UNEP

REGIONAL SEAS

Management and conservation of renewable marine resources in the East Asian Seas region

UNEP Regional Seas Reports and Studies No. 65

Prepared in co-operation with

IUCN

UNEP 1985

PREFACE

Thirteen years ago the United Nations Conference on the Human Environment (Stockholm, 5-16 June 1972) adopted the Action Plan for the Human Environment, including the General Principles for Assessment and Control of Marine Pollution. In the light of the results of the Stockholm Conference, the United Nations General Assembly decided to establish the United Nations Environment Programme (UNEP) to "serve as a focal point for environmental action and co-ordination within the United Nations system" (General Assembly resolution 2997(XXVII) of 15 December 1972). The organisations of the United Nations system were invited "to adopt the measures that may be required to undertake concerted and co-ordinated programmes with regard to international environmental problems", and the "intergovernmental and non-governmental organisations that have an interest in the field of the environment" were also invited "to lend their full support and collaboration to the United Nations with a view to achieving the largest possible degree of co-operation and co-ordination". Subsequently, the Governing Council of UNEP chose "Oceans" as one of the priority areas in which it would focus efforts to fulfil its catalytic and co-ordinating role.

The Regional Seas Programme was initiated by UNEP in 1974. At present, it includes eleven regions (see note 1 below) and has over 120 coastal States participating in it. It is conceived as an action-oriented programme having concern not only for the consequences but also for the causes of environmental degradation and encompassing a comprehensive approach to controlling environmental problems through the management of marine and coastal areas. Each regional action plan is formulated according to the needs of the region as perceived by the Governments concerned. It is designed to link assessment of the quality of the marine environment and the causes of its deterioration with activities for the management and development of the marine and coastal environment. The action plans promote the parallel development of regional legal agreements and of action-oriented programme activities (see note 2 below).

The Regional Seas Programme has always been recognised as a global programme implemented through regional components. Interregional co-operation among the various sea areas on common problems is an important element in assuming the compatibility of the different regional components.

As a contribution to the development of the Action Plan for the East Asian Seas region (UNEP Regional Seas Reports and Studies No. 24) supported by UNEP in the framework of the Regional Seas Programme in the Indian Ocean region, the International Union for Conservation of Nature and Natural Resources (IUCN), in co-operation with UNEP, has prepared this document.

1/ Mediterranean Region, Kuwait Action Plan Region, West and Central African Region, Wider Caribbean Region, East Asian Seas Region, South-East Pacific Region, South-West Pacific Region, Red Sea and Gulf of Aden Region, East African Region and South-West Atlantic Region, South Asian Seas Region.

2/ UNEP: Achievements and planned development of UNEP's Regional Seas Programme and comparable programmes sponsored by other bodies. UNEP

This document reviews past and on-going conservation activities relevant to the East Asian Seas region at the regional and national levels; identifies priority concerns of the Governments bordering the region; and contains recommendations for interregional and regional projects to be undertaken to address these concerns. The assistance of a consultant, E. Wood, in the preparation of this document is gratefully acknowledged. In addition, the sections dealing with fishery aspects of conservation have been prepared by J. Beddington and J.A. Gulland. The report has been compiled and edited by the Tropical Marine Research Unit, University of York, UK.

CONTENTS

INTRODUCTION

The East Asian region lies between Asia and Australia, and between the Pacific and Indian Oceans. It includes the mainland coastline and islands of Thailand, Malaysia, Singapore, Indonesia and the Philippines, and stretches from 20°N to 10°S and 95°E to 142°E. The total area of the South East Asian region is reported to be 8.94million km^2, which represents about 2.5% of the surface of all oceans (Soegiarto, 1978).

Within the area are the Andaman Sea, Strait of Malacca, China Sea, Java Sea, Flores Sea, Banda Sea, Arafura Sea, Timor Sea, Celebes Sea, and Philippine Sea. The terrain of the region is complicated and features shallow continental shelves, deep sea basins, troughs, trenches and numerous coral and volcanic islands.

The islands of Indonesia and the Philippines are the most important in terms of sea area covered and coastline length. Indonesia has approximately 13,677 islands, with a coastline length of about 81,000km. (Soegiarto & Polunin, 1982). The Philippines has 7,107 islands and islets, and a coastline length of approximately 17,500km (de Celis, 1981).

The region has an equatorial climate, modified by the monsoonal wind system. Basically, the northeast monsoon lasts from December to February, and the southwest from June to August. The transition periods have variable winds. The onset, strength and length of the monsoons varies according to geographic location. Cyclones and hurricanes influence the northeast part of the region, in particular the northern and western coastlines of the Philippines and also the northwest, on the northern Burmese border (Couper, 1983).

Rainfall is high throughout the region. In West Malaysia annual rainfall lies between 2,000 to 4,000mm (Chua & Charles, 1980), while in some more northwestern coastal areas it may reach 5,000mm (FAO, 1983). To the west of the region the wettest time of year is during the southwest monsoon, while in central and eastern areas the heaviest rains coincide with the northeast monsoon.

The largest sea in the region is the South China Sea. This is a deep basin, with a maximum depth of about 5,020m. There are extensive shallow areas to the south and west where the seas lies over the Sunda shelf. This is one of the largest continental shelves in the world, and joins the islands of Sumatra, Java and Borneo to mainland Asia. Water depth over the Sunda shelf is between about 40 to 100m. The South China Sea connects to the Java Sea (depth 20-60m) in the south, and through the Malacca Strait, with a sill depth of about 30m, to the Andaman Sea (Soegiarto, 1978).

