SUMMARISED CONCLUSION SUGGESTIONS AND PROGNOSIS

The impact of terrain on agricultural development of North Bengal with particular reference to Darjeeling District has given us a clear idea about the agricultural situation in this region. The study includes the interpretation and analysis of the fifteen chapters, which will be summerised below.

A brief relevant works in this subject is written in order to have background knowledge of the problem. The data were collected for each chapter from Government Offices, library sources and filed investigation to complete this research work. The researcher also has read and collected various relevant books, journals and published material to understand the topic well and got thereby some general information about the situation of agriculture in North Bengal. Data thus collected were analysed and with the help of cartographic and statistical methods maps and diagrams were drawn. Introduction deals with the geographical setting of the area, the problem, scope of the study and its objectives, hypothesis, methods, and its significance.

North Bengal lies between 27°13′ - 24°40′20′′ North Latitude and 89°5′35′ east longitudes North is bounded by the river Ganga in the south the state of Bihar in the west Nepal and Sikkim and Bhutan in the North and Assam and Bangladesh in the east.

The northern most region of the state of West Bengal is known as North Bengal. The six districts that comprise North Bengal are Darjeeling, Jalpaiguri, Cooch Behar, Uttar Dinajpur, Dakshin Dinajpur and Malda. The total area of North Bengal is 21845 sq.km which is 24.62 percent of the total area of the state of West Bengal. The northern most part of the Darjeeling district is a mountainous region situated on the Himalayan chains. The southern districts of North Bengal viz., Uttar Dinajpur,

Dakshin Dinajpur and Malda are completely riverine plains, other plain areas comprise southern parts of Cooch Behar, Jalpaiguri and Darjeeling District.

Historical background of each six districts has been discussed in brief. The study area North Bengal with particular reference to Darjeeling district in the state of West Bengal is acknowledged agriculturally and economically backward region according to the indicators prescribed by different institutions to determine agricultural development of a region. It is an area of great physical enequalities with varied topographical features. The physical constraints are : (i) variations in topography (ii) variations of soil fertility (iii) problems due to drainage and floods (iv) uncertainty and uneven rainfall and temperature (v) soil erosion and landslides and (vi) problems due to irrigation. All these factors directly or indirectly wholly or partly stood in way of development of agriculture in North Bengal in general and Darjeeling district in particular.

Chapter one deals with the geology of North Bengal, which is covered by diverse rock types ranging from oldest Archaean metamorphis to sub recent and recent alluvium. The region lies partly in the extra peninsular region and partly in the plain. The various rock formations of North Bengal are (a) Daling Darjeeling series – the mountainous tract is characterized by folding thrusting and metamorphism with resultant inversion in straightgraphy (B) Buxa formation comprises predominantly by dolostone, phyllite and quartzite etc. occupying the northern part of Jalpaiguri district, around Buxa and Jainti Hills Buxas are an admixture of argillaceous, are nacreous and calcareous facies. Besides, the presence of hematite schist and banded hematite as per in the Buxas are also (C) Gondwana formation occurs in the ditrict of Jalpaiguri and Darjeeling (D) Gondwana rocks consist of pebbles boulders slates, quartzites quarzilts slates and carbonaceous slates and coal seams (a) Tertiary rock formation is notice in the Terai region of Darjeeling district and northern part of Jalpaiguri district. These rocks consist of detritus material of coarse hard red sandstone, silstones shale and pseudo conglomerate, belonging to the Siwaliks. (e) older and newer alluvium. The older alluvium generally occupies high grounds forming raised terraces and mostly

covers the southern portions of foot hills and forms part of the gangetic alluvium in the area known asterai. The newer alluvium is of recent origin. It occupies the northern and western part of Uttar Dinajpur Dakshin Dinajpur and western part of Malda.

Chapter two deals with physical setting of the North Bengal. On the basis of elevation morphological features and slopes of terrain North Bengal may be divided into four physiographic units (a) northern hills (b) the terai (c) transitional plain and (d) the plains of uttar Dinajpur, Dakshin Dinajpur and Malda. The northern hills corresponds with the three northern sub-divisions of Darjeeling district. The hilly potion consists of complicated relief features with ridges and narrow deep gorges most of the ridges stretch from north to south. The hilly portion of Jalpaiguri district comprises the part of Bhutan hills. The area extending from the foot hills of Darjeeling and Jalpaiguri districts is divided into Terai and Duars by the Tista river. The area lying west of Tista river is known as Terai and area lying east of the river is known as Duars. The transitional zone between the terai and Duars is a triangular shaped plain area. This area is intersected by numerous rivers and streams flouring southward. The plains of Uttar Dinajpur, Dakshin Dinajpur and Malda. Composed of old and recent allivium, sandy loams drained by many large and small rivers and characterized by recent floods. The altitude is varying from 300 meters to 100 meters from North to South.

