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INTRODUCTION : AN INDICATIVE SURVEY OF THE MARICULTURE POTENTIAL OF ANDAMAN AND NICOBAR ISLANDS

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The Andaman and Nicobar Islands enjoy the status of an archipelago with over 550 islands, islets and rocky outcrops in the Bay of Bengal, lying between 6°45'N and 13°41'N lat. and between 92°12'E and 93°57'E long. With a land area of only 8293 sq. km, it has a total coastline of 1962 km which is about one-fourth of the total coastline of India. Of the 2 million sq.km of the Exclusive Economic Zone of India, 0.6 million sq.km or 30% of the area lies around the Andaman and Nicobar Islands. However, the annual marine fish production in the islands is around 1500 tonnes forming about 0.1% of the total of India's 1.4 million tonnes. Being oceanic islands, the continental shelf around them is limited to about 16,000 sq.km as compared to the total shelf area of about 452,000 sq.km of the country. With practically no continental slope, the land drops steeply to great depths not far from the coastline.

The limitations of continental shelf are, to a certain degree, compensated by the presence of numerous bays, creeks and inlets on the landward side and vast expanses of productive oceanic waters of the Bay of Bengal on the west and the Andaman Sea on the east. Major developments in fisheries are possible in the oceanic waters around the islands, particularly for oceanic fishes such as tunas, tuna-like fishes, billfishes, elasmobranchs and squids. Such programmes need large capital investments, infrastructure facilities and trained manpower.

The islands did not have a traditional fishing population and the only fishing used to be done by the aborigines with bow and arrows and by the tribal Nicobarese with spears. Starting from the early 'fifties, fishermen from mainland were encouraged with incentives to settle down in the islands and carry on fishing activities. However, this has not led to any remarkable development. The remoteness of the islands from the mainland, lack of infrastructure and the absence of a fish trade between mainland and the islands are some of the factors responsible for the poor development of fisheries.

Marine capture fisheries in the Andaman and Nicobar Islands has a vast scope for increasing production several fold from the present order of 1500 tonnes/annum. This would require long-term integrated development programmes on manpower, technology, infrastructure and capital assets such as vessels and gear. While this has to be done in a phased manner, certain immediate short-term possibilities exist for fisheries development in the bays, creeks and inlets fringing the islands. These water bodies can be developed for culture of marine organisms, or mariculture, for increasing fish and shellfish production. Aquaculture is closer to agriculture than fish capture is and can be taken up with relative ease both by the fishermen and farmers and could be a part-time job while dealing with semi-culture and extensive farming. Mention may be made here of the brief experimental programme on fish culture taken up by the Department of Fisheries, A & N Islands at Chippighat. The project had to be abandoned as it was not based on the right principles of fish farming.

Although farming of marine organisms is not totally new to the country (Kerala and West Bengal have certain traditional systems practised by the rule-of-thumb), technical advances have been made in the field only during the last one decade. The Central Marine Fisheries Research Institute (CMFRI) has played a pioneering role in this and developed technologies which are low-cost in investment and easily adoptable and manageable by an average farmer or fisherman. These relate to culture of marine prawns, mussels, oysters, seaweeds and finfish. The Institute has made significant achievements in pearl culture which requires

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a higher level of technology and investment. More recent developments have been on controlled seed production of these species, again with low-cost technologies, for reducing or removing mariculture's dependence on nature for seed supply. With this background, the CMFRI planned to explore the potential of Andaman and Nicobar Islands for development of mariculture.

An action plan for this survey was drawn up by the end of 1977. The objective as defined then was to conduct a rapid survey of the Andaman and Nicobar Islands to (1) identify and indicate the species resources suitable for mariculture, (2) collect environmental data from the bays, creeks and mangroves and indicate locations that can be considered for mariculture, and (3) assess the infrastructure facilities that are present and that would be required for taking up mariculture. Since it rains for nearly 9 months in a year in the islands due to the south-west and north-east monsoons, and a survey of this nature would not be possible during such wet conditions, January-April 1978 was chosen for carrying out the programme. The survey was done by two teams of scientists. The first team was in the islands from 31 January to 18 March and the second team from 21 March to 22 April 1978. The composition of the teams was as follows :

Team 1 : Dr. K. Alagarswami (Leader), Dr. R. S. Lal Mohan, S. Shri S. Shanmugham and K. Ramadoss (Scientists), R. Panigrahy (Research Scholar), J. Antony Pitchai and Soosai V. Rayen (Skin-divers) and P. Raghavan (Photographer). Dr. R. S. Lal Mohan officiated as team leader during part of the survey.

