UNIVERSITI PUTRA MALAYSIA

MULTIVARIATE ANALYSIS OF PELAGIC FISHES IN THE SOUTH CHINA SEA AREA

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By

MD. SHAHAB UDDIN

Thesis Submitted in Fulfilment of the Requirement for the Degree of Doctor of Philosophy in the Faculty of Science and Environmental Studies Universiti Putra Malaysia

September 2001

This Thesis is dedicated to my parents

and

My wife Hasina Akter, son Rafi & daughter Priata

Abstract of thesis presented to the Senate of Universiti Putra Malaysia
in fulfilment of the requirement for the degree of Doctor of Philosophy

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Chairman: Prof. Dr. Mohd. Ibrahim Bin Hj. Mohamed

Faculty : Science and Environmental Studies

Pelagic fishes are important fisheries resources in the South China Sea Area. The aim of the study is to determine the dynamics and status of pelagic fishes and develop the fishery management efforts for sustainable development in the region. Three analytical methods, correlation analysis, principal component analysis and cluster analysis were used for this purpose. In this study, 19 species groups were considered and annual catch data were collected from SEAFDEC Fishery Statistical Bulletins from 1976 to 1996. For estimation of MSY (Maximum Sustainable Yield) in the East Coast of Peninsular Malaysia, Schaefer's Surplus Production Model was used based on catch and effort data.

In the case study of estimation of MSY, the estimated MSY was 94,321 mt and fMSY was 74,011 (days/year) by fishing gear standardization. This study

estimated MSY-like value of the whole South China Sea provisionally based on studies done in the East Coast of Peninsular Malaysia.

The correlation analysis showed the relationship among 21 sub-areas on the basis of catch composition per year .The study indicated that Taiwan, Hong Kong and Singapore did not show significant relationship with other sub-areas. However, West Sumatra, South Java etc showed significant relationship with other sub-areas.

The principal component analysis showed alternation of the major species groups in different sub-areas. The analysis indicated that alternation of major catches were observed at two or four years interval while some species groups were found to be stable over the periods in different sub-areas. Alternation of pelagics by sub-area and by species are very important information as the baseline data for multi-country's fisheries management.

The cluster analysis was used for grouping of sub-areas on annual basis and overall basis. The results of overall basis are summarized in the following two types of grouping. The first type of grouping is as follows: (1) Taiwan, Indonesian part of Malacca Straits, West Coast of Peninsular Malaysia, East Sumatra and Kalimantan; (2) Luzon, Visayas, Mindanao, Sulewesi & Gulf of Thailand; (3) Hong Kong, West Sumatra, North java, South Java, Bali-Nusa Tenggara, Maluku-Irian Jaya, East Coast of Peninsular Malaysia, Sarawak, Sabah, Indian Ocean and Singapore. The second grouping is that, all sub-areas were grouped into six clusters: (1) Taiwan;(2) Gulf of Thailand; (3) East Coast of Peninsular Malaysia & North Java; (4)

Indonesian part of Malacca Straits, West Coast of Peninsular Malaysia; East Sumatra & Kalimantan; (5) Luzon, Visayas, Mindanao & Sulawesi and (6) Hong Kong, West Sumatra, South Java, Bali-Nusa Tenggara, Maluku-Irian Jaya, Sarawak, Sabah, Indian Ocean & Singapore.

On the pelagic resources or shared stocks, this study emphasized the importance of multi-country's fisheries management and that detailed information is required to achieve the objectives. This study identified the fisheries relationships among the sub-areas, and also clarified the alternation of pelagics in the South China Sea area, based on the multivariate analyses. The important baseline information obtained from the study can be utilised for multi country's pelagic fisheries management in the South China Sea area.