North Bengal is drained by many large rivers with their numerious tributaries and distributors. The varied physical and geological characteristics of the region have profoundly influenced the drainage pattern of the area. In the district of Darjeeling rectangular drainage is observed. In other plain areas of North Bengal dendritic drainage patter is noticed.

The large rivers of North Bengal are the Tista, the Torsa, the Jaldhaka, the Sankosh, Balason, the Atrai, the Punarbhaba, the Kulik, only the Ganga, the Tista and some other tributaries have their origin in glaciers other rivers rise from the drain outs of the precipitation in the different parts of the Himalayan range and these rivers become dry

in the dry seans. The soils of North Bengal are generally poor in organic matter and as well as in nitrogent content. The depth of the soil is rather low and soil is principally derived from tertiary rocks. The texture of the soil is mainly from sandy loam to loam and the colour of the soil is yellowish. The soils are mainly porous and have faced acute erosion. These are not very fertile but responsive to fertilizers is noticeable. The soils of the hilly areas are immature than the soils of the plain areas, moreover hill soils are constantly disturbed by the process like soil creep. Four broad classification of soils in North Bengal area (a) hill soils (b) terai soil (c) Alluvial soils and (d) red soils. Acidic character of soils in the districts of North Bengal varies between pH 5.0 and 6.5. Though in some areas like Darjeeling it is even less than 5.0. the acidic character of the soils makes them less suitable for agriculture as most of the plant nutrients do not get the major nutrients, nitrogen and phosphorous tend to become available in lesser amounts below pH 6.0

The North Bengal has two district tracts – the hills and the plains. The mountainous portion of the northeast and the area bordering the Himalayas in the north experience lower temperature mainly due to the effects of elevation. The west extension of the Himalayas effectively bars the influence of cold polar winds, on the other hand annual range of temperature does not show continental character due to the influence of the Bay of Bengal. The average maximum and minimum temperature in hill area is 20° Celsius and 3° Celsius respectively. In remaining parts of North Bengal the average annual temperature is almost uniform and ranges between 23° to 43° Celsius. Minimum temperature ranges between 7° to 9° Celsius. The highest amount of rainfall is restricted to the northern most part of the region at higher altitude and decreases southward.

The rainfall in this area ranges between 2500 to 4000 mm in a year. It has been observed that the yield of crops usually increases with an increase in rainfall. Heavy rainfall is favourable for the cultivation of jute and rice in plain areas. Productivity of crops also depends very much on the total amount of temperature which plant receives in varying degree with seasons.

North Bengal is gifted with a large forest area in its mountainous terrain and adjacent valleys. These forests are covered with valuable trees. There also exists a wide variation of different types of forests. The variation is mainly due to the variation in altitude and climate. In the districts of Darjeeling and Jalpaiguri 38.27 p.c. and 28.74 p.c. of the area to total area of the respective districts are under forest cover. Other districts of North Bengal has less than one p.c. of forest area.

The agricultural landuse in North Bengal is not uniform because of the differences in soil fertility, relief and climatic conditions etc. The great regional variation in agriculture is primarily due to varying physical and ecological conditions, level of socio-economic development, demographic and cultural pattern. It has been observed that the pattern of landuse is governed by the relief morphometries and morphological characteristics of the area. It is generally found that most of the hilly terrain, ridges, domes, rocks are either under forest or pasture according to climatic condition of the area. Landscape recognized as alluvial fans, valleys some hilly terrain, flood plains, out wash plains and loess plains are under intensive agriculture because of low climatic and physical constraints.

Particular study area Darjeeling district has been discussed in chapter eleven. In the landuse of other five districts of North Bengal gives clear idea about the agricultural pattern, practices and development of the area.