Team 2 : S. Shri K. Nagappan Nayar (Leader), S. Mahadevan, R. Marichamy, D. C. V. Easterson, M. Kathirvel and Dr. C. P. Gopinathan (Scientists), J. Antony Pitchai and Soosai V. Rayen (Skin-divers), and M. Rengan (Laboratory attendant). Dr. D.B. James, the then scientist-in-charge of the Port Blair Research Centre of CMFRI, gave local assistance in organising the programme and also participated in the survey, around Port Blair. Shri C. John, Fieldman at the Port Blair Centre assisted in the field work.

The survey concentrated on the resources of finfish, crustaceans, molluscs, sea cucumbers and seaweeds. Information on salt-water crocodile and marine turtle resources was also collected, as these two endangered resources are of considerable importance from the viewpoint of conservation. Experimental fishing nets were used for collection of biological samples. Facilities of the fishing boats of the Department of Fisheries at Port Blair were availed of whenever possible. SCUBA-diving equipment were used, besides skin-diving, for observations on the mollusc, seaweed and other sedentary resources and sea-bed conditions. Hydrographical data were collected and primary productivity was estimated. Plankton samples were examined from the observation centres. Topography of the areas visited was studied. Special emphasis was placed on studies of the mangrove ecosystem as potential grounds for mariculture and as a source of seed.

The places visited by the teams during the survey are given below (the base camps are given in italics). Figs. 1-8 illustrate the areas surveyed.

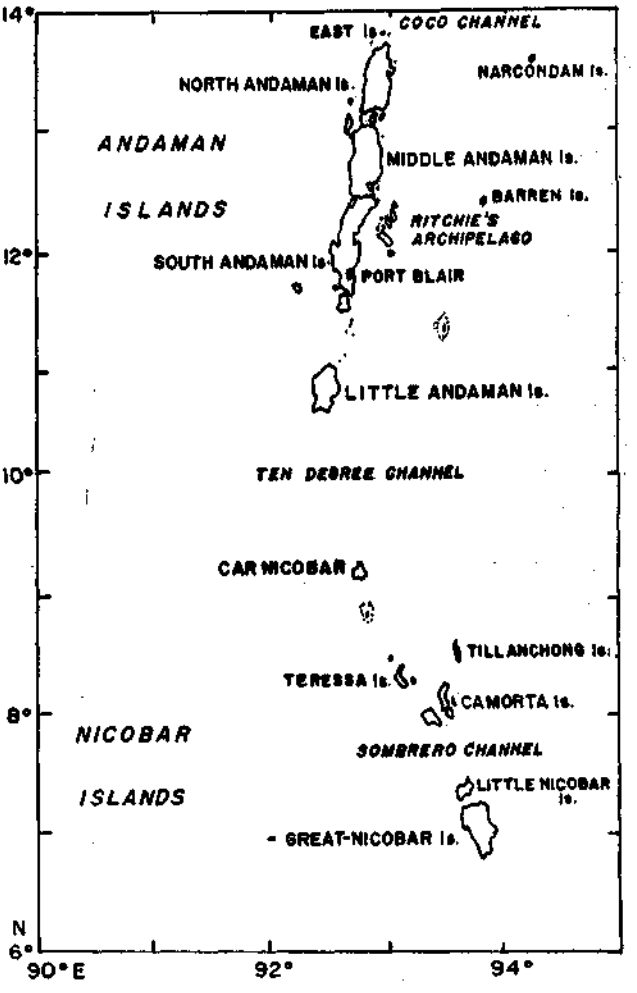

Fig. 1. Andaman and Nicobar Islands

North Andaman : Table Is., Smith Is., Turtle Is., Ross Is., Smith Bay, Blair Bay, Ariel Bay, Atalanta Bay, Lakshmipur, Kalpong creek, *Diglipur*, Durgapur Bay, Kalighat, Stewart Is., Sound Is., Oyster Point and Ray Hill.

