

CHAPTER - 6

POTENTIAL OF FOREST RESOURCE

6.1 INTRODUCTION

Forest production and protection of the environment are not necessarily incompatible; they are complementary, and there is a great need for people to communicate with the forests (Nayak, 2001). The best way to merge and link the social and productive functions of forests is to make forestry a profitable undertaking in the area. It therefore, becomes very important for us to examine the potential of forest resource of the selected districts. There are several factors on which the potential of forest is dependent which include soil characteristics; rainfall, altitude, temperature, wind, slope aspect, sun light etc. (Guleria & Gupta 1993). Temperature and rainfall are the most important factors which are directly linked with the potential of forest resource. Here an attempt has been made to investigate the potential of forest resource of the area which are directly and indirectly related with the local economy. (Figure 6.1)

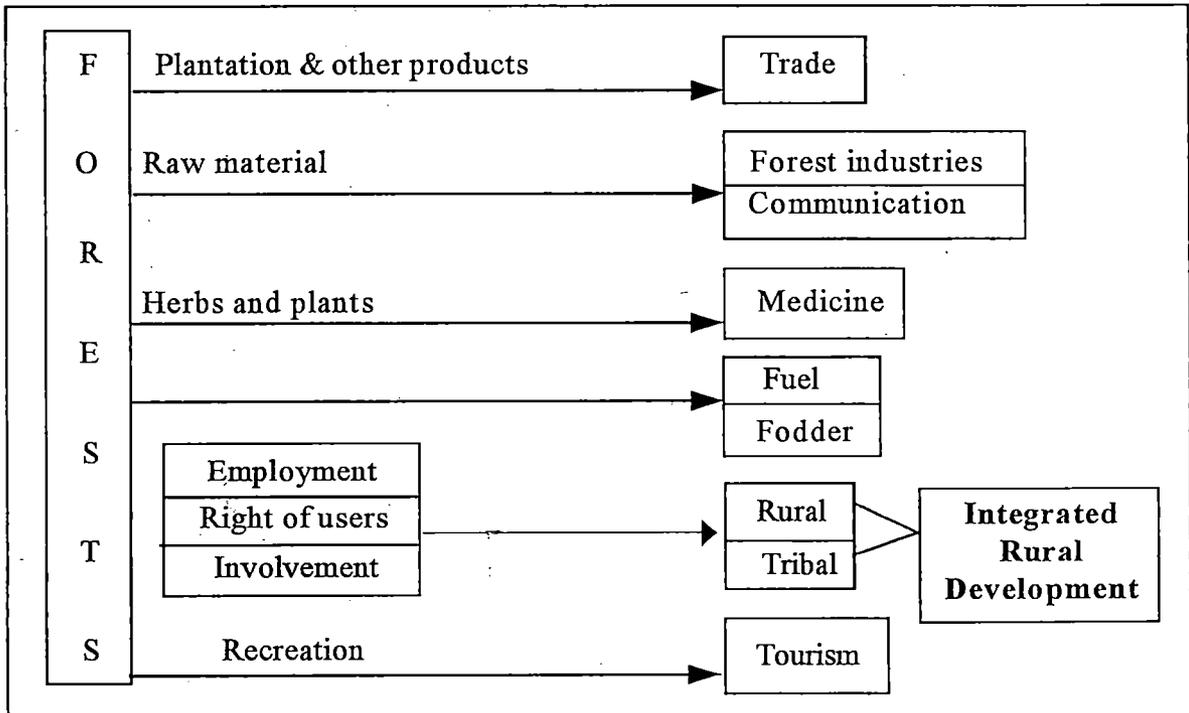


Figure 6.1 - Inter-relationship of forests with the rest of the local economy of the study area.

A picture of potential of various forest resource of the area has been made from the different angles. Estimation of potential of timber including fuel wood, poles and other non-timber forest products of the area is the main task of this chapter. In addition, there are some other elements which are indirectly related with the potentiality of forest products such as employment, wild life, tourism etc. have also been taken into consideration. The estimation of potential of forest resource and other linked elements has been divided into the following :-

- Potential estimation of timber, fuel wood and poles.
- Potential estimation of non - timber forest produces or minor forest produce
- Estimation of employment potential.
- Potential estimation of wild animals.
- Potential estimation of eco-tourism.
- Potential estimation of ecological role of forests.

