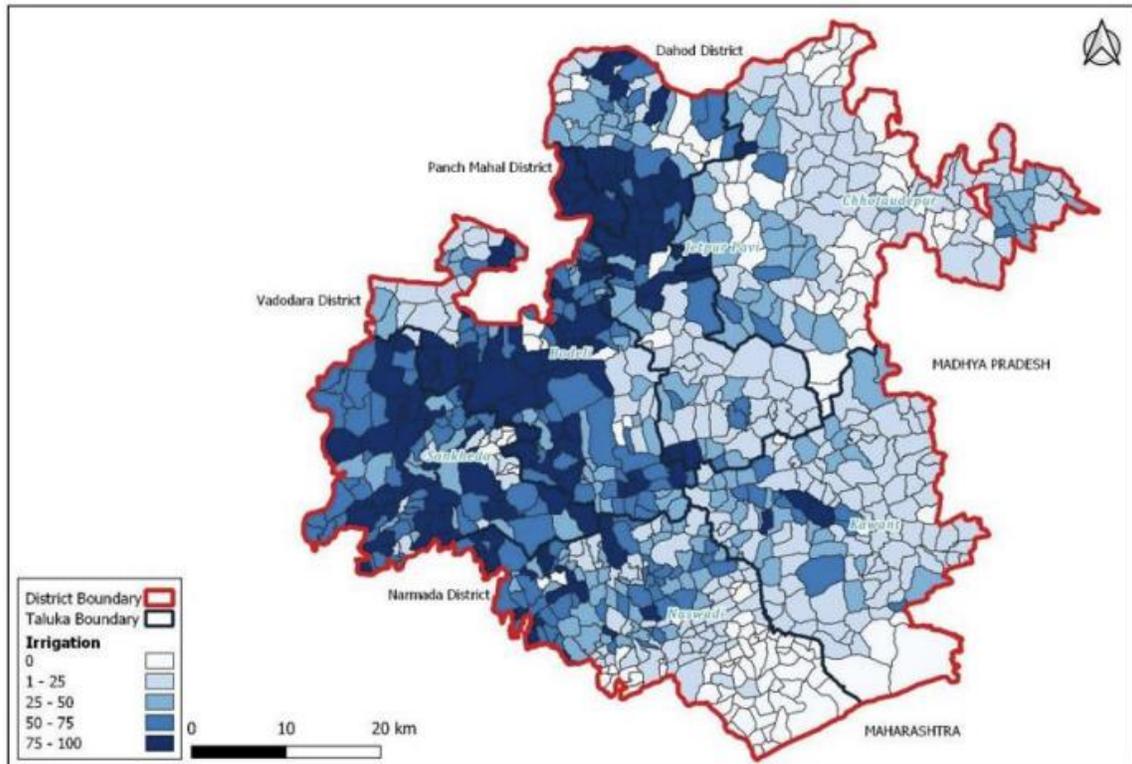


4.8 Irrigation Changes in the District:

The tribes in general are associated with forests, hills and the natural ecological set up of their habitat. Based on the characteristics of their habitat, the tribes develop specific economies and cultural lifestyles, including rain fed *Kharif* agriculture. Based on Thornthwaite's climate classification, most parts of the eastern tribal belt of Gujarat fall under the central semi-arid region of Central India, particularly in its northern portion including the Chhota Udepur district. The southern portion, particularly Bharuch district southwards, is relatively more humid due to higher amounts of rainfall. Thornthwaite derived the potential evapotranspiration process in 1948. Based on three parameters like PE (Potential Evapotranspiration), TA (Mean Monthly Air Temperature in °C), and seasonal characteristics

of surplus and deficit moisture condition, he has divided the World into 32 climatic types. The semi-arid D type of climate is experienced in the southern parts of Punjab, Haryana, Mathura-Agra belt, eastern Rajasthan, Madhya Pradesh, Maharashtra, Andhra Pradesh and central Tamil Nadu. (Subrahmanyam, 1955: 253, e-PG *pathshala* accessed on 4th July 2023). Traditionally however, excepting for a few tribes of the plain areas, the tribes in general were not practicing irrigated agriculture due to the ecological conditions of their habitat. Of late, the tribes have started using irrigation water for crop production wherever possible. Tapping the underground water of the hilly and undulating topography for irrigation has commenced in areas endowed with aquifers. Chhota Udepur district is no exception to this new development. ‘In major parts of the district, especially in north and almost in eastern half of the district, the hard rocks such as phyllite, schist, granite, gneiss, basalt and other sediments such as sandstone, limestone etc., form aquifers’ (Gupte, 2010: 30).

Map - 4.4
Irrigated Area: Chhota Udepur District (2011)



Source: Census of India, 2011

Utilizing this natural circumstance, 27 *Van Talavadis* (forest ponds) and 53 check-dams have been constructed in Chhota Udepur district by the Forest Department in 2021-22 and 77 tube-wells of which, 55 are for irrigation of around 656 hectares. NSA is closely associated with irrigation especially, in arid and semi-arid climatic conditions. Also demand for food in a country like India always needs support of efficient irrigated systems throughout all cropping seasons.

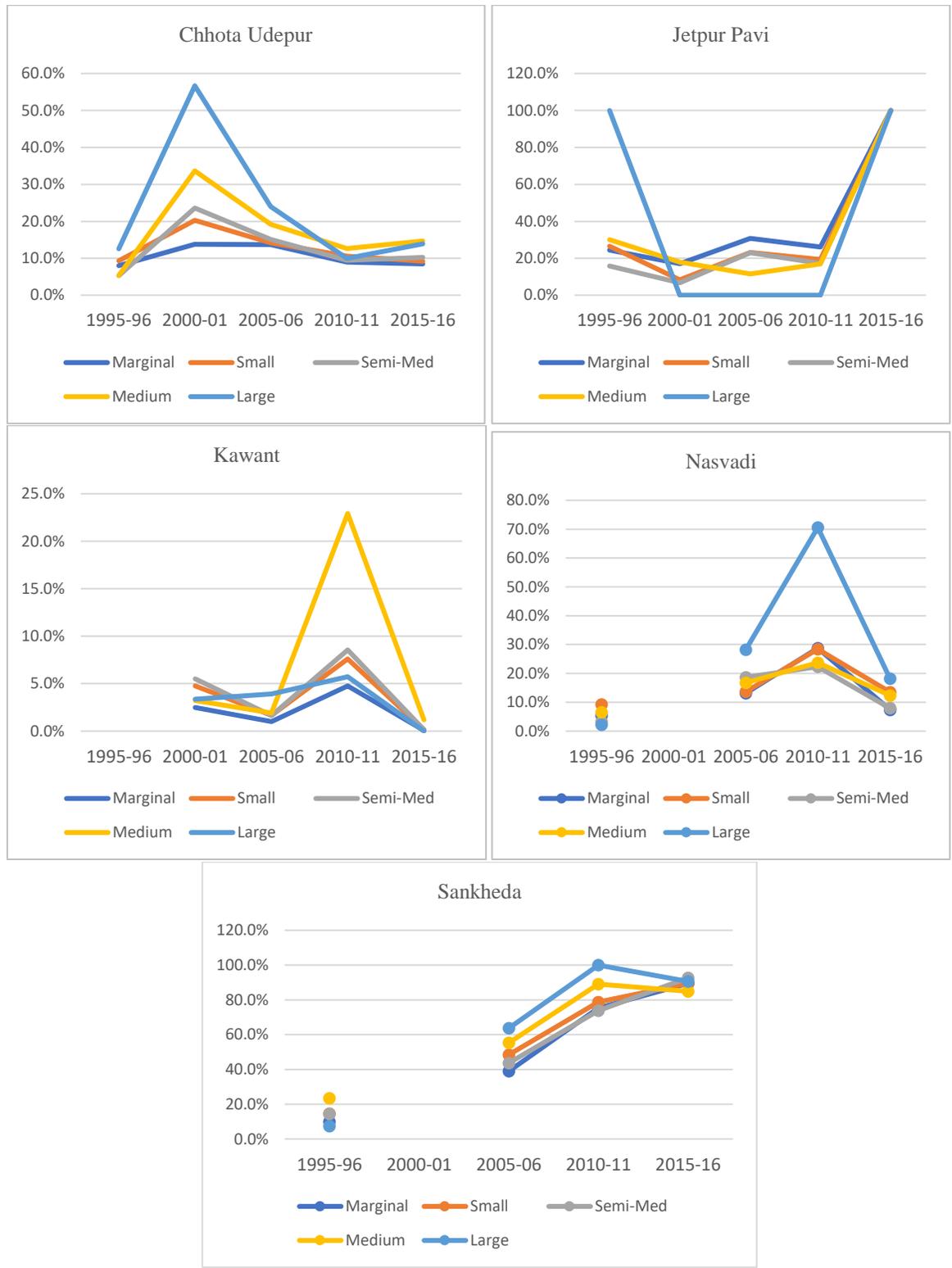
Table - 4.13
Irrigated Area by Land Size Category: Chhota Udepur District (1995 - 2016)