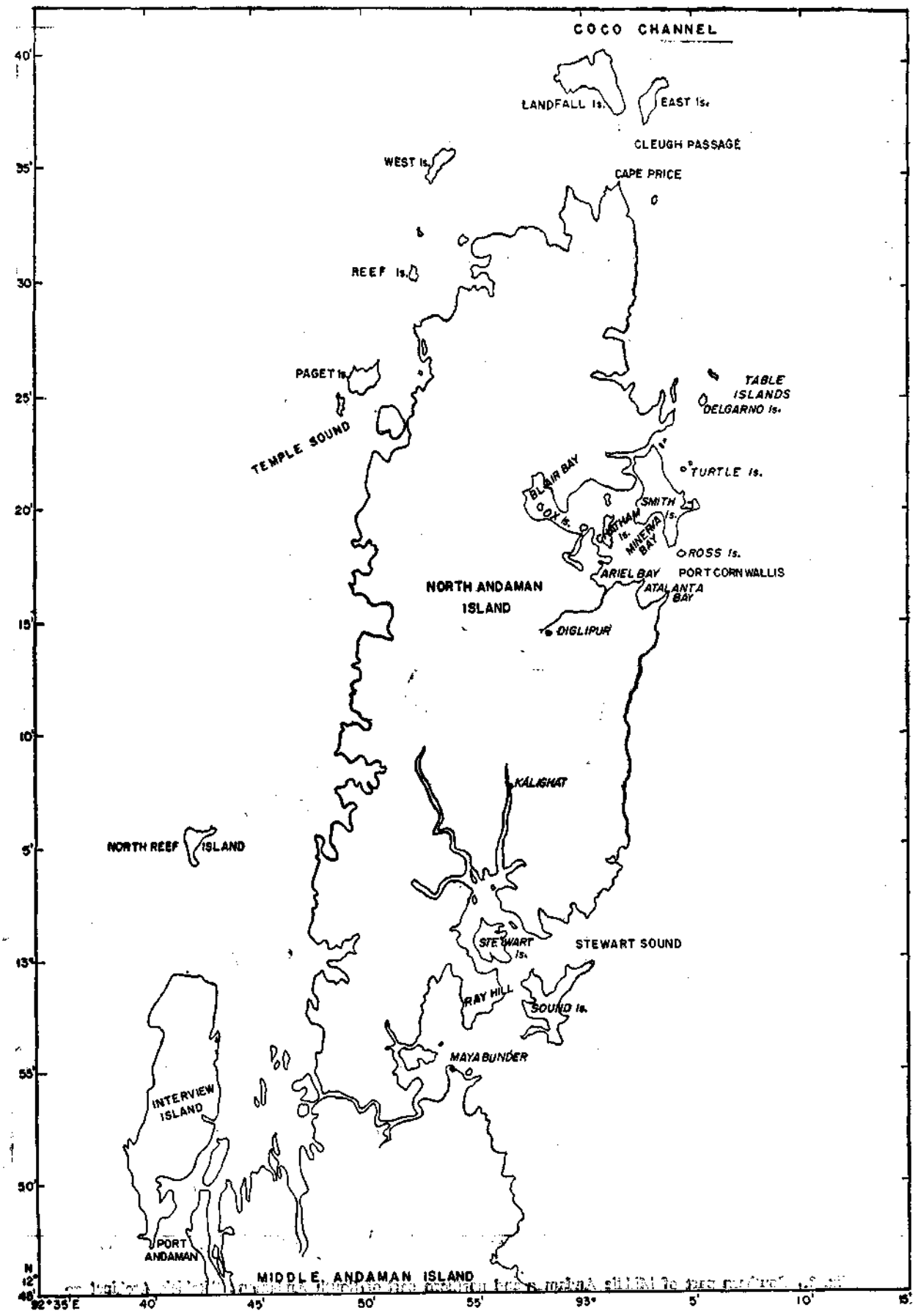

Fig. 2. North Andaman and northern part of Middle Andaman (Places surveyed are given in italics in Figs 2—8)