6.1.1 Methodology

A systematic line of approach has been adopted to estimate the potential of forest resource of the area as par the details given below :-

- Collection of primary data from the field through sample survey.
- Collection of secondary data from the several sources of West Bengal State Forest Department.
- Meeting and consultation with the concerned forest official and other authorities.
- Meeting with the forest villagers, local villagers who are involved in JFM and social forestry activities. A case study on strip plantation has also been undertaken by the investigator.
- Potential estimation of forest resource and employment are calculated on the basis of average trend values of the last few years with the help of time series analysis

6.2 ESTIMATION OF POTENTIAL OF TIMBER, FUEL WOOD & POLES.

An attempt has been made to estimate the annual potential of timber, fuel wood and poles which are given in table 6.1. Estimation has been done for the hill forest and plain forest

separately. It is observed from the table that the potential estimation of timber in the hilly regions of the study area is more than that of plain areas. The Northern hilly tract still possesses a fair amount of natural dense forest with variety of species (Nagarik Mancha,2000). The average annual productivity of hill forest is 12.5 cu.m./ha. where as it is 5 cu.m/ha. in case of plain forests of the area. This is because of the good amount of rainfall, suitable soil, temperature, which help to grow natural vegetation of the hilly area. Average auction price of the timber of the plain forests is more than the hill forest . Timber of the plain forests mostly consist of Sal which is more economically valuable species and best quality in the country.

A huge amount of money is earned by the forest department every year from the sale of timber, fuelwood and poles through auction. Here average auction prices of the forest department have been taken into consideration to give the total value of estimated potential of timber, fuel wood and poles.

Table 6.1

Potential value of timber, fuel wood and poles in the study area.

SI No.	Forest products	*Estimated quantity(Annual)	Average auction prices (Rs.)	Total value (Rs.)
1	2	3	4	3 x 4
1.	Timber (in c.ft.)	1,12,000 (hills) 59,850 (plains)	500.00 600.00	5,60,00,000 3,59,10,000
2.	Fuel wood (in stack)	2,210 (hills) 10,200 (plains)	130.00 130.00	2,87,300 13,26,000
3.	Poles (in number)	3,310 (hills) 1,610 (plains)	80.00 80.00	2,64,800 1,28,800
			Total Rs.	9,39,16,900

* The estimation above are based on 1994 - 2001 data.

Source - Annual Reports of Forest Department, Jalpaiguri and Darjeeling districts,
Govt. of West Bengal.

6.3. POTENTIAL ESTIMATION OF SOCIAL FORESTRY

“Social forestry” identified by the Forest Department as growing of trees on lands not held by the forest department. The department feels that trees grown on these lands would meet the needs of rural population for fuel and fodder. In its broadest meaning “Social forestry” must be defined as the establishment of fuel food-fodder production system on uncultivated land within and outside the jurisdiction of the forest department. Social forestry not only check the depletion of forests by providing an alternative source of livelihood to persons who presently depend on forest exploitation, but also improve the standard of living of the villagers by increasing productions on uncultivated and unforested lands.

Social forestry in the study area was launched in 1981-82 with the assistance from World Bank to make rural areas self-sufficient in their daily needs of forest products so as to act as catalyst for over all rural development and to utilize the waste and barren lands along the roads, canals, railway lines. Social forestry in the area covers strip plantation and farm forestry. At present social forestry supplies major quantity of the raw material to wood based industries in the study area. The importance of social forestry is increasing after the imposition of restriction on natural forests by the Honourable Supreme Court of India. It is one of the important source of timber of local wood based industries (Sinha, 1997).

6.3.1. A case study of harvesting of social forestry

Social Forestry has great potential to generate a large amount of revenue for the Panchayats. A case study of harvesting of social forestry has also been considered to measure the exact potential of social forestry. 17 ha. of strip plantation was raised on Falakata - Madarihat state P.W.D. road site during 1986 by Falakata S.F. range and on 21.06.1989, it was handed over to Moyradanga Gram Panchyat and Chotto Salkumar Gram Panchayat under Falakata Panchayat Samiti after 3rd years, for its further maintenance and protection. The said strip plantation was recommended for harvesting and replanting by Cooch-Bihar Social Forestry Division during 1996-97. It was also decided that the harvested produce will be disposed off through auction by Cooch Behar Social Forestry Division. The following is the result of such harvesting and subsequent disposal :-

