

CHAPTER-IX

SUGGESTIONS AND CONCLUSION

INTRODUCTION

The main problem of the hill agricultural system is lack of irrigation facility. There is neither explicit government policy for expanding irrigation facility in the hill nor specific programme for developing rainfed agricultural technology for the hilly region. Despite considerable annual investment in agricultural, sector new recommended technologies have not reach to the majority of farmers even in the vicinity of the district headquarters. The policies and planning for agricultural development in the district should be area specific. While formulating the planning the situation and problems exist in the ground should be keep in mind and proper understanding of the problem is very necessary. Many a time while formulating the policy and planning lack of proper analysis of the ground reality, arises many hurdles and create another problem instead of solving the existing problems. The following suggestion can be adopted for the development of agriculture in the South District which one of the important cultivated region of the State.

SUGGESTIONS FOR SUSTAINABLE LAND USE PLANNING FOR SOUTH DISTRICT.

i). Multidisciplinary Approach:

Multidisciplinary approach for the identification of priorities to research and adoption of technologies for better utilization of soil fertility and rehabilitation of degraded land (Avasthe, Bhaduria 2006)

ii). Land tenure system:

The land tenure systems in the district have various underlying problems. Without proper land tenure system, policy and planning the development of agriculture and allied sector is not possible. Proper land holding survey, maintaining of land records by using modern and scientific means and methods like computer recording, GIS, etc. will help in the development of agriculture.

iii). Public Private Participation (PPP):

Involvement of local farmers in identifying the problems of land resource, degradation , constraints and opportunities to change land use through research extension and training for the solution to the future generation survivals.

iv).Modification of land tenure system:

Land tenure system in the district has various underlying problems, without proper land tenure planning and policy and proper system, the development of agriculture and allied sector is not possible. Scientific and proper land holding survey and maintaining for future reference by using various GIS and maintaining up-to-date computerize records will help these regard.

v). Promotion of Mix farming: Promotion of mix and rotation practice will be encouraged, these practice insures the failure of crop and retaining of soil nutrient. In the district, The mixed farming set up is naturally the most appropriate farming system for the small and marginal farming units of the Sikkim(Balaraman1998)the maize+soyabean, maize+ginger, pea+oilseed, ginger+pulses+turmeric, rice+vegetable combination and rotation will help the farmers.

vi). Watershed approach:

Watershed approach for the agricultural development with public private participation (PPP) will be encouraged. Watershed approach is an integrated effort of land development for effective soil and water conservation with a view to "in-situ" utilization of rain water for crop production and animal husbandry is the basic approach for watershed management (Verma 1998, Verma, Srivastava 1999). Watershed approach benefits the farmers through improve soil health, better drainage and more efficient use of rain water with the possibility of excess water being store in suitable structure for the use during scarcity period (Misra 1996)

vii). Adoption of modern technologies:

The practice of modern scientific methods of agriculture e.g. green house technology will be strengthened, which can be easily established small patch of land especially in hilly area. As a profession, agriculture is not attractive for educated youths, which is partly due to the drudgeries associated with field work. To motivate the educated youths, agriculture has to be developed as a remunerative and drudgery less industry as comparative as any other industry using agricultural technology like green house (Sunwal,Yadav, Patel 2004). Many a time the modern technologies which is develop for the plain area are push to the mountainous areas without trying

their suitability, which cause various problems and discourage mechanization of farming in the hilly area. The adoption of locally suitable modern technology will certainly boost the production and solved the problem of unemployment and under employment in the district.

viii).Diversification in Agriculture:

Diversification in agricultural sector is strongly related with strong development of infrastructural facility. In the district, diversification of agriculture and allied sector can be done in the field of horticulture, olericulture, floriculture, cultivation of medicinal and aromatic plant as the prevailing condition of physio-climate is suitable for successful practice of olericulture, horticulture, floriculture cultivation of medicinal plants and aromatic plants. Besides, diversification is also an effective way of optimizing the use of socio-capital (e.g. rural labour) in rural areas.



