

# Chapter 1

## Introduction to Agro-Economics and Food Security

### Introduction

Agricultural economics, as its title implies is that branch of knowledge which takes into account agriculture and economics together. The study of agricultural economics is of recent origin. Agricultural economics has been written about and many important problems of the agricultural economies have been given considerable thought and solved through organized efforts, but not enough literature exists on many aspects of agricultural economics as a separate discipline. After the economic depression of 1890's some renowned economists like Henry Moore (1911) of the Columbia University and Henry Schultz (1927) of Chicago University had been able to devote attention to make important contribution to agricultural economics by applying quantitative methods. Black brought out a major work in 1926 on production economics in agriculture (Lekhi and Singh, 2001). Similarly, Taylor (1945) has done more than any other writers to shape the development of agricultural economics during the past quarter century. During the last twenty years, agricultural economists have made significant contribution in the analysis of economic development.

### The Conceptual Framework of Agro-Economics and Food Security

Agricultural economics, in simple words, can be defined as an applied phase of economics. In it, attention is given towards all aspects of problems related to agriculture. It helps the farmers to decide what kind of crops and livestock they should raise to maximize their profits. In this form, it is a social science associated with the allocation of scarce farm resources (Lekhi and Singh, 2001:1/5). According to Prof. Goodwin (2004:11), "Agricultural Economics as a social science is concerned with human behaviour during the process of producing, processing, distributing and consuming the products on farms and ranches".

According to Prof. N. Jouzier (quoted from Chauhan 1953:1), "Agricultural Economics is that branch of agricultural science which treats the manner of regulating the relations of different elements comprising the resources of the farmer, whether it is the relations of each other or to human beings in order to secure the greatest degree of prosperity to the enterprise".

Likewise Taylor defines (quoted from Chauhan 1953:2), "Agricultural Economics treats the selection of land, labour and equipments for a farm, the choice of crops to be grown, the

selection of livestock enterprises to be carried on and the whole question of the proportions which all these agencies should be combined”. Prof. Hibbard (quoted from Chauhan1953:4) defines Agricultural economics as “the study of relationships arising from the wealth-getting and wealth-using activity of man in agriculture”. Further, Prof. Gray has defined it as (quoted from Chauhan1953:4) the science in which the principles and methods of economics are applied to the special conditions of agricultural industry”.

Agricultural economics, in addition to general economics and agriculture, covers a variety of fields such as history, geography, mathematics, statistics, sociology, political science etc. These are characterized by the relationship arising amongst them on account of agriculture being followed as a vocation and a way of life. It is with these relationships that the agricultural economists deal. These relations include: i) Relations between different enterprises indicating the choice of farming as an occupation and the relationship between the different branches of farming, a choice between cultivation of crops or animal husbandry, or even between various crops, ii) Problem of selecting a good combination of various factors of production; for example labour vs. capital, iii) Relations of value of different factors of production and the final product, i.e. cost-benefit relationship or the factors of production and price relationship, iv) Commercial relations between farmers and the rest of the economy and even with the outside world, for example, terms of trade, international prices advantages.

The food and fibre system is related to almost every facet of our economy and our environment. As a result, the study of agricultural economics necessarily encompasses a great deal more than just the activities of the farmer. Since the food and fibre system is an important part of our natural environment, some agricultural economists deal with issues of resource conservation, pollution control and water management (Drummond and Goodwin, 2004).

Agricultural economics is the most important part of economics of the primary sector. Earlier, agricultural economics was mainly “descriptive” in nature giving statistics of the agricultural outputs, or about the inputs used or share of different regions etc. “Analytical” part was almost missing. Now this is rigorous theory and highly developed statistical tool of analysis of the performance of the agricultural sector, inter-regional differences, or of the production functions of various crops.

Demographic explosion in recent years has brought tremendous strain on agriculture. Now the question is not merely of “high rate of growth and higher levels of development” but of food self-sufficiency first.

When the subject of study is the individual farm or the farmer, it is termed as micro analysis but when it studies agricultural economy as a whole, it is called as macro – analysis. Agricultural economics has both of them. The farmer deals with the economics of the family

farm unit from the standpoint of its internal operations. This involves a study of budgets; inputs- output ratios, prices and costs faced by the family farm unit.

Further, Jouzier has aptly remarked that the domain of Agricultural Economics covers the examination of each element of production, whether in connection with anyone of the above named relationships in particular or with several of them together, to obtain the greatest net profit. Jouzier looks upon Agricultural Economics as:

- i.) the science which deals with the principles underlying the co-ordination of all the factors in such a way that farmer may be able to get the maximum net profits,
- ii.) the science which deals with the art how to apply these principles on a given farm.

Similarly, the scope of Agricultural Economics in the words of Taylor, “agricultural economics deals with the principles which underline the farmers’ problem of what to produce and how to produce it , what to sell and how to sell it in order to secure the largest net profit for himself consistent with the best interest of society as a whole. More specifically, it treats the selection of land, labour and equipment for a farm, the choice of crops to be grown, the selection of livestock, enterprises to be carried on and the whole question of the proportions in which all these agencies should be combined. These questions are treated primarily from the point of costs and prices”. No doubt Taylor deals with the subject in broader perspective still the whole treatment rests only on the problem of production. But we do not conclude that agricultural economics has nothing to do with the problems of distribution and consumption of farm products. Consumption, processing and distribution economics is an important for farm people as it is for them to understand the economics of their farm production. They are, therefore, part and parcel of the economics of agriculture (Lekhi and Singh, 2001: 1/9).

Agricultural economics is a social science which teaches us how to maximize production, yields outputs and returns from agricultural activities. It studies the principles and analytical methods of economics to seek solutions to the economic problems in agriculture. It teaches us to improve technical production function as well as the economic (marketing) production function and improving the terms of trade, employment intensity and income propagation from the agricultural activities. In a limited way it also teaches how to optimize the inter-face with other sectors, sub-sectors, activities and functions. It is the economics which helps us increasing economics returns per unit of land, per person, per package of inputs and per unit of capital. It is economics of warding off hunger as also making agriculture a tool of further economic development.

Agricultural economics shall study how inputs for farm products are produced and procured, part of the inputs come from the industrial sector but actually their planning can legitimately be regarded part of agricultural economics. The farm management and production economics, farm output-processing, transportation, storage, retailing and services can also be included

within the scope of agricultural economics with reference to border prices, which cover these all. Goodwin and Drummond have made an interesting observation.

“Agricultural economics is quite obviously what agricultural economists do. It studies the entire food and fibre production to consumption system” (Shrivastava, 1996: 7).

### **Agricultural Economics – Applied Science or Pure Science**

There exists a hot controversy over the issue whether agriculture is an applied science or a pure science. Some agricultural economists consider agriculture as an applied science. Froster and Leoger (Lekhi and Singh, 2001:1/6&7) opined that “agricultural economics is an applied science as it is concerned with the identification, description and classification of economic problems of agriculture to the end that these problems may be solved”. Prof, Ashby while favouring this argument remarked, “agricultural economics is a methodological pursuit of knowledge of economic process and organization in agriculture and of their results, for the purpose of stabilizing, adopting or modifying them and if and when necessary, of changing their results”. According to Snodgrass and Wallance, “Agricultural Economics is an applied phase of social science of economics in which attention is given to all aspects of problems related to agriculture” (Lekhi and Singh, 2001:1/7).

Prof. Gray (Lekhi and Singh, 2001:1/7) in his ‘Introduction to Agricultural Economics’ treats it as a branch of the general subject of economics. In this sense, agricultural economics is only one of the many branches of applied economics, such as, labour economics, public economics, monetary economics, household of economics etc. Thus, agricultural economics is merely a phase or field of an immense field called economics in which primary attention is paid to the analysis of the economic problems associated with agriculture.

Thus, from the above quoted studies, it may be said that Agricultural economics as an applied science is concerned with economic problems that are associated with farmer’s effort to make a living. Their problems are varied in character but can be grouped into three categories, namely:

i) production, ii) marketing and iii) financing. Moreover, as an applied science, agricultural economists have to formulate the methods, techniques and procedures through which the problems relating to agriculture may be resolved (Lekhi and Singh, 2001: 1/7).

### **Agricultural Economics – Science or an Art**

Agriculture is the science and an art of cultivation of crops and the raising of livestock and is not only a mode of livelihood but also a way of life. In such an organization, the farmer is called upon to make innumerable choices and decisions involving economic considerations. Agriculture, in general is governed by a number of considerations, physical and biological which are treated by their respective specialist. However, the information so obtained has to be translated into economic terms. For example, the knowledge of agricultural chemistry helps the farmer to know how fertilizers can increase his crop production. On the economic side, it will be necessary to determine whether the value of the additional crop will be more than enough to cover extra costs due to the application of fertilizers. The above analysis elaborates that as a science; it explains the cause and effect relationship between various economic variables operating in agriculture. The relationship which exists in these variables can be used to solve the problems that affect agriculture in one way or the other. In the same way, Agricultural Economics is also an art (Lekhi and Singh, 2001).

### **Food**

Food is the prime ingredient of human life. The food which one eats is helped for digestion and assimilating in the body and used for its maintenance and growth. Food also provides energy in the body for doing work. Man has expressed much thought and foresight in cultivating varieties of grains, fruits, vegetables, nuts and oil seeds and in rearing birds and animals for use as food. The selection of foods best suited for promoting good health has been found out by trial and error by continued use. Use of milk of different mammals as sources of food for infants has been practiced from very early times.