<i>Talukas</i>		1995-96		2000-01		2005-06		2010-11		2015-16	
		Net Irrigated Area	% Irrigated area								
Chhota Udepur	Marginal	406	8.0	424	13.8	588	13.7	415	8.9	417	8.4
	Small	1284	9.3	1586	20.3	1238	14.1	963	10.6	876	9.2
	Semi-Medium	908	5.3	2051	23.6	1452	15.1	896	9.4	999	10.2
	Medium	971	5.4	2513	33.7	1535	19.2	903	12.6	1053	14.7
	Large	266	12.6	284	56.7	171	24.0	201	10.0	189	13.9
Jetpur Pavi	Marginal	300	24.4	223	17.0	462	30.8	396	26.2	1101	100.0
	Small	657	26.5	178	8.3	541	23.1	431	19.3	1809	100.0
	Semi-Medium	388	15.8	125	6.7	451	23.0	288	17.2	1304	100.0
	Medium	449	30.1	174	17.9	98	11.5	90	16.9	501	100.0
	Large	95	100.0	0	0	0	0	0	0	50	100.0
Kavant	Marginal			90	2.5	40	1.0	177	4.8	3	0.1
	Small			453	4.8	169	1.7	666	7.6	15	0.1
	Semi-Medium			519	5.5	162	1.6	669	8.6	14	0.1
	Medium			289	3.2	168	1.9	1398	22.9	93	1.2
	Large			33	3.4	31	3.9	22	5.7	0	0
Nasvadi	Marginal	79	5.4	0	0	242	13.2	506	28.8	138	7.4
	Small	387	9.3	0	0	662	13.7	1283	28.4	671	13.5
	Semi-medium	226	3.3	0	0	1251	18.6	1348	22.3	522	8.0
	Medium	447	6.5	0	0	937	16.7	1133	23.7	612	12.4
	Large	37	2.3	0	0	172	28.2	319	70.6	81	18.2
Sankhe da	Marginal	69	10.0	0	0	324	39.0	622	75.3	587	89.5
	Small	235	14.6	0	0	1126	48.5	1755	78.8	1563	89.5
	Semi-Medium	696	14.4	0	0	2618	43.7	3995	73.9	3579	92.7
	Medium	529	23.5	0	0	1579	55.3	2032	89.1	1351	85.0
	Large	28	7.4	0	0	353	63.7	283	100.0	222	90.6

Source: <https://agcensus.dacnet.nic.in>, computed by author.

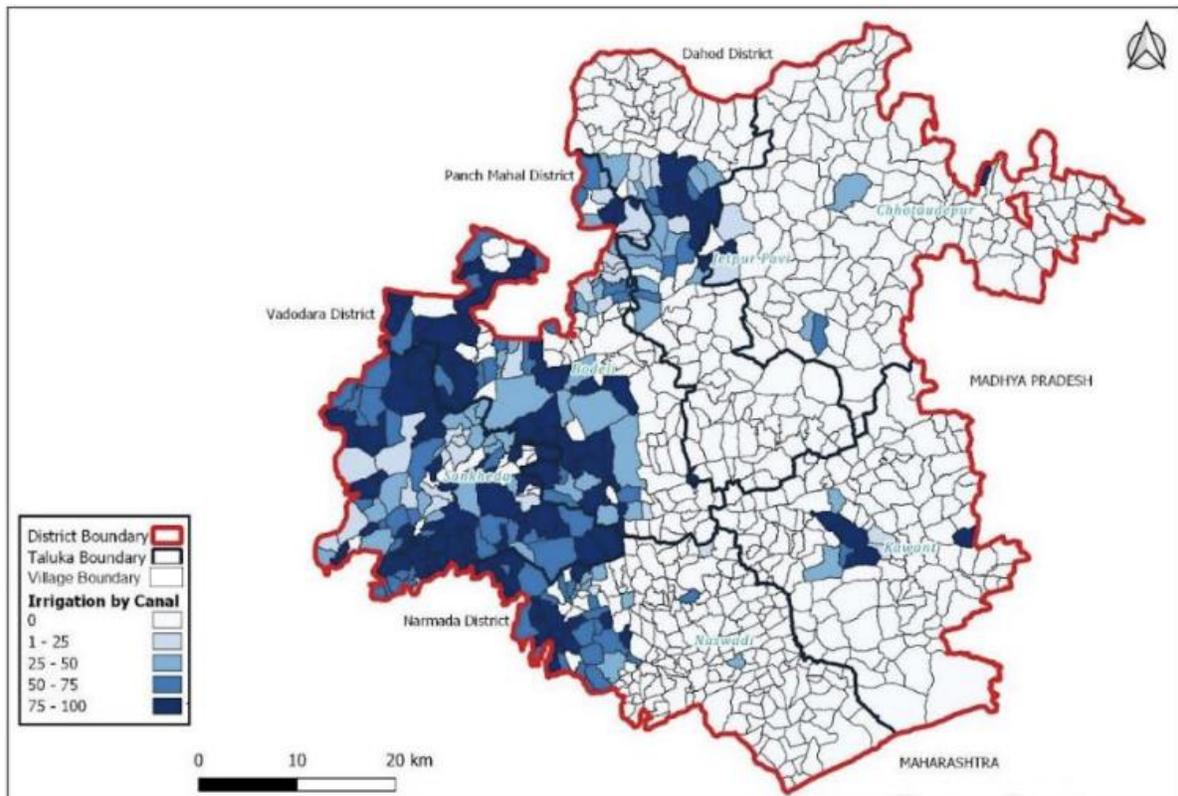
In Chhota Udepur *taluka*, large holdings have a higher share of irrigated area than other land size classes. Irrigated area reached its optimum position in 2000-01. Marginal farmers of Jetpur Pavi *taluka* are having a good share of irrigated water and showing an increasing trend of irrigated holdings for all size classes from 2010 onwards. In Jetpur Pavi *taluka* there has been a remarkable increase in the proportion of net irrigated area which is 100 per cent for all land size classes. Next improvement in area under good irrigation facilities can be observed in Sankheda *taluka*. Data for 2015-16 point out clearly that more than 85 per cent of the NSA of all land size classes are under irrigation. The percentage increase of NSA under irrigation in Sankheda *taluka* also significantly developed from 2010-11. After commencement of Narmada Irrigation Project, a large part of Sankheda and Nasvadi *talukas* benefitted immensely resulting in a big change in the overall irrigated land. Irrigation is not at all showing improvement in Chhota Udepur, Kavant and Nasvadi *talukas*. Percentage of area under irrigation ranges between 7 to 18 per cent of the total NSA. Semi-arid climate, less availability of ground water and hilly terrain are some of the constraints for area coverage under irrigation. There are two types of ground water vulnerability - intrinsic and specific. Intrinsic vulnerability is a natural function of hydrogeological factors like characteristics of an aquifer, overlying soil and geological material. In Kavant, Chhota Udepur and Nasvadi *talukas*, groundwater is dependent on nature of underlying formation, average annual rainfall and flow path. Generally, in hard rock areas of eastern part of the District, the groundwater is available in shallow aquifers and moves from recharge area to discharge area. In Chhota Udepur district, higher plateau and hill zones of north, north-east and eastern part constitute recharge area and Narmada-Mahi doab alluvium plain of south and south-western part constitutes discharge area. Due to this flow path of groundwater Kavant, Chhota Udepur and eastern part of Nasvadi *talukas* fall short of required water for irrigation for nearly 8 months and the average annual rainfall is also less than 1000 mm. This is the reason why there is unavailability of water for irrigation in these *talukas*. However, when considering the District as a whole, specific vulnerability becomes a more significant concern. Specific vulnerability of ground water which originates due to urbanization and industrialization, induces water logging and salinity, which makes it unsuitable for irrigation.

