

# **Chapter One**

## **Introduction**





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### 1.1 Introduction:

The study of different systems of agriculture encourages the investigator to acquire a thorough understanding of the problems of agriculture in the regions of plenty and poverty. The composite circumstances that contribute to the existing problems facing agricultural activities must be critically appreciated in a spatio-temporal perspective (Singh and Dhillon, 1984: 320).

After Independence, particularly after the introduction of Green Revolution techniques in 1966, agricultural production and productivity have increased. This had been made possible by bringing additional areas under cultivation, extension of irrigation facilities, use of High Yielding Variety (HYV) seeds and modern techniques of cultivation, efficient water management, use of plant protection techniques, educating the farmers and development of marketing provisions etcetera. Since then, the agricultural scenario of the country has undergone a great deal of change. A review of various studies on agricultural development in several states of India reveals that there are regions where agricultural output has increased at a significant rate. There are also regions where the increment is constrained by both environmental and social circumstances. The latter groups of regions mostly include the forested, hilly and agriculturally unsuitable areas inhabited by the tribes, who have resorted to agriculture to sustain their livelihood.

Social geography of the country presents a clear ecological demarcation between the tribal and non-tribal habitats. Indigenous, natural, traditional, subsistence and ill-equipped are some of the distinguishing characteristics of tribal agriculture, while the non-tribal agriculture has slowly evolved into a fully mechanized system with increased production and productivity. The traditional tribal communities are clustered and concentrated in the agriculturally unsuitable hilly, forested and dry areas of the country. Their economies were primarily based on hunting, food gathering and animal husbandry. The tribes inhabiting the river valleys of the hills partly depended on rudimentary agriculture. On the other hand, non-tribal peasant communities of the country are clustered and concentrated in the agriculturally suitable river valleys and plains.

A tribe is an indigenous group and can be differentiated from the non-tribal peasant communities on the basis of certain cultural traits and practices, and of livelihood patterns. Based on 'mode of human grouping' reminiscent of a 'stage in social evolution', Andre Béteille opines that "A tribe is in an ideal state, a self-contained unit. It constitutes a society in itself" (Béteille, 1977: 7). Since ages, the tribal communities lived in symbiotic relationship with the forests and depended heavily on their immediate environment (Ahmad, 1999: 115). Due to several developmental projects like construction of railways, roads, dams, establishment of industries, reservation of forests, extension of arable land and encroachment of non-tribal peasant and business communities into the tribal heartlands, the tribes gradually got alienated from their traditional resource base. Quite naturally every society evolves and no society could ever live with a complete equilibrium with nature always (Ibid.: 117).

Two processes brought land and forests used by the tribes under the control and management of the state. Firstly, the system of administration introduced during colonial rule and adopted with minor modifications by the Independent Indian Government, failed to recognize the tribal rights on land and forests. Secondly, the legal restriction imposed on the traditional agricultural practice of shifting cultivation, except in the north-east. "In concrete terms it implies that the forest on which the *Adivasi* community was dependent for shifting cultivation was not recognized as forest under the control of the community or the village" (Xaxa, 2007: 14-15). Launching of regional development programmes with the onset of the planning era also left their impact on the tribal societies. "While there is no gainsaying the fact that the tribes have to be drawn into the vertex of development, encounters with modernization have produced devastating results on the tribal society" (Ahmad, 1999: 154).

Consequently, bereft of the age-old natural resource base particularly forests, and in the absence of alternative economic avenues for sustenance, the tribes had to adopt sedentary agriculture as their mainstay livelihood in an ecological setup that is primarily unsuitable for the purpose. Under the circumstances, performance of agriculture in the tribal areas of the country has remained much behind the agricultural performance of the peasant communities of the plain areas. Today, the arts and artefacts produced by the tribes with the use of locally available resources have vanished, the tribal economy is losing its multiple dependence on the bounties of their milieu, and the tribes are acquiring the characteristics of peasant communities. Dependence on a single

resource base of land, which is not rewarding enough, has led the tribes towards impoverishment and pauperization. The 'inadequacy of the process of structural change' and 'the distortion inadvertently introduced in the socio-economic milieu through some of the tribal welfare and regional development policies' have been considered responsible for the problems faced by the tribes today (Ibid.: 67). Raza and Ahmad poetically describe their predicament in the following manner: "their old world is dead; and the new has yet not been born" (Raza and Ahmad, 1990: 5).

The processes in the tribal areas of Gujarat have in no way been different from this generalization. Over the entire stretch of its tribal habitat covering the easternmost administrative blocks from north to south, which marks the western border of the central Indian tribal belt, the different tribal communities of Gujarat have been struggling to sustain themselves on cultivation of crops and the unorganized urban labour market. An attempt would be made in the proposed research to unravel the condition and sustainability of agriculture in the tribal areas of the State and propose measures to alleviate the problems. Besides, the researcher has tried to present an overview of the changing agricultural patterns and the persistent adaptation by the tribal communities of Gujarat to these changes.

## **1.2 Statement of the Problem:**

India is a state with huge disparities in economic and social development owing to complex social edifice of the country. There are several spatially segregated social groups. Out of these social groups, Indian tribal communities constitute a sizable portion with heterogeneous ethno-lingual characteristics. Their socio-economic development experiences have also been different from that of the mainstream population.

Post-Independence social and economic changes in the country have impacted its population with notable social and spatial differences. While some regions and social groups have been successful in appropriating the benefits, others have failed to do so. Progress of a nation depends to a great extent on the spatial and social uniformity in the process of change. Conceptually, change should take place in a time-space frame. It is also not unidirectional. It is considered progressive or regressive, positive or negative based on the value-system of the society concerned. Progressive or positive change is achieved through "institutionally directed intelligent interventions in the situation. Then it is called development, as it brings about a qualitatively new and irreversible

sequence of changes eventually leading to transformation. In the ultimate analysis, what is desirable is not just social change but social transformation” (Ahmad, n.d.: 2).

Agriculture, industry, and urbanization are just a few of the national sectors that are rapidly growing and impacting all social classes and geographic areas. But the consequences haven't been consistent in terms of social and spatial dimensions. Time is of the essence for carefully considered initiatives that can provide spatial and social homogeneity as well as a constructive direction for these changes.

Population and society are dynamic factors of a geographical region. The overall development of a region is based upon an equitable distribution and sustained growth of relevant factors. Agricultural development is also correlated with a healthy development of a region. The blocks or sub-regions which are highly developed in terms of their social, economic and demographic factors can also show significant growth and development in terms of optimum land use and agricultural efficiency. The fact that the Indian tribes are not primarily from peasant society must be considered when discussing agricultural efficiency. Characteristics of peasant society should be ingrained in the tribes wherever agricultural operations in the tribal territories can provide satisfactory results. Otherwise, we must seek to create opportunities in other economic pursuits replacing cultivation. The proposed study intends to evaluate agricultural and other economic practices of the tribes in different ecological setups in the study area and try to propose specific modular strategies as alternative resource utilization methods that could be expected to provide sustainability in a much more efficient way in comparison to the ones in practice.

Many technological experiments have been conducted for agricultural development in Gujarat. The Central and State government administrations, NABARD, NGOs, commercial banks and agricultural universities are continuously supporting the development process in the Schedule Areas of the State. Development projects/schemes like *Jyoti Gram* Scheme (24 x 7 electricity), MGNREGA (employment guarantee), *Ujjawala* Yojana (LPG cooking gas distribution) and Sardar Sarovar Project (a multipurpose, inter-state hydel project) are some of the initiatives taken by the State and Central Governments.

However, there are drawbacks to using natural resources, such as variable rainfall, diminishing subterranean natural aquifers, overuse of underground water resources, water logging, and saline intrusion. A few technological challenges facing agriculture are a lack of knowledge about

pesticides and fertilizers, a low seed replacement ratio, and labour-intensive farming methods performed by inexperienced farmers. Issues such as fragmented or marginal land holdings influence other institutional problems like, accessibility to rural credit, crop loan, Direct Benefit Transfer, insurance etcetera. In addition, ecological issues like wild boar, monkeys, pests and other domestic animals damage the standing crops in the fields.

Finally seasonal inter- and intra-district migration of the Schedule Tribe (ST) farmers from Vadodara district, disturbs the agricultural practices and engrossment towards farming. They lose their connection with the land and cannot engage themselves completely and efficiently in the farming process.

The present study examines and analyses the major constraints of tribal farming at macro and micro levels with generalizations and anticipations which could kindle further research.

### **1.3 Significance of the Study:**

Appropriate use of land is necessary for proper utilization of limited natural resources. If mainstream agriculture is considered, where cultivation is done through a system of engaging man, machine, and mechanism, then the State's economy is rolling on. Simultaneously, there is a need and requirement to develop traditional agriculture where environment, ethnicity and evolution are pursued.

