SUMMARY
Tropical forest ecosystems are complex and rich in biodiversity due to variability in seasons and distribution of rainfall. Within the more or less similar climatic conditions, these forests exhibit variations in floristic structure, composition and phenological events, due to variations in edaphic and biotic influences.

Scientific knowledge pertaining to structure, composition, dominance, diversity and classification is greatly lacking particularly in relation to tropical dry deciduous forest occurring in Sagar district. Although some information about forest types is found in literature which appears to be superficial. There is an urgent need to workout details of vegetation ecology of these forest communities to understand their structure and function before formulating strategies for conserving them.

The present work is an attempted to evaluate the current status of forest vegetation of Sagar district. The following aspects were taken into consideration to workout the vegetation ecology of these communities.

- Study of phytosociological attributes including qualitative and quantitative aspects, diversity and physiognomy of forest communities occurring on different formations;
- Study of floristic structure and composition, biological spectrum and vegetation profile;
- Classification of vegetation of entire district;
- Study of edaphic characteristics and their correlation with distribution of forest communities;
- Identification of different forest community types and to find out strategy for conservation.

Present study was carried out in Sagar district located between 23°10' to 24°27' North latitude and 78°04' to 79°22' East longitude. Natural Vegetation of district comprises of tropical dry deciduous type of forests. To study different aspects of vegetation ten forest sites namely Patharia (1), Mainpani (2), Jaruakheda (3), Rahalgarh (4), Bahadurpur (5), Ramna (6), Ranipura (7), Gopalpura (8), Baraytha (9) and Mohli/Nauradehi (10) were selected covering all the Tehsils of the district. These forest sites occur on varying rock formation and soils and vegetation are continuously affected by varying intensity of biotic influences. Mainly two major formation are found in this area viz. basalt and sandstone. However, others are also met at different places.

Interestingly, there was a study available done during 1952 at the Patharia complex. In the present study the same complex was again studied to find out changes in vegetation and other aspects after 50 years of time period.

Different ecological aspects of these forest communities were analysed by selecting uniform stands at representative sites selected. At times an account of variation, the main site was divided into subsites. Quadrat sizes of 100 sqm, 25 sqm and 1 sqm were considered for trees, shrubs and herbs respectively. Importance value index (IVI), relative
importance value (RIV), distributional pattern, similarity index, species diversity, beta diversity and concentration of dominance were computed for phytosociological study.

On the basis of IVI, six forest types were identified in Sagar district. They are named after the dominance of tree species in each kind. The forests types are:

*Acacia leucophloea* and *Diospyros melanoxylon* type;
*Anogeissus latifolia* and *Tectona grandis* type;
*Tectona grandis* and *Diospyros melanoxylon* type;
*Tectona grandis* and *Anogeissus pendula* type;
*Diospyros melanoxylon* and *Lannea coromandelica* type;
*Tectona grandis* and *Terminalia tomentosa* type.

Results showed that in general *Tectona grandis* appears to be the dominant tree species on seven different sites studied. However, it was co-dominant or next to dominant species on rest of the sites. Therefore, most of the vegetation types are teak (*Tectona grandis*) dominating or teak associating forest types. The other associated species were *Diospyros melanoxylon*, *Lagerstroemia parviflora*, *Lannea coromandelica*, *Anogeissus latifolia*, *Cassia fistula*, *Aegle marmelos*, *Butea monosperma* and *Terminalia tomentosa*.

By and large, the shrub vegetation was consisted of *Lantana camara* as dominant species and *Carissa spinarum* as its associate at most of the site excepting a few variations. Ground flora consisted of *Cassia tora* as dominant herb species which is at places replaced by *Eragrostis tenella*, *Sida veronicaefolia* and others.
Contagious distribution is the most common pattern exhibited by trees, shrubs and herbs layers. However, some species showed random distribution. Results are in agreement with others as they also come out with the conclusion that contagious distribution is most common type of pattern found in most of the communities. All the communities were found to have heterogeneous structure, which is a very common character of natural vegetation.

Results pertaining to species diversity showed highest diversity index of trees (3.66) and herbs (3.04) at Baraytha (site 9). On the other hand, comparatively less, however, maximum diversity index (1.86) was observed for shrubs at Ramna (site-6). Considering the vegetation of whole district, species diversity ranged from 1.26 to 3.66. Results indicate that the vegetation still posses comparatively higher species diversity even after under continuous biotic influences. It may be attributed to greater heterogeneity of the physical conditions and a greater potential of regeneration and hardiness of the species.