Figure - 4.6
Percentage of Irrigated Area of Each Land Size Class of ST: Chhota Udepur District
(1995-96 to 2015-16)



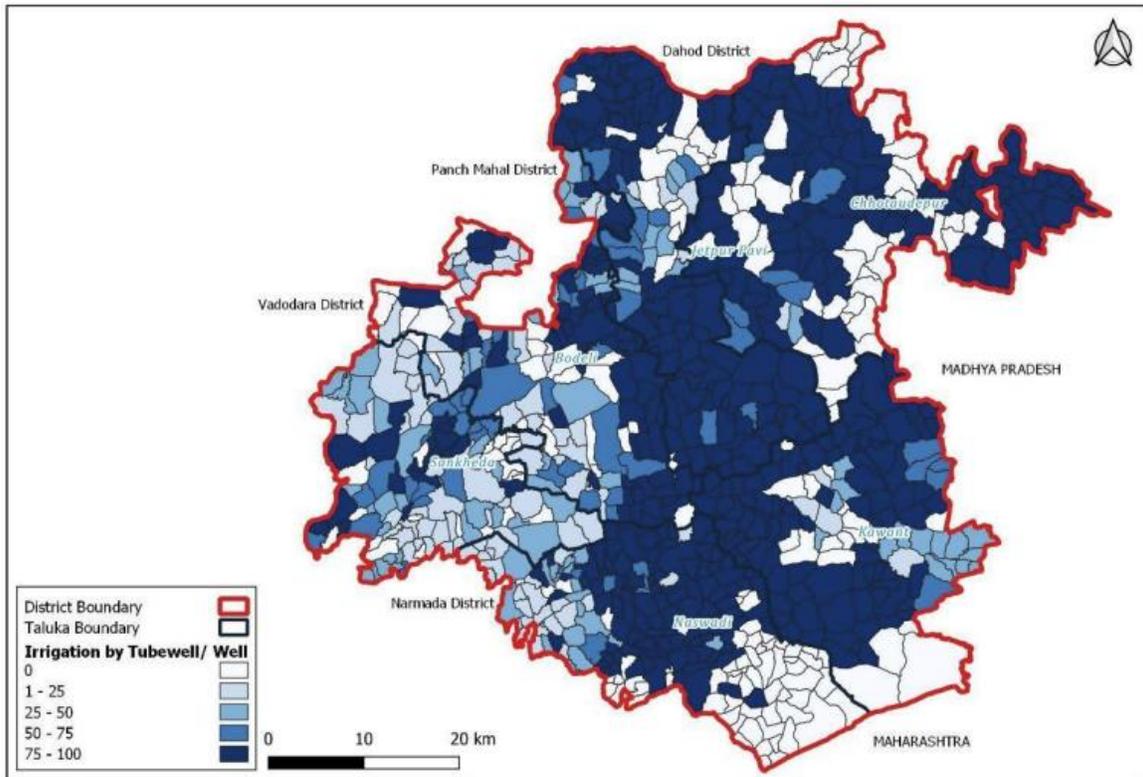
Kavant *taluka* shows a special trend where there is an increase in per cent share of irrigated area of medium holdings for all land size classes during 2010-11, after which it starts to decrease. Same condition prevails in Nasvadi, where the only difference is the largest proportion of irrigated area under large land holdings during 2005 and 2015. Sankheda shows a positive trend of irrigation among all land size classes. Percentage of area under irrigation out of net cultivated area reached 90 to 92 per cent in 2015 for all land size classes. Sankheda *taluka* has canal irrigation facility but, well/tube well is the most important source of irrigation in other *talukas* of the District. Canal irrigation accounts for 19.07 per cent irrigated area while, well irrigation for about 33.07 per cent.

Map - 4.5
Area Irrigated by Canal: Chhota Udepur District (2011)



Source: Census of India, 2011.

Map - 4.6
Area Irrigated by Tube Well / Well: Chhota Udepur District (2011)



Source: Census of India, 2011

Table - 4.14
Change in Irrigated Area: Chhota Udepur District
(2001-2011)

Irrigation by Government Canal (Area in Ha)				Irrigation by Well (Area in Ha)			
	2001	2011	% Decadal change		2001	2011	% Decadal change
Chhota Udepur	1176.70	321.70	-72	Chhota Udepur	4240.8	6193	46
Jetpur Pavi	4793.40	5543.70	16	Jetpur Pavi	11160.8	18766.6	68
Kavant	830.40	946.10	14	Kavant	3056.8	5403.7	77
Nasvadi	466.40	3994.20	756	Nasvadi	3955	7962.8	101
Sankheda	2271.70	22494.10	890	Sankheda	6449.8	11711.7	81.00

Source: District Census Handbook, Vadodara, 2001 and 2011, computed by author.

Area under canal irrigation has increased remarkably in Nasvadi and Sankheda *talukas* between 2001 and 2011 due to development of Narmada Canal System. On the other hand, area under canal irrigation has marginally increased in all other *talukas* except in Chhota Udepur *taluka*, where it has decreased by more than 70 per cent. Area under tube well/tube well irrigation has increased during the same period in all *talukas*. However, in this context also, Nasvadi and

Sankheda *talukas* have excelled with the highest increase of 101 and 81 per cent respectively. Both bore well and open well are the most important sources of irrigation in Chhota Udepur, Jetpur Pavi and Nasvadi *talukas*. Relatively less proportion (52.47%) of the gross cropped area (GCA) of the District is irrigated by all sources of irrigation. Of the gross irrigated area (GIA), around three-fifth (57.92%) area are catered by bore wells and open wells (Table 4.15).

Chhota Udepur, Jetpur Pavi and Nasvadi *talukas* face acute shortage of water during the dry season between the months of March to June as the ground water level goes deep down. Only a handful of big farmers are able to extract water with the help of electric pumps. As observed earlier, the majority of the farmers of these *talukas* belong to the marginal, small and semi-medium landowner category, who find capital intensive farming difficult. People residing in the villages on Gujarat-Madhya Pradesh border depend on water from across the border for survival.

