

# Fish stock assessment in the Bay of Bengal region

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A training course under BOBP auspices was held recently in Colombo on the use of microcomputers to analyse fisheries data. The stock assessment models tried out during the course threw light on such phenomena as growth, mortality and recruitment patterns for fish species that occur in the Bay of Bengal region. This article describes the findings of the course.

Lots of courses in fish population dynamics and stock assessment are being held these days in the tropics and elsewhere, but the one organized recently by the Marine Fishery Resources Management Project of the Bay of Bengal Programme in Colombo deserves special comment, as it differed in major aspects from other courses with similar aims.

The major characteristic of the course — which ran from August 27 to September 7, 1984 and was organised by Dr K Sivasubramaniam,

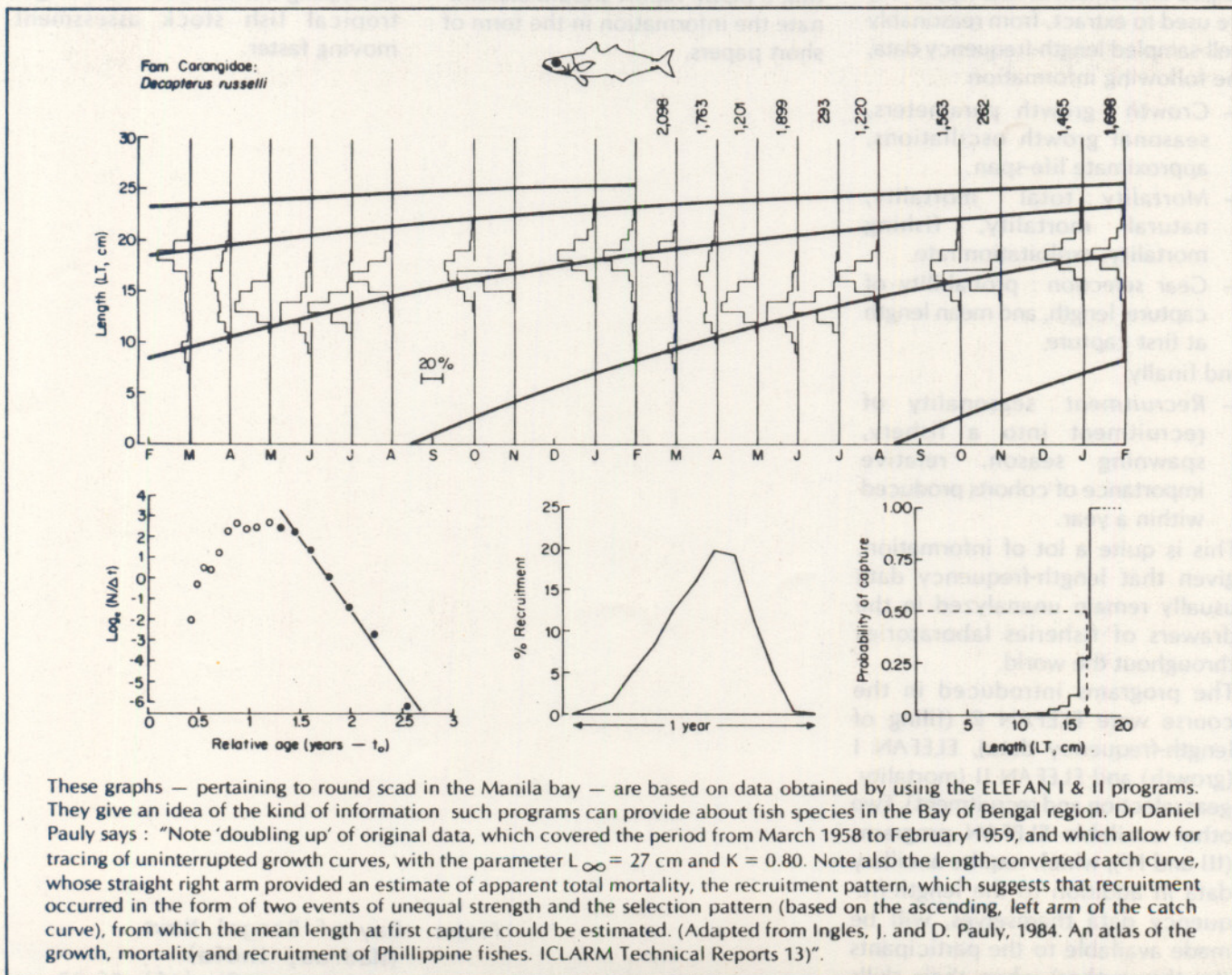
Senior Fishery Biologist of the BOBP — was that it was structured entirely around microcomputers, in this case four Apple II e's purchased by the BOBP from a dealer in Colombo.

The idea was that the 12 participants in the course (two each from Malaysia, Thailand, Indonesia, Maldives, Bangladesh and Sri Lanka) should be able to get immediate hands on training on filling and analysing fishery data (i.e. catch statistics) and using various stock assessment models, then return to

their home institutions with "their" computers.

The four computers used during the course will be placed by BOBP in fishery research institutions in Indonesia, Malaysia, Sri Lanka and Thailand. One computer has already been sent to the Maldives, one will be sent to Bangladesh.