Economic development among the tribals largely depends upon agriculture and its allied activities. Besides, forest resources and minor forest produce contribute substantially to the tribal economy. Although the majority of the ST population depends on agriculture and forests, their ability to cope with the changing economic scenario, especially in taking advantage of the new economic avenue has been negligible. This calls for capacity building to diversify their livelihood sources (Govt. of India, 2013b: 232).

As per the Census of India 2011, the state of Gujarat has 14.75 per cent of tribal population. Most of the tribal population in the State is concentrated in the eastern and southern districts. If a correlation can be established between the mainstream agricultural practices of Gujarat vis-à-vis tribal agriculture, it will help the planning authorities to formulate a policy for sustaining the tribal agricultural livelihood. The evolution of agricultural practices of the tribal communities can be compared with the non-tribal agricultural development. This study will try to give an

understanding as to how to optimize the forest and natural resources for a sustainable tribal agricultural practice or any other economic activity. The following aspects about the tribes and tribal areas briefly mentioned below, have been kept in mind while undertaking the present study.

- The tribal population in India, though numerically small, represents an enormous diversity of groups.
- They differ from one another in terms of their language and vocabulary, the natural environments in which they reside, their physical characteristics, the population's number, the degree of adaptation, the prevalent means of subsistence, their degree of advancement, and their status in society.
- Tribes share certain characteristics with other oppressed groups in Indian society, such as poverty, cultural prejudice, and lack of political consciousness, despite having distinct traditions and heritage.
- A majority of the ST population is clustered and concentrated in the eastern, central and western belt covering the nine States of West Bengal, Odisha, Andhra Pradesh, Jharkhand, Chhattisgarh, Madhya Pradesh, Maharashtra, Gujarat, and Rajasthan.
- The seven states of north eastern India - Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, and Tripura accommodate about 12 per cent of them. The southern and the northern states respectively share about five and three per cent of the country's ST population. (Govt. of India, 2014a: 36)

Protecting the land and forest rights of tribal communities is equivalent to protecting their livelihoods, life and liberty. The right to natural resources in tribal lands has to be protected. They should only be accessed with the consent of the *Gram Sabhas* of the villages. While tribal lands hold much of the natural and mineral wealth of the Nation, these resources cannot be alienated against their will. Moreover, communities who part with their lands have the right to share in the wealth and income so generated from its resources. Hence, a reasonable share of the wealth generated by the resources in their homelands must accrue to them by law. The right to preservation of their language, culture and traditions, and to protect themselves against the loss of identity, must be recognized, protected, documented and allowed to thrive as a dynamic living culture (Ibid.: 33).

#### **1.4 Objectives:**

This study has set the following objectives:

1. To study the land use changes in the tribal areas of Gujarat.
2. To study the changes in the work participations in the tribal areas of the State and study region.
3. To develop an understanding of the prevailing agricultural practices in the tribal areas of Gujarat, specifically in the study area.
4. Assess the consequences of the current agricultural practices on tribal economy and society.
5. To examine the prospects of ameliorating tribal livelihood.

#### **1.5 Hypothesis:**

The following hypotheses have been formulated for the study.

1. The multiple dependence of the tribes on their immediate surroundings has reduced substantially.
2. Lack of alternative economic avenues and near complete dependence on agriculture has left a large segment of the tribal population impoverished and has compelled them to migrate out seasonally mostly to the nearby urban areas in search of sustaining opportunities.
3. Traditional tribal cultural activities and authenticity have changed under the influence of urbanization and industrialization.

#### **1.6 Study Area:**

The present study focuses on Chhota Udepur (presently a separate district, delineated out of Vadodara district in 2013) *taluka* (a sub-district) of Vadodara district, selected from among the 43 designated Scheduled Area *talukas* spread over 12 districts of the State. These 43 *talukas* have

more than 50 per cent ST population, and are also known as Integrated Tribal Development Programme (ITDP) and Tribal Sub-Plan (TSP) areas for planning purposes. According to 2011 census, there are twelve *talukas* of Vadodara district, of which, Jetpur Pavi, Chhota Udepur, Kavant and Nasvadi *talukas* are ITDP and TSP areas and are now parts of the new Chhota Udepur district. These ST areas/*talukas* have been selected for investigation in this study. Besides, the neighbouring Sankheda and recently formed Bodeli *talukas* have also been considered in the study for different parameters.

### **About Vadodara District:**

Vadodara district is located in the eastern part of the state of Gujarat in western India. The district covers an area of 7,794 square kilometers. As of 2011, the district has a population of 4,165,626 of which 49.6 per cent is urban, 50.4 per cent is rural. The ST segment accounts for 27.6 per cent of the district total population, of which 1,040,599 or 90.5 per cent and 1,09,302 or 9.5 per cent are respectively rural and urban by residence.

It is the third most populous district of Gujarat, after Ahmadabad and Surat. The district is bounded by Panch Mahals and Dahod districts to the north, Anand and Kheda districts in the west, Bharuch and Narmada districts in the south. The Mahi River passes through the district. The historical city of Baroda, also known as Vadodara, was the capital of Baroda Residency, one of the princely states of India during British Rule.

The administrative boundaries have changed since 2013, when all the predominantly tribal *talukas* of Vadodara district were demarcated out and put together under a new administrative unit called Chhota Udepur district, Keeping the purpose of the present research in mind, this portion of erstwhile Vadodara district, now named Chhota Udepur district has been considered for the present study. As the 2021 census has not yet been held and recent authentic secondary data are not available, the study has depended on the 2011 census sources

### **About Chhota Udepur District:**

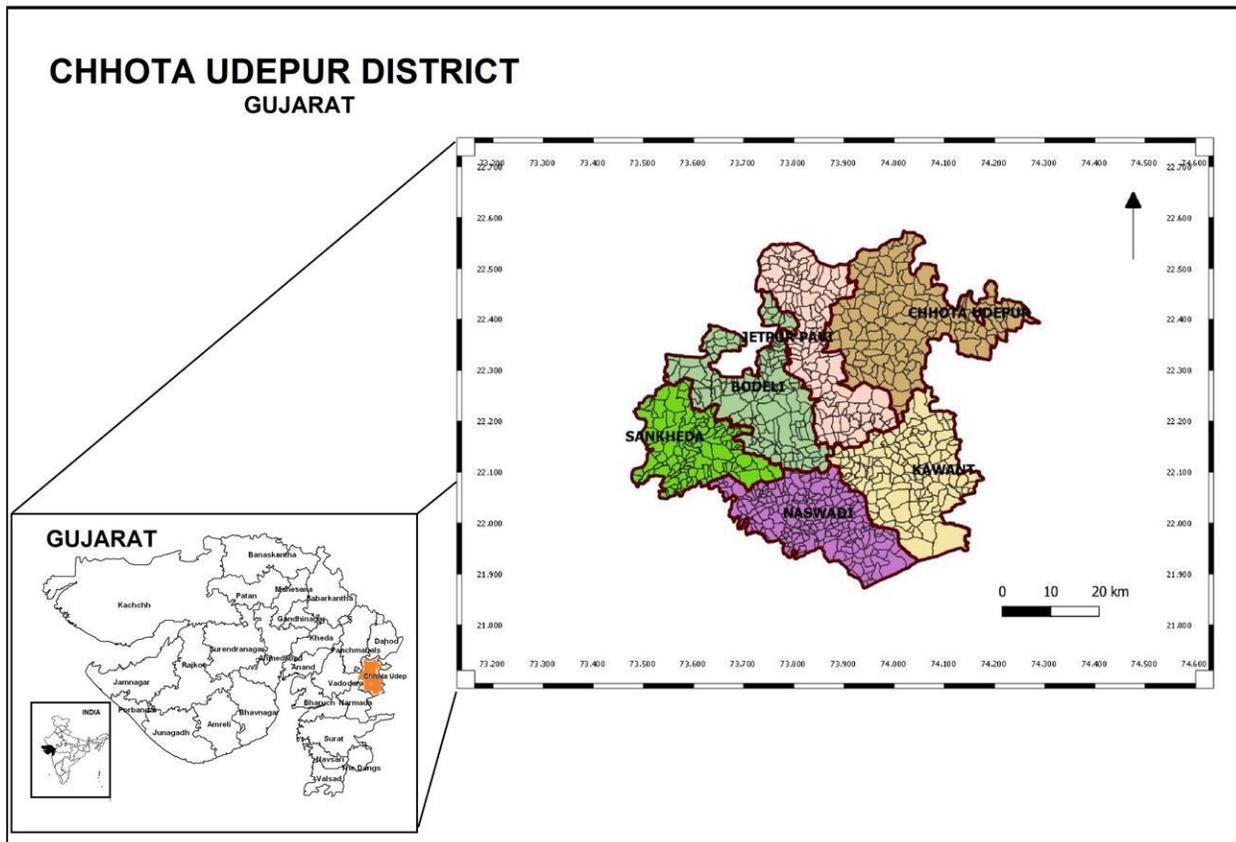
The total area of the district is 3,436 Sq. Kms., extending between 21° 51' 36" and 22° 34' 39" north latitudes and, 73° 28' 46" and 74° 16' 25" east longitudes. The district shares its boundaries with the state of Madhya Pradesh in east and south-east, Dahod and Panch Mahals districts in the north, Vadodara district in the west and Narmada district in the south. Chhota Udepur town in Chhota

Udepur *taluka* serves as the district headquarters of this district with six *talukas* under its administration namely, Chhota Udepur, Kavant, Nasvadi, Jetpur Pavi, Sankheda and Bodeli.