Photograph 9.1Floriculture(Gadulus Flower)

ix). Infrastructural facilities:

Besides, other facilities the availability of market infrastructure and mechanism is very essential for agricultural development. Setting up of regulated market with infrastructural facilities with proper market information along with the development of transport facilities on one hand and encouragement of financial institution and co-operative to investment in agricultural sector is very much needed in the district. With out strong capital input, the question of successful development

in agriculture and diversification in horticulture, floriculture, and other allied sectors like processing, packaging, and cool storage is not possible.



Photograph 9.2 Oreliculture

x). Organic farming:

The entire agricultural practice in the district is shifted to the organic farming practice, as a government policy and the favorable conditions exist in the district. Among all the farming systems, organic farming is gaining wide attention among farmers, entrepreneur, policy makers and agricultural scientists for various reasons (Rai 2005). But proper planning and implementation with proper institutional support are required especially in the case of contamination of products. Certification and marketing of the product are a big challenge due to the certain regulations and laws exist for organic farming products. Keeping in mind, the planners and policy makers should solve these problems by formulating a proper policy and planning, to compete the national and international standards than only the farmers of the district can benefit of the organic farming.



Photograph 9.3 Improved Compost Pit

xi).Alternative Agriculture:

The success of horticulture, floriculture, mushroom culture, medicinal plants cultivation and olericulture is linked with the success of fruit processing units and storage facility, because of poor marketing and transport facility (Mishra & Satapathy 2003). The processing industry can help in shorting out the problem of proper disposal of the perishable commodities. Till today there is hardly any cold storage facility available, only a single fruit processing unit exists in the district but are not to the desired capacity. Use of pre and post harvest practice for horticultural, floricultural, mushroom culture, medicinal plant cultivation is vital for the success of the crops and return to the growers. Unfortunately, this is the weakest spot in the district. Establishment of processing and preserving unit with private participation especially by the educated unemployed youths will solve these problems. Value addition can be given only by establishing these facilities. Production of oleoverin from ginger, turmeric powder making, chilly sauce processing and preparation can be further developed.

xii) Live stock farming and animal husbandry:

Live stock farming is an integral part of the farming community of the district. The rearing of different species of animal (cattle, goat, poultry, piggery etc) is done for draught, milk and meat purposes and these animals also provide manure to meet the crop requirement of nutrient for organic farming. The production of dairy by cattle on small land holding in the rural areas in conjunction with primary agriculture production creates employment and contributes substantially to the domestic income and obtaining better utilization of farm resources.(Avasthe,Pritam, Bhaduria 2002) Rearing of locally adaptable variety of poultry, rabbit, goat and pig can be encouraged.

xiii) Development of farm Fodder:

In the South District, plenty of grasses are available during the monsoon period and scarcity only occurs during winter (Nov to March). The only practical alternative is available to encourage the propagation and planting of tree species and grass (e.g. broom, banana) on village waste and marginal land, community grazing land, out scrub between in and around cultivated farms and terrace bunds etc under the different afforestation programme for their topping of leaves to meet the feed requirement during the lean seasons. The leaf of some fodder trees is almost as nutritious as that of leguminous crops and offers an added advantage of the

production of fuel wood as byproduct. Leguminous fodder trees enrich the site through nitrogen fixing which help in effective soil and water conservation.

xiv) Pre-urban planning:

The pre-urban areas of the some of the revenue blocks in the district has facing the problems of encroachment of agricultural land and forest area, mass movement of soil during monsoon, diversions of water and labour, indiscriminate and haphazard dispose of solid water form the construction, un plan dispose of sewage and effluent etc. All these problems require system oriented research approach to identify the problems on the technical and scientific level. The development of cities has no limit the technical personals should not ignore while formulating land use planning in the district.

CONCLUSION

The land resource in the district is very limited as the district has the mountainous topography where the snow capped mountain, steep slope,(more than50%) dissected precipitous cliffs and escarpments with high drainage density (up to $3/\text{km}^2$) with swift flowing streams and acidic soils. Out of the total 750 km^2 only 12% of the area can be available for agriculture and allied activities. This limited agricultural land is decreasing due to the conversion of cultivable land into non-agricultural purposes, like establishment of industries, expansion of town, construction of roads, hydel-projects and educational institutions etc. The increasing population pressure on the land also leads to the declining of land resources of the district. The density of population in the district is increasing steadily as 44 persons per km^2 in 1981 to 76 persons per km^2 . These increased population leads to the fragmentation of land holding. The pre urban characteristics of most of the small towns is also encroaching the available land resources of the district. The general land use pattern also shows that the total operational holdings is increasing, but these increase in the total operational holdings is due to the encroachment in forest land in the district as the percentage of forest land is declining in the district. The areas under scrub and fallow land have the same tendency. These also show that the intensity of available land is maximum, as the area of fallow land indicates that available cropped area is not leaving for natural reoccupation which is very important for the hilly and mountainous region. The study also shows an increase in the cultivated area. Out of the total revenue blocks, 54.36% registered increase in cultivated area. In the general