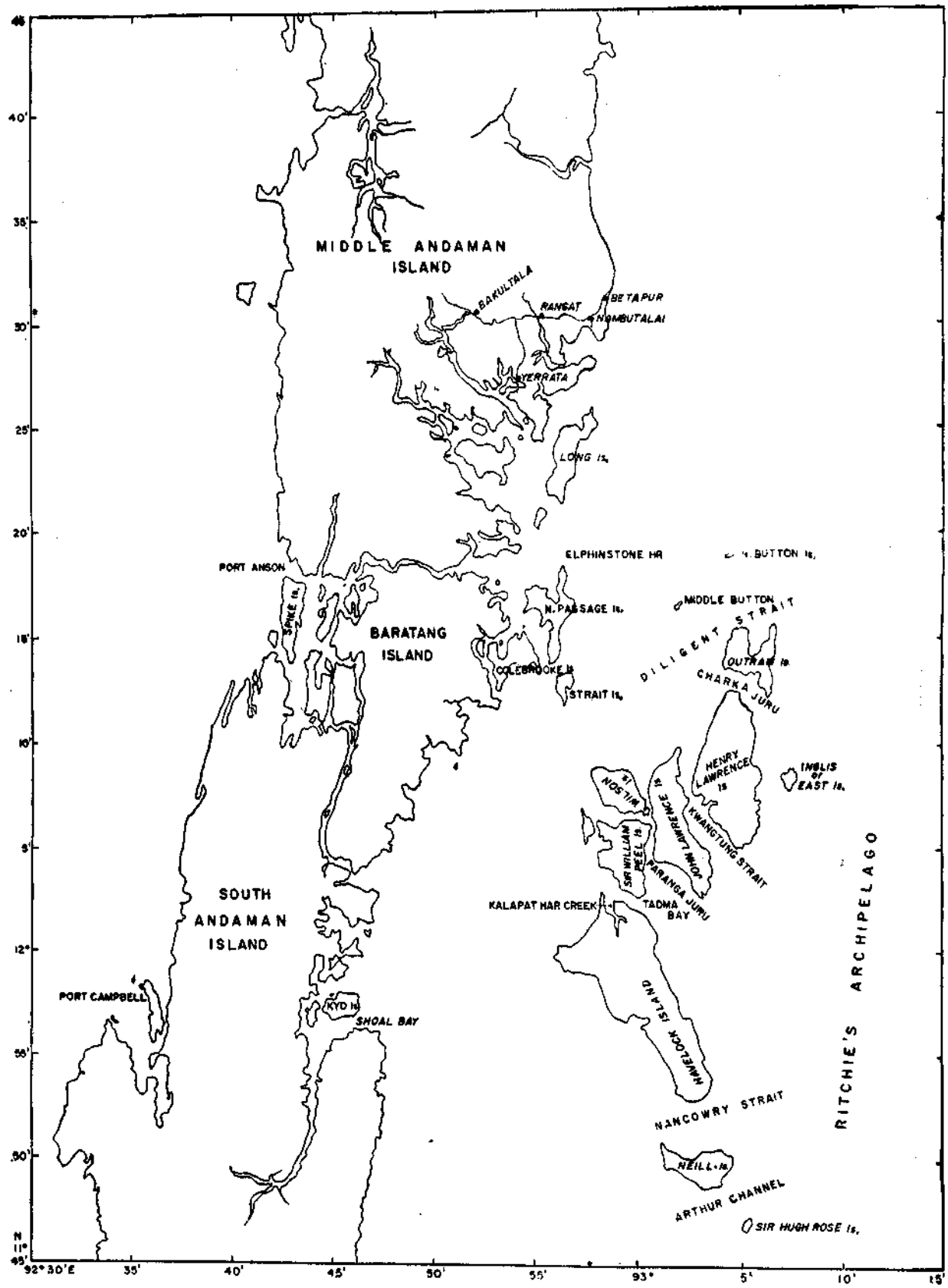

Fig. 3. Southern part of Middle Andaman and northern part of South Andaman ; Ritchie's Archipelago