Since foods contain various wide nutrients, they have been broadly grouped under three heads from the untraditional point of views:-

- 1) Energy yielding foods.
- 2) Body building foods, and
- 3) Protective foods (Swaminathan, 1990).

Similarly, food is essential for human existence just like the air we breathe or the water we drink. The food that we eat is utilized in the body and the assimilated substances are used for the growth and maintenance of tissues. A living organism is the product of nutrition. The human being requires more than 45 different nutrients for its well being. Food materials ingested by the body are digested, absorbed and metabolized. Useful chemical substances derived from food by the body are called nutrients. A number of foodstuffs have to be selected to get all the nutrients. The health of a person depends on the type and quantity of food stuff he chooses to make his diet. For sustaining healthy and vigorous life, diet should be planned according to the principle of nutrition. Extensive research works carried out on human beings and an experiment on animal throughout the world has provided us with sufficient knowledge

on nutrition and health. World Health Organization defines health as “The state of complete physical, mental and social well being and not merely the absence of disease - infirmity” (Begum, 1991, 3). A World Bank study of the relation between poverty and hunger quoted an edict by the Emperor When in 113 BC: why is the food of the people so scare? Where does the blame lie? The deficiency is even more remarkable today, because in many countries and in the world as a whole food supplies are believed to be adequate. Yen World Bank study concluded. : The often predicted Malthusian nightmare of population out stripping food production has never materialized. Instead the world faces narrower problems; many people do not have enough to eat despite there being food enough for all. This is not a failure of food production, still less of agricultural technology. It is a failure to provide all people with the opportunity to secure enough food something that is very hard to do in low income countries”. Although one world questions the statement that production growth has never out stripped food production, it is an assessment of the position in many countries today ([www.Unsystem.org](http://www.Unsystem.org)).

Moreover, food is the most basic of human needs and is central to the discussion of human rights and social development. Ensuring food security ought to be an issue of great importance for a country like India where more than one-third of the population is estimated to be absolutely poor and one-half of all children malnourished in one way or another. Food security has been promoted by the United Nations Development Programme (UNDP) and analysts of hunger and famine as the most basic human need and as a central indicator of absolute poverty and physical well-being (Sen and Sengugta 1983). Food Security refers not only to an adequate aggregate supply of food, but also means that “all people at all times have both physical and economic access to sufficient food to meet their dietary needs for a productive and healthy life” (FAO). In this sense, food security is a broad concept and implies not only producing sufficient food, but also making food accessible to the entire population throughout the year on a sustainable basis. Food security also connotes freedom from famine and chronic malnutrition and this requires provision of the means whereby all individuals or families can adequately meet their nutritional needs on a daily and annual basis. Food security is a right of every citizen and not merely an aspiration. The ultimate objective of food security, therefore, is to guarantee food to every citizen irrespective of his or her ability to pay. Provision of food security is essential for maintaining peace and social harmony in a country ([www.journalijdr.com](http://www.journalijdr.com)).

However, Article 21 included in the chapter on Fundamental Rights Article 21 of the constitution entitled ‘protection of life and personal liberty’ Says, ‘No person shall be deprived of his life or personal liberty except according to procedure established by law’. Over the years a series of judicial interventions and interpretations have expanded the frontiers of this right to include several other social-economic rights, including the right to food, right to housing and right to work. The interpretation is that the right to life implies life with dignity

and the complementary rights that are mandatory for the realization of this right are also by implication fundamental rights. Since life is biologically impossible without regular nutrition the right to food has been widely recognized by implication as a fundamental right (Saxena, et.al, 2008).

### ***Right to Food***

A world without hunger is one in which adequate food is a human right, like air to breath or water to drink. The minimum expectation for any who live in any country, upheld and enforced by all, for all. As utopian as this may sound there are continuing trends in this direction. The elements for an international recognition of a human right to food co-exist today in the form of the 1948 Universal Declaration of Human Rights, the 1966 International Covenants on Economic, Social and Cultural Rights and for armed conflict in the 1977 protocols to the Geneva conventions assistance in case of widespread disasters that are caused by natural or technological hazards or war. This has been further extended, albeit not always implement to civilians in zones of armed conflict, even when such conflicts are within national borders or are condoned or encouraged by national governments, as in Bosnia, Northern Iraq, Sudan and Somalia. There is growing agreement that no nation, governmental authority or faction has right to store its own or neighboring people ([www.gcrio.org](http://www.gcrio.org)).

### ***Food Security as Right***

Gradually a consensus is building all over the world that food security should be a Right of a citizen in every civilized society. The consensus is moving towards ensuring human security for which food security is an important component. As it is, most of the countries in the region have made commitments to ensure food security at various forums. Yet these are distinct advantages in enshrining it as a Right. Acceptance of food security as a right will make efforts of the states obligatory, transparent and judiciable. In place of an ad-hoc measures it will force the states to evolve a consistent and long policy, measures such as availability of foods, access to food at all times of the year and entitlement to food by raising incomes, will become essential parts of development policies. Even the household of the old and infirm and otherwise incapacitated persons will be able to secure essential food for a 'healthy and productive life'. Food security as a matter of right will impart the necessary 'human face' to development in the poor developing countries. As the discussion in the country studies have suggested either in financial or in administrative terms this goal is unreachable. It will require more imaginative mobilization of resources and more focused attentions by the institutions of state ([www.visitsikkim.com](http://www.visitsikkim.com)).

## **Food Security**

The concept of Food security originated only in the mid-1970s, in the discussions of international food problems at a time of global food crisis. The initial focus of attention was primarily on food supply problems - of assuring the availability and to some degree the price stability of basic foodstuffs at the international and national level ([www.fao.org](http://www.fao.org)).

The initial concept focus, reflecting the global concerns of 1974, was on the volume and stability of food supplies. Food security was defined in the 1974 World Food Summit as: *“availability at all times of adequate world food supplies of basic foodstuffs to sustain a steady expansion of food consumption and to offset fluctuations in production and prices”*.

In 1983, FAO expanded its concepts to include securing access by vulnerable people to available supplies, implying that attention should be balanced between the demand and supply side of the food security equation *“ensuring that all people at all times have both physical and economic access to the basic food that they need”*.

In 1986, the highly influential World Bank report “Poverty and Hunger” focused on the temporal dynamics of food insecurity. It introduced the widely accepted distinction between chronic food insecurity, associated with problems of continuing or structural poverty and low incomes, and transitory food insecurity, which involved periods of intensified pressure caused by natural disasters, economic collapse or conflict. This concept of food security is further elaborated in terms of *“access of all people at all times to enough food for an active, healthy life”*. In other words, food security implies “access by all people at all times to enough food for an active, healthy and enjoyable life.

By the mid-1990s food security was recognized as a significant concern, spanning a spectrum from the individual to the global level. However, access now involved sufficient food, indicating continuing concern with protein-energy malnutrition. But the definition was broadened to incorporate food safety and also nutritional balance, reflecting concerns about food composition and minor nutrient requirement for an active and healthy life. Food preferences, socially or culturally determined, now became a consideration.

The 1994 UNDP Human Development Report promoted the construct of human security, including a number of component aspects, of which food security was only one. This concept is closely related to the human rights perspective on development that has, in turn, influenced discussions about food security.

The 1996 World Food Summit adopted a still more complex definition:

*“Food security, at the individual, household, national, regional, and global levels (is achieved) when all people, at all times, have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life”.*

This definition is again refined in The State of Food Insecurity 2001:

*“Food security (is) a situation that exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life”.*

This new emphasis on consumption, the demand side and the issues of access by vulnerable people to food, is most closely identified with the seminal study by Amartya Sen. Eschewing the use of the concept of food security, he focuses on the entitlements of individuals and households ([www.fao.org](http://www.fao.org)).

Food Security is an important component of human welfare and considered the most important basic requirement of human resource development. Food security as a goal sets before itself, the norms in regards to the availability of food, firstly, this should ensure basic existence of people and at the next level, it should serve the minimum nutritional standards for their active and healthy life. Food and nutrition security are the basic requirements for human life. It plays a vital role in livelihood security in terms of capabilities, assets and activities required for living (Radha, 2009).

Food security exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food which meets their dietary needs and food preferences for an active and healthy life. Household food security is the application of this concept to the family level, with individuals within households as the focus of concern ([www.fao.org](http://www.fao.org)).

In recent decades, demographic and economic growth have challenged the limits of economic, social and ecological sustainability, giving rise to questions about food security at a global level. Despite technological advances that have modernized the conditions of production and distribution of food, hunger and malnutrition still threaten the health and well being of millions of people around the world.

Access to food is still perceived by many as a privilege rather than a basic human right and it is estimated that about 35,000 people around the world die each day from hunger. An even larger number of people (mainly women, children and the elderly), suffer from malnutrition. Far from disappearing, hunger and malnutrition are on the increase; even in advanced industrialized countries like Canada, each year an estimated 2.5 million people depend on food

banks. About 30 million people in the United States are reported to be unable to buy enough food to maintain good health. The continuing reality of hunger and the unsustainability of current practices, both locally and globally, make food security an essential concern.

According to the United Nations' and Agricultural Organization's (FAO's) widely accepted definition, food security means that food is available at all times; that all persons have means of access to it; that it is nutritionally adequate in terms of quantity, quality and variety and that it is acceptable within the given culture. Only when all these conditions are in place can a population be considered "Food Secure". In recent years, most of the research initiatives for food security have focused on four key components of the FAO's definition:

*Availability:* Providing sufficient supply of food for all people at all times has historically been a major challenge. Although technical and scientific innovations have made important contributions focused on quantity and economics of scale, little attention has been paid to the sustainability of such practices.

