5. Discussion

The present study of forests of district Bankura, West Bengal, revealed many facts that was previously not studied or rather informed. Those can be discussed under the following heads of priority for forest.

A. Forest cover on record and the ground reality at present.
B. Changes in the composition of forest species.
C. Increasing influence of the plantation of exotic species and the subsequent effect.
D. Focus on proper classification of forests.
E. Need for framing up of the conservation policy.

A. Forest cover on record and the ground reality at present

As per records made available during the present study, there was 1482 sq. km. of forest in the district Bankura in 1966 (Anon., 1966). The figure is still the same according to the present report of the Department of Forests (Anon., 2011). However, the forest map of 1964 (Anon., 1966; Map 5) and the present forest map (NRDMS, 2011; Map 8) based on satellite image if compared, shows the ground reality as much less forest as shown in the present map. The comparison of the present survey work with the Survey of India topographic sheets (r.c.) reveals the same fact which may be caused by deforestation in between 1966 and 2004. It is noted that the present study began in 2004 and ended in 2012. On investigation it is found that this amount of forest land is in the possession or under control of the department of forests in this district. The present study reveals that the claim of existence of 1482 sq. km. of forest is not true in sense that as many pieces of fragmented forests are deforested during this time from 1966 to 2004 and later. The areas severely affected by deforestation lie under the ranges of Bankura. According to the degree of deforestation or conversion as observed during this study, these areas are Beliatore, Gangajalghati, Onda, Indpur, Simlapal, Pirrorgari, Chhatna, Khatra, Taldangra and Saltora.

The comparison of the present ground situation and the Survey of India topographic maps, it is found that atleast 17% areas among the total surveyed area of the present study are now barren. Which was previously covered by Sal forest or
Mixed forest according to the Survey of India maps as shown in the survey records between 1971 to 1981. So it can be told that there might be 1482 sq. km. of forest lands in possession of the Department of Forests but that does not ensure existence of forests within this total area. Moreover, excluding this 17% area some of the Sal forests and Mixed forests were again converted into plantation forest by the exotics like Acacia and Eucalyptus. It is also further observed that some areas of the forests were cleared off for the cultivation by interference of local communities. Now this cultivation is also failed due to scarcity of water and thus the land is left barren as observed in the area around 23°10'18.81" North × 86°56'58.34" East. This is another event of deforestation that has contributed to the fragmentation of forest. However, those areas are also claimed to include as forest in the report of the department.

B. Changes in the composition of forest species

As already stated in the chapter 4.3.1 that many areas marked as Sal forests in the forest maps are now converted into plantations of Eucalyptus, Acacia or many other plantation tree species. It is now a matter of great concern that with the destruction of Sal forests, the composition of species in the forests is gradually changing. The number as well as the kinds of species in the community is also changed. The changing pattern as observed is presented in Diagram 1. The immediate effect of this change as observed in the present study can be categorized as follows:

I. Effect on retention of soil moisture;
II. Effect of habitat alteration on wildlife;
III. Disappearing or decreasing number of indigenous plants;
IV. Effect on production of non-timber forest products;

I. Effect on retention of soil moisture

The presence of deep Sal forest helps in maintenance of water table of the soil and extends availability (Anon., 2008). Most of the exotic plantation forests cannot form such dense forest in this arid land that can prevent drying of soil during late winter and summer as these plantation forests cannot form thick perennial undergrowth as they are
still unable to form association with other shrubby or herbaceous species of this semi-arid zone (May and Ash, 1990). They lack their natural association here. As a result, plantation of these trees in deforested drier western and north-western part of the district proves detrimental to soil quality. During late winter and summer, these areas fall under severe draught. Whereas in the southern part of the district under Ranibandh range it can escape such severe draught due to the presence of thick Sal forest in spite of the fact that the area is hilly and wavy.

II. Effect of habitat alteration on wildlife

Vanishing wildlife is a common fact in all places as well as in this district also. The fact was ignored until herds of Elephants from Dalma range, Jharkhand, invaded the cultivated lands of southern Bengal especially Purulia and Bankura districts of West Bengal in the late 1980’s. Only from that time the fragmentation of forests due to cultivation was considered as a major cause of loss of habitat for wildlife. It is evident from the reports that the cultivated land, near or inside forests, most of which actually comes under the 1482 sq. km. of forest cover claimed by the department of forests, are worst affected by the present regular entry of elephants and their more or less permanent occupancy. The habitat loss for elephants gained importance as it creates problem and economic loss to human beings. However, effects on the other wild animals of this area are unnoticed.

III. Disappearing or decreasing the number of indigenous plants

By the help of the quadrate study it can be estimated that with the loss of 1 hectare of Sal forest about 70 plant species of indigenous or naturalized exotic plants lose their habitats. Conversion to exotic plantations in those places bring back a few of them but as observed (Table 9) many could never return. This way the district lost its treasure of plant diversity in this part and the process is not stopped at present.