South of Chhota Udepur is mainly constituted by Deccan Trap which is furrowed by the Narmada and the Tapi Rivers. North of the Narmada River is covered by Vindhyan while, south of the Narmada are the broken and dissected Rajpipla hills. Drainage of the Chhota Udepur district corresponds with the terrain characteristics. The river Narmada, is the major river flowing through the district. Orsang River with its two tributaries, Heran and Bharaj Rivers, meet the Narmada River at Chandod. The Orsang river is an important river system draining the Chhota Udepur district. Chhota Udepur has a semi-arid climatic condition with the rainfall period being confined to the middle of June to the middle of October, when the district receives much of its rainfall from the south-west monsoon.

To achieve the set objectives, the study has relied upon the secondary information available in the census reports of 2001 and 2011 and other Government reports, as well as primary information have been generated by the scholar from the sample villages of five predominantly tribal *talukas* namely, Chhota Udepur, Kavant, Nasvadi and Jetpur Pavi, and one non-tribal *taluka*, namely Sankheda. For the primary survey, all six *talukas* were transected, including Bodeli *taluka*, so as to comprehend the problems and prospects of tribal farming.

**Map 1.1: Study Area**



## **1.7 Literature Review:**

**An attempt has been made in this section to comprehend the ideas and understanding of scholars belonging to various disciplinary backgrounds on tribal life and livelihood.**

### **1.7.1 Tribal Economy and Society:**

Changing economy and changing livelihood, whether one is having more influence, or both are acting symbiotically is viewed differently by different authors., Although the ST population is a very important component of total population, economically they comprise the poorest section; socially, they are the most deprived ones, and physically, they have the most raw forms but environmentally, they present a brilliant show of a fine symbiotic relation with the habitat they live in (Manna, 2013: 1).

Anthropology of development is very important for any developing country in Asia and Africa. Development is the struggle of opposites, governed by and subordinated to the continuous struggle between the producers to dominate over their product and the conditions of production. It does not proceed harmoniously or mechanically in a step-by-step way. Effective resistance to imperialism, history informs us, is rarely accomplished without decisive struggles of the oppressed people. It is also disastrous to assume that development of the third world can take place without bringing about radical structural transformations (Pathy, 1981: 627).

Old resources acquire new significance and new resources should be managed and controlled effectively to survive the severe competition over the control of resources. In this situation, tribes can no longer remain in isolation and consequently, the changing pattern of stratification is particularly appropriate for the study of tribes (Bose, 1981: 191).

The Aryan invaders through the north-west frontiers of India penetrated the mainland. The early settlers who resisted them were either completely annihilated or, in compelling circumstances, some merged with them. The rest were pushed back into the interior jungles, to the dales and the forest-side inhospitable regions of our country, where somehow, they were able to preserve their own culture and traditions. (Bhowmick, 1982: 297 as cited in Pathy, 1984: 46). Pathy examined this theory and refuted it with three arguments. Firstly, the Aryan population who were cattle breeders during the period (320 B.C) was too small to push back the primitive dwellers. Secondly, the capacity of hunters and gatherers to fight is relatively much stronger than that of the pastoralists or agriculturists. So, it is skeptical how the Aryans conquered the habitat of the hunters and gatherers. Lastly, the common habitation of the hunters and gatherers have been uplands and the Aryans were in need of fertile river banks. Therefore, there was no pushing back (Ibid.: 48).

It is evident from the available historical accounts that at one time the tribal communities of India occupied much larger areas than they are occupying today. During the early days of British administration dispossession of their lands had continued due to the ignorance and neglect of their rights and customs by the administration (Patel, 1997: 60).

Though fast changing land use/land cover is truly global but land use change is not bringing any solution to tribal communities. Loss of forest cover is ought to bring loss of soil and water resources. Biodiversity imbalances could bring famine and that cannot be solved with capital input. Gadgil and Guha contend that the dual economy must be taken into account when evaluating the

forests' huge potential to improve rural economies. The richest ten percent of Indian society benefit the most from progress, while the impoverished in rural areas face productive unemployment (Gadgil et. al, 1983: 131). For tribal societies, changing land usage and cultivating a bigger region is not a favourable solution. Regular work involving land and water such as farming imbued with environment preservation, is desperately needed.

According to sources, as a result of agricultural development programs that emphasize the use of irrigation and HYV seeds to secure food security and stabilize farmers' income, there has been a decrease in crop diversity that had developed in response to regional geoclimatic changes. These regions are more vulnerable to drought due to decreased soil nutrients, decreased water retention capacity, and unfavourable modifications to water regimes (Choudhury and Sindhi, 2017: 44). Furthermore, during the past 20 years, these farms' crop management, crop varieties, and cropping practices have changed dramatically in terms of food output. These adjustments are a reaction to research, the external market, and the stimuli of extensive programmes. The majority of these modifications have taken place without investigating and optimizing the potential of traditional farming methods, which have developed through time by utilizing scarce local resources and through cultural ties (Ibid.: 44).

We must reevaluate our social anthropology if we are to consider and talk about the connections between agricultural development and culture. According to Mair, “anthropology means talking about man and sociology is the study of society. Like law and politics, economics is an aspect of social organization that small-scale societies have often been lacking. Such societies are commonly said to have a subsistence economy” (Mair, 1965: 161).

According to Ahmad, there are agricultural groups spread across the entire spectrum of social evolution, from the Meghalayan style of jhum (shifting agriculture) to Punjab's intense irrigated farming. Living on the edge of sedentary agriculture, the nomads were frequently selected from among the disenfranchised peasantry, whose agrarian economy was repeatedly upended by a regular cycle of famine and drought. Nomadism became an integral part of the agrarian mode itself due to the large-scale migration that occurred during a drought year from Kutch and Kathiawar in Gujarat, as well as from the drier regions of Marwar, Bikaner, and Jaisalmer (Ahmad, 1999: 41).

Rayamane and Nyonyo (Rayamane and Nyonyo, 2003: 55), had expressed that in Myanmar, crop association constitutes a major feature of the agricultural land use of an area. Crops are

blended through intentional decision-making rather than by accident. This decision is invariably influenced by the surrounding environment, including terrain, climate, soil types, socioeconomic factors, and governmental regulations. Crop association patterns and spatiotemporal fluctuations provide as a window into how much humans adapt to the intricate overall environment under given circumstances.

Further, “Growing population is one of the main factors for changing land use patterns and is the main threat to the land. The dynamics of land use and land cover change differ in different parts of the World. In most of Europe, land is being relieved from agriculture and is reverting to scrub and to forest. In many parts of Africa, Asia and Latin America, the agricultural area continues to expand. Land use reflects a complex correlation between natural, historical and socio-economic factors. The use of land changes according to the changing needs of man” (Rayamane, 2001: 88).

Sharma has given his view that there is a clear influence of size of holding and social status of the farmers on the usage pattern of fertilizers. When it comes to using fertilizers, tribal communities and marginal farmers are far behind. These contemporary methods and practices are not easily embraced by the tribal people (Sharma, 2003: 56). On the contrary, Dash views that the tribal economies in various tribal habitats show how they have adapted to the natural environment based on the limitations placed on them by local biological circumstances. It would be incorrect to believe, nevertheless, that their economy was totally shielded. He goes on to say that their economy was heavily dependent on that of the nearby peasant groups, particularly along the boundaries of the tribal heartlands (Dash, 1993: 35).

It's not appropriate to compare indigenous people to primitive cultures, according to Roy Burman's essay. Though he does not put the tribes' performance at a lower level of social organization, he does argue that it is different from other communities. He goes on to say that for ages, indigenous people have coexisted peacefully with their unique environments (Roy Burman, 1994: 145).

Sundaram and Jha opine that “Technology also led to some adverse results as evidenced by the third generation of problems caused by the green revolution”. They also believe that indigenous knowledge or traditional techniques can be beneficial in addressing issues like soil pollution by fertilizers, air pollution by the waste and crop diseases. This suggests that important information

about conventional farming or methods ought to be incorporated into mainstream development (Sundaram and Jha, 2009: 20).

“Migration is mainly rural-urban to cities such as Vadodara, Surat and Ahmedabad in the state of Gujarat. Despite substantial investments by the Government of India and the Government of Gujarat in watershed and rural development, over 30 per cent of the tribal households were seen migrating seasonally” (Lobo and Shah, 2017: 107).