The district of Jalpaiguri extends over an area of 6227 sq.km. in the shape of an irregular rectangle lying length wise east to west. The district of Jalpaiguri is known as western Duars, which is submontane and covered almost by forest and dry sandy river beds. The northern part of the district is undulated high and low deep plain small hillocks can be found in plently in northeastern part of the district. The major part of the district is formed with riverine plain. The majority of the people in the district are engaged in agriculture. There are 241026 hectares of agricultural land where intensive forming is practiced. The economy of the district is dependent on agriculture and plantation. Tea orange are important plantation crops of the district. Net cropped areas

is 59 p.c. In Jalpaiguri paddy, jute, potato are produced in large quality. Pulses sugarcane tobacco are other important crops of the district. During the period 1997 to 2002 agricultural the yield rate of various crops has undergone major changes owing to expansion irrigational facilities. Moreover the area in majority of the cases reveals the mounting pressure on land or the increasing intensity of cropping. Some other factors such as use of fertilizer, application of improved varieties of seeds and change in technical inputs are collectively responsible for the improvement in the productivity level of some important crops. A plain geomorphology also ensures continuity of cultivation. Successful agriculture is possible only on reasonably level ground if climatic conditions and some other related factors such as soil labour capital, marketing and institutional facilities are favourable for the agricultural development in the district. Cooch Behar district is located in east-west direction. Cooch Behar is situated in the sub-Himalayan, territory, which is commonly known as 'terai' in West Bengal. The total area of the district is 3387 sq.km., and it is more or less a plain district with a slight slope from north-west towards south-east direction. There is a small forest in the north-eastern region of the district. Net cropped area in the district is 81 p.c. soil of the district is fertile and alluvial in nature. The district has witnessed a total increase of land area during study period. The period 1997 to 2002 shows the upward trend in the production of all the crops such as rice and potato with exception of pulses. The total area of irrigation also increased from 46 thousand hectares in 1997-98 to 75 thousand hectares in 2001-20. The average consumption of fertilizer also shows increasing trend. Majority of the farmers in the district have less than one p.c. of cultivated area and are practising subsistence agriculture. Moreover infrastructural development in the rural area is very low or in the process of development. Uttar Dinajpur is completely a riverine plain land. The altitude is insignificant here. The region has a monotonous landscape characterized by agrarian fields with scattered homestead leaving some barren land here and there. The total geographical area of the district is 312467 hectares and only 0.579 hectares area is covered by forest. Net cropped area is a little more than 84 p.c. Total cereals, which includes rice, wheat jute and other crops occupy the highest percentage of area. Yield

rate of rice, wheat, potato shows increased production. The application of chemical fertilizer and better irrigational facilities boosted the production of cereals crops. The agricultural holdings are very small and fragmented. It may be concluded that the plain topography, soil, Climate, irrigation and communication have collectively influenced the spatial pattern of agriculture in Uttar Dinajpur. But farmers are still in the level of subsistence agriculture.

Dakshin Dinajpur is a low lying plain area. The total area of the district is 221908 hectares. More than 86 p.c. of the land area is under cultivation. The percentage of net cropped area is increasing every year since 1999. Food grains production is showing increasing trend. Though some crops are also showing decreased yield rate. Irrigational facilities, consumption of fertilizer, network of communication are other factors influenced the district to become important in the cultivation of rice jute and potato.

The district of Malda is a low-lying area without any hill. The land is sloping towards south. The district has 1.68 thousand hectare of land of which 60 p.c. is net-cropped area. The yield rate of rice is very high; potato and wheat also give high yield rate. Other food crops and jute are showing increasing yield rate. The farmers of Malda are using different sources of irrigation and move land are being covered by the well-developed system of irrigation. The data suggests increased use of fertilizer and, therefore, bumper crops are grown. Like other districts of North Bengal average size of holding is below one hectare but net of communication does not show much improvement.

Chapter eight deals with the influence of geology and soil on agriculture in Darjeeling district. The physical configuration of Darjeeling varies from a wide range of alluvial plain, terai Duars to the mountainous areas of the Darjeeling Himalaya or the lower Himalayan range. In terms of geological era this region is the product of very recent times. The greatest difference in relief has brought about difference in climate, natural vegetation, and drainage and soil character. All these factors together influence the