a) Year of plantation	:	1986	
b) Area	:	17 ha.	
c) Spacing	:	Row to Row	
d) i) Planting density	:	2000 number. per ha.	
ii) No. of trees planted	:	34000	
e) Species planted	:	Kadam, Gamar, Sirish, Akashmani, Sissoo, Chikrasi, Champ, Teak, Jarul, Neem, Jam, Radhachura, Mango and Kanthal.	
f) Year of feeling	:	1996	
g) Number of trees felled	:	1073	
h) Volume of harvested produce	:	i) Timber 177.414 (cu.m.) ii) Fire wood - 75 stacks.	
i) Amount of sale proceeds	:	i) Timber	Rs. 11,45,476.00
		ii) Fire wood	Rs. 9,750.00
		Total	Rs. 11,55,226.00
j) Creating cost including 3 years maintenance	:	Advance work	Rs. 6,716.40
		Creation (1986-87)	Rs. 91,016.92
		Maintenance (1987-88)	Rs. 16,621.28
		(1988-89)	Rs. 11,552.18
		Total	Rs. 1,25,336.60
k) Harvesting cost including felling, marketing, carriage logging, stacking etc.	:		Rs. 1,01,934.00
l) Cost of replanting	:		Rs. 3,06,000.00
m) Net surplus out of total sale proceeds handed over to Falakata Panchayat Samity	:		
[i - (j+k+l)]			Rs. 6,21,926.00

Source : Annual Report of Cooch Behar Social Forestry 1997. Forest Deptt., Govt. of West Bengal.

It is observed from the Falakate case study that the each hectre of land under social forestry generated Rs. 36,589.00 (17 hectares of land yielded Rs. 6,21,926.00) in 10 years rotation. It is also noted that out of 34,000 trees planted only 1073 survived i.e survival percentage was only 3.16. The enumeration of growth data in Jalpaiguri district indicate that with the proper selection of species, it is possible to attain Girth at Breast Height (GBH) of more than 90 cm. in almost 50% plants. It is also possible to reach a target of 50 % survival rate in this district under its favourable environmental setup.

It is further reveals from the above analysis that an optimum net surplus of Rs. 5,79,000.00 per hectre could have been realised, if 50% survival rate was achieved in the said plantation and maintained properly by selecting beneficiaries and adopting appropriate technical measures viz. proper selection of species using improved planting materials, maintains optimum spacing etc. However, the case study proves the point that strip plantation if properly protected can generate a huge amount of revenue for local Panchayats and provide rural development besides improving quality of environment and micro-climate of the region. These strip plantation would also help in meeting the raw materials demands of local wood based industries.

6.3.2 Projected Potential of Social Forestry

The Falakata case study conclusively proves the point that social forestry if properly protected can generate huge ammount of revenue for panchayat and provide rural development besides improving quality of environment and micro-climate of the region. Social forestry would also help in meeting the raw materail demands of local wood based industries. Further more, with the introduction of superior clonal planting materials, soil amendment etc; it is posible to attain 90 cm GBH growth for all plants and average yield of upto c.ft or 0.8cu.m per tree in 10 years under suitable condition.

The study area has ample seope to plant trees along road side, river bed, school compound, waste land, embank ment, railway side and other public places under the scheme of social forestry (Photo 6.1 & 6.2). An attempt has been made to estimate the area would be available for plantation from the following table (6.2).



Photo 6.1 Social forestry on the river bank at Domohini.



Photo 6.2 Social forestry on the school compound at Jalpaiguri.

Table 6.2

Potential area for social forestry expansion

Sl.No	Nature of land	Total available area in hectre	Number of trees planted	Number of trees to be harvested (50% survival rate)	Expected net revenue in million Rs.
1.	Road side	600	12,00,000	6,00,000	347.4
2.	Railway side & abundant Railway land	300	6,00,000	3,00,000	173.7
3.	Embankments	150	3,00,000	1,50,000	86.8
4.	River bed & bank	2400	48,00,000	24,00,000	694.8
5.	School compound	90	1,80,000	90,000	52.1
6.	Other public places including waste lands	12000	24,00,000	12,00,000	1389.6
	Total	4740	94,80,000	47,40,000	2744.4

Source: Sample Survey, Reports of Forest Dept. and DL & LRO Departments.

Thus, social forestry along can generate a revenue of Rs. 2744.4 million in Jalpaiguri district alone within a period of 10 years rotation. This huge amount of additional fund would have been available to the local Panchayats for various developmental and poverty allevation schemes.

In addition to this, social forestry scheme would also generate huge employment opportunity. The Falakata experiment may also be used to estimate employment potential of social forestry in Jalpaiguri district. The following table depicts the details of social forestry in Jalpaiguri district (Table 6.3). It is observed from the table that it would be possible to generate over 2 million man-days of employment among the rural unskill workers. Considering 180 working days per year, the proposed social forestry would also support 11000 rural families.