Researchers from a variety of academic backgrounds have not given the issues surrounding Gujarat's agricultural development and the resulting modifications to tribal agriculture the attention they deserve. It is anticipated that the diverse institutional and individual research endeavours will contribute to the development of long-term policies and their successful execution by government and non-government organizations serving the tribes. An attempt would be made in the present research to address these and related issues.

In this study three aspects are there: first is to understand the prominence of tribes, then tribal agriculture and conclusively challenges concerning tribal agriculture. In the edited book ‘A New Deal for Tribal India’ published by Ministry of Home Affairs in 1962, Verrier Elwin describes that the word 'tribe' is nowhere defined in the Constitution of India, which has been content to declare, in its Article 342, that the Scheduled Tribes are “the tribes or the tribal communities or parts of or groups within tribes or tribal communities” which the President may specify by public notification. As these groups are presumed to form the oldest ethnological sector of the population, the term ‘*Adivasi*’ (‘*Adi*’ original and ‘*Vasi*’ inhabitant) has become fairly popular. The International Labour Organization has classified them as ‘indigenous’ (Elwin, 1963: 1). In his book, Elwin has outlined two important issues regarding initial challenges faced by tribal communities. He stated that the tribes of India were open to change in the future independent India, but not at the expense of their unity and unique way of life. He has further explained that during the early planning era, there were two parts of tribal challenges: integration and development. Emotional integration was deemed to be the most crucial feature of national integration, and all tribes desired to preserve their forests and lands. Positive welfare programs free from harmful aspects are necessary for the area's development.

The primary shift has been from tribes to peasants. Nowadays, we are able to follow the flow of technology from peasants to tribes in both pre-colonial and colonial countries. Communities of

tribal people who had been reduced to farming had developed in Assam, Rajasthan, and central India by the end of the 18th century. This pattern was accentuated throughout the colonial era as peasant migration into tribal areas persisted. The colonial government acknowledged the right of tribal peasants to occupy land and established a system of tenure for the higher class of tribal society, which included the tribal leaders. The goal of the colonial system was to bring the tribes back to civilization by assimilating them into the market and implementing plough culture. Tribes were turned into peasants by the introduction of survey and settlement activities in un-surveyed tribal areas. By classifying various types of land, establishing tribal members' entitlements to it, setting rent, and so forth, they imposed the idea of private property on the native system. Transition to settled agriculture was also helped by the conservation of forest resources for commercial exploitation, which pushed the tribals off their land in reserved forests (Singh, 1982: 1377).

Now, if the issue comes for tribal and their cultivation, preliminary efforts were swaddled by the mainstream. “Their simple nature and their unwillingness to remain at one place for long, whenever they cleared the jungle and settled there for some time, had facilitated their lands being acquired by the more clever, prudent, and thrifty Hindu cultivators” (Ghurye, 1963: 135). Ghurye further sorted out two different categories of problems. One cantered around new habits, language, and shifting cultivation, peculiar to many tribes. The cumulative impact of forest restrictions, land loss as a result of the British system, and the voraciousness of money lending classes fall into the following category. Though Indian tribes picked up the art of agriculture quite early in history, it was subsistence in character. Ahmad states that “the 20-year period following 1961 witnessed all-embracing changes in the tribal economy, leading to the transformation of the tribal mode of production” (Ahmad, 1999: 160). One of his most significant findings was that there are now fewer cultivators in the agricultural labour sector. The main areas of discussion in this study are the dual independent variables, such as labour and land, and their interaction. Other objectives are outcomes of these two aspects.

### **1.7.2 Physical Problems of Agriculture:**

The physical attributes of soil, water, and forest cover as well as the political, economic, and social makeup of a region are intimately linked to agriculture. “As late as in 1970-71, agriculture and allied activities contributed 44.5 per cent to India’s GDP, and mining and quarrying contributed another 1.3 per cent. Thus, the economic sectors which depended directly on the harnessing of

nature accounted for 45.8 per cent of GDP in 1970-71. By 1991-92, however, the share of agriculture and allied activities had dived to 30 per cent and that of mining and quarrying increased to 2 per cent. The shares had fallen to 26.1 per cent and 1.7 per cent respectively by 1996-97. The worrisome aspect of the situation lies in the fact that the declining share of the primary sector in GDP is not accompanied by a corresponding decline in its share in the workforce. Thus, the proportion of agricultural workers (cultivators and agricultural labourers) in the total workforce, which was 69.7 per cent in 1971, declined only slightly (to 64.9 per cent) in 1991 in spite of a continuous and large decline in the share of agriculture and allied activities in GDP. This only means that while non-agricultural sectors have grown fast in terms of income generation, they have not grown correspondingly in terms of employment generation. The pressure of poor people, the residual not absorbed by the fast-growing sectors, remains on land, forests and fisheries” (Nadkarni, 2000: 1184).

Environmental degradation is exacerbated not just by population pressure but also by a lack of readily available natural resources. “The factors and processes historically associated with prosperity and richness, such as resource use intensification, risk free range of high productivity options, gains of scale, generation and reinvestment of surplus, gains from external exchange, etcetera are extremely limited. The people have to live with limited, high risk, low productivity options. The mainstream economic and political systems generally found them unattractive and ignored them as marginalities. Thus, nature (and mainstream economy as well) generated high poverty prospects for these areas” (Jodha, 1998: 2385). According to Jodha, it is better for local resources to be managed by local people.

Land use is simply how land is put to use. When land is put to different uses certainly there is impact. According to Ilbery, “it is the interaction of physical and human factors which determines patterns of agricultural land use, especially as man interacts with, and increasingly controls much of the physical environment” (Ilbery, 1985: 8). The physical environment may remain relatively stable over long periods of time, the economic environment can be very unstable and fluctuate according to changes in such basic items as demand, price, and government policies (Ibid.:9).

The population of humans and livestock has increased at an unprecedented rate, which has changed the type and intensity of land use. It has been acknowledged that there is not much room for large-scale agricultural usage of the land. In the region that is being farmed, all potential growth

has mostly been achieved. Indeed, regions like degraded forest land, grazing land, and other wasteland that aren't exactly appropriate for agricultural production are also being brought under cultivation. Cultivable land is under a different kind of pressure. The productivity per unit of land has to be increased to meet requirements of the growing population. This has resulted in input intensification. The increased use of chemical fertilizers and pesticides, canal and groundwater and the modern agro-mechanical technologies had led to both reversible and irreversible environmental damages to the land areas under crop (Iyengar, 2003: 3596).

### **1.7.3 Soil:**

Soil texture is an important soil characteristic that could influence water retention capacity, aeration, drainage, and susceptibility to erosion which drives crop production and management. The soil texture of the Kutch region belongs to the sandy class. The soils found in South Gujarat and Saurashtra are predominantly clayey. In midland, floodplains and the coastal saline areas of Central Gujarat it is sandy loam to loam or clay loam to clay. The predominant texture of North Gujarat's soil is sandy loam to loam (Narmada Water Resources, 2010).

Soil salinity is due to two major reasons - inherent salinity and man-made salinity (Singh and Nair, 2012: 31). Most sources of water are from surface run-off but mostly they are seasonal. Stream flow constitutes the principal source of freshwater in Gujarat. River flows are concentrated in the relatively short monsoon season. Salt affected area covers 3,07,000 ha (WRIS, 2018).

Land degradation takes place largely in the form of soil erosion due to water. Water-related erosion is in the form of direct and indirect erosion. Direct erosion is due to floods and surface runoff while indirect erosion is due to excess or inappropriate use of water resulting in salinity and alkalinity (Reddy, 2003: 4700). Reddy also emphasizes that excessive use of fertilizers and pesticides turns the agricultural lands unsuitable for cultivation and enhances the replacement costs (enhanced input use, abatement and conservation costs) which eventually affect National income.

For sustainable development of any region, it is necessary to assess previous trends of soil degradation. In that way Shiva clarified how forests turned into wastelands in the colonial period, as rich forests were also considered 'waste' in the early colonial period. Large scale destruction of the primeval forests of Doon Valley for land grants to Britishers is one example of how an administrative category of 'waste' actually created an ecological category of 'waste'. What was

not economically of value to the British was declared value-less (waste) in spite of high ecological value and high value in local use. Ecologically, wastelands are lands which have lost their biological productivity. This process of productive lands turning un-productive is also called desertification (Shiva, 1986: 613).

Adding to the soil and land degradation, though soil degradation is a physical process, it has different other belongings in the economy like agricultural production, demand supply balance of crops, food security and debt-ridden economy. In order to cope with soil degradation, a farmer's perception of the relation between soil erosion, soil quality and cropping pattern is very important. Here comes one experiment done by Joshi et. al. in Yavatmal district of Maharashtra. They have observed that in the upper areas the poor land is located at higher elevation and, in the lower village low productivity land is found in upper reaches of the sloping ground due to soil erosion and, in the flat areas the lower reaches are less productive due to water logging and salt accumulation (Joshi et. al, 1996: A-89). Along with perception of dealing with soil degradation, understanding of input use, cropping pattern, nutrient mining and crop land value are the other issues farmers must handle.

