

CHAPTER 8

SUMMARY AND CONCLUSIONS

8.1 SUMMARY

Land degradation is a burning problem in the country and it is very serious in the Himalayas and Western Ghats. Though the Nilgiris has about 56% of the area under forest, because of deforestation, landuse practice in conflict with the slope, landslide, urbanization etc., the fragile ecology of the district is in danger. Unless we take steps to arrest soil erosion, the reservoirs in the district will be completely silted up and food production and power generation will be affected. Hence, land degradation studies in the Nilgiris have been taken up to assess the status of degradation and suggest action plans to arrest the degradation using remote sensing and GIS techniques.

To have a understanding of the various researches carried out in the field of remote sensing and GIS applications in land degradation, soil erosion, morphometric analysis and soil stability index (SSI), a number of research articles, journals, conference proceedings and websites were referred to, and the literature thus gathered was reviewed in Chapter 2. Such a review helped in developing the methodology to be adopted for this study and also in identifying the limitations of such a study.

The degradation study for two years (1973 and 1993) has been carried out in a GIS environment using weighted overlay analysis. By assigning weights and ranks to themes such as landuse, slope, drainage

density, geomorphology and lineament density, which influence degradation, a status map is prepared for 1973 and 1993. There is an increase in the intensity of degradation over the years. The SSI (Soil Stability Index) analysis, based on the studies by Pickup and Nelson (1984) is also carried out for the years 1973 and 1992 using satellite data. The results of SSI analysis are comparable with the results of the degradation study.

The main cause for the degradation is the present landuse practice, which is in conflict with the slope. Slope based action plan and landuse practice is suggested and for the three highly degraded watersheds namely Sillahalla, Neeralipallam and Kundahpalam a detailed analysis has been carried out by studying landuse practice and slope.

Morphometric analysis has also been carried out for the Sillahalla, Neeralipallam and Kundahpalam watersheds. The watersheds are further subdivided into 28 micro watersheds and morphometric analysis has been carried out. Parameters such as form factor, circularity ratio, bifurcation ratio, elongation ratio, drainage density and drainage texture have been computed. Based on the above results, the watersheds have been prioritized for implementing soil conservation measures.

8.2 CONCLUSIONS

The general and specific conclusions derived from this study are listed below:

8.2.1 General Conclusion

- The study demonstrates the importance of remote sensing and GIS in spatial data collection and analysis.
- In generation of degradation status map GIS (overlay) analysis was found to be a simple and straightforward method for a combined analysis of multi thematic layers.
- There is an increase in the intensity of degradation over the two decades. In most parts of the district the present landuse practice is in conflict with the slope and needs to be altered to reduce the soil erosion.

8.2.2 Specific Conclusions

- During 1973, the highly degraded area is 13% of the total area. The moderately and less degraded areas are 25% and 30 % respectively. About 32% of the area is not affected by the degradation.
- During 1993, the highly degraded area is 33% of the total area. The moderately and less degraded areas are 13% and 37%. The areas not affected by the degradation is 17%
- There is 20% increase in the areas severely affected by the degradation over the period of study.
- In 1973 about 30% of the district is not affected by degradation but in 1993 it has come down to 17%.

- From the study of landuse pattern in 1973 and 1993 it is observed that the area under dense forest has been reduced by about 12%.
- Area under Tea plantation has increased by about 60%.
- The action plans prepared for the three watersheds reveal that main crop in the Sillahallah watershed is annual crops. About 50% of the area is under annual crops. Out of this 75% of the crops are raised in slopes not in conformity with the land use practice. Hence there is a need for change of landuse practice.
- In the Neeralipallam watershed, tea is the major crop and grown in 79% of the area. Though 79% of the area is under tea, major part of the crop is not grown in the appropriate slope i.e. in 10% to 33%. To reduce the erosion, tea plantation raised in areas with more than 33% slope may be converted into multi-layered by planting horticultural plants like plum, peach, silver oak etc.
- In Kundahpalam watershed 45% of the area is under tea. Out of this, nearly 80% is raised in unsuitable slopes. Here also multi-layered approach is suggested.
- The study of drainage morphometry leads to an understanding of the dissection of the area, which in turn helps in deciphering the erosion condition, soil development and land use pattern of an area, which is of utmost importance in prioritization of watersheds.

- The three watersheds are further sub divided into 28 micro watersheds. Based on morphometric analysis these watersheds are prioritized for further taking up conservation works and eight micro watersheds need immediate attention.
- Soil stability index computed using satellite image data allows rapid survey of the erosion status of large areas commensurate with the size of management units.

8.3 LIMITATIONS AND SCOPE FOR FURTHER STUDY

- The scope of this study is limited to degradation studies for Nilgiris district and suggesting action plans for few watersheds. Further study can be conducted for the remaining watersheds.
- In the degradation study for 1973, the spatial resolution is only coarse, but in 1993 the resolution is better. Further study can be carried out using higher resolution satellite imagery.
- Assigning of ranks and weights for various themes depends upon the logical reasoning and varies from person to person and will alter the output map. Further study can be conducted by considering other parameters such as urbanization, land slides, soil properties etc.
- Morphometric analysis has been carried out for few watersheds. The study can be conducted for entire district to have a better idea of soil erosion status and to suggest suitable soil conservation measures.

- Remote Sensing is not an end in itself for any resources study. It is only an effective tool for acquiring authentic comprehensive timely data, especially for land degradation study. But field checks are most essential for confirming the result derived from Remote Sensing data products.

Thus, this study concludes that the remote sensing and GIS have a pivotal role in assessing the various parameters of land degradation and suggesting the conservations measures for the better management of watersheds.