# THE TRAINING OF FISHERIES ADMINISTRATIVE OFFICERS IN SOUTH EAST ASIA*

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Tham Ah Kow
Director
Fisheries Biology Unit
University of Singapore, Singapore

## ABSTRACT

In this paper the thesis has been put forward that the training of Fisheries Administrative Officers in South-east Asia should be based on their functions which are related to the types of problems met with in the fishing industry. The range of these problems is briefly reviewed.

In the formulation of the training schedule certain factors such as

(i) the complexity of the aquatic fauna and flora peculiar to this region,

(ii) the level of education, the psychological background and the socio-economic status of the fishery operatives,

(iii) the state of development in the fishing industry as well as the adequacy of the communication network of the country,

(iv) the consumer preference of the consumer and

(v) the staffing position of the Fisheries Department and its ancillary research and technological institutes,

should be taken into consideration.

The theoretical as well as the practical content of courses of training in Fisheries Science which will fit the Fisheries Officials concerned for more effective service is outlined.

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## INTRODUCTION

The line of thought presented in this paper on the training of Fisheries Administrative Officers in South-east Asia has been crystallised after having served in various capacities in the Fisheries Department of Malaya and Singapore for almost thirty years. As distinct from the situation twenty years ago, almost all Fisheries Departments in South-east Asia have a Central Administrative Unit, which forms the 'backbone' of the Fisheries Department and is charged with the administration of the fishing industry, with one or more ancillary research or technological institutions. There are thus two main groups of officers, viz: (a) those engaged in the administration of the fishing industry and (b) those engaged on special research, technological and socio-economic projects. For the development of the fishing industry both these groups will have to participate. The administrative group will assess the need for development and identify the problems, whilst the second group will have to find solutions to the problems. Both groups will then cooperate in the formulation and implementation of the development projects. In this paper only the training of officers of the administrative group will be considered.

## FUNCTIONS OF THE FISHERIES ADMINISTRATIVE OFFICERS

The training programme for the Fisheries Administrative Officers has to be based on the functions of the various categories of the officers. It is usual in any Fisheries Administrative Organisation to have a Director or Chief, with a Deputy Chief to assist him. Then depending on the size of the organisation, there may be a number of Regional Fisheries Officers who may sometimes be designatedas Assistant Directors or Senior Fisheries Officers, each in charge of a region comprising several states or of an individual state. In each State Fisheries Office there will be further subdivision of duties so that the smallest unit may be a District Fisheries Office. All these Officers can be grouped, for training purposes, into two main groups, viz: (a) those who have had education at University level and (b) those who have had education at High School level. In Malaysia and Singapore, for example, those in charge of districts are known as Fisheries Assistants or Assistant Primary Production Officers (Fisheries). There may be one or more Senior Fisheries Assistants to supervise and coordinate the work of those in charge of Districts. All these Officers have been educated to High School level. Those in charge of a Fisheries Office of a State or of a Region comprising several States are known as Fisheries Officers or Regional Fisheries Officers and are University graduates.

The Fisheries Administrative Unit, being the organ of the government which looks after the well-being of the fishermen and the fishing industry, has multifarious functions. It has to face all the problems of the fishermen and the fishing industry. Its Officers must therefore

be conversant with all the facets of the vast array of problems which could arise. These problems may be environmental or biological in nature. For example, they may concern the failure of certain species of fish to appear during the fishing season as a result of changes in the environment such as bad weather, sudden change in direction of prevailing wind or currents, pollution, sudden appearance of large shoals of coelenterates. It may be the appearance of the lower age groups of a particular species of fish in the catch, or the gradual diminution of the fish catch of a particular gear over an extended period of time. Or it may be a case of sudden mass mortality in a fish pond.

On the other hand the problem may be of a technological nature. For example, phenomenal catches of anchovies may coincide with the rainy season so that the fishermen could not sun-dry the fish sufficiently quickly before deterioration sets in. It may happen that the fishing ground has shifted much further from the fishing base so that the catch will deteriorate before the fishing boats can reach the base, thus resulting in a poor price for the catch. The problem may also be a socio-economic one. For example, there may be a sudden storm resulting in the loss of boats and equipment which means that they are incapacitated from fishing for some time.

Then there is the normal routine work of administration of the industry with its many problems, as well as the collection of statistics of catches, boats, equipment, fishing effort, types and sizes of fish caught and such other data which helps the Fisheries Department officials to feel the pulse of the industry and assess the need for conservation measures.

One very important factor which also has to be taken into account is the state of development in the country, since development plans which can be easily implemented in a developed country may fail completely in a developing country. The transportation system may be totally inadequate and may have to be improved before a development plan can be effectively implemented. In many developing countries the methods of fish capture used, whilst being extremely ingenious, may be very primitive and too labour-intensive in relation to the catch obtained. The level of education of the fishery operatives may be rather low so that they may have to receive special training before they could effectively participate in any development plan. Or they may be extremely conservative and reluctant to accept change so that a preliminary study of their psychological background may have to be undertaken and the results taken into consideration before finally formulating the development plan. Yet another important factor is the local consumer preference. For example, any attempt to produce smoked fish will fail unless the local consumers are prepared to accept smoked fish as an item of their diet. Account will also have to be taken of the staffing position both of the Fisheries Administrative Unit as well as of the ancillary research and technological institutions. This is of importance especially in many countries of South East Asia where the number

of Fisheries problems awaiting solution is usually large compared with the staffing position of the Fisheries Department and its ancillary institutions.

