

Training in Tropical Fisheries Science

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The educational requirements for fisheries scientists are well established: a good grounding in the basic sciences—mathematics, physics, chemistry and biology, and an awareness of the environmental sciences, development economics and social and political issues. Specialized training in aquatic sciences, including fisheries, should ideally be deferred until after a first degree is attained. It is not always recognized that a basic degree is not sufficient basis for a career in *any* research field.

American and British Systems

After the first degree, a basic and important dichotomy appears in the two graduate educational systems which dominate the English-speaking world. Under the "American" system, undergraduate degree requirements are broader, generally founded upon a less intensive high school education with a great variety of courses and usually produce a well-rounded "liberal arts graduate" who then needs to complete a number of specialized courses before proceeding to undertake an M.Sc. or Ph.D. research topic. Under the "British" system, high school students are already quite specialized before they enter university, have a detailed education in the sciences, embark at once on relatively advanced science courses, complete an "Honours" degree and proceed directly to research for their higher degrees without, in most cases, undertaking any further course work. Further knowledge comes from directed reading and discussions with research supervisors. Both systems have their advantages. However, it is fairly easy for a graduate of the British system to embark on graduate studies under the American system but *not* the other way around. The fundamental difference lies in what is expected of students at the high school level.

Graduate Courses and Supervision

At the graduate level, fisheries training



cannot proceed alone, irrespective of the system which nurtured the student. Fisheries studies must be backed up by courses or advanced studies in limnology, oceanography and environmental sciences. Additionally, and most importantly, the student working towards a Masters or Doctoral degree needs to be in the right atmosphere of learning, backed up by facilities to learn the practicalities of the trade, such as statistics, computer sciences, scuba diving, small boat handling, and the opportunity for participating in at least one scientific expedition or a series of offshore cruises handling a wide variety of oceanographic and fishing gear. Finally, the student needs the supervision of an experienced scientist, and preferably of a group of scientists, from whom the correct rigorous approach to scientific inquiry can be learned. And

where can this perfect educational arrangement be found? The answer is "nowhere in the tropics and very few places elsewhere."

Undergraduate Courses

The availability of undergraduate training in marine fisheries science at English language universities lying within the tropics is distinctly limited. The College of Fisheries of the University of the Philippines in Manila offers an undergraduate course with major emphasis on fisheries. There has been a recent move to permit increased numbers of foreign students in Philippine educational institutions, but present regulations are somewhat restrictive. In Malaysia, the Faculty of Fisheries and Marine Sciences of Universiti Pertanian Malaysia, located at Serdang, Selangor offers a Diploma of Fisheries and Bachelor of Science (Fisheries). In India, Colleges of Fisheries at the University of Agricultural Sciences at Mangalore and at Tuticorin, Tamil Nadu, offer Bachelor's degrees in fisheries science.

Elsewhere, the University of the South Pacific in Fiji, the University of the West Indies in Jamaica, the University of Papua New Guinea, University of Guam, James Cook University of North Queensland, Moulmein College in Burma, Silliman University at Dumaguete in the Philippines, the University of Dar es Salaam in Tanzania and the University of Hawaii, all offer undergraduate instruction in marine sciences with at least a modest mention of fisheries and fisheries methodology. There are other universities in India and West Africa which fall into the same category.



Postgraduate Opportunities

However, all of the foregoing evades the question of what opportunities are offered to a graduate with a good record in the basic sciences, and perhaps a small component of marine biology and fisheries in his undergraduate degree, and who now wishes to proceed to a Masters and possibly, a Doctorate in Fisheries Science. The answer is that within the tropics, the opportunities are extremely limited because of the scarcity of fisheries scientists within academic institutions—a self-perpetuating cycle.

There is one way out of this cycle for the student who wishes to remain in the tropics, and that is to enroll at his local university for a higher degree, but (with the assent of the Faculty concerned) to seek his thesis supervision within a national or international fisheries organization close to his home university. It might be possible to complete a thesis on a topic relevant to some of the research programs of that institution.

Transfer of graduate students between tropical countries is also possible but such movements are rare indeed. Would it not be more desirable for a student from Tanzania to study in Jamaica rather than at the College of Fisheries of the University of Washington in Seattle? I hasten to add that Seattle is undoubtedly one of the best institutions of its kind in the world but it lies on a frigid temperate shore in which all fisheries problems are large-scale by tropical standards and the social, economic and biological problems hardly prepare the graduate for a return to the tropics.

It can be argued that the temperate-tropical differences are not significant and that any serious biologist educated in the temperate regions will soon learn to recognize home species and understand the home fishing techniques. But one vital point is never sufficiently emphasized—the work done by graduate students for their dissertations is often of great importance to the fishery investigated and creates an underlying theme for the future scientific career of the investigator. When a student who has researched in a temperate country fishery returns to the tropics, a discontinuity is created, and the theme is often lost while the research benefits go to the host country. All too

often the theme is not lost because the new graduate decides *not* to go home.

Restraints

All of the above add up to lots of problems and very few solutions, with the odds in favor of the present system continuing whereby tropical academic institutions struggle to develop expertise, but compete for staff with national and international fisheries agencies, never get sufficient financial support and seldom achieve any degree of excellence. However, the annual cost of supporting a single Ph.D. candidate at, for example, a North American institution can easily exceed the entire equipment and teaching budget of a biology or fisheries department in a third world university. Perhaps, priorities need to be reassessed before real progress can be made.

The principal point which must be made is that tropical countries will continue upon the same treadmill until such time as their academic institutions recognize that fisheries science deserves its place along with the health, social and environmental sciences. Further, until such time as tropical fisheries scientists of the highest quality become educators, avoid the temptations of administrative power and prestige, and teach the next generations, it seems likely that the State of Washington and a few other temperate locations will continue to be the main beneficiaries of the efforts of graduate students from the tropics.

Lastly, we might address the question of why any student should contemplate a career in fisheries science. The answer is that throughout the tropics, fisheries departments or administrations are faced with problems of development, assessment and management of fisheries. Development work, where any remains feasible, has sometimes had to be relegated to a secondary position as a result of the demands placed upon fisheries administrations by the need to regulate fisheries in newly-acquired exclusive economic zones (EEZs). However, such regulation and management work as has been done has, with a few notable exceptions, been done in the absence of reliable assessments of the state of exploitation of the fisheries resources of the EEZs. The reason for this state of affairs is largely



that the availability of fisheries scientists in the tropics amounts to only a minute fraction of the demand. A second sad fact is that many fisheries administrators do not realize that it is possible to increase harvests on a sustainable basis by means of scientific management.

All of the foregoing is not somebody's *fault*; it is merely a function of the fact that educational machineries have been unable to keep pace with specialized demand for highly trained fisheries scientists except in some temperate zone countries.

Nevertheless, it is time that national and international agencies recognize that no amount of international training programs overseas will ever contribute significantly to development unless the recipients are themselves given the opportunity to become scientists or educators at home. If education is relegated by uncompetitive salaries and low prestige to be the responsibility of unspecialized scientists, it need not be surprising if fisheries science and hence, fisheries management suffers from a lack of progress. If newly graduated Ph.Ds promptly accept administrative posts because of the higher pay and prestige, how will tropical fisheries science ever progress? ●