Table - 4.15
Area Irrigated by Source: Chhota Udepur
(2019-20) (Area in '00 Hectares)

District	Canal	Tank	Well including Tube-Well	Other Sources	Gross Irrigated Area (GIA)	Percentage of GIA to GCA
Chhota Udepur	216	1	702	293	1,212	52.47

Source: Govt. of Gujarat, 2023b: 34

Table - 4.16
Percentage of Area Irrigated by Source: Gujarat (Selected Districts)
(2019-20)

District	Canal	Tank	Well including Tube-well	Other Sources	Intensity of Irrigation
Chhota Udepur	17.82	0.09	57.92	24.17	128.6
Districts with more than 170% Cropping Intensity					
Anand	44.15	4.69	37.49	13.67	198.4
Bharuch	49.35	6.07	41.94	2.64	179.0
Dahod	8.21	20.56	48.31	22.92	371.7
Kheda	34.48	5.72	56.57	3.22	179.0
Porbandar	0.00	0.00	75.26	24.74	170.7
Sabar Kantha	10.09	7.13	82.63	0.14	171.2
Tapi	41.68	0.00	49.74	8.58	170.0
Gujarat	22.46	4.17	64.98	8.38	161.0

Source: Govt. of Gujarat, 2023b: 36

It is quite easy to understand from Table - 4.16 that in terms of intensity of irrigation, the Chhota Udepur district lags much behind the State as a whole (161.0%) and many other districts where CI is higher than 170 per cent. It may be pointed out here that, the performance of Chhota Udepur district with 128.6 per cent irrigation intensity, falls behind other predominantly tribal districts namely, Dahod (371.7%), Bharuch (179.0%), Sabar Kantha (171.2%) and Tapi (170.0%). Pipeline irrigation facility has supported Dahod district to achieve the highest irrigation intensity.

4.9 Gross Cropped Area (GCA):

Area sown more than once added to net sown area gives total cultivated area or GCA. While NSA is the manifestation of the land use pattern, higher GCA is the reflection of efficient management of the land resources. Again, gross cropping depends on weather, soil, climate and off farm opportunities. Increase in GCA implies irrigated farming. Rain fed farming permits cultivation of crops only during the rainy season. But irrigated farming is input intensive and yield should compensate for the capital input. In Chhota Udepur district, area under more than once or GCA did not increase much. In 2015-16, total GCA of Chhota Udepur district was 98,127 hectares.

Table - 4.17
Gross Cropped Area by Land Size Category: Chhota Udepur District
(1995-2016)

<i>Taluka</i>	All Size Class ST	1995-96	2000-01	2005-06	2010-11	2015-16	% Change between 1995-96 to 2015-16
Chhota Udepur	Marginal	5273	3075	4299	4669	4944	-6%
	% Marginal of Total <i>taluka</i> GCA	9.1%	11.2%	13.7%	14.1%	14.7%	
	Small	14291	7827	8756	9226	9545	-33%
	% Small of Total <i>taluka</i> GCA	24.7%	28.4%	27.9%	27.9%	28.4%	
	Semi-medium	17644	8692	9630	9647	9765	-45%
	% Semi Med of Total <i>taluka</i> GCA	30.5%	31.5%	30.7%	29.1%	29.0%	
	Medium	18533	7466	7997	7501	7197	-61%
	% Medium of Total <i>taluka</i> GCA	32.0%	27.1%	25.5%	22.6%	21.4%	
	Large	2123	501	712	2082	2196	3%
	% Large of Total <i>taluka</i> GCA	3.7%	1.8%	2.3%	6.3%	6.5%	
	Total Tehsil GCA	57864	27561	31394	33125	33647	-42%
Total GCA change %	0	-52	14	6	2		
Jetpur Pavi	Marginal	1393	1318	1507	1540	1101	-21%
	% Marginal of Total <i>taluka</i> GCA	15.8%	20.7%	22.5%	25.1%	23.1%	

	Small	2883	2155	2339	2270	1809	-37%
	% Small of Total <i>taluka</i> GCA	32.7%	33.9%	35.0%	37.0%	38.0%	
	Semi-medium	2699	1875	1964	1731	1304	-52%
	% Semi Med of Total <i>taluka</i> GCA	30.6%	29.5%	29.4%	28.2%	27.4%	
	Medium	1759	973	850	591	501	-72%
	% Medium of Total <i>taluka</i> GCA	19.9%	15.3%	12.7%	9.6%	10.5%	
	Large	94	43	31	10	50	-47%
	% Large of Total <i>taluka</i> GCA	1.1%	0.7%	0.5%	0.2%	1.0%	
	Total Tehsil GCA	8828	6364	6691	6142	4765	-46%
Total GCA change %	0	-28	5	-8	-22		
Kavant	Marginal	NA	3694	3946	3763	3986	8%
	% Marginal of Total <i>taluka</i> GCA		11.2%	11.8%	13.6%	12.3%	
	Small		9633	10124	8926	10155	5%
	% Small of Total <i>taluka</i> GCA		29.2%	30.3%	32.3%	31.4%	
	Semi-medium	NA	9567	9839	7941	9542	0%
	% Semi Med of Total <i>taluka</i> GCA		29.0%	29.4%	28.8%	29.5%	
	Medium		9062	8746	6597	7824	-14%
	% Medium of Total <i>taluka</i> GCA		27.5%	26.1%	23.9%	24.2%	
	Large	NA	978	791	384	812	-17%
	% Large of Total <i>taluka</i> GCA		3.0%	2.4%	1.4%	2.5%	
	Total Tehsil GCA		32934	33446	27611	32319	-2%
Total GCA change %			2	-17	17		
Nasvadi	Marginal	1498	1760	1837	1834	1863	24%
	% Marginal of Total <i>taluka</i> GCA	7.1%	8.6%	9.4%	10.0%	9.9%	
	Small	4238	5010	4825	4593	4961	17%
	% Small of Total <i>taluka</i> GCA	20.0%	24.5%	24.6%	25.2%	26.4%	
	Semi-medium	6872	7051	6722	6158	6551	-5%
	% Semi Med of Total <i>taluka</i> GCA	32.4%	34.4%	34.3%	33.7%	34.9%	
	Medium	6937	6054	5602	5153	4953	-29%
	% Medium of Total <i>taluka</i> GCA	32.7%	29.6%	28.6%	28.2%	26.4%	
	Large	1663	603	610	524	444	-73%
	% Large of Total <i>taluka</i> GCA	7.8%	2.9%	3.1%	2.9%	2.4%	
	Total Tehsil GCA	21208	20478	19596	18262	18772	-11%
Total GCA change %	0	-3	-4	-7	3		
Sankheda	Marginal	711	495	832	833	675	-5%
	% Marginal of Total <i>taluka</i> GCA	7.1%	5.1%	6.6%	7.3%	7.8%	
	Small	1688	1767	2328	2254	1746	3%
	% Small of Total <i>taluka</i> GCA	16.8%	18.2%	18.5%	19.8%	20.2%	
	Semi-medium	4941	5135	5993	5555	3868	-22%
	% Semi Med of Total <i>taluka</i> GCA	49.2%	52.9%	47.7%	48.8%	44.9%	
	Medium	2327	1882	2854	2467	2090	-10%
% Medium of Total <i>taluka</i> GCA	23.2%	19.4%	22.7%	21.7%	24.2%		

Large	377	425	559	283	245	-35%
% Large of Total <i>taluka</i> GCA	3.8%	4.4%	4.4%	2.5%	2.8%	
Total Tehsil GCA	10044	9704	12566	11392	8624	-14%
Total GCA change %	0	-3	29	-9	-24	
All <i>talukas</i> total GCA	97944	97041	103693	96532	98127	0.2%