The Andaman Sea is an extensive basin bounded in the west by a ridge on which the Andaman and Nicobar islands are situated. There is a sill between Nicobar and Sumatra at a depth of about 2,000m, and the deepest part of the Andaman basin (4,360m) is in the west (Soegiarto, 1978).

At the eastern end of the archipelago is the Sahul Shelf which connects Australia with New Guinea. Its waters range in depth from 30 to 90m. There is a deep water connection between the Indian and Pacific Oceans via the Sunda Strait and the narrow passages between the islands east of Java and the Celebes Sea. The Celebes Sea has a maximum depth of 6,200m and its sill to the Pacific

south of Mindanao is 1,400m deep. At its northwest boundary is the Sulu Sea with a sill of about 420m, enclosing a deep basin up to 5,580m deep. The Sulu Sea connects with the South China Sea through the Mindoro channel.

Surface water circulation within the region varies with the monsoons. During the northeast monsoon, water flows from the north along the mainland coast of Asia and into the South East Asian region, and this circulation is essentially reversed during the southwest monsoon. On the western side, however, the main flow in the Malacca Strait is to the northwest (FAO/IPFC, 1976).

The region is influenced by two oceanic currents. The north equatorial current flows westward across the Pacific before being deflected to north and south when it reaches the Philippines. The south equatorial current flows westwards to the Timor Sea and then parallel to the Javan coastline, before entering the Indian Ocean.

The tides of East Asian waters reflect tidal movements in the neighbouring oceans. Semi-diurnal tides are predominant in the Indian Ocean and so occur in the Andaman Sea, the Malacca Strait and the shelf off northwest Australia. Other regions, such as the south coast of Sumatra, Java and the Nusa Tenggara Islands have mixed, but prevailing semi-diurnal tides. In the western Pacific Ocean the diurnal tide is predominant, but it changes as soon as it enters East Asian waters. Almost the entire China Sea, for example, has a mixed prevailing diurnal tide. In other waters, such as the Gulf of Thailand and the Java Sea, an almost pure diurnal tide is observed.

Surface waters are consistently warm and the annual temperature variation is small. The average annual variation is less than $2^{o}C$, but is slightly higher ($3-4^{o}C$) in the Banda Sea, Arafura and Timor Seas, and in the waters south of Java. In the China Sea temperatures are higher and there is a greater annual variation in the north due to increasing inflow of cold water through the Strait of Taiwan during the winter monsoon (Soegiarto, 1978).

In contrast to the uniform temperature in the region, the salinity is extremely variable. The high rainfall causes a lowering in salinity of the surface layer, and this usually follows a seasonal pattern related to the monsoons. The monsoons also influence seasonal water circulation so that interactions between geographic structure, runoff from rivers, evaporation and circulation result in a highly complicated salinity pattern (Soegiarto, 1978). In general there is a lowering of salinity in shallow coastal waters. Thus off the east coast of West Malaysia and the northwest coast of Borneo, the average annual salinity is around 33ppt (Chua & Charles, 1980; Valencia, 1978), while in the Java Sea it falls to 30ppt during the northeast monsoon (Doty & Soegiarto, 1970). In the Gulf of Thailand there is an unusual salinity pattern (Meith & Helmer, 1983). Surface water with a salinity of 30.5ppt to 32.5ppt flows out of the Gulf, while water with a salinity of more than 34ppt flows in beneath it over a 58m sill.

Organic production and nutrient levels are generally high in coastal areas, especially around river mouths. In addition, vertical mixing during the monsoon periods brings nutrients from the bottom to the surface waters. The nutrient content over deeper portions of East Asian waters shows a distribution typical of tropical waters. The surface layer is extremely poor in nutrients, with phosphate levels of less than 0.2ug/l, while in deep water phosphate levels are normally 2.5 to 3.0ug/l (Soegiarto, 1978). Surface layers are replenished in

areas of upwelling, and these have been reported to the north of Sumatra, off the south Javan coastline and at the eastern end of the Indonesia archipelago, in the Arafura Sea (Soegiarto & Polunin, 1982).

The equatorial climate within the region leads to marked stratification in the water column. Mixing occurs in extremely shallow water (e.g. to about 20m) but in deeper shelf areas and in the deep seas a discontinuity layer is formed. Warm, low-salinity surface water lies over denser, colder water, but the depth at which the discontinuity layer is formed varies according to season and location.

GENERAL CONSERVATION AND MANAGEMENT ACTIVITIES

International

Under UNESCO's Man and the Biosphere (MAB) programme all countries, excluding Brunei, have established national MAB committees, but only Indonesia and the Philippines have established Biosphere reserves.

None of the countries in the East Asian region is party to either the Wetlands (RAMSAR) or the World Heritage Conventions, despite the fact that many have sites of particular relevance within their borders.

Thailand, Malaysia, Indonesia and the Philippines are all party to the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES).

Regional

In 1981 the five member states of ASEAN (the Association of South-East Asian Nations - Indonesia, Malaysia, the Philippines, Singapore and Thailand) adopted a co-operative programme to ensure that environmental considerations are incorporated into all aspects of economic development within the region. The Action Plan for the Protection and Development of the Marine and Coastal Areas of the East Asian Region is incorporated in the UNEP-sponsored Regional Seas Programme. The foundation for the development of the Action Plan was laid at the International Workshop on Marine Pollution in East Asian waters, held in Penang, Malaysia, in 1976 (IOC/FAO(IPFC)/UNEP, 1976). Since then a large number of workshops, seminars, conferences and consultations have been held in order to advance the Plan.

Steps have been taken by the ASEAN countries, with assistance from UNEP and IUCN to establish a network of ASEAN Heritage Parks and Reserves. One marine park, the Kor Tarutao Marine National Park in Thailand, is included in the list.

National

Thailand. At present there is no single coastal management agency or