A Fisheries Administrative Officer, to be effective, must be able to identify clearly the problems of the industry. Having identified the problem he should then be able to isolate the factors which have given rise to the problem and evaluate the role which each factor plays in the formulation of the problem. When he is faced with a biological problem he must be able to carry out simple preliminary observations on environmental characteristics such as salinity determinations, Secchi disc readings, pH determinations, dissolved oxygen estimations, etc. He must be able to identify the fish, plankton organism or other organism concerned as well as understand the significance of his observations so that he could prepare a report which is intelligible to the specialists.

When he is faced with a problem related to fish capture, he must have an understanding of the method of operation of the fishing gear concerned as well as the principles underlying such operations so that in his report to the specialists all the pertinent points will be covered.

Similarly when he is faced with a problem concerning the preservation and transportation of fish, he must have an understanding of the principles and processes of fish preservation as well as of the organisms which cause deterioration of the fishery product. The problems of marketing of fish should also be clearly understood.

In the case of problems of fish culture, he should have an understanding of the principles of fish culture, disease identification and control as well as of site selection and pond construction.

This does not imply that he must be a specialist in all branches of Fisheries Science but he must be capable of carrying out an intelligent preliminary investigation of the problem and submit a report which will be of use to the specialist. In the case of many minor problems, he might be able to solve them without assistance from the specialist. All that is required is for the specialist, after reading the report, to confirm the diagnosis of the problem and agree with the proposed solution, with a few minor suggestions where necessary. Only when major problems are concerned or where specialist work is required will there be a need for specialist to study the problem at first hand.. This method of procedure is of special importance in developing countries where the number of specialists is usually limited and communications are poor, as otherwise the few specialists available will have to be travelling over long distances to solve minor problems thus leaving them with very little time to carry out their real function of attending to major problems.

Another important aspect is the fact that in many countries of this region a Fisheries Administrative Officer is in charge of the fisheries of a whole State. He has, very often, to appear before a State Council meeting or other high level meeting in the State to answer questions relating to fisheries problems. In order to secure the confidence of the State Government as well as fishermen he must be sufficiently knowledgeable in the many facets of Fisheries Science to answer the questions with confidence. He must therefore be trained accordingly. The same applies to his assistants who are the direct day-to-day link between him and the fishery operatives. His work will certainly be more effective if his assistants are also adequately trained, especially if his assistants are in charge of Districts.

## TRAINING SCHEDULE

Based on the functions discussed earlier in this paper, it is considered that the following syllabus for instruction in Theory and Practical work for one year should be adequate for Fisheries Administrative Officers who should have a first degree in Zoology with Botany or Biochemistry or Chemistry as a subsidiary subject:-

*Theory*

1. General Fishery Biology

   a) Classification of fish: general anatomy and use of keys.
   b) General physiology of fish: food and feeding; growth and reproduction; reactions of fish to light, currents, sound, electric currents and other characteristics of the environment; aggregations and migrations of fish.

2. Methods of Fish Production

   a) Classification and description of methods of fishing.
   b) Relationship between fishing methods and behaviour of fish.
   c) Culture of aquatic organisms - fish, oyster, prawn and exotic fish.

3. The Fishing Industry

   a) Fishery operatives.
   b) Organisation and capitalisation of the industry.
   c) Marketing and transportation of fish.

4. Marine Products of Commerce

a) Methods of production of iced fish, frozen fish, smoked fish, salt fish, fish sauce, Maldive fish, dried prawns and by-products, dried cuttle fish, dried oyster and other molluscs, canned fish, beche-de-mer, sponges, belachan and miscellaneous marine products such as shells, lime, pearls, fish oil, agar etc.
b) Grading of marine fishery products.

5. Fisheries Conservation, Legislation and Administration

a) Stock assessment and overfishing.
b) Conservation of the fisheries: the need, methods and problems met with in tropical seas.
c) The need for legislation and subjects requiring legislation.
d) Administration of the fishing industry- licensing, statistics, fishing port control and socio-economics of fishermen.
e) Elements of International Maritime Law.

6. The Marine Environment

a) General characteristics of seas and oceans, currents and tides.
b) Physical properties of sea water.
c) Chemistry of sea water and chemical composition of marine organisms.

7. Populations of the Sea

a) Marine bacteria, Plankton, Nekton and Benthos.
b) Relationship between marine organisms and the physical and chemical characteristics of the environment.
c) Nutritional relationships of marine organisms.

8. Organic Production in the Sea

a) The production of phytoplankton, zooplankton and fish.
b) The standing crop and estimation of productivity.