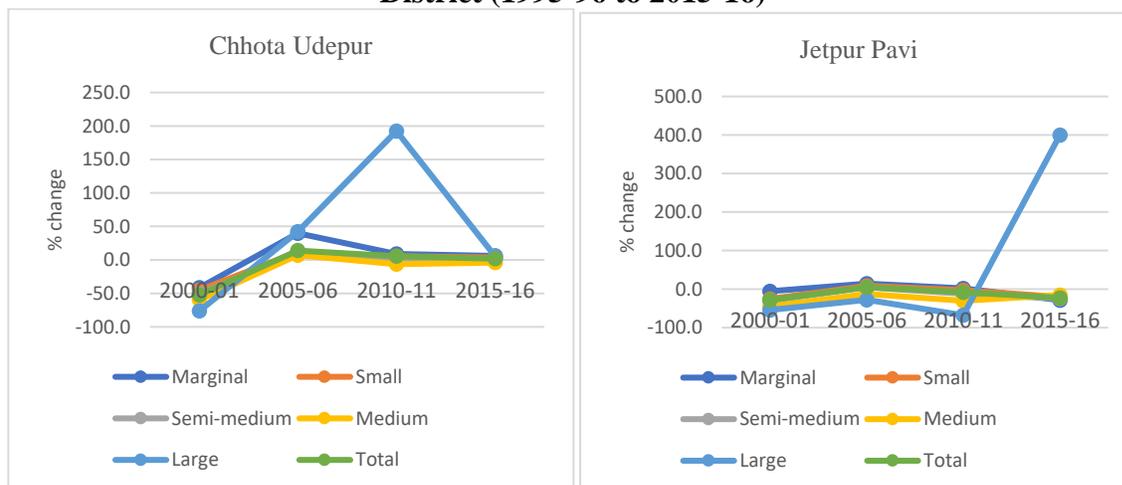
Note: The percentage change of Kavant *taluka* is calculated based on 2000-01 and 2015-16.

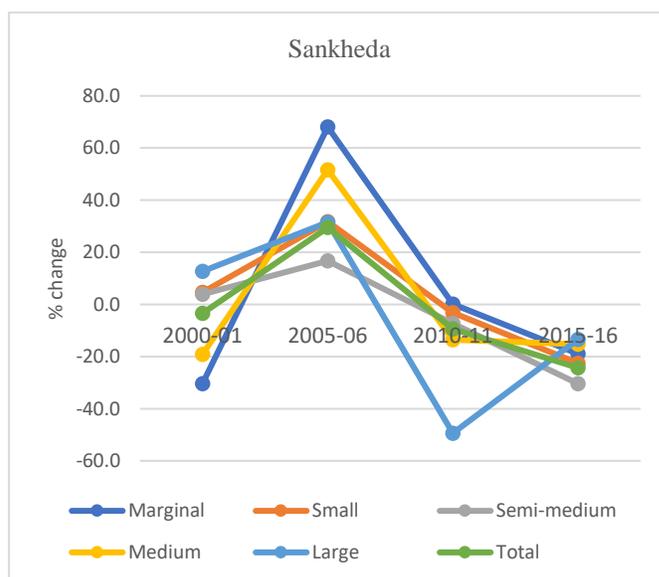
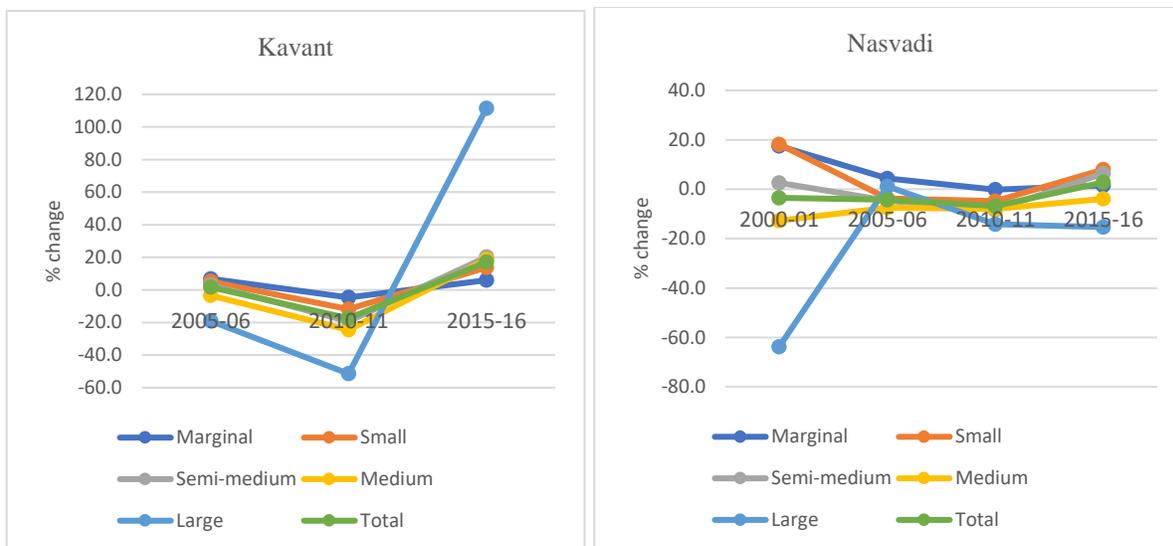
Source: Agricultural Census, <https://agcensus.dacnet.nic.in>, computed by the author.

Percentage increase in GCA can be observed during 2015-16 for marginal and small land size categories of Nasvadi and Kavant *talukas*. Over the last 20 years, there has been increase in the GCA of the marginal and small size holdings of Nasvadi and Kavant *talukas* by 24.4 and 17.1 per cent, and 7.9 and 5.4 per cent respectively. Increase of 3.4 per cent in GCA of small size land owners can also be seen in Sankheda *taluka*. Other than these, larger land size categories in all *talukas*, except the large land size holdings of Chhota Udepur (3.4%), have registered reduction in the GCA in varied proportions. The highest reduction is in the case of the large land size category of Nasvadi (-73.3%). Despite a remarkable increase in the percentage of net irrigated area over the period in reference, the Jetpur Pavi *taluka* has incurred loss of GCA. This may be due to low transport facility, less farm mechanization, less scientific agricultural practices, and non-availability of farm labourers due to seasonal migration. During 2018-19, the percentage of total cultivated area in the District was the 159 highest in Kavant *taluka* (17.8 %) and the lowest in Sankheda *taluka* (15.5 %) (NABARD, 2020: 12).

Figure - 4.7

Percentage Change in Gross Cropped Area of Each Size Class of ST: Chhota Udepur District (1995-96 to 2015-16)





4.10 Cropping Pattern:

From the computed data, it can be observed that in Chhota Udepur district, tur and maize are the two dominant Kharif crops, followed by pigeon pea and unirrigated rice. Wheat, sorghum and gram along with maize are cultivated by the farmers of the District as rabi crops. Cotton, now a predominant Kharif crop was introduced in the District in the mid 1960s. The pulses, especially summer green gram, and oil seed (ground nut), could not achieve much importance due to slackness and sluggish approach of the farmers towards these crops in spite of their suitability for the region. The products are mostly used for self-sustenance.

Majority of the households being marginal and small farmers, generation of surplus for the market is rare. Besides these crops, the farmers cultivate vegetables particularly in the low-lying areas with water facilities in the *talukas* of Sankheda and Chhota Udaipur and in some pockets of Kavant, Nasvadi and Jetpur Pavi *talukas*. Castor, groundnut, green gram, jowar etcetera are cultivated on small areas. Check dams are the major source of irrigation in the District. Around 42 per cent of the GCA in the District is occupied by cotton, followed by maize (16 %), paddy (11 %) and tur (11%).

