SUMMARY AND CONCLUSION

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Environmental conservation needs constant monitoring of temporal environmental disturbances and degradations to plan the mitigative measures to lead the biosphere into a sustainable system before the repair implementation costs become prohibitive. In such situation a comprehensive approach in the form of remote sensing technology, involving an optimum blend of modern survey techniques and traditional methods in combination with fast processing and analysis of data, has immense value in taking timely and appropriate decisions. This study has been undertaken to test the potentials of this technique in monitoring of soil salinity in the arable lands of Khambhat agroecosystem.

Khambhat taluka of Gujarat state comes under the Mahi Right Bank canal command and since the sixties, the fertile agricultural fields known to produce the best cotton and wheat is facing complete disorientation as a result of waterlogging and soil salinity. This humble attempt to study such a degraded agroecosystem using satellite remote sensing and other field studies, has yielded the following findings.

1. For saline soil monitoring the satellite data in the form of Landsat MSS/TM particularly of summer month have been found to be good due to their synoptic view and repetitive coverage.
2. Using multitemporal Landsat TM FCC transparencies of 1:1,ØØØ,ØØØ scale expanded four fold, an overall increase in the saline soils in the Khambhat taluka from the year 1975 to 1987 has been evident and found to be very high. The

maximum increase of salinity has been observed between the years 1986-1987.

3. The High Magnification of the 1:1,000,000 scale positive transparencies of Landsat 5 TM data, to 1:50,000 scale has aided in getting the villagewise information of salinity in Khambhat taluka, at 98 % accuracy at 90 % confidence level. Villages like Untwada, Mahiyari, Chikhaliya, Gorad, Malpur and Khanpur have more than 50 % of saline affected agricultural lands.
4. The overlapping of the data obtained at 1:50,000 scale when transferred on village cadastral map has yielded plotwise information of salinity. This work has been successfully attempted on five villages namely Jafrabad, Jichka, Khaksar, Padra and Valli and the overall percentage accuracy achieved has been 90 % at 90 % confidence levels. The misinterpretation occurred during this study has been mainly due to the "Goradu" or sandy soils registering as saline soils as the reflectance of both the type of soils resemble each other.
5. By visual image interpretation technique three categories of saline soils have been delineated viz., the slightly saline affected, moderately saline affected and strongly saline affected and there is increase in all the three saline areas since 1975.
6. The digitized IRS-1A LISS II information has been proved to be superior to the visually interpreted Landsat data. The MSS band equivalent coefficients have generated successful SBI output with the IRS-1A LISS II data that has delineated

the saline boundaries sharply. Concurrently the use of supervised classification has yielded six categories of saline soils, viz., two in low, two in moderate and two in severe. However, the divergence matrix proves the inseparability of these subcategories from each other.

7. Winter data of the Landsat has been found to be superior over the summer data for vegetation mapping. The four different vegetational levels, viz., the dense, moderate, sparse and nil categorised by visual interpretation of winter data exhibits a vivid negative correlation with the levels of salinity.

8. Due to the better spatial, spectral and radiometric resolution, the Thematic Mapper data have been found to be more suitable for vegetation detection than the Multi Spectral Scanner (MSS) data.

9. The supervised classification image generated using the Green Vegetation Index as the base, has generated five classes of vegetation and confirms the negative correlation between the vegetational and salinity levels earlier witnessed by the visual image interpretation.

10. The major causes of salinity in this area are the sea water ingress and mismanaged irrigation in the absence of proper drainage and uneven topography.

11. Increased ground water table due to the irrigation canals and the subsequent capillary rise of water resulting in the accumulation of alkali salts on the surface followed by evaporation during summer has contributed to the development of salinity.

12. The salinity in this region may be attributed to the occurrence of ions mainly of sodium and chloride and to a lesser extent of sulphate. The order of cation accumulation on the surface is Na>Ca>Mg>K.

13. The pH of 7.5 to 8.0 of the soil samples confirms that the soils are saline.

14. Negligible difference in the ionic content of soils, collected during winter and summer of 1987 is due to the acute shortage in rainfall during this period resulting in ineffective leaching of salts after the monsoon.

15. Salinity has reduced the photosynthetic leaf area of the cultivars grown in this region, thereby affecting adversely their biological as well as economic yield. The economic yield of rice cv. Mahsuri growing at different salinity levels has been decreased by 70,74 and 90 % in slightly, moderately and strongly affected saline soils respectively. The comparison between the varieties Mahsuri and Bhura rata grown in the field has indicated the cv. Mahsuri to be better suited to grow in the saline soils than the cv. Bhura rata.

16. The laboratory experiments to screen different salt resistant cultivars of rice reveals that the rice cvs. Mahsuri, SRB-26, and SLR 51425 can survive salinity of ECe upto 14-16 dSm^{-1} with greatly reduced economic yield, as compared to Bhura rata, GR_3, IR 20, IR 28, Mahsuri, SLR 51425 and SRB-26.

17. The heavy ionic substratum at the root zone affects the different rice cvs. resulting in a high accumulation of Na^+, and a low accumulation of Ca^{2+} and Mg^{2+} ions in their system. The K^+ ion accumulation however, increases with the increasing salinity in the saline resistant cultivars indicating to their saline resistant ability.

18. The phytosociological studies of weeds exhibits a decreasing Species Diversity Index, Evenness Index, Richness Index, and Similarity Index. The weeds of normal and moderately or strongly saline soils are dissimilar. Disappearance of *Acalypha indica* (L.), *Astercantha longifolia*, Nees, *Celsia coromandelina* Vahl, *Cleome viscosa* (L.), *Cyanotis axillaris* (L.) Schult. F. *Enicostema hyssopifolium*, *Ipomoea acquatica* Forsk; *Leucas aspera* Spr. and *Ocimum canum* sims and appearence of certain species like (L.) *Commelina benghalensis* (L.) *Eclipta prostrata*, *Limnophila indica* (L.) Druce, and *Vernonia cineria* (L.) Less. can be good indicators of slight salinity while weeds likes *Cressa Critica* (L.) *Suaeda fruticosa* (L.) Forsk ex Gmel *Aleuropus lagopoides*,Trin *Prosopis Cineraria* (L.) Druce can be considered as distinct indicators of moderate to strong salinity.

It can be concluded from the above study that visual and digital imageinterpretation can play a vital role in the monitoring of saline lands at macro and micro levels as in Khambhat taluka. However, this information needs to be substituted with the edaphic and historical knowhow to minimize error and also a supplementation of field information will aid the planners at district and taluka levels to take proper reclaimative measures according to their specific requirements. Moreover, the early detection of slight salinity or waterlogging in some of the areas will prove beneficial to take preventive measures before it is too late.