*Accessibility:* The equality of access to food is a dimension of food security. Within and between societies, inequities have resulted in serious entitlement problems, reflecting class, gender, ethnic, racial and age differentials as well as national and regional gaps in development. Most measures to provide emergency food aid have attempted to help disadvantaged but have had limited success in overcoming the structural conditions that perpetuate such inequities.

*Acceptability:* As essential ingredients in human health and well being, food and food practices reflect the social and cultural diversity of humanity. Efforts to provide food without paying attention to the symbolic role of food in people's lives have failed to solve security problems. This dimension of food security is also important in determining whether information and food system innovations will be accepted in a country, given the social and ecological covers of its citizens.

*Adequacy:* Food security also requires that adequate measures are in place at all levels of the food system to guarantee the sustainability of production, distribution, consumption and waste management. A sustainable food system should help to satisfy basic human needs, without compromising the ability of future generations to meet their needs; it must therefore maintain ecological integrity and integrate conservation and development ([http\\www.idrc.ca](http://www.idrc.ca)).

The concept of food security in its wider attention comprises of four elements:

- 1) Availability of food,
- 2) Household's entitlement to food,
- 3) Stability in the supply of food throughout the year, and

4) Protection against malnutrition  
(Dev, Kannan and Ramchandran, 2003).

“Food Security has three components”, writes Prof. M.S. Swaminathan. “The first is food availability, which depends on food production and imports. The second is food access, which depends on purchasing power. The third, food absorption, is a function of safe drinking water, environment hygiene, primary health care and education” (Current Science, 25<sup>th</sup> Oct.2001).

Ensuring food security continues to be an issue of vital importance for the developing countries. The concept of food security has undergone considerable change in the recent years. A broadly accepted definition of food security now goes beyond adequate availability of food. It includes “access to adequate food to all people at all times for an active and healthy life”. The aim is not merely to supply adequate quantities of food but to create conditions in which people are capable of feeding themselves self-reliantly with healthy and culturally acceptable food stuff (Vyas, 2005).

“Food security” states the Rome Declaration on World Food Security at the World Summit held in 1996 “exists when all people, at all times, have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life” (Srivastava, Nisha 2003). Economists talk about two types of food insecurity, namely, chronic food insecurity and transitory food insecurity. The latter is caused by fluctuations in agricultural output, which are mainly due to uncertain weather conditions. Given the fact that a large fraction of arable area lacks adequate and assured irrigation facilities, it has to depend on the monsoon. A backward area is characterized by low and wide fluctuations in output, widespread poverty, unemployment and limited opportunities for income generation. In view of these constraints, provision of food security to the poor is crucial for households located in such an area. In the absence of adequate income to buy basic food items from the market, these households would either have to consume less or borrow. In a broad sense, therefore, food security would be essential not only in terms of providing adequate food at a reasonable or low price but also generating enough income either through self-employment in own activities and wage employment provided by the private or state-sponsored programmers (Sarap and Mhamallik, 2003).

Human Development Report is one of the significant reports which emphasizes on Human Security and how it varies from country to country (UNDP, 1994). Actually, human security stands for basic needs like adequate amount of food, health and eradication of poverty. However, one common factor that binds these issues is the central focus upon human being. It identifies seven categories for ensuring human security in the form of Economic Security, Environmental Security, Food Security, Political Security, Community Security, Personal Security and Cultural Security. In order to achieve food security in the new millennium

coordination and cooperation among International organizations, countries (develop, developing and underdeveloped), NGOs /Civil Societies (Self Help Groups), Individuals especially focusing on women were found to be inevitable. Thus inclusion of women, traditional agricultural practices at International forum was the major focus. “Food security is the people’s right to define their own policies and strategies for the sustainable production, distribution and consumption of food that guarantees the right to food for the entire population, on the basis of small and medium–sized production, respecting their own cultures and the diversity of peasant, fishing and indigenous forms of agricultural production, marketing and management of rural areas, in which women play a fundamental role” (*Final Declaration of World Forum on Food Sovereignty*, 2001) (14.139.206.50>jspui>handle).

The Atlas of the Sustainability of Food Security in India proposes a “Sustainable Food Security Compact”, a nine-point action plan for every state and union territory. The action refers to stabilizing population, conserving and enhancing land resources, ensuring water security, conserving and restoring forests with community participation, strengthening biodiversity, improving the atmosphere, managing common property resources, intensifying crop and animal production in a sustainable way and forming a coalition for sustainable food security across different states in the country, across different size classes of towns in the states and within different types of towns. Millions of people in India suffer from chronic poverty and inequality leading to deprivation in availing proper nutritious food and moreover an absence in systematic distribution of Central and State schemes worsen the situation. One of the major concerns for this region has been its growing population where issues like food insecurity are proving to be one of the upcoming challenges. The present functioning of Public Distribution System has left large dents in the form of irregularities, errors of Inclusion and Exclusion, leakages etc. These further affect the people at the grass roots level the most. These loopholes raise strong questions on the policies of the government framed by the Central Government and its execution by the various State Governments. About 1.75 billion people across 160 countries suffer from deprivation like health, education and average standard of living which are the three dimensions of Multidimensional Poverty Index (HDR, 2010). There are 920 million people living under 1.25 dollar per day (World Bank, 2008) and estimated 925 million people suffering from chronic hunger (MDR, 2010). Developing countries account for 98 percent of the world’s undernourished people. Two-thirds live in just seven countries (Bangladesh, China, The Democratic Republic of the Congo, Ethiopia, India, Indonesia and Pakistan) and over 40 percent live in China and India alone (FAO, 2010). Nearly half of the world population belonging to undernourished children under age five belongs to South Asia (MDR, 2010).

According to Prof. Lama “elements like availability, accessibility, affordability and acceptability in a sustained manner are underlying factors in ensuring food security to the

common people in general and poor people in particular which also shows a balancing act between supply and demand sides.(Lama, 2010). India ranks 67<sup>th</sup> among 81 countries in Food Security one of the major challenges for a food self sufficient state (GHI 2011, ranks 122<sup>nd</sup> among 138 countries in Gender Inequality Index (HDR, 2010) equality of women plays an important role in minimizing food insecurity, ranks 66<sup>th</sup> among 83 countries in ‘alarming hunger’ and it accounts for 40 percent of total malnourished children in the world (IFPRI, 2008) which shows serious limitations in balancing act. In India, states like Bihar, Madhya Pradesh, Rajasthan, Jharkhand, Orissa, Karnataka, Uttar Pradesh, West Bengal and Chhattisgarh are most affected by poverty, hunger, malnutrition and unemployment, primarily due to corruption and lack of effective governance (14.139.206.50>jspui>handle).

The concept of food security has undergone considerable change in recent years. The first Development Goal seeks to eradicate extreme poverty and hunger. It aims to halve, between 1990 and 2015, the proportion of people –

- i) whose income is less than US\$ 1 a day, and
- ii) who suffers from hunger.

Until the seventies, the concept of food security focused mainly on availability and stability of food. A broadly accepted definition of food security now goes beyond adequate availability of food. It includes ‘access to adequate food to all people at all times for an active and healthy life’. The aim is not merely to supply adequate quantities of food but to create conditions in which people are capable of feeding themselves self reliantly with healthy and culturally acceptable foodstuff - a state of ‘nutritional sovereignty’ (Sagar, 2005).

The concept of food security has evolved significantly over time. The definition of food security adopted at the 1996 World Food Summit held in Rome was as follows:

“Food Security exists when all people, at all times, have physical and economic access to sufficient safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life”.

This definition introduces four main *dimensions* of food security:

- Physical *Availability* of food
- Economic and physical *Access* to food
- Food *Utilization*
- *Stability* of the other three dimensions over time.

*Food availability* addresses the “supply side” of food security and is determined by the level of food production, stock levels and net trade.

From the early 1980s the importance of *food access* was increasingly recognized as a key determinant of food security. Hence, food production is just one of several means that people have to acquire the food that they need.

Food can be accessed through trade, barter, collection of wild foods and community support networks; it can also be received as gift. Actually access to food is influenced by market factors and the price of food as well as an individual's purchasing power, which is related to employment and livelihood opportunities.

The *food utilization* has become increasingly prominent in food security discussions since the 1990s. Utilization is commonly understood as the way the body makes the most of various nutrients in the food. This food security dimension is determined primarily by people's health status.

General hygiene and sanitation, water quality, health care practices and food safety and quality are determinants of good food utilization by the body. Sufficient energy and nutrient intake by individuals is the result of good care and feeding practices, food preparation, diversity of the diet and intra-household distribution of food. Combined with good biological utilization of food consumed, this determines the nutritional status of individuals.

Food security was traditionally perceived as consuming sufficient protein and energy (*food quantity*). The importance of micro-nutrient diet (*food quality*) is now well appreciated.

The phrase "all people, at all times" is integral to the definition of food security, and is key to achieving national food security objectives.

*All people* - Different people are food secure to varying degrees and will be affected by adverse events differently. There must be assessing variations in food security status between different groups of people. Most commonly, humanitarian and development agencies differentiate between groups according to their main livelihood (source of food or income), in addition to other factors such as geographical location and wealth.