land use pattern, the build up area has recorded highest amongst the positive changes of land used in the district revealing the fact of conversion of agricultural land into non-agricultural uses, Amongst the revenue blocks Singithang, Jorethang, Likship, Chisopani, Yangang where the pre-urban characteristics prevails have shown higher percentage of decrease in the cultivated area. The percentages of net shown area also have the declining trends recording 82.90%, 73.37%, 52.42% and 69.04% in 1076-77, 1981-82, 1991-92 and 2001-02 respectively and on the other hand, the percentage of un-cultivated area is increasing having 18.86%, in 1977-78 to 20.34% in 2001-02. These show that the fragmentations of land holding are due to the increase in population, landslide, deforestation, soil erosion, expansion of infrastructural facilities and urbanization in one hand and lack of proper planning and policy in the agricultural development in the district on the other.

These changes of land use in the South District have both negative and positive impact on agricultural development and feature planning for the district. The negative changes are observed in wheat, maize and cardamom cultivated and vegetable cropped areas. The factors which lead to the decreasing of these cropped area are may be social, cultural, economic and institutional. Besides, the changes of food habits of the people also help in decreasing these crop area, e.g. in old days main meal cooked mixing with rice, used as animal feeds and for brewing local sprits but these practice have changed tremendously. The main stable food of the people is rice, and use of animal feeds is decreasing due to the availability of artificial animal feeds as the new improve high breeds are animals domesticated in the district with out studying the local suitability. Another notable negative change of land use is the decrease in main cash crops i.e. cardamom cultivated area in the district. The main factor of decreasing the cardamom cultivated area is low demand in markets due to the stiff competition from the neighboring countries like Nepal and Bhutan. Besides, lack of scientific methods of cultivation and involvement of middle men due to the lack of proper market mechanism has further aggravated the problems of decrease in cardamom cultivation.

The decrease in olericulture (vegetable) cultivated area is due to population increase which leads to the conversion of vegetable cultivated land into the build up area. And urbanization leads to the encroachment of cultivated area as well as transfer of water and labourers for non agricultural uses. The changes of socio - economic and cultural changes out o look of the people also help in the changes, of land use.

Farmers have to choose the market demand crop for profit as the crops for profits as the crop insurance is not available in the district.

The positive changes have shown a variable path for the development of agriculture, and future panning and policy of the district. The positive increase in rice, pulses, and oilseed, potato, ginger and horticulture cropped areas indicated that future agricultural planning should be on these crop oriented. The underlying factors of positive changes of these crops can be summaries as; in the case of rice, the changing food habits give more thrust to change the cropped area and higher price of rice in the district e.g. the locally produce rice get around Rs. 40 per kg and demand for locally produce rice is ever increasing. Still there is a gap between supply and demand and this leads the farmers to shift the other crop cultivated area into rice cultivation. Crops like potato, pulses, and ginger and oil seed have also registered positive change due to less labour intensive, lesser fertile soil and low soil moisture conditions. These crops can be cultivated in the rainfed area. High local demand, market value and non perishable nature of these crops lead to increase of cropped area. Besides, these crops do not required specific facilities after harvesting; they can be stored by using simple traditional methods of storing.

The crop concentration pattern also shows that, the concentration of pulses and oilseed is uniform throughout the district. But the crops like cardamom, potato and horticulture has the tendency to concentrate only in selected pockets. This nature of concentration shows that, the dry land farming practice will be one of the viable, successful, adoptable and affordable agricultural practices in the district.

