



Farmers as Scientists

This is a series anchored by M.C. Nandeesh. It describes farmer-driven innovations and experiences.

Aquaculture Education in India – opportunities for global partnership

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The current issue of Aquaculture Asia is focused on Indian aquaculture so I thought it may be appropriate to look at the aquaculture education situation in India and stimulate discussion on this fundamental issue. Education being the foundation for all development, good aquaculture education will be a foundation for sustainable aquaculture development in the country. China is reaping the benefit of investment in education of all sectors that are important to the country, including aquaculture. China tops the list and India stands second in aquaculture production with more than 2.0 million metric ton production from aquaculture. Aquaculture research and education has contributed significantly for rapid increase in aquaculture production in the country and it will continue to play major role in harnessing the huge untapped potential in both fresh and coastal environments. In this context, this article attempts at examining some of the issues relevant to aquaculture education in India in the space available through this column.

Growth of Aquaculture Education

Aquaculture education in India began receiving higher importance with the emergence of freshwater fish culture technology being developed and promoted by the Central Inland Fisheries Research Institute since early 1960s. Fisheries Education as a formal degree program was conceived by Dr. K.C. Naik, the then Vice Chancellor of the University of Agricultural Sciences in Karnataka in southern India. The foresight of this great visionary led to the early emergence of fisheries education as a professional degree program. The first Fisheries College of the country was headed for almost two decades by Professor H.P.C. Shetty. With a group of dedicated faculty, he laid a strong foundation for fisheries education in the country. The Mangalore College received technical support for the development course program through USAID from Auburn University and some of the staff were also trained in the USA at a higher level as part of the bilateral program. The Marine Products Processing Center established through the Indo-Japanese collaboration program at Mangalore during 1963 became an excellent facility for training of

students. Following the success of Mangalore Fisheries College, many other states in the country have established Fisheries Colleges and there are now twelve spread all over the country (Table 1). Among these, six colleges offer postgraduate education in aquaculture. In addition, there is a National University of Fisheries (Central Institute of Fisheries Education) located at Bombay that offers postgraduate programs in different disciplines of Fisheries including aquaculture. Several hundred fisheries graduates from these institutions are now working throughout India and are contributing to aquaculture development.

Aquaculture Department

The Aquaculture Department is one of the major groups in all Fisheries Colleges and a large number of staff are involved in carrying out the three major functions of the Agricultural Universities, namely teaching, research and extension. Although most Colleges have been established following the pattern of Mangalore Fisheries College, there is large variation in the number of staff between the Colleges. Mangalore College had specialized teachers in many disciplines and that helped to build the institution activities strongly. However, increasing resource constraints and inadequate planning have resulted in a drastic reduction of staff strength in the newly established Colleges. This calls for the situation to be reviewed in various agricultural universities and alternate strategies need to be evolved to impart quality education with minimal staff strength. Teaching programs without active research and extension components are not effective and so the issue of minimal staff required to run a degree program needs to be determined based on the experiences of several institutions within and outside the country. The Indian Council for Agricultural Research (ICAR), a nodal agency for monitoring quality of agricultural education in the country is reviewing the situation through an accreditation program to bring parity in agricultural education programs offered throughout India.

Instructional facilities

While staff strength in the institutions is a key factor for training, facilities available to help students in acquiring skills also determine the quality of graduates passing out of these institutions. Although several of these Colleges have created essential basic facilities for teaching purposes, many of them require pilot scale instructional facilities, wherein students would be able to acquire skills and confidence to the required degree by the time they complete the course. Most Agricultural Universities in the Country have large areas of land available for cultivation of agricultural crops on a commercial scale to help students gain the necessary expertise in agriculture. However, the same is not true in the fisheries sector. Since Agricultural Universities are generally headed by persons with agricultural backgrounds often the fisheries sector has not been getting its due share in terms of resource allocation and other support services. Operational difficulties encountered in managing large facilities under the Government structures are the major reason facilities have not been created for training.



Dr. K.Gopal Rao on the left standing before a pond of 20 ha. He is currently heading the Fisheries College in Andhra Pradesh, a state which has excelled in aquaculture. Farmers have shown that the larger the pond the better the production in carps

Unfortunately, although this true to some degree, it is most essential to have at least pilot scale structures to help students gain experience on the systems that are relevant to the region. In this operating environment several Fisheries Colleges would need substantial support from the respective State Governments and the ICAR to strengthen their teaching facilities.

Aquaculture Education in landlocked States

Several states in India are landlocked in nature, but the course structures followed are more or less similar based on the standard curriculum developed by ICAR. However, colleges located in different agro-climatic conditions have been given the freedom to modify their curriculum to an extent of 25% to meet specific needs of the State. To ensure equal opportunity for the students graduating from the Colleges of these landlocked states to seek jobs or self-employment, efforts are made to teach marine courses by evolving different strategies. Although, the mandate of Fisheries Colleges established under the State Government is to cater for the requirements of the respective State, keeping in view of the emerging opportunities through globalization, landlocked state colleges need to examine the possibility of establishing partnership arrangements with other Fisheries Colleges in order that Students from these areas can spend a semester or two to undergo courses in marine sector that can't be easily covered within the state. National Fisheries Universities with centers in coastal areas and other Central Institutes also have opportunities to help the landlocked states. ICAR intervention might help these landlocked states through the existing structures.