This way the study perhaps indicates that all these issues are going to be established in the sample villages of Vadodara district. It is being observed after 1960-70, due to huge food demand, high input intensive technology influenced agriculture which perhaps could meet the food demand but along with the increase in food production, soil degradation and soil salinity also increased. The primary environmental issues associated with such intensive agriculture include soil degradation brought on by improper use of chemical fertilizers and monoculture, groundwater quality degradation, increased pesticide use that poses health risks, deforestation, and neglect of common property resources (CPRs), all of which exacerbate the issue of degraded soils. The present study focuses not only on problems of agriculture in the tribal areas of Gujarat, but also explores the probable potentials for improvement.

The main factors that may be instrumental in changing the perceptions of people towards the environment and achieving the objectives of sustainable agricultural development are (a) literacy, (b) market forces, (c) technologies, and (d) institutional changes in terms of agrarian reforms. (Reddy, 1995: A-26). According to Reddy, problems with the environment and sustainable agriculture are not exclusive to poor or fragile resource regions, though the type and severity of

issues may differ between agriculturally developed and less developed regions. As a result, this paradigm of sustainable agriculture along with its intensive characteristics can be examined in the tribal areas of Gujarat in addition to emphasizing technology-based farming. Sustainable farming practices, as currently envisioned, seem like an impossible goal unless people's awareness, attitudes, and views about the environment are changed. There is another immaculate feature insinuating the parallel co-existence of conservationist approach along with updated farming technologies. And agriculture in the tribal areas of Gujarat should be accessed in this way.

#### **1.7.4 Population:**

According to the official declaration on Schedule of Tribes issued by the President of India in March 1950, the tribal population was 178.75 lakhs, consisting of 245 tribes. Before partition, the estimated tribal population in India was about 26 million. The tribal population in the States was as follows: (population in lakhs): Assam: 17.15; Bihar: 42.10; Bombay: 30.37; Hyderabad: 2.37; Madhya Bharat: 9.49; Madras: 5.96; Madhya Pradesh: 24.59; Mysore: 0.10; Orissa: 29.25; Punjab: 0.15; Rajasthan: 4.47; Saurashtra: 0.73; Travancore and Cochin: 0.23. Number of Scheduled Tribes by States were Assam: 13; Bihar: 28; Bombay: 24; Hyderabad: 9; Madhya Bharat: 3; Madras: 40; Madhya Pradesh: 31; Mysore: 6; Orissa:42; Punjab:1; Rajasthan: 1; Saurashtra: 6; Travancore-Cochin: 16; Vindhya Pradesh: 10 (Mehta, 1952: 236).

The Indian Constitution recognized about 645 tribes as Scheduled Tribes in different parts of India. Article 366 (25) of the Constitution has defined 'Scheduled Tribes' as "such tribes or tribal communities or parts or groups within such tribes or tribal communities as are deemed under article 342 to be Scheduled Tribes for the purpose of this Constitution". By the Constitution (Scheduled Tribes) Order, 1950, issued by the President in exercise of the powers conferred by Clause (1) of the Article 342 of the Constitution of India, 212 tribes have been declared to be Scheduled Tribes. Gradually the list expanded to include more tribes into the category of Scheduled Tribes (Archer, 2013 as cited in Kumar, 2018: 1508).

#### **1.7.5 Irrigation:**

Canal irrigation has resulted in issues along with edges of large irrigation projects of large investments. These are mainly - soil salinity, water seepage and poor water drainage (water logging). The micro problems from these are: fertile, well irrigated fields turning into barren lands,

weed growth, water diseases, water logging, and income disparities, etcetera. The macro problems are: poor production, unemployment, migration, diseases, regional diutes, and ecological imbalances, etcetera. These problems have increased investments and social costs (Joshi, 1984: 528).

Soil and water conservation practices based on imposed technological interventions have not delivered the environmental or economic benefits they promised. The practice of designing and implementing interventions without involving local people can only succeed with coercion. Such enforced responses may appear technically appropriate but are commonly rejected by local people when external pressure is removed (Hinchcliffe, 1995: 15). Evidence from Africa shows exacerbated erosion was caused by terracing. Large ridge terraces and bunds were introduced which disturbed natural drainage. Instead of grassed boundaries contour banks not only reduced size of the field but also induced gully erosion (Ibid.: 3).

Surface crusting, which is widespread in semi-arid regions, appears to be the primary reason for low infiltration (Valentin, 1985 as cited in Jat et. al. 2012: 193). Surface crusting may prevent seedling sprouting in addition to decreasing infiltration. The low intrinsic moisture-holding capacity of sandy soils may limit the amount of water that can be stored in the root zone. The research project entitled "A Problem-Oriented Survey for the Indo-German Watershed Development Programme" found out that erratic rainfall and frequent droughts are the main constraints faced by agriculture in Gujarat. The Programme found different problems related to agriculture in Gujarat that constrain irrigation possibilities, like limited availability of surface water and depleting groundwater resources. Soil erosion is another factor, which severely limits agricultural productivity. Forest lands cover only about 10 per cent of Gujarat (Groetschel et. al. 2000: III).

#### **1.7.6 Forest Cover:**

Forests constitute a critical resource base of tribal society. In the second half of the 19th century, the British administration initiated the commercial exploitation of forest resources. This was done with systematic legal and administrative mechanisms. Forest policies resulted in unprecedented intervention of state apparatus into everyday life of tribes. This friction between forest rules and tribes resulted in consistent tussle between the tribes and the forest department.

And forest policies accelerated the process of integration of tribes with the colonial economic and governance system (Kumar, 2018: 1513).

Gujarat receives less rainfall and has an arid and semi-arid climate. Under such ecological circumstances, significant vegetation cover is beyond expectation (Khullar, 2020: 5.47). Out of the total geographical area of 1,96,024 km<sup>2</sup>, Gujarat has only 21,647 km<sup>2</sup> or 11 per cent area under forest cover (CSO, 2018: 194). Nevertheless, compared to the international standard of 33 per cent forest cover, this proportion in the State is miserably low.

Forests are an inextricable part of tribes. The colonial state established property rights over forests in the 1860s, prior to which usufruct was unrestricted. Today, forests continue to be state property and control over them rests with the Forest Department (Joshi, 2016: 2).

Forest and tribal livelihood are symbiotic in nature. This statement has been felt and refurbished by many authors. Over time, in the refuge zones, the *Adivasis* developed symbiotic relationship with their immediate environment. They revered and protected the forest, which provided their basic needs. This relationship was canonized in the form of customary rights over forest produce. With the advent of colonial rule, especially over the last century, this bond was ruptured. Even after Independence, tribal areas have not received their fair share of potential benefits from mainstream development (Shah, 2005: 4896). Depletion of forest is another problem in tribal life. According to Lobo, the depletion of forests in the state of Gujarat and the country as a whole is a major concern, but today the need for the minerals that lie underground especially in forested areas has become a bone of contention. Hence, losses are affecting the forest dwellers (Lobo and Shah, op. cit: 18).

Sonavane and Gandhi have dealt with a few issues related to forests. Over the past 30 years, several changes have taken place in relation to forest laws in the country. Most significant are the passage of keystone legislations recognizing rights traditionally enjoyed by the tribes and forest-dwelling communities over forest land and resources (The Scheduled Tribes and other Traditional Forest Dwellers / Recognition of Forest Rights Act, 2006). Legislations such as the Compensatory Afforestation Fund Act (CAFA), 2016 and the recently released Draft National Forest Policy (NFP) 2018, are indicative of this trend. The NFP 2018, especially, reconstructs forests from being primarily a vital ecological entity to a sustainable industrial resource. This reduces the historically

conditioned, organic symbiotic relationship between the tribes and forest-dwelling communities into a reductionist linear framework (Sonavane and Gandhi, 2018).

### **1.7.7 Work Participation:**

Reorganization of farm size as well as agricultural population is an on-going process. Economy has moved from subsistence to commercial, farm sizes have become larger, demand for food crops has increased. Still there is out-migration from farms. Generally, a rural worker has three types of work choices - rural farm work, rural non-farm work and migratory work. There is a significant gender effect on rural non-farm work and migration choices (Zhao, 1999: 770).

Poverty is a common phenomenon in a jobless family and food security in a dual earner family. To understand economic plurality and gender equality, contribution in farming as well as in tribal farming is very essential. To control the out-migration or withdrawal of farmers from primary occupation to other occupations, occupational transition has to be dealt with.

Two important segments related to tribal workforce are defined by Lobo and Shah as both unskilled and skilled labourers in different industries often remain absent at work. Analytically they have observed that their needs are limited and once they get enough money for their survival, they remain absent for the rest of the month. Secondly, Lobo and Shah find a particular type of shift in the attitude of educated tribal youth. If their education does not create employment opportunities, they prefer to remain unemployed rather than taking up traditional sources of income generating activities. On the other hand, graduate and postgraduate tribal youths avoid taking up traditional sources of income generating activities (Lobo and Shah, op. cit.: 210)

Agricultural labourers, hunters and food gatherers' occupational mobility is more than cultivators. Perhaps cultivators' ownership of land restricts them to change the occupation. According to Singh and Dhillon, there are two reasons for changing occupational mobility in the Oriental World where, farm population is high. First, the size of the land holding is progressively declining and secondly, educated children of farmers prefer to seek employment in the white-collar job market (Singh and Dhillon, 1984: 149).

