CHAPTER 6
SUMMARY AND CONCLUSION

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Waterlogging, that is one of the most common problems in Khambhat taluka of Kheda district, caused by the rise in water-table, due to the imbalance between the influx of water and expenditure of groundwater, attained by the intensive irrigation in the absence of adequate drainage, not only modifies the normal soil-chemical processes, hampering the healthy activities in the soil, it also causes the severe salinization of the land, by excessive evoporation.

The present study carried out for monitoring waterlogged areas in this taluka using remote sensing technique and ameliorative of its effects on the crop, has given the following information for the planners and administrators to define the areas for large-scale reclamation, utilization and the subsequent monitoring of these lands being deteriorated.

(1) Visual interpretation of Remotely sensed data, in the form of False Colour Composite with bands 4,5,7 for Landsat MSS and 2,3,4 for Landsat/TM and 1Rs-1A/LISS-II clearly distinguished the waterlogged area from the other area and was used for the identification and delineation of the waterlogged area efficiently and accurately.

(2) The waterlogged areas were delineated in to two categories,Viz. Permanent waterlogged land and the Surface moist soil, based on the tonal variation with smooth dark blue and the coarse , grey with bluish tingh respectively using the satellite image acquired in summer season.

(3) Analysis of the premonsoon and postmonsoon data to assess the suitability of the seasonal data for identification, delineation and monitoring of waterlogged land, revealed the effective potentiality of the premonsoon data, which used for the different categorisation of the waterlogged lands. Since the presence of luxurient vegetational growth, which obscuring the surface information of the soil during post monsoon season due to the monsoonic activity showed its inability to delineate the surface moist soil lands. However, the permanent waterlogged and seasonal waterlogged lands were mapped with the aid of substraction technique by superimposing both pre and post monsoon seasonal data.

(4) The monitoring of the waterlogged areas of Khambhat Taluka with the aid of remote sensing images ie Land sat/MSS of May 1983. Land sat/TM March 1986 1RS-1A/LISS-II of March 1989 indicated the sporadic spread of waterlogged lands from the southern parts of the taluka towards the eastern cultivable lands, paralleled with the increasing saline lands. The quantified data showed the increasing level of 22.5 Sq. Km. total area of waterlogged land from the year 1983 to 1986.

(5) The identification and delineation of the different categories of waterlogged lands using Remote sensing technique was found to be accurate,when it was correlated with the ground check verification,as it dipicted by the accuracy test which yielded 99% accuracy level at the level of 85% confident.

(6) The attempts carried out for generating the data at village level at 1:250,000 scale for the village wise information of the taluka can be used by the District Department of Agriculture and the Micro level attempt to delineate the waterlogged area in the plot with the detail of ownership,depicted by survey numbers, for the plotwise information of the village, can be potentially help ful for the formers to define their land and plan to carry out the remedial measure efficiently.

(7) The monitoring of vegetation from the year 1983 to 1989 , highly supported the gradual degradation of land day by day in this area.The study of the post monsoon data, was not suited to assess the land degradation because of the profuse and luxurient growth of the plants,due to the dilusion of the stress condition in monsoonic period. However, analysis of both the pre monsoon and post monsoonic season showed the real picture of vegetation in this taluka through out the year. The complete elimination of vegetation by the stress condition was clearly evident in the southern region of the taluka from the year 1983 to 1989.

(8) Digitally enhanced and classified output, proved its immense use in the delineation of waterlogged areas. Among the various enhancement technique SBI (Soil Brightness Index) is showed its superiority in demarcating the waterlogged areas from saline areas. However, Ratioing technique couldnot demorcate these two features.

(9) The vegetational survey carried out in Khambhat taluka in different communities viz. Normal lands, Surface moist site and Flooded site showed the definite influence of the nature of habitat on the plant growth.The surface moist soil was found to be the highly stress filled site than the flooded site.This was confirmed by various diversity indices and the dominant diversity curves. Species of Acalypha, Aeruva, Alycecarpous, Amaranthus, Centella, Cleome, Euphorbia, Fimbrystilis, Oscimum, Tridex and Vernonia were found only in the normal site and Aleuropus, Aleuropus,. Alhghi, Euclipta, Susbania, Suaeda, Trianthema were found only in moist surface soil. The species of Typhas, Sagitaria, pomea were found only in flooded site. Then IVI value showed the tolerant nature of these plant in a respective ecosystem. Thus it has been found that the plants can be good indicators of the nature of the area. The emergence of **Aleuropus lagopoides**, Cressa critica, **Suaeda fruticosa** indicated the saline nature of the area.

(10) The results of ameliorative studies, confirmed the adverse effect of the waterlogging on the growth of crops. Among the attempts to introduce the plant for waterlogged conditions, **Vetiveria lawsoni** showed a appreciable response over the crops **Pennisetum typhoides** and **Brassica juncea** growing well in the waterlogged and as well as combined conditions of waterlogged and salinity stress. However, **Pennisetion typhoides** cultivars were tolerant to prolonged water logging.

(11) The attempts to ameliorate the ill effects of waterlogging by applying humus for increasing the availability of organic matter to the crop and the spraying of growth regulaters viz. diamine Putrasine and polyamine Spermine and Spermidine revealed that the application of humus had brought about the significant partial improvement in the growth and yield of**Pennisetum typhoides** cultivars GHB-32, MH-179 and BK -560 though under waterlogged conditions. Among the growth regulators,the diamine putrasine had a slight influence on the growth of pearl millet, application of poliamines did not ameliorate the effects of waterlogging and the combined conditions of waterlogging and salinity.

(12) The reflectance study,revealed the potentiality of the technique, in utility for the identification and monitoring of crops growing under stress conditions. The decreased reflectivity in the red and infrared regions of the electromagnetic spectrum correlated with the Leaf area index, Biomass of plant, and pigment content indicated the high degree of stress prevailed in combined treatment of waterlogging and salinity over the waterlogging and salinity individually. The recoverence from the stress by putrasine application was also confirmed by this study.

Thus with the over all information collected from this present study, it can be concluded that,the waterlogging is the main cause of the land degradation in Khambhat taluka, caused by the rapid rise in water-table,due to the excessive irrigation

inadequate drainage and this condition is aggravated by the cultivation of paddy, which needs stagnated water.The waterlogged soils not only effect adversely on the growth of plant, but also deteriorate the land by leading into salinization due to the excessive evoporation. The sporadic spread of waterlogging areas indicated the total failure of the Management in water and soil in this study area.So the following recommondation can be made to plan to control and conserve the water logging problem by implementing suitable remedial measures like,

i) Improving the irrigation system by linning of canals, Pre-irrigation soil surveys, 'x' limits for perennial irrigation,Block system,Varanbandhi, Conjuctive use of water resources etc.

ii) Selection of suitable cropping pattern that requires lesser application of water can reduce the percolation of water reaching the ground water table.

iii) Improving the availability of organic matter and nitrogen to the plant by external application nitrogen sources.

iv) Screening the tolerant plant for waterlogged soil,to introduce and green the waterlogged soils.