Social forestry would also be provided rural families with fuel and manure. It is estimated by the investigator that on an average a tree would provide 2 quintals small twigs, branches and leaves which is approximately equivalent to Rs. 60.00 (after deducting labour cost). Thus, 4.74 million trees would also generate Rs. 284.4 million.

Table 6.3

Employment potential of social forestry in Jalpaiguri district *1

Sl.No.	Nature of work	Cost for the work *2	Man - days needed *3 (in million)
1.	Land preparation	3.40	56,650
2.	Tree planting	27.80	4,63,300
3.	First 3 years maintenance	9.80	1,63,300
4.	Harvesting	24.70	4,11,700
5.	Replanting	54.60	9,10,000
	Total	120.30	2,004,950

*1 Considering total potential area of 4740 hectre.

*2 Estimation of cost at per 2002 rate.

*3 Rs 60.00 is the per man-day cost.

The estimated total revenue generation of potential social forestry would be Rs. 3 149.1 million in Jalpaiguri district alone. The present investigator strongly believes that if this vast potentials tapped properly, the rural socio-economic scenario of the district will be changed.

6.4. POTENTIAL ESTIMATION OF NTFPs OR MFP

NTFPs are drawing greater attention today as this can supplement livelihood and income generation to the fringe people. Varieties of NTFPs are collected by the fringe people in the study area. Few small scale industries have been established in the area on the basis of different NTFPs. Production and collection of different NTFPs in the area involve huge number of employment to forest villagers. Scientific exploitation of NTFPs can reduce the increasing pressure on natural resources. Economic condition of the study area can be developed with the proper exploitation of NTFPs. So there is a need to study the potential of such resource. A potential estimate of some important NTFPs in the study area has been done on the basis of average annual production which is given in table 6.4

Table 6.4
Potential estimation of NTFPs

Sl No.	Name of NTFPs	Unit	Rate (Rs.)	*Estimated quantity (annual)	Total value (Rs.)
1	2	3	4	5	4 x 5
1.	Citronella Oil	Lt.	400	3,000	1,20,000
2.	Black Pepper	Kg.	300	458	13,740
3.	Turmeric (Green)	Kg.	1000	613	6,13,000
4.	Sal Plates (finished)	No.	1.25	1,00,000	1,25,000
5.	Sal Seed	Kg.	20	5,100	1,02,000
6.	Phul Jharu (finished)	No.	10	4,800	48,000
7.	Bamboo (Matured)	No.	30	10,120	3,03,600
8.	Cardamom	Kg.	200	310	62,000
9.	Cane	Bundle	200	108	21,600
10.	Golden mushroom	Number	5	40502	2,02,510
11.	Others **	-			8,00,000
Total Rs. -					24,11,450

Source- Annual Reports 1994 - 2001 Forest Department Govt. W.B. * Estimation are based on 1994 - 2001 data and field observation. ** Other include 158 species of trees, shrubs, herbs of which 20 are more important like Khata, Sabai, Chirata, Til, Satamul etc.

6.5. EMPLOYMENT POTENTIAL

So far we have discussed many advantages of forest in terms of forest produce and environmental quality; but in terms of employment opportunities the contribution of forest is very high specially in the rural areas. Investment in forestry sector has employment potential as it is highly labour intensive (F.A.O, 1974). In labour surplus countries like ours, the investment priorities ought to be decided in terms of employment potential of different schemes, even though they contribute a low proportion to Gross National Product and National Economy. Though forests contribute very little to state exchaquer, yet forestry

by itself can provide large employment both directly by engaging persons in forests and indirectly in many forest based industries. It provides employment opportunities through management of forests, in lumbering, logging, plantation, collection and processing of various minor forest produce, swan wood, transportation and social forestry schemes. Forests of the area have great employment potential. Forest of Darjeeling and Jalpaiguri district provides a large number of mandays every year in addition to regular employment. Employment potential of forests of the districts is given in table 6.5

Table 6.5
Employment potential of forest of the study area

Sl. No.	Forest area	Annual employment potential (man days)*
1.	Hill area	1,10,782
2.	Plain area	3,10,720
	Total	5,21,502

* Employment potential estimated on the basis of 1994-2001 data.

Source - Annual Report, Forest Department, Darjeeling and Jalpaiguri.