Overall, the above review makes it clear that scholars belonging to various branches of social science have significantly contributed towards the critical assessment of tribal economy and development in the country. The historical genesis of issues pertaining to the alienation of the tribes

from their traditional resource base and its consequential adverse effects leading to their economic impoverishment, and destruction of their age old social and cultural practices and traditions, have been addressed adequately. A good number of studies attempting critical evaluation of the institutional measures concerned with the welfare and development the tribes have also been accumulated. However, the burning issue of empowering the tribes to manage the degraded economic resource base of their fragile habitats with managerial and technical skills suitable to specific milieus, have scantily been taken up. Besides, the contribution of the geographers to the field has been negligible. Nevertheless, the geographers have very skillfully unravelled the spatial characteristics of the Indian tribes as manifested in their distribution and heterogeneous socio-cultural and historical backgrounds. They have stressed upon consideration of the spatial characteristics of Indian tribes in planning endeavours targeting development of the tribes and their territories. The crux of the matter is, the heterogeneity of ecological set ups, socio-cultural traditions and practices, and economies of Indian tribes has to be kept in mind while planning for their development. Blanket cover like measures may not be applicable to all tribal areas. Stress should be laid on identifying specific spatial characteristics of one or similar tribal milieus, and develop milieu specific planning measures. A modest attempt has been made in the present research in this direction, focusing on a micro region of the eastern tribal belt of Gujarat.

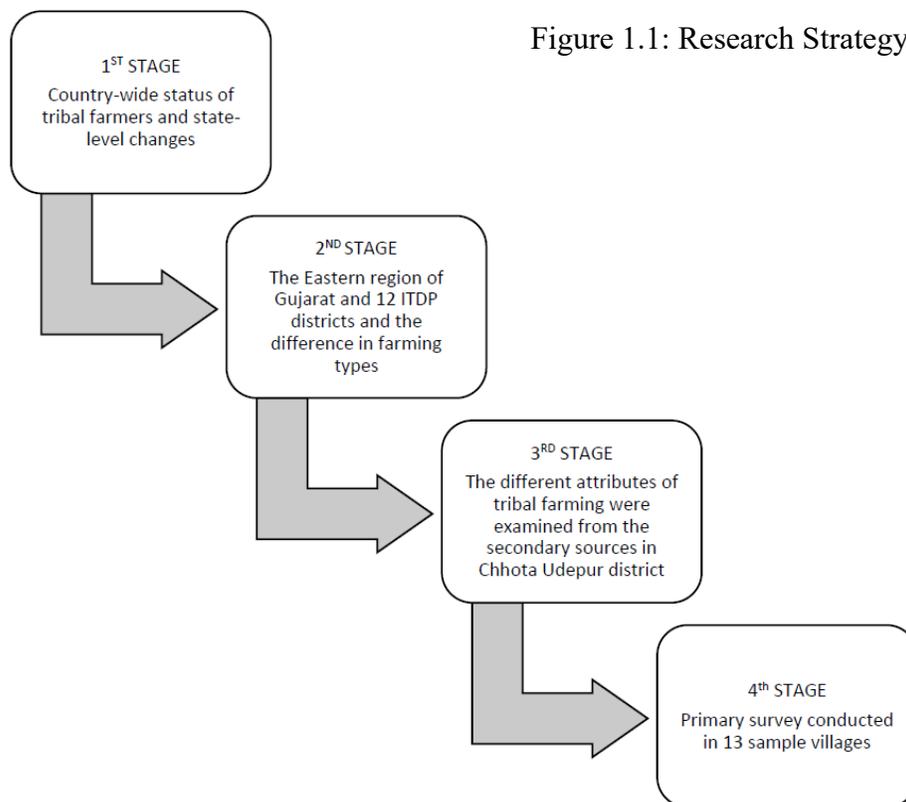
### **1.8 Methodology:**

The present research is based on both secondary and primary data. The secondary data have been used to analyze the issues in hand at larger units of analysis, such as the country, state, district and *taluka* levels. To gather the required secondary data for the purposes of this research, books, peer reviewed journals, online sources, government publications, reports, Census of India reports, published and unpublished theses, Statistical Abstract of Gujarat, Socio Economic Review of Gujarat, Agricultural Census, Gazetteer of Baroda, MOSPI, India-WRIS, Bhuvan, Survey of India toposheets, and Maps of India website have been extensively used. Wherever necessary and available, temporal information have also been collected from the relevant sources. The data collected thus, have been tabulated and depicted with the help of appropriate maps and diagrams using the GIS system.

Primary data have been generated by the scholar from the sample households of the selected villages in the study area with the help of structured household schedules (Annexure - 1), personal observations, group discussions and Rapid Rural Appraisal methods.

### 1.8.1 Sampling Technique:

To establish the population parameter and to substantiate secondary data with primary findings, multi stage cluster sampling method has been adopted in the study. Cluster method is used as the population is large and scattered throughout the eastern part of the State, and it is also cost effective. In cluster analysis, grouping of objects is done which have common characteristics. From the secondary data, it is evident that most of the tribal communities are predominantly farmers in the State. With respect to the temporal analysis conducted for the years 1995 to 2015, the main concern of the research has been the changes in the farming practices amongst the tribes. More than one variable is used for grouping. Thus, the methods of primary investigation can be called as divisive polythetic clustering. The primary focus of the research is on changes in land use and work participation.



### 1.8.2 Selection of District:

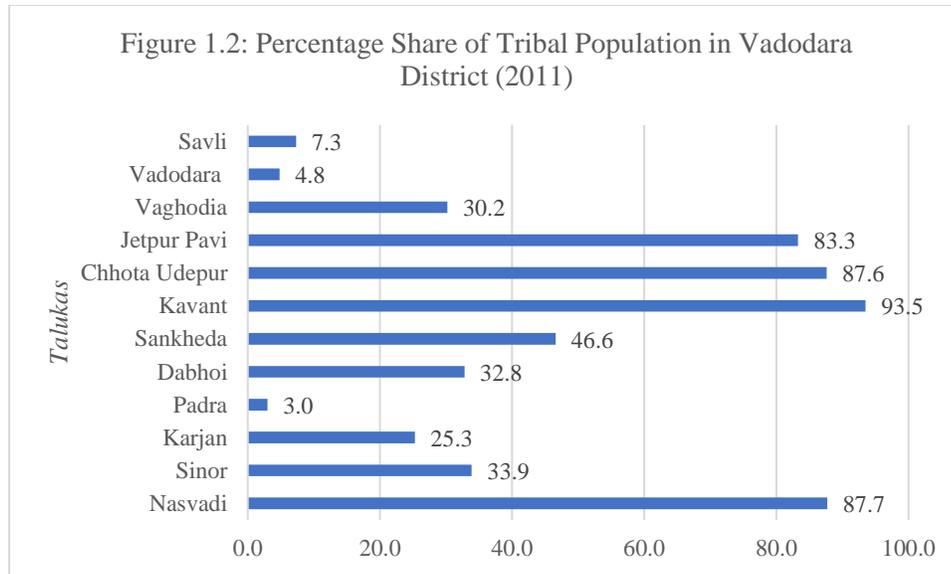
Vadodara has a significant segment of non-tribal peasant population in its total population, and a number of urban centers including the city of Vadodara from where urban-industrial influences diffuse to the peripheral tribal tracts of the District.

The proximity and acquaintance of the area to the researcher are also important influencing factors in the selection of the study area.

**Table - 1.1**  
**Taluka-Wise Distribution of ST Population in Vadodara District**  
**(2011)**

<i>Talukas</i>	<b>Total population</b>	<b>Tribal population</b>	<b>Percentage of Tribal Population</b>
Savli	2,55,099	18,510	7.3
Vadodara <i>Taluka</i>	2,009,434	97,373	4.8
Vaghodia	1,49,914	45,219	30.2
Jetpur Pavi	2,61,425	2,17,836	83.3
Chhota Udaipur	2,41,377	2,11,506	87.6
Kavant	2,10,002	1,96,373	93.5
Sankheda	2,03,584	94,792	46.6
Dabhoi	1,80,518	59,239	32.8
Padra	2,65,901	8,090	3.0
Karjan	1,67,579	42,454	25.3
Sinor	65,440	22,154	33.9
Nasvadi	1,55,443	1,36,355	87.7
<b>Vadodara District Total</b>	<b>4,165,716</b>	<b>1,149,901</b>	<b>27.6</b>

Source: Census of India 2011- District Census Handbook



### 1.8.3 Steps to Choose Sample Villages:

- Multi-stage sampling has been taken into consideration to accommodate sub-population in the spatial frame.
- In the initial stage the background was analyzed from the country wide status of farming amongst tribal people to state level changes.
- In the second stage, the difference in farming in the eastern part of the Gujarat state and 12 ITDP districts was studied.
- In the third stage, different attributes of agriculture in the *talukas* of Chhota Udepur district were examined from the secondary sources.
- Finally, 13 villages from 6 *talukas* of the Chhota Udepur district have been selected to examine the parameters of the research.
- To make the tribals feel free to respond, along with multi-stage cluster sampling, a non-probability convenience sampling method has also been applied. The easily accessible members of the selected households in the study villages have been approached to get the information.