agricultural practices in Darjeeling district. All these factors together influence the agricultural practises in the District of Darjeeling. The hilly areas of the Darjeeling consist of a landscape with rugged terrain full of ridges. The mountains are made of folded rocks piled one over another by a series of north south horizontal compressions. The Darjeeling district may be divided into four tracts viz. the hard rocks area, the Bhabar belt, the terai belt and the alluvial plains. The soil of Darjeeling is characterized by brown podzolic variety. It may be mentioned here that mountains cover about 66 p.c. of Darjeeling district. The nature of soil changes with altitude. For example, it is black and alluvial in Siliguri but higher up it is rather reddish or white in colours. On the whole agricultural practices and cropping pattern shows considerable variations due to influence of geology and soil formation. There is no flattened land or valley at the relatively high altitude and therefore, limited area is available for cultivation. In high altitudes the productivity per unit area is very low, since crops are subject to various physical and other constraints. Soil in the plain areas of Siliguri sub-division is fertile and dark in colour. Paddy jute and other crops grows well in this area. Climate is one of the most important factors affecting the cultivation practises of an area. The mountainous portion of the Darjeeling bordering. Himalayas experience lower temperature mainly due to the effect of elevation. In the remaining part of the district average annual maximum and minimum temperature ranges between 30° to 38° and 12° to 8° Celsius respectively. In hill areas average maximum temperature is 20° Celsius in May and minimum temperature is 3° Celsius in January. Darjeeling receives fairly high rainfall on account of hilly terrain and there are sharp contrast in the amount of rainfall even between nearby stations. Rainfall in general heavier in the southern terai region and slopes near the plain rice, maize, millets along with other minor crops such as ginger, oilseeds, pulses, buckwheat etc are cultivated as summer crops. In hill regions principal cold weather crops are barley, mustard, buck wheat and vegetables. In lower elevation rice, oil seeds, cereals, jute, wheat, potato are grown as summer crops. Rabi crops includes rice pulses maize, potato and vegetables, From the study of the climate of Darjeeling district, it has been found that

there is wide diversities in the cropping pattern, which is closely associated with the climatic regions of the district.

The hill areas consist of a landscape with rugged terrain full of ridges and spurs of sharp incline and deep riverine valleys. The northern most point of the district is characterized by very hard types of rock and is not cultivated, southern stretch of the area lying along the base of the outlying hills. This belt is fertile and cultivation is practiced here. In plain areas agriculture is practiced throughout the year because of flat nature of land. In Darjeeling slopes have been fully used for tea cultivation. Hill slopes determines terracing and its characteristics. The greater the slope, the smaller the width of the terraced fields.

There is an extensive network of drainage system of rivers, rivulets and streams, which flow down below the valleys. Flood does not occur due to natural slope of hill areas. Generally heavy rainfall is favourable for agriculture but excessive rain causes flood, and water logging in plain areas. In Darjeeling delay in the on set of summer monsoon may be disastrous as Kharif sowing may be delayed in rain fed areas. In hill area the only available source of irrigation is the spring. Irrigation is common in terai areas. In plains area of Darjeeling revierlift irrigation is practiced. Landslide is another common feature in Darjeeling hills where landform is far from stable. Heavy rainfall, light soil, hailstorms are the main causes of landslips. The occurrence of landslips is a serious threat to life, agriculture and property in the district. Effective control measurers include, afforestation, terrace, cultivation, introduction of suitable cropping pattern and treatment of gullies and jhoras.

The data regarding landuse pattern shows that the growth and development of agriculture during few years was not encouraging due to some physical and socio-economic constraints in the district of Darjeeling. The pattern of agriculture within the district changes from one place to another. As a result there is a wide variation in the patterns of agriculture within the hill and plain areas of the district. The effect of terrain can be observed significantly in the mountainous region of higher altitudes.

The differences in topography and elevation make agricultural conditions extremely diverse. The two distinct division of the district are mountainous region in north forming the greater part and the alluvial plains to the south. There is also poor sandy tract, which cannot be brought under cultivation. Altitudes vary from 74m above the sea level in the plains to about 3500 m in the hills. Most of the area in the district is under forest. Cultivation is suitable between 300 m and 600 m in the hill areas.

The agricultural cropping pattern, which dominates in the hills of Darjeeling comprise of maize, mille and maize, rice crop cycle both of which lead to considerable soil loss through rainwater run off. In plain areas of Darjeeling rice and jute dominates the cropping pattern.