The other major characteristic of the course is that the stock assessment methods taught were appropriate for the study of tropical fish stocks, such as occur in the Bay of Bengal region. This was, trivial as it



may seem, no mean feat, given that most of the stock assessment models taught in various universities of the developed world are not applicable to tropical stocks.

Thus, rather than concentrating only on "age-structured" models, which require tedious, costly (and in the tropics often unfeasible ageing (determining the age) of individual fish, the methods taught in this course were mainly "length-structured", i.e. they were based predominantly on the detailed analysis of length-frequency samples, i.e. size composition data such as can be obtained quite straightforwardly by measuring fish at shoreside markets or in specially designed seagoing surveys. The length-structured models which formed the bulk of the course are the ELEFAN (Electronic Length Frequency Analysis, with pun intended) programs developed by this author and some of his friends. These programs, which BOBP associate expert Jan Hertel-Wulff had helped implement on the Apple II's, are used to extract, from reasonably well-sampled length-frequency data, the following information :

- *Growth* : growth parameters, seasonal growth oscillations, approximate life-span.
- *Mortality* : total mortality, natural mortality, fishing mortality, exploitation rate.
- *Gear selection* : probability of capture, length, and mean length at first capture.

and finally

- *Recruitment* : seasonality of recruitment into a fishery, spawning season, relative importance of cohorts produced within a year.

This is quite a lot of information, given that length-frequency data usually remain unanalyzed in the drawers of fisheries laboratories throughout the world.

The programs introduced in the course were ELEFAN Ø (filing of length-frequency data), ELEFAN I (growth) and ELEFAN II (mortality, gear selection and recruitment). Two other available ELEFAN programs (III and IV), which require ancillary data in addition to the length-frequency data themselves, will be made available to the participants (by this author) when their skills

match the added requirements of these more advanced programs.

Impressive results were obtained — within days — by the participants, using length-frequency data they had brought from their countries. Thus, for example, the growth parameters of skipjack in the Maldives were estimated quite reliably, as were those of a mollusc, *Paphia undulata* from Malaysia. Also, growth and mortality rates for a sardine (*Sardinella sirm*) in Sri Lanka were estimated, and fishing mortality was found to have increased during the period 1980 to 1984 to values beyond the level considered optimum. Other studies were concerned with big-eyed scad in the Java Sea, Indo-Pacific mackerels off Thailand and Malaysia, shads in Bangladesh and yellowfin tunas in Sri Lanka and the Maldives.

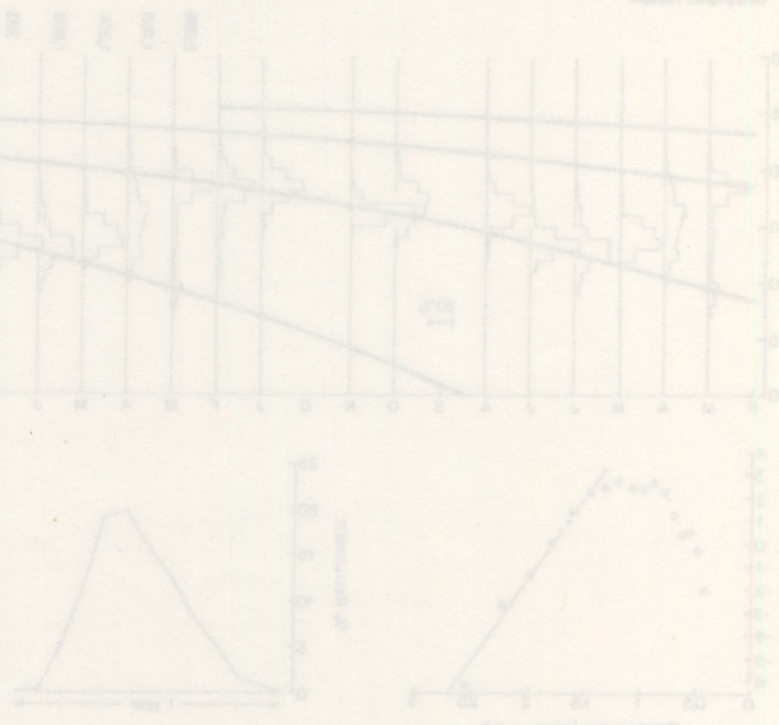
In fact, so much emerged within these few days from the data brought by the participants of this course, that Dr K Sivasubramaniam suggested that a BOBP report should disseminate the information in the form of short papers.

"Writer's block" is a disease which seems to affect many fisheries officers working in developing countries — a problem worsened by the unrealistic standards of "rigour" which are sometimes applied to their work (mostly by people working in places where detailed statistical data and decades of previous research make such rigour appropriate).

To publish as a collection of short papers the results of our training course will, however, not only help some fishery officers overcome their "writer's block"; it will also help to show that there are ways to perform fish stock assessments quite straightforwardly in all tropical countries, including those in the Bay of Bengal area. Wait and see.

#### Acknowledgements

I would like to thank Dr Sivasubramaniam, Mr Jan Hertel-Wulff, the other BOBP staff and all participants of this course for their enthusiasm in helping demonstrate how to get tropical fish stock assessment moving faster.



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