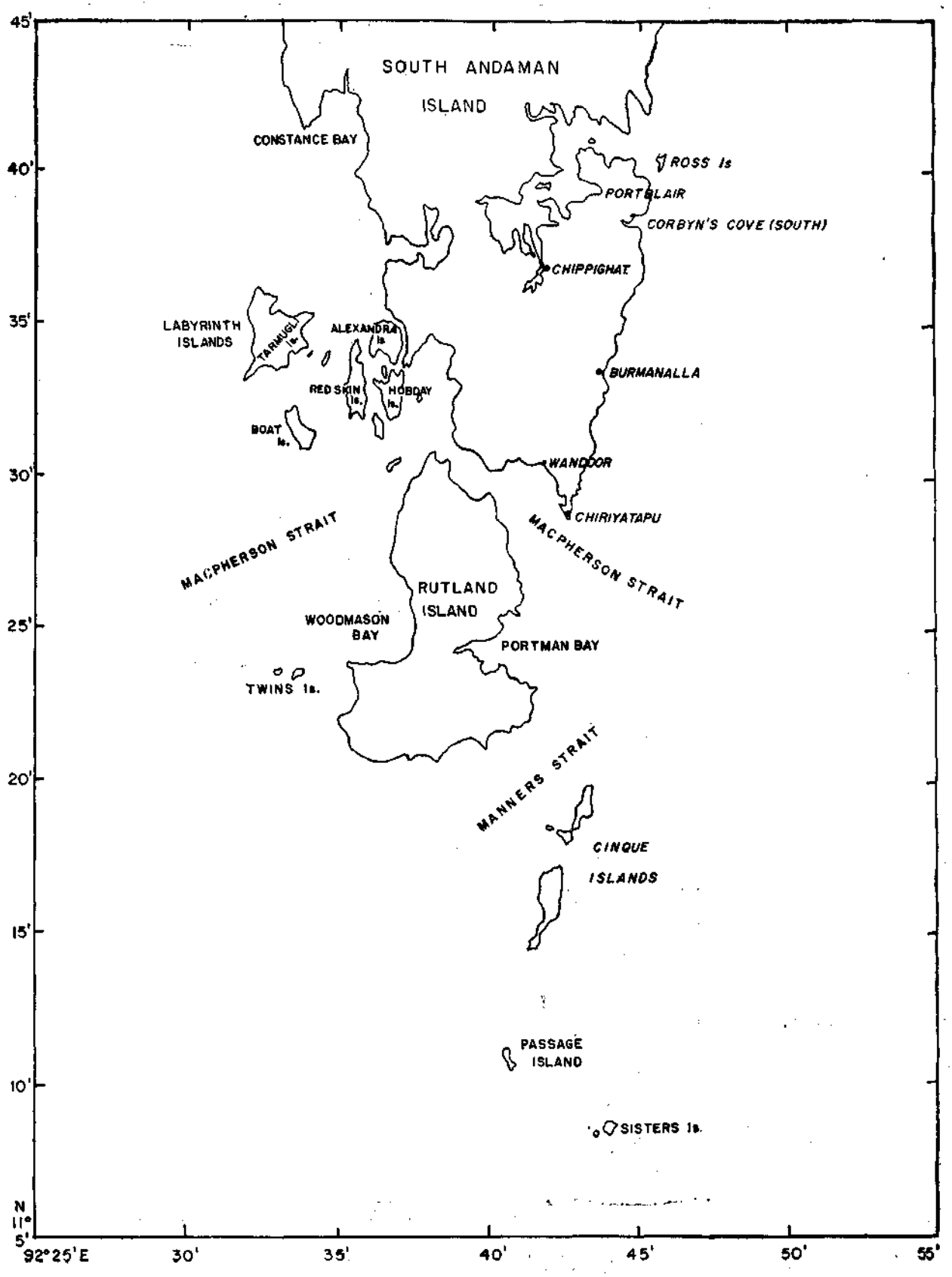

Fig. 4. Southern part of South Andaman

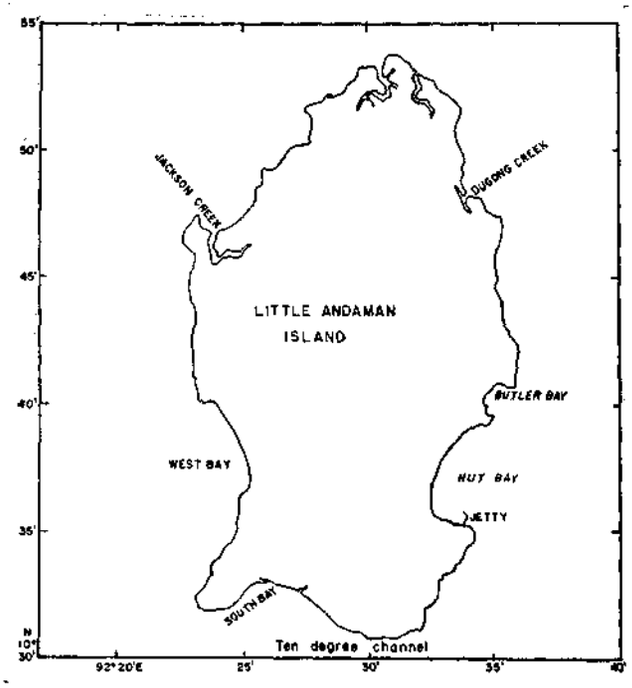

Fig. 5. Little Andaman

Middle Andaman : *Mayabunder*, Rampur, Austin creek, Bakultala creek, *Rangat*, Betapur, Yerrata creek and Long Is.