Table - 4.18
Percentage Change of Yield of Major Crops: Chhota Udepur District (1995-96 to 2015-16)

Crop	Chhota Udepur Taluka 1995-96			Chhota Udepur Taluka 2015-16			10 Years % change 1995-96 to 2015-16	Chhota Udepur Taluka 2020-21 Projected			5 Years change % 2015-16 to 2020-21
	Area (Ha)	Prod (Ton)	Yield (kg/Ha)	Area (Ha)	Prod (Ton)	Yield (kg/Ha)		Area (Ha)	Prod (Ton)	Yield (kg/Ha)	
Rice	12501	8538	683	8042	11346	1411	107	8042	12623	1570	11
Jowar	4107	3162	770	183	172	940	22	183	247	1351	44
Bajra	187	261	1395	0	0	0	-100	2	6	2780	
Maize	13910	11935	858	12266	29408	2398	179	12266	19594	1597	-33
Tur (Arhar)	5475	3329	608	4432	7078	1597	163	4432	6568	1482	-7
Sugarcane	34	219	6452	0	0	0	-100	0	0	0	0
Groundnut	1555	1738	1118	0	0	0	-100	0	0	0	0
Castor	114	126	1108	0	0	0	-100	0	0	0	0
Cotton	9230	2372	257	5627	3675	653	154	5627	3736	664	2
Tobacco	0	0	0	0	0	0	0	0	0	0	0

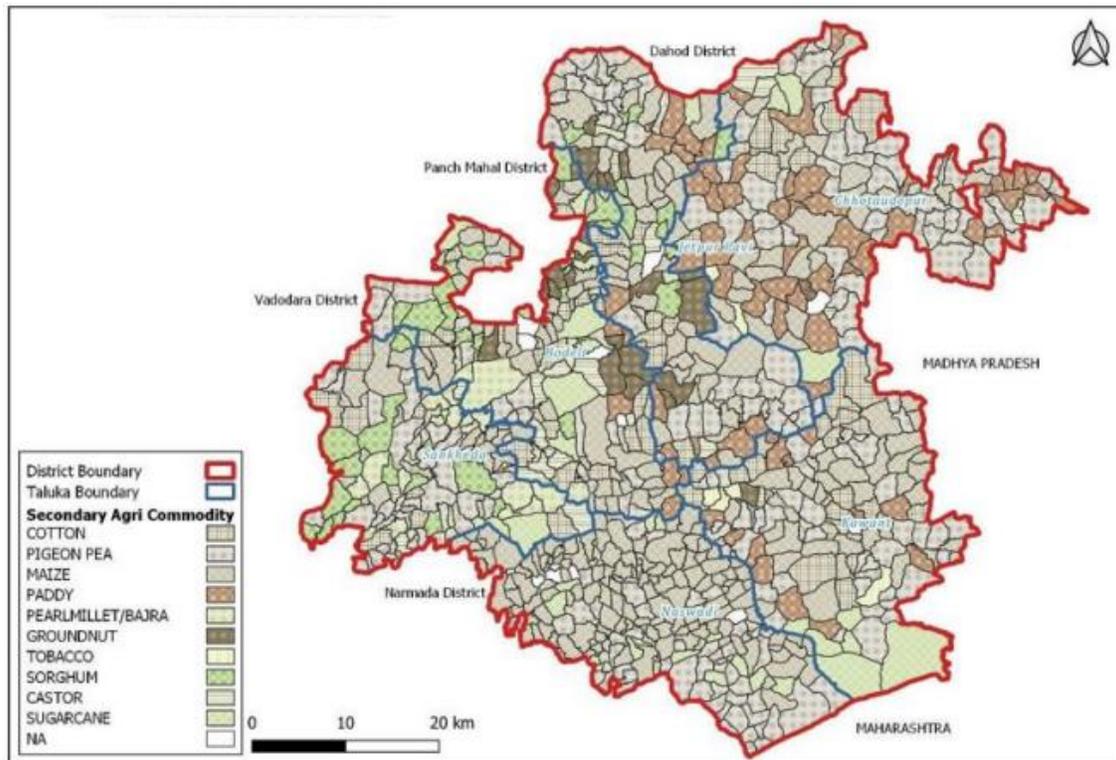
Crop	Jabugam Taluka 1995-96			Jetpur Pavi Taluka 2015-16			10 Years % change 1995-96 to 2015-16	Jetpur Pavi Taluka 2020-21 Projected			5 Years change % 2015-16 to 2020-21
	Area (Ha)	Prod (Ton)	Yield (kg/Ha)	Area (Ha)	Prod (Ton)	Yield (kg/Ha)		Area (Ha)	Prod (Ton)	Yield (kg/Ha)	
Rice	1727	1180	683	0	0	0	-100	0	0	0	0
Jowar	485	373	770	24	23	958	24	24	32	1351	41
Bajra	7	10	1395	0	0	0	-100	0	0	0	0
Maize	3091	2652	858	2110	5059	2398	179	2110	3371	1597	-33
Tur (Arhar)	1418	861	607	444	709	1597	163	444	658	1482	-7
Sugarcane	10	65	6506	0	0	0	-100	0	0	0	0
Groundnut	197	220	1118	0	0	0	-100	0	0	0	0
Castor	92	102	1112	0	0	0	-100	0	0	0	0
Cotton	1249	321	257	1237	808	653	154	1237	821	664	2
Tobacco	0	0	0	0	0	0	0	0	0	0	0

Crop	Kavant Taluka 2000-01			Kavant Taluka 2015-16			15 Years % change 2000-01 to 2015-16	Kavant Taluka 2020-21 Projected			5 Years change % 2015-16 to 2020-21
	Area (Ha)	Prod (Ton)	Yield (kg/ Ha)	Area (Ha)	Prod (Ton)	Yield (kg/ Ha)		Area (Ha)	Prod (Ton)	Yield (kg/H a)	
Rice	4153	490	118	1274	1797	1411	1096	1274	2000	1570	11
Jowar	2882	986	342	138	130	940	175	138	186	1351	44
Bajra	6	7	1142	96	267	2780	143	96	267	2780	0
Maize	9135	8486	929	15299	36680	2398	158	1529 9	24439	1597	-33
Tur (Arhar)	3263	1168	358	5099	8143	1597	346	5099	7556	1482	-7
Sugarcane	29	207	7147	0	0	0	-100	0	0	0	0
Groundnut	243	227	935	111	177	1591	70	111	240	2166	36
Castor	122	89	729	5	9	1927	164	5	9	1918	0
Cotton	7659	1432	187	8400	5486	653	249	8400	5578	664	2
Tobacco	0	0	0	0	0	0	0	0	0	0	0

Crop	Nasvadi Taluka 1995-96			Nasvadi Taluka 2015-16			10 Years % change 1995- 96 to 2015-16	Nasvadi Taluka 2020-21 Projected			5 Years change % 2015-16 to 2020-21
	Area (Ha)	Prod (Ton)	Yield (kg/ Ha)	Area (Ha)	Prod (Ton)	Yield (kg/ Ha)		Area (Ha)	Prod (Ton)	Yield (kg/ Ha)	
Rice	1865	1274	683	1488	2099	1411	107	1488	2336	1570	11
Jowar	1065	820	770	301	283	940	22	301	407	1351	44
Bajra	33	46	1395	11	31	2780	99	11	31	2780	0
Maize	7227	6201	858	5668	13589	2398	179	5668	9054	1597	-33
Tur (Arhar)	4653	2829	608	2094	3344	1597	163	2094	3103	1482	-7
Sugarcane	6	39	6452	0	0	0	-100	0	0	0	0
Groundnut	53	59	1118	18	29	1611	44	18	39	2167	34
Castor	69	76	1108	16	31	1918	73	16	31	1918	0
Cotton	4380	1126	257	9386	6130	653	154	9386	6232	664	2
Tobacco	0	0	0	0	0	0	0	0	0	0	0