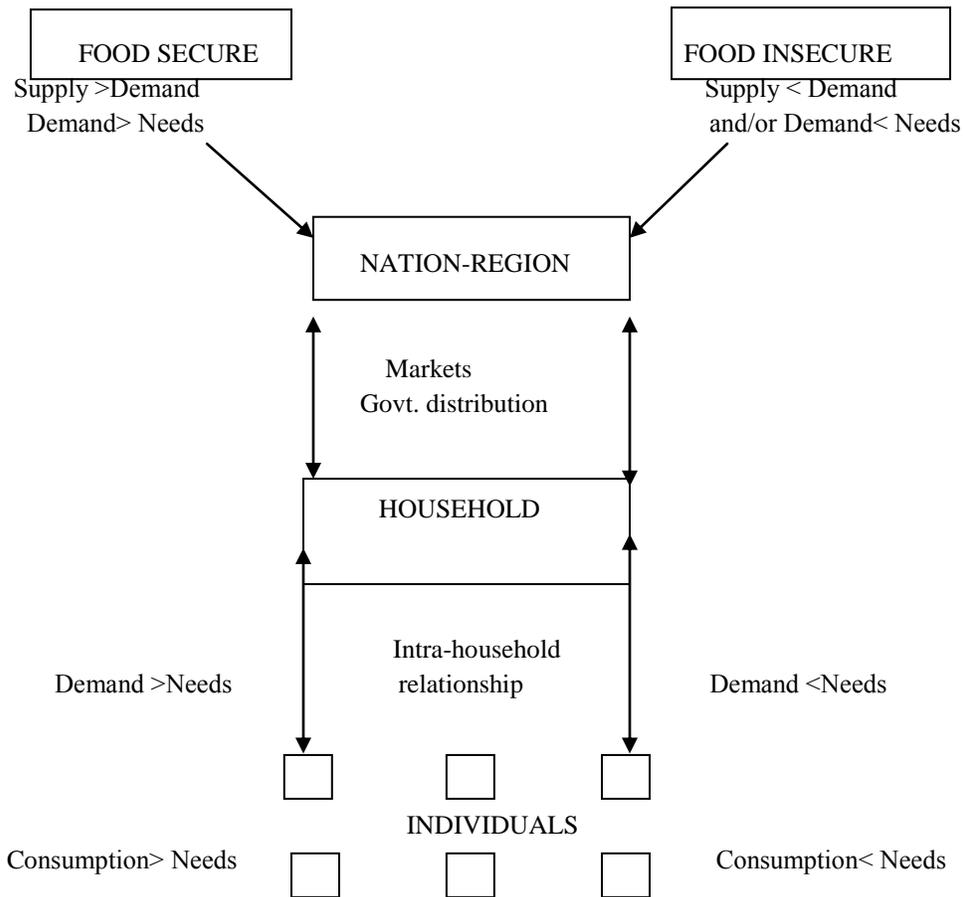
*All times* - This recognizes that people's food security situation may change. Even sometimes questions may arise;

- Your food intake is adequate today?
- Are you still considered to be food insecure?
- Have you inadequate access to food on a periodic basis?

Adverse weather conditions (drought, floods), political instability (social unrest), or economic factors (unemployment, rising food prices) may impact on food security status.



**Figure 1.2:** Schematic representation of Different Levels of Food Security



Source: [www.fao.org](http://www.fao.org)

With somewhat satisfactory levels of national food security influenced by the production performance of Indian agriculture during the past decades, attention has been shifted from national food security concerns to individual and household food security while household is influenced by both physical access and economic access, food security of individual members of the household is influenced by intra-household allocation of food. Food security of the people will be ensured not only by the increased food production at the national level but also from the increased economic access through increased income levels or from reduced prices. Economic access to food for the poor could be achieved through a mix of employment and income policies for the farm and nonfarm sectors and through a minimum safety net ([shodhganga.inflibnet.ac.in](http://shodhganga.inflibnet.ac.in)).

## **Review of Literature**

### **Literature on Agro-economics**

*Drummond and Goodwin (2004)* express their views regarding the agriculture economics. Agricultural Economics deals with decision making within the unique context of the broadly defined food and fiber sector. This book takes a thorough look at agricultural economics from a broad prospective that emphasizes the linkages between and among financial institutions, the macro economy, world markets, government programmes, farms, agribusinesses, food marketing, farm services and the environment. In the chapter of introduction to agricultural economics they stress that the agricultural economics is that part of economics that surveys agriculture in its many fields and farms. The agricultural economics is concerned with the entire food and fiber system, from the inputs used in production all the way through the production, processing, distribution and consumption chain. Further they say that the food and fiber system is related to almost every facet of our economy and our environment.

*Gallup, John Luke, Jeffrey Sachs and Andrew D. Mellinger (1998)* in their paper “Geography and Economic Growth” argue that too little account is taken of basic elements of geography as important determinants of economic growth. Their econometric model suggests areas of complex relationship between geography and economic growth, policy choices and institutions. Their paper finds that location and climate have large effects on income levels and income growth through effects on transport costs, disease burdens and agricultural productivity. There is a disjunction between areas of high economic growth and areas of high population density and high population growth – especially when these latter are far from coastlines or navigable rivers. Much of the population growth projected for the next 30 years will likely occur in these geographically disadvantaged regions. The paper starts from comparative income data suggesting that 1992 Africa per capita income is approximately on par with average per capita GDP in the Europe of 1820.

*Handbook of Agriculture (1987)*: The handbook of agriculture comprises of authentic information on various aspects of agriculture. It covers fields as well as agricultural legislation and control of pests and diseases. Further, it presents a full panorama of Indian agriculture.

*Jhingan (2003) and Dhar (2005)* have conducted a study on different perspectives on role of agriculture in economic development and they sorted out some points:

- i) providing more food to the rapidly increasing population and it becomes source of livelihood;
- ii) role of agriculture for industrial development,
- iii) source of government revenue,
- iv) providing productive employment, and

- v) role of agriculture in economic planning etc. It is concluded that agriculture brings sustainable development for the enhancement of economic condition of the society as well as nation.

*Jordan, Chavez-Mejia & Rayes Regee (2001)* have studied the mountains of Central Mexico that have a long and rich history of agricultural development. They further endeavor to show how agriculture is possible in hilly mountain region.

*Lekhi and Singh (2001)* state that after a long spell of backwardness and stagnation, there have been new strides in transforming latest technology, institutional and agrarian reforms in the country. Their book unfolds in a systematic way the basic issues relating to the growth and problems in Indian Agriculture. The book is divided broadly into three units. Unit I deal with the basic concepts of Agricultural Economics, Unit II makes analysis of various Models of Agricultural Development and Unit III has been devoted to the Development Problems of Indian Agriculture.

*Sikor and Truong (2002)* in their article have examined the effects of agricultural policy on land use. They suggested that the landscape in the commune has been highly dynamic and that this dynamism was partly the result of the agricultural policy.

*Som (1988)* observes that India is a country of villages and its economy is primarily based on agriculture. Approximately 80%, through agricultural production lives in rural sectors with different types of cultivation. Since independence Indian planners and policy makers have greatly concentrated their minds on the advanced technological development in agricultural sector with a view to putting India on the same level with the developed countries of the world.

*Srivastava (1996)* outlines a number of perspectives pertaining to agro-economic studies, such as, how unlimited economic goals can be realized with limited financial, physical, real, technological and human resources. He studies how different degrees of scarcities give rise to different prices. This pricing process, studied with reference to commodity and service (factor) pricing, leads to locatives efficiency and everything is to happen within a time horizon. It is a macro science of promoting growth, stability and redistribution – the cardinal principles of all economic policies. The aims are reducing poverty, of making a country strong in economic terms and of maximizing employment generation and income propagation. He further adds that agricultural economics belongs to the “pain economy”. It helps us in warding off hunger and it is to be kept in view that not being in pain is the true pleasure. The author endeavors to show the relationship between land, resources, production and market to sustain the people in the country.

*Tulachen* (2001) has tried to identify the trends for three integral components of mountain farming systems - production of food grains crops, horticultural and cash crops and livestock. In fact, productivity actually increases for some food grain crops leading to increased food grain production in a few mountain areas over the past 10-15 years. The reasons for this could be:

1. Government policies relatively favourable to production of food grains in an attempt to ensure food security,
2. Most of the fertile valley lands with irrigation are under food grain crops, and
3. Development of road infrastructures could be contributing to timely supply of modern inputs, such as fertilizers, improved seeds and pesticides.

### **Literature on Food Security**

*Bouis and Hunt* (1986) have described the food security of several countries in the Asian region, analyzed the causes, discussed about the food security and identity changes in the programme and policy response that are likely to promote food security at all places.

*Dev, Kannan, and Ramachandran*(2003) have noted that India is often cited as a land of paradoxes. This is certainly true when it comes to food security. Despite a decline in poverty, close to 30 percent of its people are food insecure and one-half of its children malnourished in one-way or another. And yet the country has a stock of more than 60 million tons of food grains stored through governments' procurement. Increased foods prices, shrinkage of area under food grains and escalating food subsidies are now the major concerns with regard to food security, rather than freedom from hunger. Food security has a number of dimensions that go beyond supply and demand. Ultimately, the key question is that of the ability to access and effectively utilize food by all people, at all times, to lead a healthy life.