9. Some Applications of Science to Fisheries

a) Problems of stock assessment.
b) Location of fish shoals - use of echo-sounders, fish finders, biological indicators, physical and chemical indicators.

c) Use of light, electric current and lures in fish aggregation.
d) Fishing gear research - underwater observation and tank tests.
e) Technological research - preservation of fish and fishing gears; utilisation of by-products and fish waste.
f) Modern Factory ships.

10. Techniques in Fishery Biology

a) Use of collection gears for water, plankton and bottom samples.
b) Physical measurements - currents, wind, Secchi disc, photoelectric cells, temperature.
c) Chemical determinations - salinity, ammonia, nitrate, pigments, phosphate, dissolved oxygen, pH.
d) Methods used in research on Fish Stocks.
e) Field observations on fishing operations.
f) Planning and recording of field work.

11. Marine Fisheries Development

a) The formulation of development schemes.
b) Fisheries Surveys.
c) Implementation of development schemes.

12. Inland Water Environments

a) Lotic environments - streams, rivers, estuaries and tidal swamps.
b) Lentic environments - lakes, ponds, paddy fields and freshwater swamps.
c) Physical and chemical characteristics of inland water environments.

13. Organisms in Inland Waters and their inter-relationships

a) Plankton and other micro organisms, Nekton and Benthos.
b) Influence of environment on these organisms and inter-relationships between them.
c) Common parasites and diseases of fish.

14. Productivity of Inland Waters

a) Biotic potential and standing crop.
b) Indices of productivity.
c) Production of ponds, paddy fields and lakes.

15. Inland Fishery Methods

a) Culture methods used in different countries.
b) Site selection and pond construction.
c) Use of fertilisers; artificial fertilisation.

16. Development of Inland Fisheries

a) Survey of water resources and swamp areas.
b) Formulation of development schemes.
c) Implementation of development schemes.

17. Simple Statistical Methods

*Laboratory and Field Work*

1. General Fishery Biology

a) Use of identification keys for the main families and selected genera and species of fish found in surrounding waters.
b) Dissection of fish and study of stomach contents.
c) Fish parasites, plankton and benthic organisms.

2. Field study of selected types of trap, net and line fisheries

3. Field study of fishing villages, Fisheries Control points and fish markets

4. Marine Products of Commerce

a) Experiments in icing, freezing of fish and dressing of fish.
b) Laboratory preparation of fish cakes, fish balls, canned fish.
c) Practice in grading of marine products.
d) Analysis of fish: water, crude protein, fat and ash.
e) Field study of manufacture of lime.

5. Techniques

a) Use of Nansen Bottles, bottom grabs, dredge, current meter, Secchi disc and plankton nets.
b) Determination of salinity, phosphate, nitrate, nitrite, ammonia, dissolved oxygen, pH, dissolved carbon dioxide and hydrogen sulphide.
c) Use of compass, sextant and range finder.

6. Fisheries Administration

a) Field survey of fishing stakes and ponds.
b) Demographic surveys of fishing villages.
c) Market surveys.

The Fisheries Assistants should be given a similar course of instruction, but at a lower level and for a minimum period of three months. The syllabus should cover the following subjects:-

1. Classification of Fish.
2. The Aquatic Environment.
3. General Biology and Behaviour of fish.
4. Methods of fishing and Culture of aquatic organisms.
5. Structure of the fishing industry.
6. Fishery Products of Commerce.
7. Fisheries Problems and the Conservation of Fisheries.
8. Fisheries Legislation and Administration.

Both theoretical and laboratory instruction should be given, together with a number of field trips during which the students should practise the use of collection gears, sextants, compass, range finders, current meters and other instruments as well as carry out demographic surveys.

On completion of this training schedule the Fisheries Administrative Officers should be in a position to make an intelligent appraisal of any problem which may arise in the course of his duties and find solutions for the more simple ones. In the case of more complex problems he should be able to submit a clear report to the specialists concerned, indicating the nature of the causative factors, the background picture and the results of a preliminary probe into the problem. This should save the specialists a lot of time and trouble, thus facilitating the solution of the problem. If the Fisheries Assistants, who work under his supervision, have also undergone the more elementary course, they could assist him more effectively by carrying out preliminary observations and tests which may be necessary and are within their competence, before submitting their report. This will ensure the more effective use of manpower in the Fisheries Department, not only in the solution of problems which may arise in the industry but also in the formulation and implementation of any Fisheries Development Scheme.

The training schedule outlined above may appear to be too comprehensive and intensive, but in actual practice it could be fitted in comfortable as a full time course in the normal University curriculum. The University of Singapore is at present providing the following courses along these lines:-

(a) An Honours degree course in Zoology of four years, in the final year of which the student may read Fisheries as a special subject.

(b) A postgraduate Diploma Course in Fisheries of one year for graduates in Zoology.

(c) A Certificate Course in Fisheries Administration of one term (about 3 months) for non-graduates who have attained High School Level.