CHAPTER - 6
CONCLUSIONS

The current study investigated the diversity and distribution of bryophytes in five districts of Gujarat which had either not been represented in earlier studies or were under-represented. The study has revealed a good diversity of bryophytes which represent about half of the known species in Gujarat State. The following are the major conclusions of the study.

1. In this study, a total of 45 species of bryophytes were recorded comprising of 13 liverworts, 6 hornworts and 26 mosses.
2. The bryophyte diversity comprised of a total of 14 families of which Pottiaceae was the dominant family which was represented by 7 species viz. *Hydrogonium arcuatum* (Griff.) Wijk & Margad, *Hydrogonium consanguineum* (Thwaites & Mitt.) Hilp., *Hyophila involuta* (Hook.) A. Jaeger, *Hyophila nymaniana* (M. Fleisch.) M. Menzel, *Hyophila spathulata* (Harv.) A. Jaeger, *Hyophila walkeri* Broth and *Semibarbula orientalis* (F. Weber) Wijk & Margad.
3. Panchmahal district has recorded the highest bryophyte diversity (38 species) within the study area with 38 species. This accounts for 84% of the recorded bryophytes during the current study. This also competes with Junagadh and Dangs district as the hotspots of bryophyte diversity in the state. With 13 species, Vadodara District reported the lowest diversity of bryophytes within the study area.
4. Bryophytes were recorded from 5 different habitat types namely soil, bark, wall, rock and brick of which wall and rock were the most preferred habitat of the recorded species of bryophytes.
5. Bryophytes were recorded at different altitudinal gradient ranging from 100 to 1100 m. Liverworts were mostly recorded at low altitude (below 200 m) except the epiphytic leafy liverwort i.e. *Rectolejeunea aloba* (about 600 m). Most of the epiphytes namely *Stereophyllum* spp, and *Fissidens zollingeri* were recorded at higher altitude (600 & above m). Hornworts were largely recorded at lower altitude with rare occurrence at moderate altitude (400 m).
6. The culturing of *Funaria hygrometrica* Hedw moss showed that the culturing in the presence of sugar resulted in much faster germination as well as growth of protonema while its absence delayed both the germination as well as growth.

However the problem of contamination in sugar containing medium was very high and probably caused by endophytes.

7. The DNA Barcoding revealed that the extraction of DNA of required length and purity was a difficult task. Of the 14 species attempted successful Barcoding could be achieved for only 5 specieswhich included 3 liverworts (*Plagiochasma rupestre*, *Plagiochasma japonicum* and *Asterella angusta*) and 2 mosses (*Fissidens zollingeri* and *Bryum coronatum*) mosses. The study also revealed that the use of universal primers like rbcL can help in identification at genus levels but more specific primers at the genus/family level would be needed for identification at species level.
8. The lack of trained taxonomists has made the task of identification of bryophytes difficult and this brings in the need of computer aided identification. The development of the DELTA INTKEY software module of the bryophytes of the study area will help plant researchers with basic taxonomic skills in the gross identification of the bryophytes of the study area. The lack of complete plants or reproductive structures will not completely hamper the identification process.
9. While extensive field work has been conducted to different parts of the study area, the delay in permissions to conduct the study in the Wildlife Sanctuary areas has resulted in less than planned visits to them. A thorough study of these areas can potentially result in additions to the diversity of the study area.
10. The study provides the baseline information for the diversity and distribution of bryophytes for the study area and would provide a reference point for further studies looking at changes in vegetation pattern due to human impacts like land-use land-cover (LULC) and climate change.
11. The study also created awareness about this little known group of plants for field-based forest department staff like foresters and beat guards who accompanied us during the field visits in protected areas.