

CLASSIFICATION OF MALAYSIAN ESTUARIES FOR MANAGEMENT GUIDELINES

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Introduction

The primary problem related to estuary management in Malaysia is that there is no recognition of the estuary regime; there is only recognition of the riverine or marine regime. This leads to misunderstanding of the physical, chemical and biological processes occurring in the estuary (Dyer, 1973). The objective of the study is to propose a simple method for the general classification of estuaries in Peninsular Malaysia that incorporate not only physical factors but also chemical, biological and socioeconomic factors. The purpose of this classification is to provide information on the status of Malaysian estuaries, which can aid management, conservation and development planning.

Materials and Methods

Physical, chemical, biological and socioeconomic data from ten estuaries in Peninsular Malaysia were used for classification. The classification of the physical condition of the estuary was based solely on the 'representative' vertical salinity gradient at spring and neap tides. For chemical status the estuarine water quality index (EWQI) for each estuary is calculated. The Shannon-Weaver Diversity Index (SWDI) is used to determine the biological status. An 'Estuarine Resources Importance Index' (ERII) was calculated to determine the socioeconomic status of the estuaries. The overall

estuary quality may be obtained by combining the above index values (Ott, 1978).

Results and Discussion

The estuaries may be divided into three regional groups based on their coastal location, i.e. the northern region group (Group 1), the central region group (Group 2) and the eastern region (Group 3). The grouping also relates to variations in the EQWI, SWDI, ERII and also reflect variations in stratification. Group 1 estuaries are well mixed, have moderate to good water quality, moderate to high benthic faunal diversity, and high importance of estuary resource. Group 2 estuaries alternate between partially mixed to highly stratified conditions, have very poor to good water quality, moderate to high benthic faunal diversity and have very high importance of estuary resource. From the data for the different factors, there appears to be no direct relationship between stratification and EWQI, or with SWDI, or with ERII. However, estuaries with partially mixed conditions, such as those in Group 2, are associated with greater variations in EWQI, SWDI and ERII than are estuaries with well mixed or highly stratified condition.

Conclusions

Due to the diverse nature and use of the estuaries sampled, only three classes are identified at present indicating the potential use of natural resources, i.e. low, moderate and high estuary quality. Using the classification method proposed, representative estuaries may be selected for future detailed investigation and the results used as the basis for the management of other estuaries.

References

- Dyer, K.R. 1973. Estuaries, A. Physical Introduction, London: John Wiley & Sons.
- Ott, W.R. 1978. Environmental Indices, Theory and Practice, Ann Arbor: Ann Arbor Science.