

CHAPTER 3

METHODOLOGY

3.1 INTRODUCTION

The different components of the generalized methodology adopted in this study are illustrated in the Figure 3.1. However the detailed description of the methodology for different types of satellite data analysis are provided in the respective chapters.

3.2 SATELLITE DATA ANALYSIS

The available high resolution satellite data like IRS-1D LISS-III were used for digital analysis in the ERDAS image analysis system and visual interpretation of IRS LISS-III (1998) and IRS LISS-II (1988) imagery were used the change-detection of coastal landuse/landcover, shoreline, coral reef and coral reef zonation. The importance of using supervised information for improving remote sensing data analysis was shown by Bastin (1988). In a case study on the area of Great Barrier Reef Marine Park, he concluded that the critical minimum value for mapping the coral reefs. Mumby *et al* (1998) found that a supervised maximum likelihood classification of Compact Airborne Spectrographic Imager (CASI) data was better than other classification for coral reef studies, in Turks and Caicos Islands. Ramachandran and Krishnamoorthy (1998) determined that factorial analysis of Landsat TM band 2 digital data could be used for demarcating reef are more accurately in Gulf of Mannar region. Nayak (1997) recommended a K.Means classification for coral reef mapping in Van Island of Gulf of Mannar Marine Biosphere Reserves. He used