The low intensity of cultivation i.e., Gorubathan is characterized by rugged terrain and devoid of fertile soils for crop cultivation. The cultivated land is confined to valleys and low lands. The medium intensity group includes Darjeeling, Jorebunglow, Sukhiapokhri, Kalimpong-I, Kalimpong-II. The last two blocks where altitude is less than 600 m some crops usually gives good yield rate. Matigara, Naxalbari, Phansidewa has high percentages of net sown area.

The study shows the very slow rate of increase in net sown area and less percentage of net sown area in some block are due to several factor such as rugged terrain which is responsible for less area under cultivation, poor accessibility, fertile and poor quality of soil, lack of extensive irrigational facilities, high altitudes, high variability of rainfall, lack of modern mechanized cultivation, major part of the some blocks are either covered by forest or by tea cultivation.

Intensity of cultivation also shows that in plains blocks of the district such as Matigara (previously Siliguri) Naxalbari, Khoribari-Phansidewa cultivation is practised though out year. This is possible because of better irrigational facilities, availability of fertilizer, better communication network made it possible to grow crops through out the year. Rangli-Rangliot and Garubathan blocks of hill area has high percentage of

cropping intensity because of the presence of river valleys and soil is fertile in some region.

The output of rice low in hill soil and land suitable for rice cultivation is limited. The productivity of different crops shows regional variation due to rapid change in micro-climatic and terrain factors. In plain areas yield rate of rice is much higher.

At the beginning of fifth five year plan high yielding varieties of seeds were introduced in entire paddy, wheat and maize growing areas of the district. It was found that the average yield rate of maize was only 3.5 to 4 quintals per acre, prior to this programme while H.Y.V. varities gave an average yield of 10 quintals to 14 quintals per acre from the same field. The programme covered entire wheat growing area and the yield rate increased substantially. But in case of paddy H.Y.V. programme could not make any success in hill areas of Darjeeling. In this context it is to be noticed that H.Y.V. responses well only if water fertilizers are supplied in prescribed quantities along with measures to protect crops from diseases and pests.

Agro-forestry landuses fulfill both productive and service functions in Darjeeling. The main productive outputs are food grains, fuels wood and fodder but most important service function is soil conservation.

The forest of Darjeeling can be divided into four classes viz. hill forest, middle hill forest, upper hill forest and plain forest. Medicinal plants are found both in hill as well as plain forests. It has been found in the Darjeeling district that during first two year of laying out a forest plantation, many food crops such as paddy maize and mustard combine with the forest trees such as sal. Medicinal plants like Chirata amlesho, market, ginger have also been successfully introduced as inter crops.

The density of population per square kilometer in 1991 was 413 but in 2001 the density has gone up to 510 persons per sq./km. The plain blocks of the district have more farmers and agricultural labourers and agriculture is practiced throughout the year. Less number of agricultural labourers and small farmers indicate that agriculture

is not practised extensively. Terrain altitude drainage pattern, soil fertility and socio-economic factors have influenced the distribution of settlement pattern in Darjeeling. It has been observed that rural settlements are found scattered and in great isolation. The rugged topography of the district is a handicapped for the development of larger settlements. The northern hilly tract of the region has sparsely-spaced settlements due to uneven surface, the presence of large forest areas and prevailing climatic conditions of the region. No general pattern of settlement is found in villages of hill areas. Settlements have also grown in a dotted fashion following the national highway and district roads. However concentration of settlement is also observed in market areas. Different types of settlement includes forest settlement khasmahal settlement etc.

The plain area of the district is density populated and cultivation is practised through out the year except in urban areas. Agricultural settlements are surrounded by the agricultural land in the villages. The progress and expansion of agriculture in hill and plain areas of Darjeeling has been discussed in chapter fourteen. The interpretation and analysis of the data shows that there remains a wide interblock variations in cropping pattern and cropping intensity in the district of Darjeeling. The possibility of increasing the area under cultivation is limited in hill areas owing to the scarcity of cultivated land, rugged terrain. Moreover major part of the hill area is either covered by forest or tea plantation. The statistical data of 1993-94 and 2001-02 reveals that potato and maize are dominate crops of the hill area. In 1993-94 the area under potato cultivation was 37.7 hundred hectares total yield was 94428 kg. In 2001-02 the area of the crop decreased to 29.3 hundred hectares and it shows a total yield of 124123 kg.

Area under Aman and Aus variety of rice shows decreasing trend and not showing substantial increase. Total yield area of wheat cultivations has decreased like other crops. The quality of rice in hill area is very poor.