Employment potential of forests in the area depends upon the developmental work of the forests which will be organised by the forest department. Baikunthapur forest division has created 1,86,108 man days in the year 1998-99 whereas Darjeeling forest division has created only 37,312 mandays (Annual Report 1998-99). This is because of the difference in nature of activities of the forest divisions.

6.5.1. Employment potential of wood based industries

A sample survey has been conducted by the investigator to find the present pattern of employment of wood based industries in the area. On the basis of the sample survey, a picture of average employment in various wood based industries is given below in table

6.6. It is revealed from the table that the number of daily employment in the wood based industries has been estimated at 13,508. This number will remain static in years to come if these industries are properly managed and protected.

Table 6.6
Present pattern of employment in some wood based industries.

Sl. No.	Nature of Industry	Employment (per day)		Total *	Number of industries and total daily employment
		direct work	indirect work		
1.	Saw mills	15	10	25	162 x 25 = 4650
2.	Plywood and veneer	16	12	28	131 x 28 = 3668
3.	Furniture making	8	4	12	405 x 12 = 4660
4.	Box making & others	6	4	10	113 x 10 = 1130
					Total = 13508

* Constructed on the basis of average data of daily employment in several wood based industries.

Source- Office of the C. F. Northern Circle, Forest Department, Office of the Timber Merchant Association, North Bengal and District Industrial Centre- Darjeeling & Jalpaiguri.

6.6. WILD LIFE POTENTIAL

The potential of wild life is closely related with the floral type found in the area. The study area has a large variety of flora. Moreover, the different types of climate are found in the districts which has resulted in the existence of wide variety of fauna. Tiger, Elephant, Rhinoceros, Bison, Leopard, Sambhar, Spotted deer, Hog deer, Wild bear, are the important animals which are found in the forests of the plain regions. In the northern hilly parts, the important animals which are generally found are Red Panda, Cat bear, Garal and Black bear. About one third forest area of the districts is under protected network. The objective of wild life management in the area is to protect the life of these animals and maintained the bio-diversity and eco-system. The state government has identified some protected areas for the conservation of wild animals which include three national parks, one tiger reserve and five wild life sanctuaries. Buxa Tiger Reserve, Jaldapara Wild Life Sanctuary and Gorumara National Park are the protected areas which have higher poten-

tial in respect to wild animals. The over all conditions of wild life in the area is not satisfactory. The total number of Bengal Tiger in the year 1993 was 40 and in 1997-1998 it was 57 which gives an increase of only 17 tigers within 5 years. The number of elephants have increased only by 42 from the year 1996 to 2000 (As per Elephant Census, 2000). Similarly the number of Rhinoceros was 58 and 66 in the year 1996 and 1998 respectively

Only 8 have been increased within the 3 years which is not very significant from the conservation point of view . Some important issues emerge in the ecological and wild life protection in the study area. These are biotic pressure and interferences by the forest villagers, degradation by dolomite mining, shifting of river courses and excessive movement of tourists in the forest areas. These factors are responsible for the destruction of wild animals in the study area (Ghosh & Nandy, 1997, Working Plan, 2000).

A quantitative potential estimation of wild animal in the study area is not possible as several factors are associated with life of animals. The most common factor is natural death or injury . An estimation has been prepared which is given in table 6.7

Table 6.7
Potential of wild life

Sl No.	Name of animals	Potential estimation (annual increase in numbers)
1.	Bengal Tiger	3
2.	Rhinoceros	3
3.	Indian Gaur (Bison)	30
4.	Elephant	10
5.	Small animals such as fish eating crocodile or Gharial	High potential in Jaldapara, Madarihat and Kathambari Bill, Odlabari.
6.	Migratory species	High potential. Rivers of Raydak & Jayanti, Rasik Bill, Jaluapara, Narathali lake and Kathambari Bill are visited by various migratory species every year.

Source - Records of wild life division - I & II, B.T.R, Forest Department, Govt. of West Bengal.

6.7. POTENTIAL OF ECO-TOURISM

The study area has a high potential to develop eco-tourism which can boost up the local economy. Eco-tourism has also employment potential. It provides a large number of employment directly and indirectly every year (Boo, 1990). There are some national parks, tiger reserve and wild life sanctuaries in the area which are the main attraction of the tourists. Jaldapara W.L.S., Gorumara N.P. and B.T.R. are the important centres which attract more than 40,000 tourists every year. At present, the forest department has set up some Nature Interpretation Centres (N.I.C.) near the natural forests of the area which are getting more attention to nature lovers tourists. On overall basis, the area can attract more than 1,50,000 nature lover tourists at the different eco-tourism spots every year. In addition, the forest department of the area has created some picnic spots near the natural forests through which a good amount of revenue is collected every year. It provides a large number of employment to the forest villagers. The Mangpong and Kunjabehar picnic spots are visited by more than 500 picnic parties from the months of December to February every year.