Ritchie's Archipelago : Outram Is., Henry Lawrence Is., John Lawrence Is., Inglis Is., Sir William Peel Is., Havelock Is., *Neill Is.* and Hugh Rose Is.

South Andaman : Kyd Is., James Is., Shoal Bay, North Bay, Semiramis Bay, Command Point, Bamboo flat, Dunda's Pt., Viper Is., Minnie Bay, Navy Bay, Chatham Is., *Port Blair*, Blair reef, Phoenix Bay, Atalanta Point, Aberdeen jetty, Ross Is., Sesostris Bay, South Pt., Janghlighat, Corbin's cove (south), Chippighat, Burmanalla, Wandoor, Chiriyatapu, Macpherson strait, Rutland Is. and North and South Cinque Is.

Little Andaman : Hut Bay and Butler Bay.

Car Nicobar : Hog Pt., Sawai Bay, Teetop, Passa creek, Keating Pt., *Malacca*, Kimios and Arong.

Nancowry group : Camorta Is. (Kakana, Naval Pt., Octavia Bay), *Nancowry* (Champin Bay, Spiteful Bay, Reid Pt.), Katchall Is. (Kapanga, *East Bay*, Hoinipoh, Jansing) and Trinkat Is.

Great Nicobar : Man Pt., Campbell Bay and Vijayanagar.

Thus, a very broad coverage was given but the intensity was limited, more so in the Nicobar Islands. Inter-Island transport was the major restraining factor. Diglipur, Mayabunder, Rangat, Ritchie's Archipelago, Port Blair, Car Nicobar and Nancowry received relatively better attention than the others.

The materials collected during the survey were deposited at the Tuticorin Research Centre of CMFRI. The scientists independently and collectively analysed the materials and examined the survey data at Tuticorin. In preparing the results of the survey for publication, the scientists were assigned to write on the areas of their specialisation, using all materials and data collected by both the survey teams.

Some scientists of the Central Marine Fisheries Research Institute have visited Andaman and Nicobar Islands on earlier occasions for carrying out specific studies. Those which are relevant directly or indirectly to the development of mariculture have been included in this Bulletin. A list of papers from this Institute on the Andaman and Nicobar Islands and their resources published earlier in different journals is given at the end of Bulletin. Shri R. Whitaker and Shri S. Bhaskar of the Madras Snake Park Trust who have first-hand knowledge on saltwater crocodile and marine turtle resources were requested to write on them.

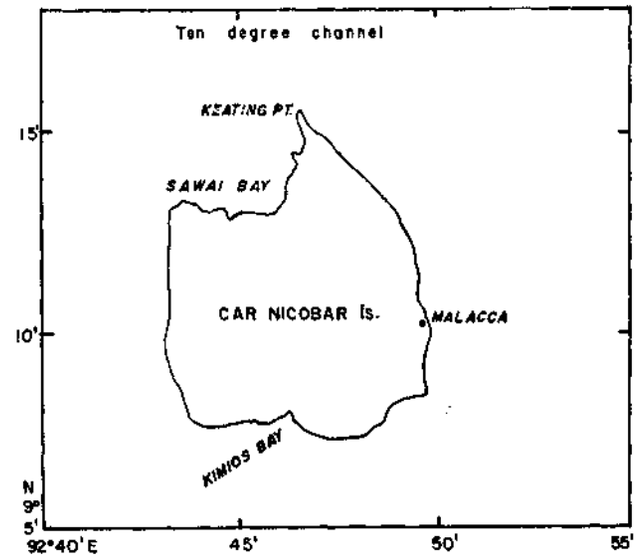

Fig. 6. Car Nicobar

In conducting the survey on the mariculture potential of the Andaman and Nicobar Islands, we have received the help and assistance of a number of officers of the A & N Administration without which it would not