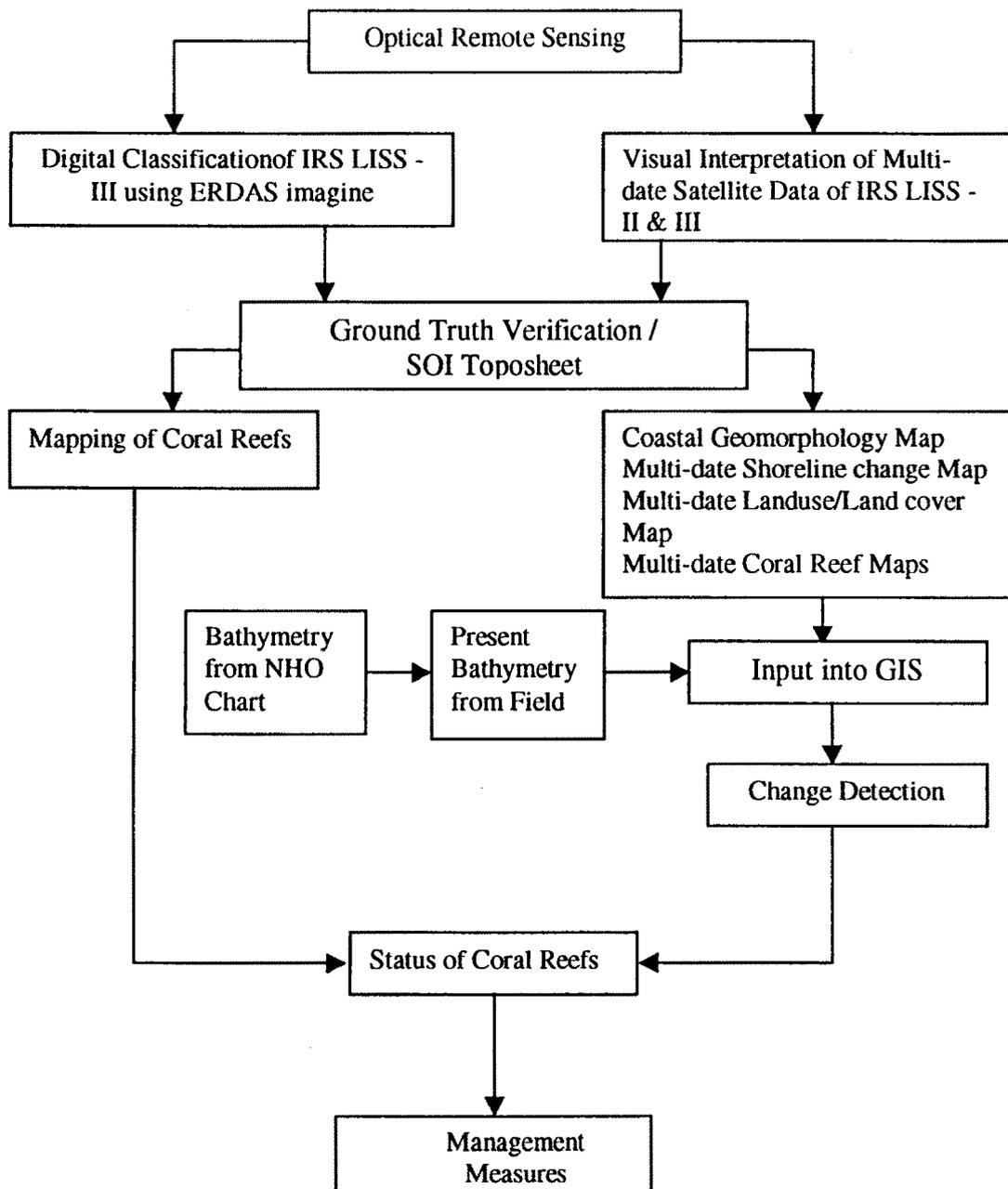


Figure 3.1 General Methodology

IRS-1C Pan merged with IRS-1B LISS-II data and identified the seagrass beds and living coral zone. In the present study, the commonly used visual and digital techniques such as Principle component analysis, supervised maximum likelihood and K.Means methods were used and classification based on spectral enhancement technique as compared for classification of coral reef areas using IRS LISS-III (1998) data in the ERDAS image analysis system. Selection of band combinations using IRS LISS-III data was also used to understand the spectral response of coral reef areas.

3.2.1 Data loading

The available high-resolution digital data of IRS-1D LISS-III sensor pertaining to Gulf of Mannar was imported from CD ROM to ERDAS system as an image format. As Gulf Mannar occupies more than three scene, the corresponding scenes were mosaiced with the option feature overlap function in ERDAS imagine.

3.2.2 Enhancement techniques applied on image

The digital data was then enhanced using different enhancement techniques available in ERDAS, such as special, spectral, radiometric enhancement to reduce the noise, atmospheric attenuation and salt paper effect so as to obtain a crispy image.

3.2.3 Geometric correction

The corresponding toposheets pertaining to Gulf of Mannar were scanned and imputed to image format. The image was rectified in such a manner that the spatial coordinates correspond to its geographic coordinates and then the image toposheet was resampled using cubic convolution method. The

projection applied in this study was Geographic Lat/Long with spheroid Everest and datum undefined. Approximately 200 Ground Control Points (GCP) were assigned for rectification.

The digital image was then registered using the resampled output of the toposheet to its corresponding geographic coordination. The registration was carried out by assigning approximately 400 GCP on the digital image.

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Accuracy of the geometrically corrected image was checked by overlaying the rectified toposheet on the digital data and swiped vertically and horizontally to check for any shift in the corresponding categories.

3.2.4 Classification

Both Supervised maximum likelihood, Unsupervised and principle component analysis classification systems have been adopted in the current study. A detailed description of the classification systems adopted is given the correspondent chapter.

3.2.5 Visual interpretation

Base maps on 1:50,000 scale were prepared using SOI toposheet. The base maps were prepared by incorporating important control points such as transport network, shoreline, forest boundary, tank, rivers and settlements.

The prepared base maps were then overlaid on the corresponding FCC hardcopy and interpretation was carried out by using the interpretation key of SAC.

3.2.6 Ground truth

A detailed ground check was carried out to validate the results obtained from classification. An accuracy matrix was prepared to ascertain the percentage of accuracy on a sample basis, assuming a binomial distribution for the probability of success/ failure of sample tests as discussed by SAC (1992).

3.2.7 GIS work

The various theme maps prepared using remote sensing data were transferred to GIS by the processes of digitisation using A0 digitizer and later analysis was carried out using ARC-INFO and ARC-VIEW soft-wares packages.