The crop combination pattern of the district is very interesting. The cropping pattern is mostly maize dominance. Out of the 41 GPUs, maize is the first ranking crop and another 5 GPUs have the cardamom as the first ranking crop. Over all characteristics of crop combination patterns in the district shows the micro crop regions as maize and pulse in western parts of the district, maize and rice in the southern parts and maize and cardamom in central and northern parts. The micro crop region shows that, the dominance of traditional practice of agriculture is still prevails in the district.

The picture of crop diversification in the South District has strong characteristics of mono-crop culture as rice in river valleys, maize in middle altitudes and cardamom in higher altitudes. But this character of mono-crop is not by the

agricultural development and advance farm management but due to constrain lay down by the physio-climatic conditions.

The pattern of crop production in the district shows that the character of regional concentration for crops like rice, maize, cardamom and horticultural crops has regional concentration and in some selected few pockets. But the crops like ginger, pulses, oilseed has uniform characteristics all over the district.

The general infrastructural facilities in the district is steadily developing, but the very important infrastructure and inputs for the agricultural development is lagging behind e.g. negligible irrigation facility, lack of financial and institutional facility and proper market mechanism



Photograph 9.4 Terrace Farming (Means Of Soil Conservation)

The land use pattern in the South District is changing for the last 15 years. The impact of these changes upon agriculture is very significant. The changes have a great impact on the fragile environmental conditions of the district. These impact upon the environment should be counted while formulating the feature policy and planning. In order to maintain the equilibrium between the land use changes and requirement of the local people in the fragile region of the district, the traditional land race-base indigenous knowledge system with scientific modification with locally suitable system would play a significant role for making value addition to the traditional cropping practice (Nautiyal 2001). Intensive farming practice suitable for the low land areas can be disastrous when use on hilly and mountainous areas without proven

technologies and experience promoting deforestation, soil erosion and reducing land productivity(Thakur, Dutt, Sandayal, 2005). Here, study and experimentations of old aged practice of agriculture is needed in modern scientific manner to address the problem of suitability of technologies. As the problem of sustainable agriculture in the district is more in technical and institutional one, involving the limited research and development.



Photograph 9.5 Tea Plantation (Eco-friendly Cultivation)

The physio-climatic constrain which does not allow to flourish the agricultural practice can be utilized into positive approaches. These hilly and mountainous terrain and climatic conditions are very favorable for the horticultural, floricultural, olericultural (especially the chilly in the South District) and medicinal plants cultivation can be successfully practiced. These are new sectors of agriculture where the farmers of the district can diversify their economy. Another emerging important means of sustainable agricultural practice with out disturbing the fragile environmental condition is organic farming; as the farmer of the district is practicing the organic farming from the time immemorial, but not large scale and scientific way. The goal of organic farming is to create a sustainable agricultural system. Organic agricultural relies largely on the locally available resources and is dependent upon the maintaining ecological balance and developing biological process to their optimum. The protection of soil and of the environment is the fundamental of the organic farming (Rai 2005). But it should be supported by the new suitable technologies, which are not only the cost effective but also easily adoptable to the farmers of the

district. Another important aspect while practicing the organic farming is that of contamination of the product due to the lack of knowledge and appropriate technology of packaging and preservation.

But the practice of sustainable organic farming and commercial olericulture, floriculture, as well as organic farming can only be viable depending upon the availability of minimum irrigation facility in the district. In the South district, agriculture is base upon the rainfed and negligible spring irrigation in higher and middle altitudes, due to the sloping nature of the terrain. Rain water runs down very swiftly causing soil erosion and landslide. These problem can be solved by strengthening the old-aged practice of terrace farming, instead of leaving the terrace buns openly, the bun area can be used as hedge grow by planting broom and banana plants which can provide farm fodder from the plants and supplements the income of the farmers selling broom and banana. Another water storage practice for this swift flowing rain water is digging small pond and patches in the cultivated field. These pond and patches can retain the swift flowing waters collecting the wash away soils and helping the recharge of the ground water. In some of the larger field, the size of the ponds can be increase for practicing pesiculture especially for the locally suitable fishes. Besides, roof rain water harvesting can be compulsory to the entire rural households. It can support the recharge of the ground water and can be used for domestic consumption. In the district, as in many revenue blocks this practice is successful practicing by implementing policy and planning.