Abstrak tesis yang dikemukakan kepada Senat Universiti Putra Malaysia sebagi memenuhi keperluan untuk ijazah Doktor Falsafah

MULTIVARIATE ANALYSIS OF PELAGIC FISHES IN THE SOUTH CHINA SEA AREA

Oleh

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Ikan-ikan pelagik adalah sumber perkanan utama di kawasan Laut China Selatan. Tujuan kajian ini adalah untuk Meneutukan denineih dan headaan ikan pelagik di kawasan tersebut sejak dua dekad yang lalu. Tiga kaedah analisis telah digunakan iaitu, analisis korelasi, analisis ' principal component' dan analisis gabungan . Di dalam kajian ini, 19 kumpulan spesis telah dikaji dan data tangkapan tahunan telah diperolehi daripada Buletin statistik perikanan SEAFDEC dari tahun 1976 hingga 1996. Untuk anggaran pengeluaran Mapan Maksimum atau Maximum Sustainable Yield(MSY) di kawasan pantai timur semenanjung Malaysia, yang merupakan sebahagian daripada kawasan Laut China Selatan, model pengeluaran schaefer telah digunakan berdasarkan tangkapan and data usaha

Dengan menggunakan peralatan tangkapan piawai, anggaran MSY menggunakan model Schaefer adalah 94,321 mt dan fMSY ialah 74,011 (hari/tahun). Berdasarkan

keputusan ini, kajian ini juga menganggarkan nilai MSY bagi keseluruhan kawasan Laut China Selatan.

Analisis korelasi menunjukan hubungan di kalangan 21 sub-kawasan berasashan tangkapan komposisi secara tahunan. Kajianini menunjukan Taiwan , Hong Kong and Singapura tidak mempamerkan hubangan yang bererti dengan sub-kawasan lain. Tetapi, Sumatra Barat, Java Selatan dan lain-lain menunjukkan hubungan bererti dengan sub-kawasan lain.

Analisis principal component menunjukkan peralihan kumpulan spesis utama di pelbagai, sub-kawasan. Analisis ini menunjukkan pengalihan tangkapan utama telah di diperolehi selang dua atau empat tahun sementara beberapa spesis didapati stabil di sub-kawasan yg lain. Matlumat ini sangat penting sebagai maklumat asas bagi pengurusan perikanan pelbagai negara.

Analisis cluster digunakan untuk mengumpulkan sub-kawasan pada tempoh secara tahunan dan secara keseluruhannya. Keputusan menunjukkan bagi kumpulan secara tahunan, mesemua sub-kawasan boleh di bahagikan kepada dua kumpulan iaitu (1) Taiwan, Selat Melaka Indonesia, pantai barat Semenanjung Malaysia, Sumatra Timur dan kalimantan ; (2) Luzon, Visayas, Mindanao, Sulewesi dan Teluk Thailand; (3) Hong Koag, Sumatra Barat, Java utara, Java Selatan, Tenggara Bali-Nusa, Maluku-Irian Jaya, Pantai Timur Semenanjung Malaysia, Sarawak, Sabah, lautan India dan Singapura. Bagi secara keseluruhan, kesemua sub-kawasan dibahagikan kepada enam kumpulan iaitu : (1) Taiwan; (2) Teluk Thailand; (3) Pantai Timur Semenanjung Malaysia dan Java Utara; (4) Selat Melaka Indonesia , Pantai

Barat Semenanjung Malaysia; Sumatra Timur dan Kalmantan; (5) Luzon, Visayas, Mindanao dan Sulawesi dan; (6) Hong Kong, Sumatra Barat, Java Selatan, Tenggara Bali-Nusa, Maluka –Irian Jaya, Sarawak, Sabah, Lautan India dan Singapura.

Bagi sumber pelagik penekanan diberi terhadap kekurangan maklumat asas dalam pengurusan perikanan antara pelbagai negara. Walaubaga imana pun kajian ini telah menerangkan keadaan perikanan dan hubungan di antara sub-kawasan dan juga menerangkan peralihan sepsis pelagik di Laut China Selatan berdasarkan analisis pelbagai pembolehubah. Oleh itu, maklumat asas dalam kajian ini, boleh digunakan oleh pelbagai negara untuk pengurusan perikanan pelagik di Laut China Selatan.

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