### 1.8.4 Tools and Techniques:

The proceedings of the study “Problems and Prospects of the Agriculture in the Tribal Areas of Gujarat: With Special Reference to Vadodara” have been examined with secondary and

primary sources of data. Different statistical techniques, cartographic methods and thematic maps' have been used at different units of analysis like state, district, *taluka* and village.

#### **1.8.4.1 Computation of Data (Chapter - 5):**

To reach the proposed target of establishing and analyzing the reason behind the problems of agriculture in the tribal regions of Vadodara/Chhota Udepur district, land and labour are the two major variables used. For the study, data on categories of workers from 1961 to 2011 Census for all *talukas* of Chhota Udepur district have been used.

The administrative bifurcation of Vadodara district led to creation of Chhota Udepur district in 2013. However, the Chhota Udepur district has been created with some alterations of the *taluka* boundaries. A new *taluka* of Bodeli was also created by taking a few villages of Jetpur Pavi *taluka*. Consequently, the villages in a particular *taluka* at the 2011 or earlier censuses, may or may not be the part of current *talukas* of Chhota Udepur district. To make the information appropriate for the current administrative divisions of the District and for convenience of analysis, village level data from the District Census Handbook or digital sources of all the census years in reference have been aggregated to derive *taluka* level data.

#### **1.8.4.2 Amenities Score:**

To analyze the status of infrastructural development in the Chhota Udepur district, an assessment of amenities available based on Census data has been carried out. Agricultural operations in the tribal areas are a product of several circumstances working in combination. It would be wrong to assume any single variable exhorting agricultural changes. Based on this understanding, a host of relevant variables have been considered in the study to comprehend the issue of agriculture in the tribal area under investigation. Variables such as irrigation, forest, education, health, primary health centers, community health centers, *anganwadis*, commercial banks, co-operative banks, agricultural credit societies, information and communication centers, power supply for both domestic and commercial purposes and, drinking water were assessed from the decadal census data of 2001 and 2011.

The score is assigned to each variable based on the number of each amenity present or absent in the village. While score 1 is assigned for the presence of the amenity, score 0 is assigned for its

absence. For example, with the availability of two primary schools in the village, score 2 has been assigned under the education variable. Amenity scores thus obtained for all the amenities of each village have been summed up to obtain the composite village level amenity score. The village wise amenity score sheet was prepared for 2001 and 2011 separately for each village of Chhota Udepur district (Annexure - 2). The tabulated amenity scores have been represented through maps depicting both variable-wise scores and composite scores. The mapping of the scores has helped the scholar to comprehend the level of development based on the amenities.

#### **1.8.4.3 Statistical Techniques:**

Both inferential and descriptive statistics have been used for the calculation and analysis of the secondary as well as primary data. Descriptive statistical tools such as diagrams, graphs and different measures to show central tendency and dispersion are utilized for the summarization of the data. Inferential statistics has been used for prediction and to reach conclusions about the population from the sample.

- a) Secondary data was used for ranking by Kendall's Rank Coefficient method. The spatial variations in physical output from land are the result of combinations of natural environment and human activities. 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. In addition, the report uses Linear regression and Correlation Coefficient.
- b) Statistical techniques used for primary data: t test is used to compare the means of two groups. In hypothesis testing t testing determines the similarity or differences between two groups of population. It is a parametric test of difference. Mostly two-tailed tests have been executed with the help of z test and Chi-Square test for hypothesis testing.
- c) Data Representation: Lorenz Curve - The Lorenz curve is a way of showing the distribution of income. It was developed by Max O. Lorenz in 1905 for representing inequality of the wealth distribution.

#### 1.8.4.4 Cartographic Methods:

For graphic representation of the data, different cartographic techniques have been applied. Thematic representations of variables with further sub-division are shown by graded colour maps drawn with the help of ArcGIS 10.3. Along with the graded colour maps, various other diagrams are also used such as pie-graphs, bar diagrams, line graphs for showcasing data in every possible way.

#### 1.8.4.5 Rapid Rural Appraisal (RRA):

The RRA method was used in this study to closely interact with the local communities particularly women, to seek ground level information directly from them, to develop understanding about various issues pertaining to their life and livelihood, and to learn from them. The exercise was conducted with a purpose of involving particularly the female segment of the target population and gathering indigenous knowledge. The process brings out finer nuances of the socio-economic scenario through free and frank discussion, where the participants express their experiences about their way of living.

#### 1.8.4.6 Use of Computer Software:

The study used software like PSPP for data processing and statistical analysis, QGIS/ArcGIS for mapping and Microsoft Excel for data entry, tabulation and data analysis along with statistical techniques.

- **Z test**

$$Z = (X - \mu_0) / (\sigma / \sqrt{n})$$

x: sample mean

$\mu_0$ : hypothesized population mean

$\sigma$ : population standard deviation

n: sample size

- **Linear Regression**

$$y = \beta_0 + \beta_1 X + \epsilon$$

- $\hat{y}$  is the predicted value of the dependent variable ( $y$ ) for any given value of the independent variable ( $x$ ).
- $\beta_0$  is the intercept, the predicted value of  $y$  when the  $x$  is 0.
- $\beta_1$  is the regression coefficient – how much we expect  $y$  to change as  $x$  increases.
- $x$  is the independent variable (the variable we expect is influencing  $y$ ).
- $e$  is the error of the estimate, or how much variation there is in our estimate of the regression coefficient.

- **Correlation Coefficient**

$$r = \frac{n \sum xy - (\sum x)(\sum y)}{\sqrt{[n \sum x^2 - (\sum x)^2][n \sum y^2 - (\sum y)^2]}}$$

- $r_{xy}$  = strength of the correlation between variables  $x$  and  $y$
- $n$  = sample size
- $\sum$  = sum of all observations of selected variable
- $x$  = every  $x$ -variable value
- $y$  = every  $y$ -variable value

- **Chi-Squared test**

$$X^2 = \sum \frac{(O - E)^2}{E}$$

- $X^2$  is the chi-square test statistic
- $\sum$  is the summation operator (it means “take the sum of”)
- $O$  is the observed frequency
- $E$  is the expected frequency

- **Other Tools**

Computer based software like PSPP, ISRI ArcGIS, Microsoft Excel have supported the data entry, tabulation and data analysis along with statistical techniques.

## 1.9 Organization of the Study:

The study is arranged in eight chapters. To understand the objectives and conclude with tested hypotheses, these chapters have been classified in different segments. Major findings and conclusions of the chapters in this thesis are as under;

**Chapter One** includes description of research problems, objectives and hypotheses of the study. An attempt has also been made in the chapter to understand the perceptions and conceptions of the research problem by reviewing some of the recent and relevant National and International level literature. Methods of acquiring data, its analysis, representation and testing of the proposed hypotheses have also been explained in this chapter. This chapter concludes with the following chapter's design and limitation of the study.

The **second chapter** explains the physical background of the study area.

### Findings:

- Indigenous people usually maintain a strong attachment to particular geographical locations and ancestral territorial origins.
- The scheme of regionalization of Gujarat by the 1991 Census into two meso-regions has been adopted in the present research. The tribal belt of Gujarat corresponds broadly with the eastern hilly region. The twelve eastern districts that are partly or fully covered by the eastern hilly region form the tribal belt of the State, and have been considered in the present research.
- For the purpose of the present research, it is intended to generate and analyze data at two levels: at secondary level, the Twelve Integrated Tribal Development Project (ITDP) districts; at primary level, the six tribal *talukas* of Vadodara/Chhota Udepur district.
- With an average elevation of 300 meters, the north-eastern and south-eastern parts of the State are differentiated by their hilly topography and forested tracts.
- The north eastern part of the tribal region has a semi-arid climate while the south-eastern part receives more rainfall and is relatively more humid.
- There is a close correspondence between the pattern of rainfall and vegetation.

- Alluvial, black and local hilly soils with mixed texture are the major soil types in the tribal region.
- The Narmada, Mahi and Sabarmati Rivers are the three major river systems contributing significantly for the fertility of the alluvial soils. Other important river basins are the Orsang, Heran, Mahi and Sukhi River basins.