*De Waal, A. and Tumushade, J.* (2003), in their paper "HIV/AIDS and food security in Africa" have addressed two major issues: 1) the impact of HIV/AIDS on agrarian livelihoods and how it can be mitigated and 2) the implications of the HIV/AIDS epidemic and regional food insecurity occurring simultaneously. This paper on AIDS and food security takes a more dire view of the situation than many, calling it the "new variant famine" that must be researched and understood as the basis for policy and practical responses. How and why the HIV/AIDS epidemic is disproportionately affecting agriculture and particularly the small-holder sub-sector is reviewed extensively in terms of the range of negative effects on rural livelihoods, communities, and social services and the failure of coping strategies.

*Diskin, Patrick* (1995) has authored the paper "Understanding linkages among food availability, access, consumption, and nutrition in Africa: Empirical findings and issues from the literature", Office of Sustainable Development, Technical Paper No.11. Diskin, an economist in Michigan State University's Department of Agricultural Economics, argues that

policymakers are constrained in designing effective food security strategies by a lack of reliable and relevant information concerning the causes of food insecurity and their linkages to nutritional status which leads to designing policies. He cites several examples of well meaning, but flawed, policies leading to unintended consequences. His conclusion is that simplistic notions about the food availability – nutrition pathway need to be replaced with appropriately disaggregated empirical information, carefully identifying the nature, extent and causality among food and nutrition security variables to better understand the primary factors limiting food access, consumption and nutrition.

*Duncan, Alex* (1999) studies “The food security challenge for Southern Africa”. The aim of the paper is to consider what governments should be trying to improve food security in Southern Africa and how they should do it. Food security aims and instruments in Southern Africa are considered against a background of changed international and regional circumstances. These include; i) enhanced focus on macro-economic stabilization, ii) a decline in funding for agriculture, iii) a reduction in government involvement in commercial activities, iv) movements toward greater integration in world markets, v) efforts in Southern Africa to move toward greater cooperation and trade in the region. The author suggests the main roles for governments in the region in promoting food security are; i) creating enabling environments for development , ii) correcting for market failure, and iii) targeted measures to achieve social objectives. More specifically in rural areas, governments need to: i) support household strategies aimed at raising and stabilizing incomes through diversification , ii ) intensification of farming , and iii ) support migration.

*FAO* (1995) has brought out “A synthesis report of Africa: Women, agriculture and rural development” that provides both macro and micro-level information of African women and rural development and includes quantitative examples from three countries in the southern Africa region (Namibia, Tanzania and Zimbabwe). Information on gender inequality in power-sharing and decision-making in terms of membership in rural/agricultural organizations, government positions, local power structures and at the farm level is presented. The conclusion, illustrated with examples from nine African countries, is that women’s participation at all levels is limited and they often are not represented for women’s affairs in each country are summarized in a table. Rural poverty, increases in the proportion of women – headed households and the implications for household income and food security are discussed in brief. Inequalities in women’s access to and participation in economic structures and productive processes is reviewed in eight areas; land ownership, access to credit, extension services and agricultural training, the gender composition of extension departments, and the gender composition of extension service clients. Examples illustrate women’s marginalization in these areas, despite their important role in agriculture. The lack of gendered data on the nature and role of women’s contribution to agriculture is discussed, specifically how it has made women “invisible” to agricultural policies and programs.

*Gladwin, C.H., Thomson, A.M., Peterson, J.S., Anderson, A.S.* (2001) have prepared the report “Addressing food security in Africa via multiple livelihood strategies of women farmers”, *Food Policy*, 26, 177-207. The theme of this paper is that insecurity is primarily a problem of low household income and poverty, not just inadequate food production and that intervention to improve food security should aim to increase women’s incomes and help make their livelihoods move sustainable. The assumption that improving food security should be based on helping women farmers in SSA (Sub-Saharan Africa) to grow more subsistence crops is incorrect. Governments and development projects must seek to improve returns to women’s resources in a broader context, including more opportunities for non-farm micro-enterprises, cash cropping and agricultural labour. The link between agricultural production and access to food is strong because agriculture is the basis of most rural households’ economic systems. But rural Africa women have “multiple livelihood strategies” in order to survive and work toward food security, so agriculture may not be the only or the most important source of income. Women work as farmers, petty traders, food processors and informal labour in order to make ends meet. Having multiple economic irons in the fire is necessary in Africa’s problematical economic context, for married women and for women household heads. Development programs must recognize and support women’s diverse economic roles and not just focus on increasing their food production. Several factors must be considered in planning interventions to improve food security by increasing women’s incomes and making their livelihoods more sustainable. A four-pronged sustainable strategy is recommended, 1) encourage women’s income generating activities and multiple livelihood strategies, 2) complement the foregoing with agricultural research programs aimed at increasing women’s returns to their land, 3) recognize that rural women are not homogeneous group and 4) in the short term, provide the poorest women farmers with productivity-enhancing safely nets to address household food consumption deficits.

*Nathan Associates* prepared a report on (Regional Centre for Southern Africa). The report ‘RCSA Food Security Strategic Option’ responds to a scope of work prepared by the Regional Centre for Southern Africa and is based on theoretical perspectives. This report is divided into three sections corresponding to the categories of enquiry suggested in the proposed food security, according to research questions:

Section 1 contains a synopsis of what is written about food and livelihood insecurity in southern Africa. It notes, that more than one-fourth of the total populations of the six countries most affected by the 2001-02 food emergency remain, as of early 2003, in a state of acute food insecurity; that chronic under nutrition in under-fives presently ranges between one-fourth and one-half of all children in that age group; and that more than half of the total population of the region, i.e. more than 50 million people can be numbered among the chronically food insecure poor.

Section 2 looks at what has been done, is being done, and should be done in the future to improve overall household food security in the region. It notes the changing nature of the domains of food security and livelihood security since the mid-1970s. It suggests a growing consensus around the notion that food security requires – at a minimum – a food system operating to create a sense of assurance among the population that access to adequate food for all individuals and households is a continuing likelihood. Food security policy is intended to maintain the conditions underpinning that assurance over time.

Section 3 focuses specifically on what role RCSA could and should play in the agriculture growth-led, livelihoods focused, development strategy suggested. Recognizing that the bulk of the effort will need to be undertaken and accomplished at local, community, and national levels, there are, nonetheless, a number of areas where RCSA, with its regional mandate, can play an important and sometimes critical role.

*Van Rooyen, Johan, and Howard Sigwele (1999)* have authored the article, “Towards regional food security in Southern Africa: a (new) policy framework for the agricultural sector”. The article argues the importance for food security of agricultural development in Southern Africa. Sustained agricultural performance will play a significant role in the improvement of food security and livelihoods in the region”. However, consideration must be given to the dramatically increasing number of urban food insecure in the region and feeding the urban masses at affordable prices will increasingly become a high priority consideration for agriculture. Household-level poverty reduction, economic development and growth are important components of a food security strategy. Agriculture is key to all of these and the development of a productive agricultural sector will depend on investment in infrastructure and marketing systems as well as in making appropriate technological advances available to farmers.

*Von Barun, J., Hazell, P., Hoddinott, J. and Babu, S. (2003)* have dealt with issues relating to “Achieving long-term food security in southern Africa: International perspectives, investment strategies and lessons”. Von Barun and his team at IFPRI nicely presents some of the approaches that developing countries once threatened by famine used to avert future food crises and embarked on a path towards long-term food security. The paper also argues that for long-term investments to work, the countries must develop the capacity of their public institutions, particularly in the areas of policy analysis, research support, data and information collection and management, analytical capacity for strategy development and planning monitoring and evaluation. Designing the appropriate policies is the key to all the other impact strategies and investments that will effectively place the region on a path to food security.

*Vyas (2005)* tries to examine the results of the efforts to achieve food security particularly the promising practical measures to reach the Millennium Goals. The case study of different countries of Asia has been done to determine food security, so that it can be best understood at

the country level. One important aspect of the process of this study thus involved the selection of the countries for case studies. A specific typology is adopted; two least developed countries (Cambodia and Nepal), two medium-income countries undergoing fast structural changes (Indonesia and Thailand), and one large and fast developing country (India) are selected for the study. The author observes that in most of the countries food security is limited because demand keeps on increasing due to population increase; as such the gap is widening between the needs and the availability of food.

Amartya Sen added a new dimension to food security and emphasized the “access” to food through what we called ‘entitlements’ - a combination of what one can produce, exchange in the market along with state or other society provided supplies. Accordingly, there has been a substantial shift in the understanding of food security, “Food Security at the individual household, regional, national and global levels exists when all people at all times, have physical and economic access to sufficient safe and nutrition food to meet their dietary needs and food preference for an active and healthy life”(FAO 1996). The declaration further recognizes that “Poverty eradication is essential to improve access to food”(Debashis Basu and et.al 2006).

### **Literature on Sikkim’s Agriculture and Food Security**

*Coelho* (1970) in the book *Sikkim and Bhutan* observes that the main sources of Sikkim’s wealth are agriculture and forests. Rice and maize are the main monsoon crops. The other subsidiary crops include millet, buckwheat, barley, pulses etc. The cardamom plantations are of importance due to its export potential. The cultivation of potato is also getting importance. Tea plantation is a new venture. Apples and pineapples are also grown and these are supplied to fruit preservation factory at Singtam. The cattle of local breeds, yaks, sheep and goats are found throughout Sikkim.