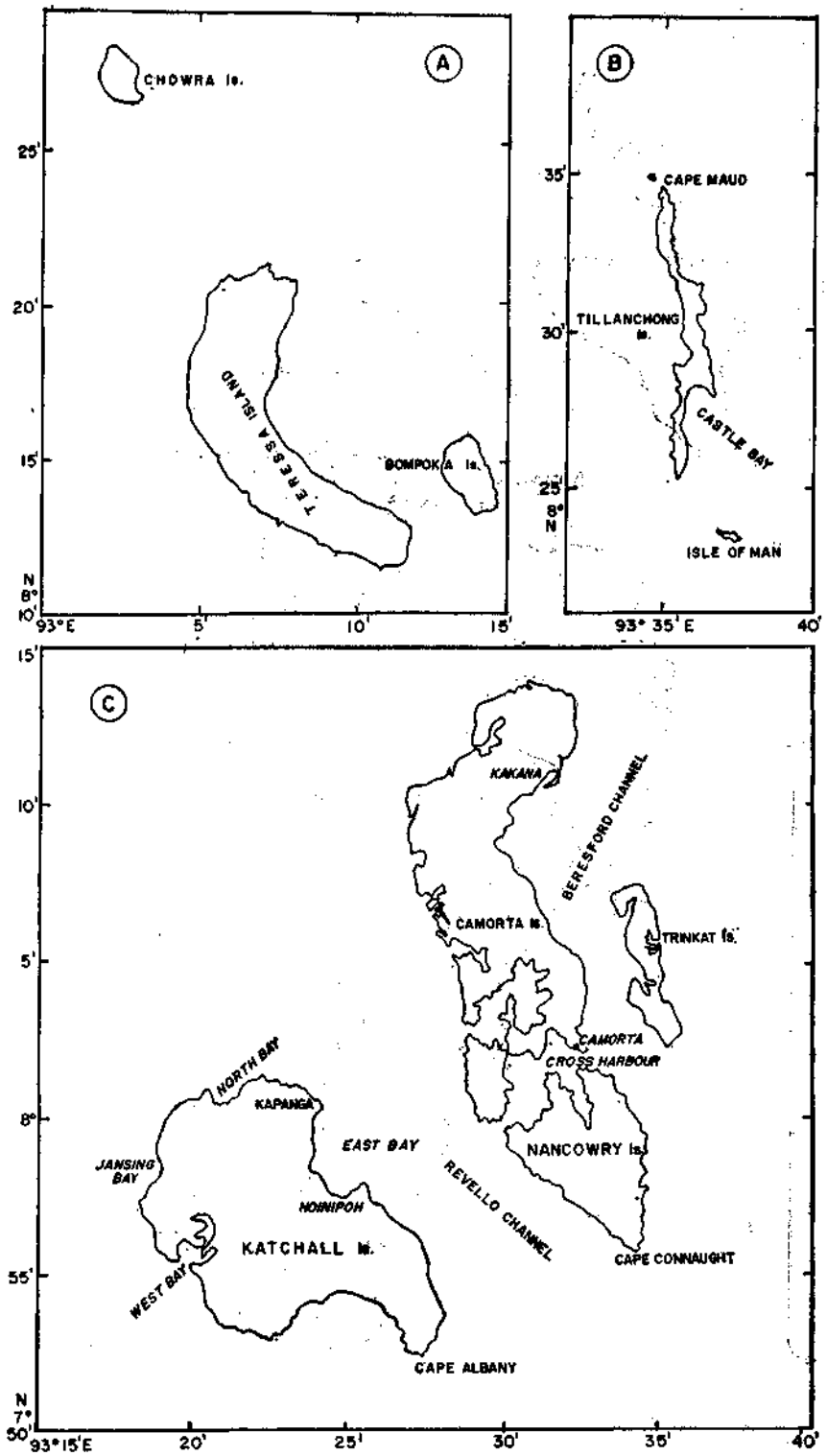

Fig. 7. A. Teressa group; B. Tillanchong group; C. Nancowry-Camorta group of Islands