There is no such association of rich plant diversity that could be found till now which can occur in this environment as a substitute of Sal
forest. So, any conversion in forest species is resulted into the loss of diversity as well as loss of habitats to the wildlife.

IV. Effect on production of non-timber forest products

With the loosing plant diversity, the supply of forest based natural products are also decreasing and thus causing loss of income to the people involved in such jobs. Due to the coppice Sal system of forest management, only the tree species that produce coppice survived and the other species are gradually decreasing. NTFP yielding plants are worst affected.

C. Increasing influence of the plantation of exotic species and the subsequent effect

Due to the formation of large exotic tree plantation the ecological role of forest is converting into the economical one. As an immediate effect of which a handsome income is projected. However, this conversion in long run ends up into draught prone barren lands as seen in the areas of 23°10’23.90”North × 86°56’45.48”East, 23°09’04.23”North × 87°07’33.03”East etc. where even these exotic plantations are now not growing without care which may not be viable commercially as well.

Most of these exotic plantation trees do not have their natural association of plants. So, they do not form any stable climax forest that Sal forest does. The exotic plantation trees engage into temporary association with very few of the indigenous species and other exotic species and rapidly use up natural fertility of the soil. Seldom there is any stable nutrient cycle in these artificial forests that can maintain itself and keep the soil fertility in optimum level that a climax forest like Sal forest can do. So, the continuing plantations for several years with these species end into used up soil and subsequently there is the formation of barren land.

The increasing popularity of exotic tree plantation in land of previously cleared Sal forest mainly in dry areas may look attractive due to generation of some initial income but end up into a barren land in which regeneration of Sal forests with least effort may not be possible for long time due to modification in soil characteristics by the exotic plantation of trees (May and Ash, 1990). The subsequent deforestation
also leave ill effect on water table as it goes deep causing hardship to the human community severely.

**D. Focus on the proper classification of forests**

Classification of forests provide useful information about sustainable management of forest. Area specific classification is needed to check the trend of conversion in forest species composition. It will help in conservation of plant diversity in drought prone western part of the district. In this semi-arid district, hedges near roadsides and villages, unclassified forests, etc. also have much ecological role as in the case of managed and protected forests. Any type of tree or vegetation cover can help to retain moisture in soil which in turn may contribute to the reduction of draught and avoid chance of desertification. A proper classification of all types of forests can provide guideline towards the initiation for the conservation of those resources. In this present study such an initiative is taken up.

**E. Need for framing up of the conservation policy.**

Based on the present study it is revealed that the natural as well as Sal forests of the district harbour most of the indigenous species (Table 5 & 6). From the composition, *Butea* forest, mixed forest, mixed Sal forest and hedge forests can be considered as natural as they hold most of the stands of indigenous plant species.

From the present study as well as from forest records (Anon., 1966) it is also clear that fragmentation of forest is a result of deforestation in the past for cultivation. It is also evident from various sources like forest and Survey of India maps, satellite maps, forest records (Anon., 1966) and the present study that most of the lands opened for cultivation deep inside the forest are now abandoned and also fragmented the forest. Due to this fragmentation forest lost compactness (Anon., 1966) as observed in this present study.

The flora of Bankura was studied by Sanyal (1994) which was estimated with 938 species under 575 genera belonging to 139 families. Present study on the forest flora of Bankura is now estimated to have 602 species under 403 genera belonging to 98 families. However, there are some new reports as good as 8 species like *Ceropegia hirsuta* Wt. & Arn., *Eriolaena hookeriana* Wt. & Arn, *Flacourtia jangomas* (Lour.) Raeuschel, *Pancratium zeylanicum* Linn., *Phoenix acaulis* Roxb.,
Rhynchostylis retusa Bl., Zeuxine strateumatica (Linn.) Schult., Ziziphus xylopyrus (Retz.) Willd. (Chapter 4.3.6) which were not recorded by Sanyal (1994) in his previous study. As a whole, Bankura is with much rich floristic composition with trees, shrubs, herbs, etc. and so also the liana, climbers, creepers, epiphytes, parasites as well as marsh-aquatic plants.

The forest regions of Bankura 1482 sq. km sharing as 21.53% of the total of Bankura district as 6871.24 sq. km. Thus there is a significant number of floristic estimate having good diversity of species, genera and families as well. So, the forest of Bankura district is still richer.

Plants are more diverse in case of Sal forest and gradually loosing their composition in plantation forest. The degraded or fragmented forests are with the entry of many exotic species.

The association of the plants in different types of forests are different as due to the changing pattern of forest composition.

Phenological data indicates that the forest of Bankura district is with three distinct periods. Most of the trees are flowering during January to March. The shrubs and herbs are flowering either in the post monsoon period or during winter.

The floristic Diversity is much rich in all forest than that of the hedge forest. Similarly, floristic composition is least in the fragmented forest as well as in the plantation forest due to lack of association within them.