In the plain areas of Darjeeling, during the period 1993-94, 83 and 289.86 hundred hectares of land was under Aus and Aman variety of rice cultivation. But 2001-02 shows area under both varieties of rice decreased. The total yield of both varieties of

rice increased from 3222.12 kg. and 2781.01 kg. to 8935 kg. and 999 kg. for the above mentioned periods. Boro variety of rice is also cultivated in the plain area and area as well as production increased in 2001-02. The area of wheat cultivation decreased from 49.5 in 1993-94 to 29.8 hundred hectares the total yield increased from 3971 kg. to 5619 kg. in 2001-02. Potato was grown in 07.7 hundred hectares and total yield was 24995.68 kg. in 1963-94 but the data shows the area and yield increased from 19.3 hundred hectare and 56103 kg. respectively in the year 2001-02.

The widespread availability and application of fertilizer and also improved irrigational facilities have gone a long way in enhancing the yield rate of some food crops in the plain areas. The data suggests decreasing trend of area in jute cultivation but the production is showing increasing trend. In hill areas of Darjeeling the primary concern of the peasants is to produce their own food crops in their own household in their own household farm. Only relatively big farmers after producing their annual requirements of foods put the remaining part of the land to the production of other crops. In plain areas of the district the agriculture is in the state of developing development is developed stage. Chapter fifteen deals with agriculture in national economy and various plan periods and future prospect through agricultural regions.

For the development of agricultural practices in hill and plain area the government should pay proper attention in every geographical units of the district. Diversification in agriculture is necessary e.g., cultivation of fruits, flower poultry fishing should be encouraged because development of primary sector does not only come from the production of food crop and other crops. Some fruitful suggestions may be placed in solving the problems in near future considering the miserable condition of agricultural practices and production in hill areas. These include subsidies should be given to peasant only FCI should be given power to collect grains and restriction should not be imposed on the production, storage, marketing and use of technology to check the entry of multinational company. The gene transplantation system may be introduced to cater the needs of the present demand, which will bring new dimension in agro diversity in North Bengal particularly in Darjeeling district. There is enough scope for

crop diversification in the soil of North Bengal. For ascertaining crop diversification, Bhatia's formula should be taken into consideration.

For the measurement of the level of production the crop yield and concentration indices ranking co-efficient may also be taken into consideration. The result thus derived will give us an idea of the level of agricultural production

$$RC = \frac{1}{\text{Production}}$$

It means that the ranking co-efficient is lower then the higher will be level of production.

For measuring the level of agricultural production a new technique comprising nine broad approaches should be considered.

(a) Value of agricultural production per unit area

(b) Production per unit of farm labourer

(c) Out put per unitarea in hect.

(d) Index of productivity

(e) Index number of agricultural efficiency per unit area.

(f) Input output ratio and profitability in farming

(g) Ranking order of land in term of population

(h) Production in terms of grain equivalent per head of population.

A yacut development and management should be practiced for high yield production. Agro-geomorphological map should be prepared for showing map should be prepared for showing the impact of terrain on agricultural development in Darjeeling district. Thus, the map will help all the farmers and agricultural planners. An assessment may be done on the basis of comparative study of the agricultural practices in plain and hill

areas and recommendation made for the over all development of the region. Chronological development of agricultural practises during the plan periods reveals that the trend in investment in agriculture is declining gradually and Darjeeling district is no exception. In the first plan period (1951-56) two fold objectives were to bring an equilibrium in economy and to bring about an all round development in raising national income. Second plan period (1956-61) and Third plan period tried to meet the food requirements of the country and priority was given to agricultural development respectively.

Fourth plan period fulfilled two objectives growth of 5% per annum and to eradicate regional unbalances. Fifth plan period fulfilled two goals i.e., removal of poverty and economic self-sufficiency Sixth Five Year Plan (1979-80 1984-95) tried to take into account for immediate and long term needs of agricultural commodities both for domestic consumption and export.

During Eight Five Year Plan it was noticed that there is enough scope for development in agriculture in Terai basin and in hill valleys.

With the completion of Tista irrigation project the agricultural scenario may be changed in North Bengal. Besides, there is enough scope of agro-based industry in North Bengal, which will strength national economy. Contract farming has become a new policy in West Bengal. The benefit of this agricultural policy is that the peasants will know their profit before hand.