*Debnath* (1980) studies the agricultural situations of Sikkim in pre-merger period (before 1975) when nearly 95% of the population depended on agriculture. In 1965-66, the proportion of contribution of agriculture including animal husbandry and forest to the net domestic product was about 80%. The important cereal crops were maize and paddy and still these were dominating. He briefly describes the production situation of millet, cardamom, mandarin orange and potato etc. The paper gives an overview of agriculture in Sikkim.

*Subba, J. R.* (1984) in the book *Agriculture in the Hills of Sikkim* states that the agricultural backwardness of Sikkim is caused by several factors. He points out that some factors, such as, limited area of cultivated land, low productivity, low irrigation facility, limited agro mechanization, slow adoption of high yielding varieties, cultivation of traditional crops, lack of post-harvest technology etc. are the basic hindrances on the way of agricultural progress. For rapid growth of agriculture and rural hill economy, he suggests cultivation of commercial

crops in the mixed cropping, relay cropping, multiple cropping, orchard and garden land cropping, mixed farming and agroforestry. Further, he has mentioned that no system of land utilization classification is followed in Sikkim.

*Bhattacharya* (1984) observes that the northern portion of the country remains pastoral, whereas cultivation is the mainstay of the people of the southern half. The majority of the people of Sikkim seem to have continued shifting cultivation until the late 19<sup>th</sup> century. The change from shifting cultivation to wet cultivation occurred mainly during the later part of the 19<sup>th</sup> century. The Nepalese settlers have since introduced rice on alluvial flats and terraced lower slopes, but the Lepchas, however confined themselves more and more to the cleared patches in secondary jungle to grow mainly maize.

*Choudhuri* (1984) writes that the cultivable land is of two types, the irrigated land or panikheti and non irrigated land or sukhakheti. Cultivation in the area is carried out on terraced fields prepared with great labour by cutting the hill slopes and most of the terraces; especially the panikheti areas are at least 5-6ft.wide and can be ploughed with the help of bullocks. But in areas with steeper slopes of about 40<sup>o</sup>-45<sup>o</sup>, the terraces are rather narrow and breaking of soil is normally done with the help of hoe and other implements. Retention of water in the fields is an important aspect of hill cultivation which requires special measures for giving an inward slope to the terraces.

*Dhamala and Bhowmick*, (1985) in their paper state that during the Chogyal's rule there was feudalism in Sikkim. During late 20<sup>th</sup> century different political parties in Sikkim demanded the abolition of landlordism and its associated vices, such as forced labour, illegal extraction by landlords from tenants and the magisterial power by landlords. It is pointed out that the ceiling on land holdings seeks to remove unequal distribution of landed property and its evils that retard social and economic development of the state. Concentration of property in the hands of a few is bound to adversely affect agricultural production and social cohesion as well.

*Mukhopadhyay* (1988) tries to explain different developmental aspects of Sikkim and further analyzes the different economic activities associated with forestry, hill-agriculture including plantations, horticulture and animal husbandry, industries, transportation, tourism etc. that have led to the development of various land use patterns in the area. Agriculture is mainly practiced in the hillside and valley side slopes of wet terrace, but in the valleys and dry terraces in the upper hills paddy, wheat, maize, millet etc. are raised.

*Subba, T. B.* (1989) has studied the agrarian social structure of Sikkim in different time period. He has analyzed the agrarian society of Sikkim in three phases – pre-British, British and post-British.

*Dasgupta* (1992) in the book *Sikkim: Problems and Prospects of Development* narrates land reforms and development in Sikkim. The land revenue system of Sikkim has undergone various changes. The question of land tenures since 1948-49, changes in land tenure system and the problem of ethnicity have been discussed briefly. The book deals with the problems and prospects of agriculture in Sikkim. The changes of land–use system in Sikkim since 1958-60 to 1980-81 are mentioned but not analyzed. The then agricultural situation of Sikkim and its limitations has been discussed. The book highlights the mixed farming system of Sikkim. It narrates how the poor people of Sikkim supplement their income through the livestock industry. He has discussed various aspects of mixed farming system keeping in mind the agro-climatic conditions. The problems of mixed farming system have also been analyzed and the problems and prospects of non-cereals crops (cardamom and oranges) of Sikkim have been discussed. Besides, the author has commented on forest management and economic development and rightly revealed the causes of deforestation and failure of forestry to integrate with development in other sectors.

*Gupta* (1992) gives vivid description about the development system in Sikkim in relation to the people and their living style during the Chogyal regime and after democracy prevailed in Sikkim. Further he highlights the agricultural society in Sikkim, the control of farmland as the principal key to wealth, stability and power. Majority of the people in Sikkim lives in rural areas and most of them must make a living through agriculture if they are to make a living at all.

*Sontheimer, Sally* (1997) in her paper *Lessons from Sikkim – India* based on the experience of the FAO Technical Cooperation Project aimed at small goat and poultry, entitled ‘Development of Small scale livestock Activities – Sikkim’ reveals a number of important lessons for using participatory, gender–responsive approaches to agricultural development. Further these lessons try to demonstrate how effective such approaches can be in improving rural livelihoods, reducing risk and indebtedness and increasing food security for all the household members.

*Singh & Pandey* (2000) in their paper point out that the majority of workers in the state are engaged in the primary activities; among which agriculture has engaged maximum proportion of population as this is the mainstream of economy of the state. They observe that out of total main workers, 65% are cultivators and agricultural laborers.

*Lama* (2001 & 2003) examines the agricultural backwardness in Sikkim before the merger in 1975. He observes that the agriculture sector is characterized by uncertainty about land tenure rights, negligible public investment and over dependence on traditional technologies. This sector has recorded considerable progress during the last two decades. In the past low

productivity, negligible marketable surplus and other institutional inadequacies, which plagued the economy led to agricultural backwardness. He asserts that Sikkim's economy is mainly dependent on agriculture. Almost 85% of the population of Sikkim lives in rural areas and only the improvement in agriculture can better their lot. Moreover, it is said that agriculture, horticulture, livestock, fisheries and agro-forestry can be integrated to give viable systems to farmers.

*Gaunle* (2002) describes the system of land holding and revenue collection in pre-merger era. Perception on landlord system in Sikkim is that people of Sikkim sustained their melancholy life during Chogyal regime but the key persons during that time were Kazis and Thikadars who collected the revenue from peoples.

*Shrestha* (2005) writes that the climate and seasons of Sikkim are suitable for growing large number of crops, viz. rice, maize, wheat, cardamom, potato, ginger, orange etc. His book attempts to focus on different bills passed in the Legislative Assembly in Sikkim, such as,

- i) The Sikkim urban land (Ceiling and Regulation) Bill, 1976.
- ii) The Sikkim Agricultural Land Ceiling and Reforms Bill, 1977.
- iii) The Sikkim Land (Requisition and Acquisition) Bill, 1977.
- iv) The Sikkim Land (Requisition and Acquisition Amendment Bill, 1978).
- v) The Sikkim Agricultural Land Ceiling and Reforms (Amendment), Bill 1977.
- vi) The Sikkim Agricultural Land Ceiling and Reforms (Amendment) Bill, 1985.
- vii) The Land Acquisition (Sikkim) Amendment Bill, 1992.

*Thirty Years of Sikkim*, (2005): In this book particularly in the chapter on agriculture it has been stated that 1975 onwards the development in agriculture sector took a turn, changing the whole approach to farming. Henceforth, till 1980 infrastructure was created in different spheres of agriculture like establishment of soil testing laboratory, more number of VLW circles was created, land purchased for research & development etc. Regional concept for the development of agriculture and horticulture was adopted and introduced in various agro-climatic zones of the state.

*www.undp.org* highlights that despite the limited cultivable land in Sikkim agricultural development has made considerable progress during the last two decades. The state has attempted to convert the subsistence farming into an economically viable venture by introducing new crops, extending more areas under high-yielding and improved seed varieties, increasing the use of fertilizers and pesticides and expanding the area under double or multiple cropping. Further it observes that as a result of all these measures, the total food grain production has increased from nearly 62,000 tons in 1980-81 to 1, 03,000 tons in 1997-98.

## **Research Gap**

Several writers and scholars have expressed their views and concerns on food security and they discussed the agricultural scenario of different countries, India and state of Sikkim as well. Some writers have focused on the past and present of agricultural situation in Sikkim. But no scholar as such has so far critically examined and written about the agro-economic perspective and food security in Sikkim, and how agro-economics helps in achieving food security. In this research I have tried to explore the virgin topic for the better understanding of rural livelihood standard in Sikkim in relation to agro-economic activities and food security.

## **Statement of the Problem**

Agriculture takes in many forms according to latitude, longitude and social groups. The hill agriculture has been defined as the agricultural practices for production on hill slopes exceeding above 36 percent slope. Almost every system is basically a form of mixed farming, including arable cultivation of cereals and tubers, livestock and intensive use of forests. Food crops, usually grown in valley, terraces and hill slopes supplemented by some animal products, satisfy the basic energy intake of rural population. Over the past several centuries, there was a close relationship between human population growth, expansion in area under subsistence crops and increase in the number of livestock. These intensified the demands on the forest to supply animal fodder, timber fuel wood and land for agriculture. The mountains and hills are highly vulnerable to degradation caused by rapid changes in vegetative resources. The mechanism of crops domestication over generation among hill tribes through trial has been evolved by their own adaptive strategies. They either modified the mountain characteristics (e.g. terracing, plantation crops etc.) to suit their needs or used the system as such in different forms of shifting cultivation relying on the regeneration of soil productivity through natural vegetation without any outside inputs except seeds and human labour.