6.8. ECOLOGICAL POTENTIAL OF FOREST

Forest affect the environment very substantially. They moderate the climate, maintain soil fertility and regulate water supplies. By the process of photosynthesis the plant take carbon-di-oxide from atmosphere and release oxygen thus purifying the air. Forests have great potential to control rainfall and contribute largely towards moderation of flow of water in the catchment areas. They also offer protection to soil against erosion by wind and water (Chandra Sarkar, 1971).

Forests of the sub- Himalayan North Bengal have high potential to maintain the ecological balance of the regions. The most important environmental event in the northern hilly tract is landslide during the rainy season. Extensive heedless deforestation is responsible for landslide in the hilly part which cause heavy damage to property and human life every year (Dutta, 1966 & Sarkar, 2000). From the field survey it has been found that landslides generally occur in deforested areas. Paglajhara is one of the important landslide prone area where the rate of degradation is more than 50% of total forest areas. On the other hand, the eastern part of the river Mahananda and riverine tract of lower Balason river

are the landslide free zones. This is because of the fact that these tracts are still under dense natural forest cover with variety of species. Large scale afforestation is an important step taken by the forest department to control massive landslides in hill areas. During the 1998, 225 ha. of landslide affected areas has taken for plantation by the forest department of Darjeeling district. (Annual Report 1998-99, Darjeeling Forest Division). Moreover 447.50 ha. of lands (Annual Report 1998-99, Darjeeling Forest Division) were taken for plantation at different places of Darjeeling hill areas in the year 1997 with R1, R5, R6, R7, P1, P2 & P5 models of species. This has apparently given increasing result and no further damage has been occurred during 1999-2000. In the year 1998, 265 ha. of lands were also taken for plantation with R1, R2 and R5 models of species (Annexure - 1). Nodoubt, this plantation will protect the hill area from massive soil erosion and landslides.

Forests of the study area have also great potential to contribute rainfall and recharge the ground water. It also played a significant role in moderation of landslide, flood and erosion hazard.

6.9. CONCLUSION

Though the potential productivity of the forest in the study area is much higher, the actual production is much less. Intensive silviculture should be adopted to increase the productive potential of forest which is neglected in many cases like weeding, cleaning and finally periodical thinning in forest plantation. NTFPs should be exploited on sustained yield basis. More involvement of FPC member should be arranged in the different activities of forests specially in the collection of NTFPs. This will provide a large number of employment in the forest villages.

The potential of social forestry in the study area should be increased. Social Forestry can reduce the excessive burden on natural forests. More over, it is a programme of income and employment generation at the village levels. In order to achieve the full potential of social forestry it is essential to have infrastructural development at Block and Gram Panchayat levels. It is essential to develop modern nurseries at the block levels to cater needs of superior seedlings not only for strip plantation but also for distribution to individual farmers in order to improve productivity both at community as well as individual levels. It is also felt that apart from setting up of modern nursery, there is a need of posting forest

officers of the rank of range officer at the block level with specific job of planning at micro level, implementation of social forestry schemes, from nursery to harvesting age.

In order to achieve the full potential of wild life, some natural forest area should be strictly protected. At present, the movement of tourists on natural forest have been increased largely. The movement of tourists should be controlled so that the natural habitation of wild animals will not be disturbed. Dolomite mining in Jayanti hill of Buxa Tiger Reserve should be restricted. The mining activities cause heavy damage to wild life. Other problematic issue on bio-diversity conservation is the increasing man animal conflict due to loss of habitation and increase in population of wild animals in excess of carrying capacity. Therefore, the damaging animals in excess of carrying capacity should be regularly cutted/captured and transferred, restoring habitat by local closure in protected areas and not encouraging introduction of exotic species. Bamboo, banana and grass should be introduced in appropriate areas particularly for the food of the Elephant.

Ecological potential of forest of the area can only be achieved through the large scale afforestation programme at the government and private levels. Degradation of forest which reduces the ecological stability of the region should be stopped by the forest department. Village people should be motivated about the inter-relationship of man and forest. More awareness programme on forestry and involvement of local people in various activities of forest can only provide the full ecological potential of forests in the districts.

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