To improve the agricultural situation in North Bengal the following programme can be taken into consideration. Budget must be increased in agricultural sector and maximum area of North Bengal is to be brought under irrigation. Trrain constraint must be taken into consideration while for proper attention should be paid to agricultural development. The hill areas are to be brought under Agri Export Zone (AEZ) and agro-based industry should be encouraged which with strengthen economy of North Bengal. Dr. Randhawa divided the country on into agricultural and animal husbandry region on the basis of rainfall temperature, altitude latitude, soils, natural

vegetation, crops, and stock animals, planning commission (1964) also divided the country on the basis of topography geology, soil, climate, landuse, irrigation and cropping pattern. Different scientist ICAR, have also classified the agricultural regions into different zones on the on the basis of natural resources, climatic factors and cropping pattern. I have divided the agricultural regions of Darjeeling on the basis of administrative boundary and it has followed the physical features of geology and relief.

14.02 Suggestions and Prognosis

Agriculture plays a vital role in changing economic development of the nation. At low levels per capita income in the agricultural sector often accounts for half or more of national income and 60 to 80 per cent employment. Successful development of agriculture is essential for national economic growth. Agricultural development contributes to national economic growth by (a) supplying raw material to agro-based industries (b) food to feed urban people (c) contributing substantially to government revenue and capital for human resource development and industrialization and (d) to earn foreign money by exporting surplus agricultural products.

The development of agriculture in the district of Darjeeling does not necessarily involve expensive changes in the morphological features of land nor does it mean full scale change in the existing pattern of crop cultivation what is essential is the better understanding of the different aspects of the terrain, the physical potential of the land and how different types of land react to the external pressure.

Agricultural scientist plays a very important role in determining agricultural development and it is more so in the hill areas of Darjeeling, which is handicapped with natural calamities.

The topographical condition of the district does not permit much economic activities. Deforestation and natural calamities have also influenced agricultural practices of the

region. For all these above-mentioned factors the method of agriculture cannot be converted into mechanized and intensive one.

Some suggestions, which can improve agricultural condition in North Bengal, are —

1. Conservation and development of resources must be given attention.

2. The objective is to develop more intensive, socially responsive, ecologically sustainable and economically efficient pattern of landuse for the hill as well as plain areas of the Darjeeling and North Bengal in general.

3. Modern methods of farm technology have to be identified in order to make efficient use of advance knowledge in the process of planned agricultural development of the study area.

4. For any agrarian development the net cultivated area pastures and grazing ground should increase and it must be given due importance

Prognoses

Our present Government has chalked out several plans for agricultural development in North Bengal in general and Darjeeling District is particular. Gene transplantation is going to be introduced in our state. Shubhendu Dev Chatterjee, the Additional Agricultural Director has cited many examples in support of it. The State Government has formed the agricultural commission to bring co-ordination between agriculture and industry in the interest of national economy of the country. Dr. M.S. Swaminathan, the eminent agricultural scientist will help in every respect to the commission. He has suggested contract farming for the benefit of the farmers of the country. The Government in the near future will be able to convert single cropped land to double cropped land in future converting 177% crop production. It is a matter of great satisfaction that India has touched 8.4% for its all round development due to large scale agriculture in the financial year 2005-06. During the current year (2006-

2007) the Government will examine its agricultural problems and try to solve these through the commission for the state's agricultural development.

I believe the agricultural development in North Bengal specially Darjeeling district will be possible if administration takes keen interest. Terrain constrain must be taken into consideration while planning for agriculture.

It is a matter of great pleasure that agricultural development of North Bengal and of Darjeeling district in particular will be having a new vista of national income through the approval of six-year, $ 250 in National Agricultural Innovation Project (NAIP) by the Union Cabinet on 29.06.2006. This will oversee transformation of the country's agricultural research system and as a matter of fact this will help a lot for agricultural development in hill areas of Darjeeling district. It will be implemented by the Indian Council of Agricultural Research (ICAR) from 01.07.2006 with the World Bank credit of $ 200 million. It may be mentioned here that for strengthening and development of agricultural education the ICAR has been sanctioned the additional funding of Rs. 200 crore during the remaining period of the Tenth Plan (2002-07) in addition to the existing allocation of Rs. 720 crore for the purpose. The research on 'sustainable rural livelihood security' will be implemented by a network of public research institutions, public sectors and Non Government Organizations (NGOs) of the country.