Hilly areas are generally characterized by fragile environment and hence cultivation of crops have been extremely difficult and very expensive because of difficult terrains, poor road communication, tremendous variations in soils, agro-climates, etc. within narrow range of altitudes. Only a limited area can be brought under cultivation due to constraints put by elements of physical environment such as climate, slope, soil, pests etc. Much larger area can be used as pastures and forests. In spite of physical constraints, cropland in the mountain and hill areas has been considerably increased by human encroachment on forests and grassland.

The initial selections of crops were influenced by climate and natural vegetation. The distribution of biomass depends upon the distribution of solar radiation, temperature and rainfall. The vegetation types vary from equatorial forest to the tundra of the sub-Arctic. Climate is still a dominant factor in agriculture, though human influence has changed the limits of growing particular crops.

Land is the most important natural resource upon which the main economic activities of people in Sikkim are based. It plays vital role where the socio-economic development is limited particularly when economy is largely based on agriculture. More than 65% of the total population of Sikkim is engaged in agricultural activity. However, present level of performance of land in terms of productivity is still very low. Different types of land units have their own production potentials. The capacity of soil is determined by bio-physical condition on the one hand and the use of technology such as irrigation, selection of crops and management of land on the other. If the land is used according to carrying capacity, the productivity can be increased over a long period.

Physical setting of the state makes cultivation extremely difficult and diverse. Altitude, slope, physical aspects, climate, rainfall etc. are important components for agriculture of the state. Bench terracing is a distinctive and important feature which is both expensive and labour oriented.

The rugged topography offers very little of its land for cultivation (estimated as only 11% of the total area of the state) and the cultivated lands are tiny, scattered and fragmented in nature, requiring a large manpower, while production per unit area is very small. The average area of holding is only 1.91 hectares although vary widely, forming four distinct classes. The majority of the farmers belong to the marginal groups and the intensity of land use, irrigated area and cropping intensity decreases with the increase in holding size. Most agriculture is concentrated in the lower mountain reaches primary in the East and South districts. Nomadic high altitude livestock herding (primarily goats, sheep and yaks) is found along the borders with Nepal and Bhutan and in the North district approaching the Tibetan plateau.

Sikkim has very diverse ecological conditions, from sub-tropical to alpine and is endowed with great biological diversity of plants and animals. A wide range of crops can be cultivated in a range of agro-ecological zones, including upland rice, vegetables, pulses, potato and ginger. Its extreme topography and altitude mean that most agriculture is done on narrow terraced benches on very steep slopes. The country is subject to torrential monsoonal rains, which contribute to rapid runoff on the slopes, resulting in landslides and flooding in river bottoms.

Most arable land has already been put under cultivation. Rapidly growing rural population of Sikkim is slowly expanding upwards and bringing steeper forested slopes under cultivation. In addition, demand for cardamom, an export crop, has also contributed to conversion of forests to agriculture. Each village has different endowments of various types of lands and very different patterns of access to public and common lands. Average holding size for poorer household is less than three acres. Most agriculture is rainfed.

The population is diverse in its ethnicity, religions and languages. The ownership of cultivable land as well as cardamom population, was historically been under the controls of Bhutia *kazi* (landlords and aristocrats), which continues to influence the distribution of land and natural resources even today. Nepalese leased lands from the *kazis* and gradually acquired land from the Bhutias and Lepchas. Consequently there is a scarcity of arable land, with fragmentation of holdings and greatly expanded cultivation on very marginal steep slopes. The distribution of income and pattern of poverty are closely linked to land ownership, with Bhutia families tending to be better off than other groups.

Likewise, due to limitations of terrace farming in terms of productivity, irrigation and the scope of extending cultivation highlight the constraints faced by farming for livelihood security. Under these conditions innovative practices in land management and horticulture and floriculture (including marketing and systems and linkages) can be identified as growth sectors.

### **Geographical Sketch of the Study Area (South Sikkim)**

Sikkim state has been divided into four districts according to administrative convenience and regional location as follows:

1. East District
2. West District
3. North District
4. ***South District.***(Study area)

The districts are further fragmented into smaller administrative division as sub-divisions i.e. East district has four sub-divisions viz. i) Gangtok, ii) Pakyong, iii) Rongli and iv) Rangpo. West district has four sub-divisions viz. i) Gyalshing, ii) Soreng, iii) Yuksam and iv) Dentam. North district has four sub-divisions viz. i) Kabi, ii) Dzongu, iii) Mangan and iv) Chungthang. South district also has four sub-divisions viz. i) Namchi, ii) Ravangla, iii) Jorethang and iv) Yangang. There is two tiers system of Panchayati Raj in the state known as ‘Ziila Panchayat’ at the district level and the ‘Gram Panchayat’ at the village level. Each district has one Zilla Panchayat’, which is headed by an ‘Adhyakshya’ and ‘Up-Adhyakshya who are elected from within members of Zilla territorial constituencies. There are 989 Gram Panchayat Wards (including *Dzumsa*) which constitutes 176 Gram Panchayat Units (GPUs). Each district has different numbers of Gram Panchayat Units, such as in East district has 52 GPUs, West district has 55 GPUs, North district has only 22 GPUs (including *Dzumsa*) and in the South district 47 GPUs.

The state of Sikkim has a total area of only 7096 sq. km. and is stretched over 112 km from north to south and 64 km from east to west. It lies in the north-eastern Himalayas between 27<sup>0</sup> 00’ 46’’ to 28<sup>0</sup> 07’ 48’’ North latitude and 88<sup>0</sup> 00’ 58’’ to 88<sup>0</sup> 55’ 25’’ East longitude. Sikkim is known as ‘*Denjong*’ and more rarely ‘*Demojang*’ or ‘*Demoshang*’ which literally means the

‘land of rice’ or ‘valley of rice’. The early European travelers like Samuel Van de putta, Horace Della Penna cited the name ‘*Bramasojan*’ for Sikkim. Simultaneously Desideri also called the country ‘*Bru-me-jong*’, which means ‘the rice country’.

Sikkim is a very small state in the Himalayas with formidable physical features. It is bounded by vast stretches of Tibetan plateaus in the north, the Chumbi valley of Tibet and the kingdom of Bhutan in the east, the kingdom of Nepal in the west and Darjeeling District of West Bengal in the south. Sikkim was known to the Lepchas, the original inhabitants of the state as ‘*Nye-Ma-el*’ or heaven. Tibetans called it ‘*Renjong*’ or ‘*Denzong*’ or ‘the valley of rice’.

The study are, i.e. the South district is located within latitude 27°14'20" N, and longitude 88°18'15" E. The total geographical area of the district is 750sq.km. South district is the 2<sup>nd</sup> largest populated district next to East district of Sikkim. South district though have smaller area is rather thickly populated (www.sikkimsprings).

**Table 1.1: Land Elevation of Sikkim**

Type of land	Elevation of land
Lower Hills	Altitude ranging from 270m to 1500m.
Mid Hills	Altitude ranging from 1500m to 2000m.
Higher Hills	Altitude ranging from 2000m to 3000m.
Alpine Zone	Altitude above 3900m with vegetation
Snow Bound Land	Very high mountains without vegetation and with perpetual snow cover up to 8580m.

Source: Statistical Profile, 2004.

**Table 1.2: Five Ranges of Climate in Sikkim**

Range	Altitude
Tropical	Below 610m.
Sub-Tropical	610m to 1524m.
Temperate	1524m to 2743m.
Sub-Alpine	2743m to 3962m.
Alpine	3962m to 5182m.

Source: Statistical Profile, 2004.

**Table 1.3: Vegetation Zones in Sikkim**

Zones	Altitude
Tropical	From sea level to 1700m.
Temperate	From 1700m to 4300m.
Alpine	From 4300mtrs to 5000m.

Source: Statistical Profile, 2004.

The habitable areas cover up to 2100m, which covers about 23.9% of the total geographical area; settlements are mainly confined to the area lying below 1800m and are generally found concentrated on the southern part of the state, following the wide river valleys and sometimes reaching up to the adjoining ridge tops. Due to the absence of any sizable flat land the distribution of population is sparse throughout the slopes, without forming any village in true sense (Boot, 1988). The population of Sikkim comprises conspicuously three ethnic communities i.e. Nepalese, Lepcha and Bhutia. Sikkim economy is mainly dependent on agriculture. Almost 85% of the population of Sikkim lives in rural areas and only the improvement in agriculture can better their lot. Agriculture, horticulture, livestock, fisheries and agro-forestry can be integrated to give viable farming systems to farmers (Lama, 2003).

Majority of Sikkimese people draw sustenance from agricultural products. Sikkim has very diverse ecological conditions, which on the one hand prevent the adoption of common crops and on the other hand favour cultivation of many kinds of fruits, vegetable both in and off season and also provide a conducive agro-climatic situation for growing commercial crops like cardamom, potato, ginger etc. Agricultural lands are situated at an elevation of 300m to 3000m but most of the cultivated areas are below 1800m. In Sikkim most of the cultivable land is terraced.

In mountain regions like Sikkim, the quantum of land is comparatively less than plains. Hilly areas are generally characterized by fragile environment and hence cultivation of crops have been extremely difficult and very expensive because of difficult terrains, poor road communication, tremendous variations in soils, agro-climates, etc. within narrow range of altitudes. Further, despite modern facilities and control over nature, agricultural pattern is primarily determined by the physical factors like soil and other characteristics like rainfall, availability of soil moisture, duration of sunshine etc. Actually, the agricultural patterns are more dependent on the conditions of terrain, topography and altitude. From the observation, it is understood that each part of the district faces a problem due to variation in different aspects such as physiographic, climate, soil and water. These are the problems which affect the agricultural development in the district.

