CLASSIFICATION AND DISTRIBUTION OF
MANGROVE FORESTS USING AERIAL
PHOTOGRAPH AND SATELLITE REMOTE
SENSING TECHNIQUES: KEMAMAN,
TERENGGANU

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By

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DEDICATION

THIS THESIS IS DEDICATED TO MY MOTHER, BROTHERS, SISTERS AND BELOVED LATE FATHER, WITH THANKS FOR ALL THEIR HELP, SUPPORT AND UNDERSTANDING

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Classifying mangrove vegetation zones is important as they can be used to explain,
among others, the variable composition of invertebrate and fish communities inside
mangroves. In this study, the mangroves of the district of Kemaman were
classified using aerial photograph with a scale of 1:5000 and Landsat TM imagery
(30m x 30m). The aerial photographs covered the coastal and estuarine areas only,
while the Landsat TM image was used to analyse areas further inland not covered
by the aerial photographs. Result revealed that altogether there are fourteen
different mangrove forest types in the district of Kemaman. The total extent of
mangrove forests is about 1472 ha. Of the total, about 738 ha (50.1%) are
mangrove forest reserve while the remaining 734 ha (49.9%) are stateland
mangrove forests.

The analysis of aerial photographs revealed that all fourteen-forest types were available inside the estuarine areas. They are *Avicennia-Sonneratia*, *Avicennia-Bruguiera*, *Bruguiera-Rhizophora*, *Bruguiera*, young *Rhizophora*, mature *Rhizophora*, *Rhizophora*, *Ceriops*, *Kandelia*, *Lumnitzera*, *Excoecaria*, mixed mangrove, *Nypa* and dryland mangrove. The accuracy of this technique was found to be 91.2%. The total mangroves area identified using this method is 357.7 ha, of which 177.90 ha (49.73%) are located along Sungai Kemaman, 70.68 ha (19.7%) along Sungai Kijal, 35.70 ha (10.0%) along Sungai Kertih, 28.71 ha (8.0%) along Sungai Paloh, 23.60 ha (6.6%) along Sungai Cukai, 10.00 ha (2.8%) along Sungai Kemasik, 6.73 ha (1.9%) along Sungai Batu Tampin and lastly 4.38 ha (1.2%) along Sungai Penunjuk.

Meanwhile, analysis of Landsat TM imagery on areas not covered by the aerial photographs revealed that, there are only seven forest types of mangroves further inland. They are *Avicennia-Sonneratia*, *Bruguiera-Rhizophora*, *Ceriops*, *Lumnitzera*, *Nypa*, mixed mangrove and dryland mangrove. The accuracy obtained for this technique is 87.8%. The total coverage area of mangrove forests using this technique is 1376.55 ha. The largest mangrove forests was located along Sungai Cukai with 754 ha (54.8%) followed by Sungai Kemaman with 310.32 ha (22.5%), Sungai Kertih with 208.08 ha (15.1%), Sungai Kemasik with 78.12 ha (5.7%), Sungai Paloh with 18.9 ha (1.4%) and lastly Sungai Penunjuk with 6.48 ha (0.5%).

It can be concluded that although both techniques are useful in determining the mangrove forest vegetation types, the large 1:5000 aerial photographs, however,

are more accurate than Landsat TM imagery. In addition, relatively more detailed information could be obtained for aerial photograph technique. On the other hand, the area of coverage provided by aerial photograph is relatively smaller than the satellite remote sensing imagery.