SUMMARY AND CONCLUSION
The present study has given insight into the phytodiversity of Chikmagalur district. The vegetation type map of the district generated using satellite data, based on spectral signatures and knowledge based hybrid approach yielded an accuracy of 90%. It has provided the spatial extent and distribution of different vegetation types viz Evergreen, Semievergreen, Moist deciduous, Shola vegetation, Dry deciduous, Scrub, Grasslands, Bamboo mixed and man made plantations like Acacia, Eucalyptus, Teak and also other non-forest land cover categories. The existence of these diverse ecosystems in a heterogeneous landscape is due to variations in bioclimate and altitudinal gradients.

This study was a pioneering effort to create geospatial database on vegetation cover types, disturbance regimes, biological richness map, species habitat relationship, floristic details and gaps in conservation areas for Chikmagalur district. The baseline information generated will help design better conservation and landuse planning of the district.

The study has resulted in characterizing phytosociology of 498 species and also richness and diversity levels of the forest types in the study area. The delineation of different vegetation types has facilitated in accounting inter and intra type variability of species composition. The analysis indicates that the district encompasses unique flora and fauna. About 40 endemic species and 39 belonging to RET category have been recorded.

In the present study, remote sensing and GIS techniques adopted were found to be useful tools for integrating biological, ecological and cultural landscapes to characterize phytodiversity and arrive at suitable conservation strategy. These modern tools helped to achieve rapid assessment, document and map the extent and distribution of plant diversity.

Ethno-botanical surveys conducted during the study, resulted in documentation of the traditional knowledge and practice prevalent in the area. Out of 498 species recorded, about 121 species are found to be of medicinal value. About 37 species are commonly used for treating different ailments. The presence of two Medicinal
Plant Conservation Areas (MPCAs) in Kudremukh and Kemmangundi, clearly indicates the richness and conservation initiative taken for the medicinal plants in the study area by FRLHT. With rich biodiversity and extensive knowledge base on traditional medicines, Chikmagalur district has high potential for exploring new plant based drug discoveries in future.

- Landscape modeling involving several parameters viz. Patch characteristics, biotic disturbance, terrain complexity, ecosystem uniqueness, species richness, biodiversity value, etc., resulted in generation of disturbance gradient zones and biological richness image of the district.

- The disturbance index indicates the disturbance of varying magnitudes at different regions on the forest ecosystems. About 24% of the forested area are found to be fragmented and highly disturbed. The present study has indicated that humans have not only changed disturbance regimes, but also have altered the ecosystem processes through habitat loss and fragmentation. Many of the natural ecosystems have become smaller, modified and their surroundings have been altered.

- GIS proved successful in combining field and satellite derived information to produce the first biological richness (BR) map of the district showing various levels of biologically rich areas. The BR index map shows more than 40% of the vegetation under high biological richness. The gap analysis indicated the presence of Biorich sites outside the protected areas. It also provided information on the areas that should be treated on priority for conservation measures and bioprospecting.

- Most important outcome of the study, was the derivation of medium and high biological rich zones, which have high conservation values. Interestingly, some of the biorich sites lie outside the deserved forests and are endangered by human pressure. Based on the biological rich zones, the study suggests the areas of very high biorich zones to be declared as Protected area and accorded strict protection. Medium biorich zones can be subjected to sustainable forestry like NTFP collection, extraction of dead and fallen woods, planting of mixed plantations etc. while low biorich areas must be given adequate protection so as to enable their recovery.
The study has also brought out various threats to the ecosystem diversity of Chikmagalur district. The important ones are encroachments, mining, forest fire, grazing, etc. It is important that these downslides are arrested and ecology of the biodiversity hotspot is conserved.

One of the highlights of the present study is the rediscovery of the lesser known endemic species *Tarenna agumbensis*, Raghavan, from its type locality, Minuhole, Agumbe, after a gap of 42 years (Raghavan, 1969). The species was recorded from a new locality Magebail, Narasimha Parvata, which is not just a new geographical distribution of species, but also an addition to the flora of Chikmagalur district.

The present study on Phytodiversity characterization at landscape level, has provided more consistent and accurate base line information than any conventional or satellite study done so far in this region. This database coupled with community level characterization and detailed site-specific field inventory, helps in identifying areas for bioprospecting.

The Biodiversity Information System (BIS) generated for Chikmagalur district facilitates simple and efficient retrieval and query of information related to Plant diversity. This would be of immense value to conservationists, researchers, decision-makers to narrow down their search and obtain relevant information viz., on floristics, ecology, distribution, threat status, economic value, etc. within a short time.

The study emphasizes that Chikmagalur is one of the important biodiversity districts of Karnataka State and is part of one of the hotspots of the world - the western ghats. The district harbours rich flora and fauna with traditional knowledge and practices. Phytogeographically, the forests of the district are rich not only with high species diversity but also with endemic and rare species which is biologically relict of an ancient and unique vegetation. At the same time the ecological integrity of the district have come under severe threat from various forces. Concerted efforts should be made to conserve the rich heritage of biodiversity of the district for the future.
Future scope

- There is a need to periodically repeat the study in order to understand and monitor the trends in the changes in phytodiversity over a period of time to understand the process of plant succession in the ecosystem.

- There is a need for greater in depth documentation of the traditional knowledge and practices prevalent in the area keeping the sensitivity of IPR in mind.

- Community level characterization using very high resolution data needs to be carried out with intensive ground sampling to account for species diversity at microhabitat level. The fragile and rich habitats that have been identified in the present study needs detailed floristic surveys.

- There is a need for identifying the spectral response of plant communities of the study area and extend the same to other districts, ecosystems, etc.

- The role of hyper spectral data and higher spatial resolution (1m) in characterizing the phytodiversity in the western ghats area has to be evaluated.

- The application of microwave data and airborne laser topographic mapping (ALTM) techniques for biodiversity characterization needs to be explored, which might provide enhanced understanding of the structural complexity of the vegetation.
PLATE: 21 Herbarium specimen (BDP B619) of *Tarenna agumbensis*, Raghavan.