### **Objectives**

The main objectives of present study lie in following parameters:

- i) To examine the agricultural structure and related characteristics of agriculture through different statistical data pertaining to operational holdings including land utilization, tenancy in terms of leasing, cropping, irrigation status, livestock, agricultural machinery and implements, use of fertilizers, land reforms and land ceiling etc.

- ii) To find out the principal causes and recent trends in food insecurity in the region. Moreover, to know about the state of food insecurity and of rural livelihood security in Sikkim.
- iii) To evaluate the government policies and programme for the benefits of rural poor in general and small and marginal farmers in particular.

### **Research Questions**

Answers to the following questions will be sought in the course of the proposed research:

- i) What is the status of agriculture in Sikkim?
- ii) What is the level of participation of the three major communities in the agro-economy of Sikkim?
- iii) How far the farmers in Sikkim depend on traditional ways of farming?
- iv) What type of land reform policies has been implemented in Sikkim?
- v) What is the socio-economic condition of agricultural labourers?
- vi) Are the common people getting both quality and quantity of food in order to satisfy their needs?
- vii) Can Sikkim ensure sustainable food security for a growing population?

### **Research Design**

The present study is exploratory, quantitative, analytical, and deductive.

### **The Survey Design**

A sampling has been done based on the agro-climatic conditions. On the basis of this out of 47 Gram Panchayat Units in South Sikkim, randomly only 15 Gram Panchayat Units have been selected. These are grouped according to altitude as follows:

1. Between 300-900 metres
  - i. Namphing GPU
  - ii. Legship GPU
  - iii. Rong-Bul GPU
  - iv. Tarku GPU, and
  - v. Turung GPU.
2. Between 900-1500 metres
  - i. Sadam –Suntaley GPU
  - ii. Tinik- Chisopani GPU
  - iii. Namthang- Maneydara GPU
  - iv. Assangthang GPU, and
  - v. Wok- Omchu GPU

3. Nearly 1500-2100 metres
  - i. Borong-Phamthang GPU
  - ii. Barfung-Zarung GPU
  - iii. Paiyong GPU
  - iv. Tinkitam-Rayong GPU, and
  - v. Perbing-Dovan GPU.

### **Research Methodology**

The methodology involves estimating the diversity in the farming system at the village level and conducting a socioeconomic study on the rural livelihoods system among three communities i.e. Nepalese, Lepcha and Bhutia in different spatial unit. Data collection is both on qualitative and quantitative, based on secondary information obtained from existing records from government and non-governmental sources. Likewise, primary information and data are collected from the farmers through questionnaires, focus discussions, field observations and mobile interview.

For data collection different techniques have been used such as:

**Census study** - Agricultural census has been consulted in order to collect different data on agriculture. Agricultural census provides essential information on distribution of operational holdings, tenancy in terms of leasing, cropping and land use patterns, irrigation status, fertilizers, agricultural machinery and implements and flow of credit in the agricultural holdings etc.

**Case study** - Different Gram Panchayat Units (GPUs), were selected according to elevation zones and study was done respectively.

**Interview** - The farmers belonging to different communities in general and government official in particular were interviewed.

**Observation** - Observation as a method includes both 'seeing' and 'hearing'. During the field survey different places as well as problems were observed, which provided support for obtaining the relevant data.

### **Data collection**

The GPU boundary map and satellite image were used to identify GPU on the basis of agro-climatic zones. The questionnaire/ interview schedules were prepared for farmers. These questionnaires consisted of questions related to family information, crops and its productivity,

cropping pattern, land use, income and expenditure, occupation, fertilizers, irrigation, operational holdings, facilities, etc.

The South district has 148 Revenue Blocks, 452 villages, 47 Gram Panchayat Units and 271 Panchayat wards. For the purpose of research only 15 GPUs were selected on the basis of agro-climatic zones. Data were collected through field visit and participation observation. Altogether there were 8,975 households in the 15 GPUs under study, out of which 1,500 households were sampled. To reach the target of above 15 percent, 100 households from each GPU were selected by random sampling method. Surveys were conducted in the year 2015-16.

### **Tools of Data Analysis**

The primary data were collected from the interviews, discussions, observation and mobile phone conversation of the respondent households, and it were crossed tabulated and master tables were prepared from interview schedule and questionnaire. The cartographic and GIS (Geographical Information System) tools were also used to analyze the data.

For analyzing all the data i.e. primary and secondary data SPSS (Statistical Package for Social Science) One Way Analysis of Variance (ANOVA) and Origin Pro8 techniques have been used. Other techniques were also used such as Crop Yield Index (Yang Method), Weaver's Method of Crop Combination, Correlation, Regression Analysis, Figure, Bar Graph, Tables, Maps etc. were also used to represents the data.

### **Chapter Plan**

This study is divided into eight chapters which are given below:

Chapter I – Introduction, Theoretical Framework, Statement of Problem, Review of Literature, Objectives and Methodology

Chapter II – Background and Profile of the Study Area

Chapter III - Agriculture and Agro-economic Environment in Sikkim

Chapter IV - Cropping Patterns

Chapter V - Land Use and Land Reforms

Chapter VI - Agricultural Production and Productivity Trends

Chapter VII - Mountain Agriculture and Food Security in Sikkim

Chapter VIII - Major Findings, Conclusion and Suggestions

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## Appendix

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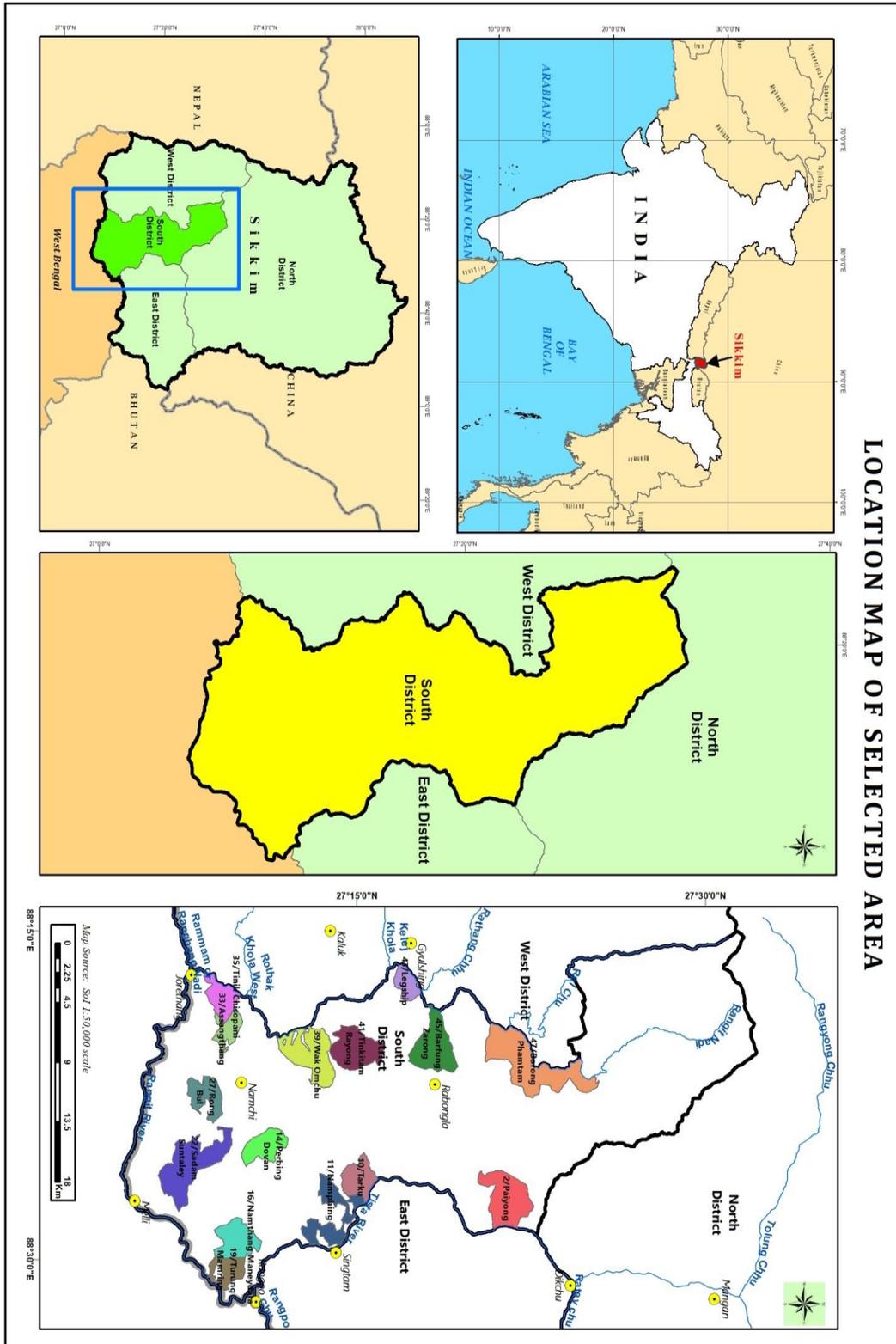
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# LOCATION MAP OF SELECTED AREA



**Map No. 1**