**Third chapter** includes descriptive analysis of socio-economic status of tribal occupation pattern in the twelve districts of the tribal region of Gujarat. The livelihood parameters of the 12 predominantly tribal districts of eastern Gujarat have been assessed in the chapter. 31

#### **Findings:**

- The socio-economic condition of the ST population and their households have changed during the 2001-2011 census decade. But the gap between the ST and other social groups have widened in terms of literacy, health, income and female work participation rate.
- Fragmented land holdings and poor management of irrigation do not encourage farm mechanization.
- Cropping pattern has, by and large, remained unaltered during the last few decades and mono cropping leads to less crop diversity.
- Periodic seasonal migration develops less involvement with settled agriculture among farmers in tribal areas.
- Importantly there is lack of awareness about different government schemes and programmes resulting in continued rural migration.

**Chapter four** deals with *taluka*-wise cropping patterns in the Chhota Udepur district. Due to physiographic differences, availability of irrigation facilities varies across the *talukas*. The irrigated water has brought changes in crop production in tribal and non-tribal regions of Chhota Udepur district.

#### **Findings:**

- Forest cover has decreased during 2001 to 2011.

- Single crop production with less crop diversity is resulting in land degradation.
- The remote hilly region is not suitable for agriculture.
- Degraded soil fertility is adversely affecting crop yield over time.
- Water intensive crops are leading to water logging and poor quality of irrigated water.
- Circular migration of the tribal farmers is more of transhumance than sedentary livelihood, directing to less time for farming.

**Chapter five** describes characteristics of tribal labour and their participation ratio. The recurrent relocation of marginal farmers results in greater income creation, which leads to the withdrawal of female workers from primary labour roles.

#### **Findings:**

- There is inequality in the female work participation scenario even in tribal regions.
- Periodic movement out of villages by farmers hamper farm income attainment.
- The soil becomes even less productive when there is inadequate utilization of organic manure and poor soil quality with low nitrogen concentration.
- Due to rising wage rates and a shortage of farm labour, large landholders are experiencing a dilemma.

In **chapter six**, findings from the field survey are analyzed along with testing of hypotheses. This particular segment of the study analyses spatial pattern of tribal farming and its characteristics. To understand the factors behind the cropping pattern of the district certain independent variables have been chosen such as land size, irrigation system prevailing in the villages, farm inputs, and work participation, which were the prime focus in the structured schedule. Relation between different variables and outcome has been examined and hypotheses have been tested.

#### **Findings:**

- Other than cultivation as the main occupation, agricultural wage labour has emerged as subsidiary work for the tribal communities in all the *talukas*.

- Social structure of the ST households in Chhota Udepur district are much influenced by the inter- and intra-district mobility.
- Overall, female literacy rate and female work participation rate are increasing but the rate of increase is not at par with each other. Female literacy rate is increasing faster than female work participation rate.
- Periodic migration sways tribal livelihood from vicinity of the forest to urban areas.
- Chi-square test shows that there is a strong relation between *taluka*-wise increase or decrease of percentage share of households with increase or decrease of land holding size.
- Lorenz curve established that there is an inequality in the expenditure on farm inputs and this inequality widens for Chhota Udepur, Kavant and Jetpur Pavi *talukas*.
- Null hypothesis has been accepted for *taluka*-wise increase or decrease in the percentage share of households with increase or decrease of land holding size.

Gap is observed between programme implementation and execution in the study area. Considering different government schemes designed for the growth and enhancement of tribal livelihood, the advantages and facilities have remained on paper only. Traditional intermediaries are still taking advantage of farmers' ignorance in the sphere of hiring and purchasing agricultural products.

**Chapter seven** deals with the observed gaps in the facilities offered and the benefits appropriated by the tribal population.

### **Findings:**

- There is a need to look into issues regarding land alienation of tribals by the State or local administration for developmental purposes.
- The developmental projects or infrastructural schemes specifically related to forestry must be executed with sustainable perspectives.

- Vulnerable areas, especially eastern hilly region and the river basins of the Narmada and the Orsang Rivers must be identified, demarcated and managed to assure sustainable implementation development projects.
- Seasonal migration of farmers affects farming with regards to yield and economic development. In the long run, unsustainable crop production and farming methods can lead to disastrous consequences.
- Direct Benefit Transfer and Agriculture Produce Market Committee are two necessary initiatives taken by the State government. However, there should be a check or control over intermediaries who control and manipulate the circumstances in their own favour at the cost of the tribal farmers.
- The need of hour is to increase awareness on seed replacement, creation of markets for small land holders and, selection of crops and crop combinations which can fetch more returns.
- Proper planning, taking into account the spatial and temporal changes of agriculture in the country and the state of Gujarat specifically, should be a component of the future possibilities of tribal farming in the District.

The **eighth chapter** summarizes mainly with the note of conclusions and suggestions. The researcher considers the present work as a humble attempt to unravel some of the finer nuances of agriculture in the tribal areas of Gujarat in particular and of the country in general. There are many other significant research arenas with regard to agriculture in the otherwise agriculturally unsuitable areas of Gujarat and the country as a whole, which await serious research investigation. The study has reached the following conclusion in the final analysis.

### **Findings:**

- The subject pertaining to the development process in tribal areas as a whole always went through struggle from ages. The development processes in the study area for Scheduled Tribes, cannot be concluded without analyzing and reviewing a reference to their socio-economic characteristics, access to land use and land use changes, temporal modifications in work participation, policies for development and alternative avenues of employment for livelihood.

- The tribal belt of Gujarat corresponds broadly with the eastern hilly region. At the secondary level, the Twelve Integrated Tribal Development Project (ITDP) districts and at primary level, the six tribal *talukas* of Vadodara/Chhota Udepur district have been considered for the research.
- Within the District, there are three different natural regions namely **Vindhyan Hill ranges, Orsang-Heran Plains and Narmada Gorge region**. Each region has its individual characteristics and issues.
- Accessing available natural resources and adjusting or managing the changes in land use pattern are analyzed through net sown area, gross cropped area, unavailability of irrigated water and resultant cropping intensities.
- The study finds that land cultivated for pulses, vegetables and oilseeds have not increased much in areas under ST. Perhaps this is due to the shift in the occupation of tribal people from primary, farm occupation to non-farm activities.
- Fragmented land holdings and rain fed farming do not allow tribal farmers to produce sufficient crops to gain a major position in the State.
- Seasonal out migrants from the District in search of remunerative avenues in the neighbouring districts and urban centers may struggle for livelihood. As there is not much increase in GCA, profit from the agricultural produce perhaps is not enough to roll the capital-intensive inputs. For survival, tribal farmers had to move on as migrants.
- Less opportunities as main workers could eventually reduce the income of tribal farmers and increase the dependence on out-migration.
- Primarily due to yield stagnation and irrigation problems, the agricultural system has reached a plateau and there is a decreasing trend in the number of both male and female cultivators.
- The particular situation of tribal women workforce in the entire District reveals the trend of an increasing number of tribal women engaged as in marginal farm labourers rather than as main cultivators.

- For restoring their authentic habitat in and around forest and natural regions and to make them more involved in farming with traditional wisdom, central and state governments have come up with many development projects.
- But the problem lies with the ignorance of the correct information regarding these plans and policies among the tribal farmers.

#### **1.10 Expected Outcome of the Study:**

1. Findings of the study may prove useful in formulation of policies related to tribal area development. This study stresses on those suggestions which can cover up the gaps between policy formulation and policy accomplishment.
2. The desired progress in agriculture in the tribal areas of Gujarat can be achieved by adopting effective planning measures capable of annihilating the difficulties pertaining to both land and labour. The study is expected to suggest appropriate alternative economic avenues in the agriculturally unsuitable areas for sustainable livelihood based on milieu specific approach.

#### **1.11 Relevance of the Study:**

Geographical research about tribal farming is of utmost importance for regional development. Regional development through all avenues of economic activities is quite desirable. Proper appraisal of agriculture in the tribal areas could be useful to understand the impediment in supporting the economy. Geographical perspective in addressing the constraints of farming in the tribal areas could be valid. Assessment of each parameter spatially and temporarily would be more helpful for proper judgement of feeling the gap and taking righteous solutions. From the review of literature, it is well explained that the relationship between the immediate environment and the tribals living in that particular area are following a dynamic change and geographers who can follow that trend perhaps could highlight a few crucial points. Moreover, matters related to changing infrastructure and privileges for the tribal peasants are also an area of examination for the forecasting.

#### **1.12 Limitations of the Study:**

To achieve the objectives of this study, gathering data from both secondary and primary sources posed major hurdles. Specially, secondary data at micro level are generally not available.

To overcome the hurdle, the researcher had to depend on predicted data. During the primary investigation, tribal farmers were less responsive due to lack of understanding and sometimes not able to provide estimates of farm inputs. Periodic migration and consequential detachment from the farming processes have adversely affected the understanding of the tribal farmers regarding the latter. They are not able to recapitulate what number of inputs they have used in the rainy season at the end of the year. With great difficulty and persuasions, the researcher could generate relevant primary information during the field survey.