Crop	Sankheda Taluka 1995-96			Sankheda Taluka 2015-16			10 Years % change 1995- 96 to 2015-16	Sankheda Taluka 2020-21 Projected			5 Years change % 2015-16 to 2020-21
	Area (Ha)	Prod (Ton)	Yield (kg/ Ha)	Area (Ha)	Prod (Ton)	Yield (kg/ Ha)		Area (Ha)	Prod (Ton)	Yield (kg/ Ha)	
Rice	460	314	683	0	0	0	-100	0	0	0	0
Jowar	1192	918	770	0	0	0	-100	0	0	0	0
Bajra	45	63	1395	0	0	0	-100	0	0	0	0
Maize	1102	946	858	674	1616	2398	179	674	1077	1597	-33
Tur (Arhar)	2290	1392	608	804	1284	1597	163	2094	3103	1482	-7

Map - 4.8
Village-Wise Secondary Agricultural Crops: Chhota Udepur District (2011)



From Map - 4.7 and 4.8 depicting the primary and secondary crops at village level in the district of Chhota Udepur, it is quite evident that availability of irrigation controls crop selection. All dry crops are the most dominant crops in the eastern and central part of the District, where well is the major source of irrigation. While unirrigated paddy, pigeon pea, bajra, cotton appear to be the most dominant crops of the eastern hilly tracts, the irrigated plains of western margin of the District grow jowar, tobacco, castor and sugarcane.

To support the demand of food and enhance the surplus income, dry river bed is utilized in the District, which is known as river bed farming. The river bed is utilized for cultivation of mostly vegetable crops during the pre-monsoon and other dry periods, and is a fruitful alternative. River bed farming has been in practice in India since ancient times. Between November and February, the dry river bed, which is usually rich in soil nutrient, is brought under cultivation. Before sowing, the crop pits or dip channels are prepared perpendicular to the river's flow in regular intervals (Mor

et. al., 2018: 3423). The Orsang river bed provides this opportunity to the tribal farmers in Chhota Udepur district.

Plate - 4.1
Farming on Orsang River bed



4.11 Cropping Intensity:

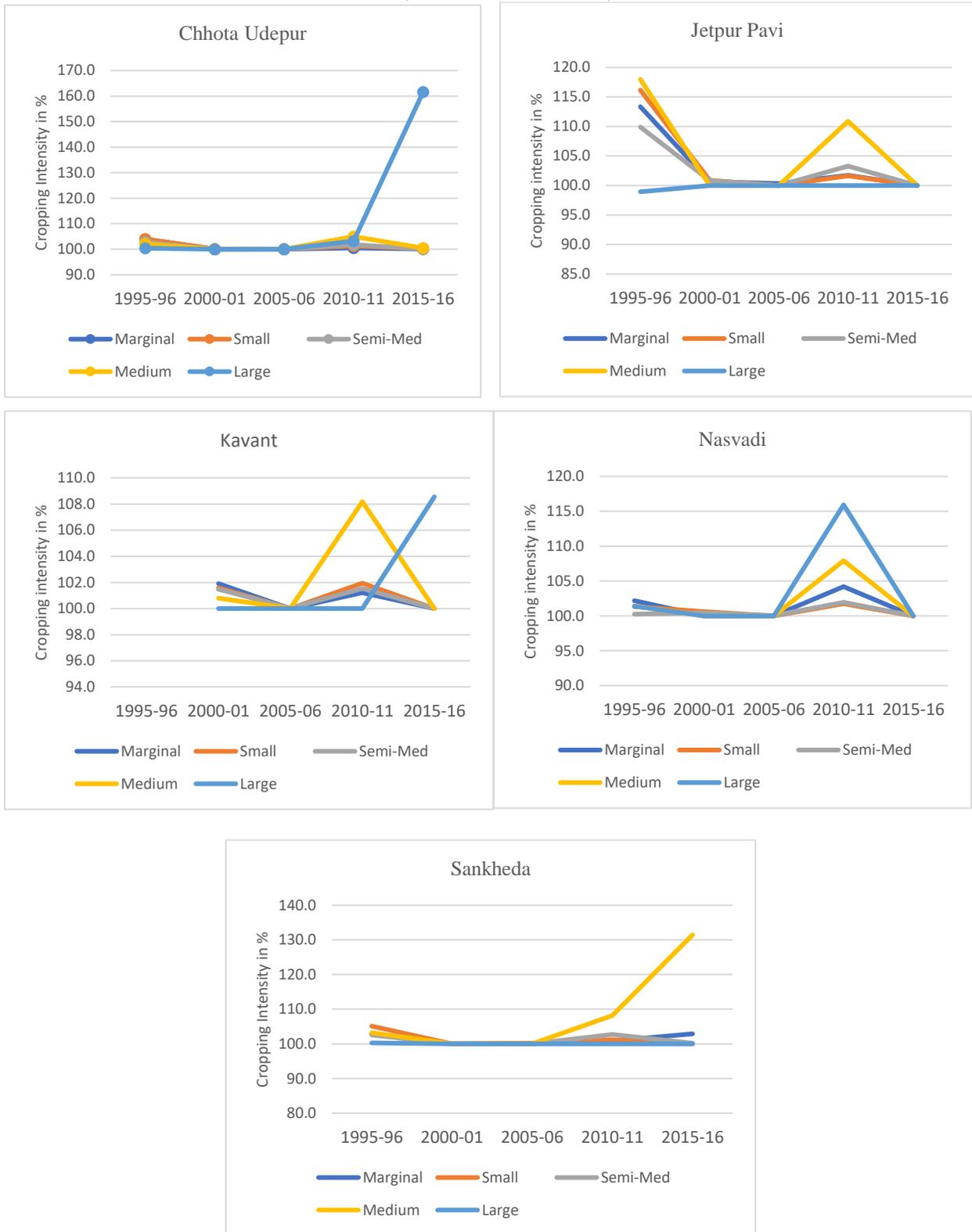
Cropping intensity is described as the extent to which the NSA is re-cropped or re-sown (Singh, 1990: 174). It is calculated as $(GCA/NSA)*100$, and is also described as land-use efficiency. Table - 4.19 makes it clear that cropping intensity of all the land size categories of every *taluka* in the District is 100 or nearer to 100, excepting in cases of some large and medium size land owners of the latest years under consideration. This scenario validates the earlier statements on single cropping, and use of irrigation by the larger land owners for cultivation of *rabi* crops.

Table - 4.19
Cropping Intensity by Land Size Category: Chhota Udepur District (1995-2016)

