

ABSTRACT

The present research work was carried out to determine the impact of local climate change on plant diversity of study area, Murree Hills, through phytosociological, carbon sequestration and biomonitoring potential. For this purpose the study area was divided into eleven sub sites comprising the Reserve Forests, in which the phytosociological attributes and carbon sequestration potential was investigated. Moreover, the impact of automobile exhaust was also assessed on three selected tree species that were planted along five busiest roads of Tehsil Murree, the biochemical attributes i.e., % moisture content, total chlorophyll contents and carotenoids in the leaves of these trees were determined and their mean values were compared, with the mean values obtained from the controlled trees, growing far away from the busiest roads.

During phytosociological assessment, 229 plant species in 295 quadrats belonging to 66 plant families were recorded. Among these, Pteridophytes represented three plant families having 6 plant species, Gymnosperms one plant family having 4 plant species, Angiosperms by three Monocot families having 34 species and fifty nine Dicot families having 185 species. TWINSpan analysis separated these plants into two major groups on the basis of % Cover which were further divided into subgroups and associations according to their plant community structure.

Carbon sequestration potential was assessed at three levels i.e. above ground, understorey and soil and above ground potential of forest with respect to dominant tree species i.e. *Pinus wallichiana* was found 4281.43 (t/ha), under storey vegetation having 3.046 (t/ha). The carbon sequestration potential of study area taken at two depths (1-15 cm & 16-30 cm) was 54.61 and 42.93 (t/ha), respectively, indicating the forest as a major carbon sink of GHGs. It was noticed that overcrowding and unmanageable tourist number was resulting in increasing the smoke and temperature in the study area when assessed through biochemical attributes of the selected trees i.e., *Aesculus indica*, *Populus ciliata* and *Pinus wallichiana*. The amount of dust (g) deposited on leaf samples was comparatively higher on road side tree samples, i.e.

0.33-0.12 as compared to the control, i.e. 0.19-0.06 in tree samples. Moreover, all the parameters i.e., % moisture content, total chlorophyll content and carotenoids showed remarkable decrease in their quantities in road side tree samples as compared to the control ones. The value of % moisture content was ranging 64.06-21.97 in control samples and 61.43-8.84 in tree samples, while total chlorophyll contents from 6.32-3.66 in control samples and 6.28-3.86 in tree samples where as carotenoids 6.98-5.34 in control and 6.44-5.34 in tree samples. It is important to mention that there was an increase of annual rain fall (118.21-140.51mm), maximum day temperature (16.83-18.11°C) and minimum (8.16-9.27°C). The above mentioned values thus obtained, clearly indicate enhanced anthropological activities in the study area, and resulting in the local climatic changes which could be a step forward in global warming. Such studies can be helpful to determine the dynamics of the forest and distribution of plant diversity. Therefore, future strategies can be devised to implement sustainable approaches to conserve the plant diversity at Murree.