The values of concentration of dominance were generally low in all the communities studied showing dominance shared by more than one and/or many species.

At all the sites, trees and herbs communities showed log-normal dominance diversity curves. These curves are indicative of shared resources pattern by a number of species and mixed nature of vegetation. On the contrary, shrub layers showed geometric series of dominance diversity curves showing low diversity and less sharing of
resources. Results of beta diversity indicates that the communities were having beta diversity index from 0.2 to 2.35, a low index values as compared to those reported by others for communities occurring in different environmental gradients.

Floristic composition of the vegetation showed that a total number of 160 species of angiosperms were encountered during the sampling of vegetation. Out of these, 73 species were of trees, 14 of shrubs, 65 of herbs, 11 of climbers and 2 of epiphytes. They belong to 54 families including 47 of dicotyledons and 7 monocotyledons. Comparatively less number of species observed in the present study may be attributed to species confined only to the sampling area. Depending upon the number of inclusion of species, family wise top position was upheld by Papilionaceae (22 species). Other dominating families were Euphorbiaceae, Asteraceae and Rubiaceae.

The site Patharia complex was having maximum number of species as compared to other sites. Overall floristic analysis showed that out of 160 species, 147 (91.87%) belong to dicots and 13 (8.12%) to monocots making a ratio of monocot to dicot species as 1:11.3.

Generic coefficient for the entire vegetation of Sagar district was 81.25% whereas it varied for different sites from 80.8% to 89.55%.

Biological spectra of all the study sites showed dominance of phanerophytes followed by therophytes. This pattern of life form indicate the overall association of life forms for the study area as "Phanerophytic-Therophytic type".
Observations of vegetation profile diagrams showed that by and large most of the sites showed non-overlapping discontinuous forest formation. However, at some sites interstratal overlapping was seen.

Classification of trees, shrubs and herbs species yielded 16, 5 and 19 species classes respectively. While site classification showed constitution of 7 classes. As far as the classification of forest type is concerned, the results of TWINSPLAN did not support phytosociological analysis. Perhaps more environmental variants should have been included in the present TWINSPLAN classification.

Results of the present study indicate that basalt rock formation and soil derived from it having clayey to clayloam texture, weakly acidic to neutral, rich in soluble salts like calcium and magnesium, supported teak dominating vegetation. On these sites associated species of Tectona grandis were Diospyros melanoxylon, Acacia leucophloea, Anogeissus latifolia and others. Only one site having sandstone supported non teak vegetation dominated by Diospyros melanoxylon and Lannea coromandelica. In general, apart from variation in underlying formations, other factors were found to determine the composition of vegetation. In this regard, Acacia leucophloea preferred calciculus habitat while Anogeissus latifolia appears to be an indicator of monsoon erosion. Terminalia tomentosa can be regarded as an indicator of improvement and stabilization of soil; Lagerstroemia parviflora is the characteristic species of poor sandy soil; Aegle marmelos as an indicator of well drained
lime and clay rich soil. *Butea monosperma, Diospyros melanoxylon* and *Acacia leucophloea* were found abundantly in biotically disturbed areas.

Comparative analysis of Patharia complex as studied by Misra and Joshi (1952) and later by Bhatia (1958) with that of present study indicate great changes in vegetation occurred during the last 50 years. Further, the successional trend given by the above workers do not conform to the present successional trend derived in the present study. The present proposed successional trend of vegetation in Patharia complex showed its retrogressive nature due to increased biotic influences, erosions and other anthropogenic factors. Nevertheless, still there are some microhabitats occurring with more or less similar composition to an extent.

Results of the present study on vegetation ecology of Sagar district revealed that the communities are mostly dry deciduous forests having six different vegetation types. The vegetation showed comparatively higher species richness, diversity and heterogeneity. It is experienced that vegetation in a stress of biotic pressure is gradually transforming into xeric nature. Interestingly, most of the species are still retained due to their broad ecological amplitude and greater adaptability against biotic influence. They are having a good potential for natural regeneration. The vegetation can be easily conserved for its diversity and growth by adopting the strategy of reduction of biotic pressure. In this way simply the protection would subsequently produce vegetation with higher proportion of indigenous species.