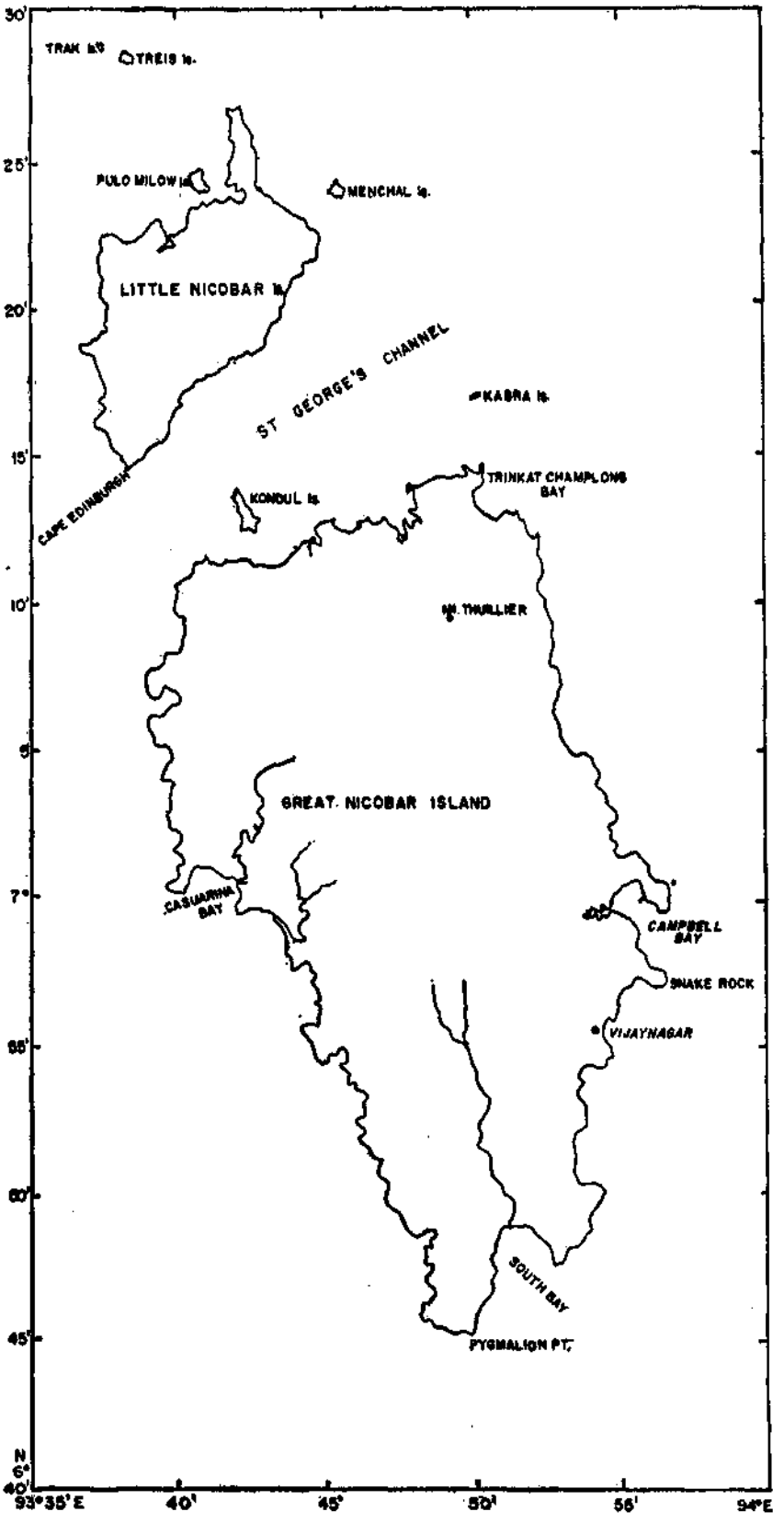

Fig. 8. Little Nicobar and Great Nicobar

have been possible to complete the work. Our grateful thanks are due to Shri S. M. Krishnatry I.A.S., the then Chief Commissioner of the A & N Islands for his keen interest in the survey and for all the help provided through the various departments of the Administration. Shri P. M. Gokulapala Menon, the then Director of Fisheries made available on occasions two departmental boats for experimental fishing and helped in planning the programmes locally. We are thankful to Shri R. Whitaker and Shri S. Bhaskar for contributing the papers on crocodile and sea turtle resources. My coll ague Dr. K. Alagarswami assisted me in planning the survey programme, coordinated the preparation of the papers and edited them for this Bulletin.