Taluka	Size	1995-96			2000-01			2005-06			2010-2011			2015-16		
		GC A	NS A	CI	G C A	N S A	CI	GC A	NS A	CI	GC A	NS A	CI	GC A	NS A	CI
Chhota Udepur	Marginal	5273	5073	104	3075	3074	100	4299	4298	100	4669	4648	100	4944	4938	100
	Small	14291	13745	104	7827	7823	100	8756	8752	100	9226	9115	101	9545	9529	100
	Semi-medium	17644	17165	103	8692	8692	100	9630	9628	100	9647	9483	102	9765	9747	100
	Medium	18533	18149	102	7466	7466	100	7997	7997	100	7501	7146	105	7197	7161	101
	Large	2123	2114	100	501	501	100	712	712	100	2082	2017	103	2196	1359	162
Jetpur Pavi	Marginal	1393	1229	113	1318	1309	101	1507	1502	100	1540	1514	102	1101	1101	100
	Small	2883	2482	116	2155	2136	101	2339	2339	100	2270	2233	102	1809	1809	100
	Semi-medium	2699	2456	110	1875	1859	101	1964	1964	100	1731	1676	103	1304	1304	100
	Medium	1759	1491	118	973	973	100	850	850	100	591	533	111	501	501	100
	Large	94	95	99	43	43	100	31	31	100	10	10	100	50	50	100
Kavant	Marginal	NA	NA	NA	3694	3625	102	3946	3946	100	3763	3718	101	3986	3986	100
	Small				9633	9482	102	10124	10124	100	8926	8756	102	10155	10155	100
	Semi-medium	NA	NA	NA	9567	9427	101	9839	9836	100	7941	7821	102	9542	9542	100
	Medium				9062	8991	101	8746	8745	100	6597	6098	108	7824	7824	100
	Large	NA	NA	NA	978	978	100	791	791	100	384	384	100	812	748	109
Nasvadi	Marginal	1498	1466	102	1760	1760	100	1837	1837	100	1834	1760	104	1863	1863	100
	Small	4238	4183	101	5010	4980	101	4825	4825	100	4593	4514	102	4961	4959	100
	Semi-medium	6872	6854	100	7051	7021	100	6722	6721	100	6158	6040	102	6551	6551	100
	Medium	6937	6838	101	6054	6054	100	5602	5602	100	5153	4775	108	4953	4953	100
	Large	1663	1640	101	603	603	100	610	610	100	524	452	116	444	444	100
Sankhed a	Marginal	711	691	103	495	495	100	832	831	100	833	826	101	675	656	103
	Small	1688	1606	105	1767	1767	100	2328	2323	100	2254	2228	101	1746	1746	100
	Semi-medium	4941	4819	103	5135	5135	100	5993	5993	100	5555	5408	103	3868	3862	100
	Medium	2327	2255	103	1882	1882	100	2854	2854	100	2467	2281	108	2090	1590	131
	Large	377	376	100	425	425	100	559	559	100	283	283	100	245	245	100

Source: Agricultural Census, <https://agcensus.dacnet.nic.in>, computed by author.

Figure - 4.8
Percentage Change in Cropping Intensity of Each Size Class of ST: in Chhota Udepur District (1995-96 to 2015-16)



To mitigate climatic variability and to minimize associated risks, and to enhance productivity of tribal farming another important component of National Mission for Sustainable Agriculture (NMSA) is Rain Fed Area Development (RAD) which focuses on Integrated Farming System (IFS). IFS helps to mitigate the impacts of unprecedented or extreme drought, flood or other events by providing alternate or additional income opportunities from allied activities like horticulture, livestock, fishery, agro-forestry and apiculture. It also enables farmers to maximize farm returns for sustaining livelihood. RAD has been implemented since 2014 across all States and UTs except Punjab and Goa (Govt. of India, 2021: 102). It is observed in the district-wise achievement of RAD (NMSA) that, different activities under IFS had been taken up in Chhota Udepur district like horticulture-based farming system and cropping system with peripheral plantation. Under the value-added resource conservation system, silage farming for increased availability of green fodder round the year is executed. Also, under this scheme, the water harvesting and management scheme, post-harvest and storage or value addition of NTFP units have been implemented. According to the RAD programme for 2021-22 financial year, the total targeted area of 120 hectares has been achieved, and Rs. 15,00,000 has been allotted jointly by Central and State Governments. To combat climatic irregularities and over dependence on chemical fertilizers sustainable agriculture or RAD is a solution (nmsa.dac.gov.in).

4.12 Conclusion:

Out of the total geographical area of 3,45,526 hectares, 20.89 per cent is under forest cover in Chhota Udepur district. Percentage of area under NSA and GCA are 27.96 and 28.39 respectively according to 2015-16 data. Invariably therefore, cropping intensity is nearer to 100 and supports single cropping. Percentage of area under marginal to semi-medium (0 to 4 hectares) land size holdings is 73.9 per cent, while medium and large size (4 to 10 hectares and above) account for only 26.11 per cent in the entire District. Per capita holdings of all the land size classes have reduced or marginally increased in all the *talukas* except in Nasvadi where, per capita holding of land has increased. As a natural resource, soil is characterized by inferior quality organic carbon. Besides, farmers use fertilizers indiscriminately. North, north-eastern and eastern parts of the District are reeling under water scarcity for crop cultivation. Single crop production with minimum crop diversity is resulting in land degradation.

The forest has long been the center of the tribal economy. They had to give up hunting-gathering for restricted entry to the forest during the colonial period. Farming in the remote areas where they live is not suitable for agriculture. Agricultural practice is not showing a very promising scenario for tribal *talukas* of Chhota Udepur district. Operational holding is a major criterion for any agricultural practice. Both number and area of the different size classes from marginal to large, play an important role for the regional development. Now here comes the debate as small farm sizes with no increase in number can result in lesser use of fertilizer directing towards good sustainability of agriculture but with lower yield. Again, if both area and number of holding sizes have increased without proper knowledge of agricultural inputs, there will be increased productivity but deteriorated soil fertility in the long run. Degraded soil fertility in the long run can enhance area specific soil degradation. Sankheda and Nasvadi *talukas* are facing soil fertility issues due to over productivity of maize. Though all *talukas* have different environmental conditions, their NSA has not increased. Area sown more than once has remained by and large nil indicating cultivation only during the rainy season. The tribal farmers face several challenges on the way to modernization of agriculture which, perhaps, lure them to migrate seasonally in search of other remunerative activities outside their habitat. These seasonal migrations often bring other challenges like urban crime, deteriorated living conditions and health.

Tribal farming in Chhota Udepur district faces the fear of land alienation due to infrastructural development programmes. Sometimes these programmes are designed keeping their development in mind, like the construction of Sardar Sarovar Dam. Commuter type peasantry life does not allow them to concentrate on and devote time to agriculture.

Year after year cotton, maize, rice and *tur* cultivation on the same field turns the parcel into malnourished land. Food crop production is for subsistence only, without any surplus for the market. Lack of surplus food crops force them to migrate to other districts in search of casual labour work. Four months of the rainy season is the only cropping season for most of the *talukas*. Even though irrigated water from the canal is available for Sankheda and Nasvadi *talukas*, crop yield in these *talukas* for rabi season is the lowest among all *talukas*.

Small land holdings, over uses of chemical fertilizers, mono-cropping leads to high nutrient depletion in soil. More traditional seed usages enhance low seed replacement ratio and reduced productivity.

Though the District has utilized the water of major irrigation projects of Sardar Sarovar Irrigation Command Area and Orsang Irrigation Projects, and Sukhi and Rami minor irrigation projects, constraints lie in the unskillful water management, and selection of crops with high water requirement, leading to water logging and poor quality of irrigated water.

One significant observation about the District is, the overall quantity of urea used in large and medium land holdings is much less than marginal, small and semi-medium land holdings.

Need of the time is to ensure that the farmers get awareness and knowledge of alternate income. Prospects of getting income from alternate sources like horticulture, dairy, and poultry etcetera are faced with the challenges of input investment like credit, farm mechanization and the like.

General and agricultural land use of Chhota Udepur district has come to a stagnant position. To increase productivity of land and suitable agro-climatic based crop choice, proper upgraded understanding of land use, skill development and awareness through government schemes are extremely vital for the tribal farmers of the District. Human Resource Development (HRD) in tribal regions of the State has to be a prime focus for the dwellers, administrators and planners. In order to involve the farmers in the long-term sustainable farming practices, they need to be equipped with a few HRD aspects like education, health, gender equality, employment opportunity and they have to be provided with infrastructural facilities by the state administration like road transport and energy resources. The motto should be to change the reaction for government schemes - from “I did not get any benefit” to “I have understood the benefit”.