Table 1: Location of Fisheries Colleges in various states of India and existing faculty strength

Location	Faculty Sanctioned	Faculty in Position	With Ph.D. degree	With Master degree
College of Fisheries, Mangalore, Karnataka	87	52	18	39
College of Fisheries, Tuticorin, Tamil Nadu	60	54	14	40
College of Fisheries, Panangad, Kerala	51	34	19	15
College of Fisheries, Nellore, Andhra Pradesh	21	8	5	3
College of Fisheries, Ratnagiri, Maharashtra	30	19	8	11
College of Fisheries, Rangailunda, Orissa	22	15	5	10
College of Fisheries, Pantanagar, Uttar Pradesh	12	6	6	
College of Fisheries, Dholi, Bihar	18	4	1	3
College of Fisheries, Raha, Assam	12	11	2	9
College of Fisheries, Veraval, Gujarat	10	5	3	2
College of Fisheries, Mohanpur, West Bengal	33	24	14	10
College of Fisheries, Lembucherra, Tripura	33	15	8	7

Linkages between the Colleges

As there are twelve Colleges and several teachers in these institutions are involved in aquaculture teaching, there is an opportunity to create a platform for sharing of information between these institutions with a primary mandate for teaching. With information technology making all such linkages possible with minimal cost and effort, a network of these Aquaculture Departments would be most useful. Learning from each other's experience to improve teaching and training would serve as a big boost to improve aquaculture education in the country. We would like to explore this opportunity as a first step in this direction from the Northeast, wherein electronic communication is improving with the emphasis laid by the Government. The region being not easily accessible, electronic media is proving to be one of the easy options to derive the benefit of expert advice from others interested to assist the region.

Networking with farming community

Farmers have made tremendous progress in the country in the area of aquaculture. Early innovation of farmers in composite culture of carps and subsequent improvement of technology by the pioneering contribution of the Central Inland Fisheries Research Institute and various Fisheries Colleges have contributed significantly for the increase in production up to 10 tons/ha/year. Since the income derived from the technology was not commensurate in all regions due to varied demand for fish species, farmers in Andhra Pradesh invented a new technique of culturing largely rohu *Labeo rohita* in a composite culture system consisting of up to 80-90% rohu and demonstrating a production potential up to 10-15 tons/ha/year with the new system. Similar breathtaking achievements have been made by farmers in the area of shrimp culture and prawn culture, although in many instances environmental issues remain as major concern. Farmers have taken the opportunity to demonstrate commercial viability of technologies generated and in the adaptation process have invented several new techniques. Educational institutions have begun to



A graduate student from Fisheries College in Tripura feeling proud to hold market fish. Knowledge accompanied with skills acquisition helps build confidence.

recognize the innovative potential of farmers and are establishing close working relationships for mutual benefits. To increase the level of partnership and make the relationship more interactive, additional support mechanisms need to be built at the institutions.

Many Fisheries Colleges have been following Fisheries work experience (FWE) established on the lines of Rural Agricultural Work Experience (RAWEX) for training of students. Almost six months are utilized for this field based fisheries work experience wherein aquaculture forms part of the training. Since Colleges are located in different states and all colleges do not have good opportunity to experience developments

in aquaculture, there is a need to evolve mechanisms to create opportunity for the students from one state to move to another state and work in a farm wherein they could gain the required experience. Identification of students interested to specialize in a particular discipline during the work experience period (either in processing or aquaculture) and placing them on a continual basis for six months in the identified discipline might help in better acquisition of experience in the chosen field instead of the current pattern of providing field experience in all the major areas of fisheries.



An integrated fish farming model prepared by the students of College of Fisheries, West Bengal demonstrates the potential. Dr. N.R. Chatterjee from that College underwent training on integrated fish farming course in Wuxi in China.



Turtle and Tortoise are endangered in most parts of the world, but they are also most preferred food item in several parts of the world. Students watching at a species conserved in a temple pond in Tripura State and exploring ways to propagate them

Networking within the region

Asia has a number of specialized institutions in aquaculture and there is an opportunity to establish close linkage between these institutions. Japan started fisheries education programs as early as in 1897 and today it has a dedicated university for Fisheries – Tokyo University of Fisheries. Japan has played a significant role in assisting several other countries in the region with expertise and Chinese Taipei appears to have benefited immensely and has translated several of the ideas into commercial realities in that country. Through SEAFDEC, Japan has also provided significant support for the Aquaculture Center established in Philippines for the South-East Asian Region. The Asian Institute of Technology in Thailand has played a key role in contributing for the development of small-scale aquaculture technology in the region and in training of human resources from several countries including India. Dr. Peter Edwards (who regularly writes on rural aquaculture for this magazine) played a key role in shaping aquaculture education at AIT for more than two decades. Some graduates from various Fisheries Colleges of the Country have completed the Master degree course in Aquaculture at AIT and have distinguished themselves in the field. Although AIT has established strong linkages with several Southeast Asian Countries due to donor interest and

support, linkages with Indian Fisheries Colleges are yet to be strengthened. There is an opportunity to train staff from Fisheries Colleges at a higher level at AIT. The wealth of experience available at this institution on rural aquaculture would be beneficial in many ways to our country. In Thailand, there are also number of other Universities involved in aquaculture education including the Kasetsart University, which offers a four year degree program exclusively in aquaculture. China is another country, where Fisheries Education has a nearly century long history and a University dedicated to Fisheries study is located in Shanghai.

China being the leader in world aquaculture production has been helping other countries to gain from its experience by regularly organizing a training course on “Integrated Fish Farming “ at their International Freshwater Fisheries Research Centre in Wuxi City. This course has been popular and few aquaculture staff from various Colleges in the Country have availed the opportunity to attend this training. The Network of Aquaculture Centres in Asia-Pacific has been coordinating the program and is willing to assist those interested to attend this course following the existing procedures. To gain practical experience in Chinese aquaculture systems, this is one of the best available opportunities that can be explored easily. In both China and Japan, under the existing bilateral programs some students are pursuing higher education in the area of aquaculture.

In the Philippines, there are a number of Fisheries Institutions apart from SEAFDEC that are well known for research and training in aquaculture. The National University of Singapore through its Zoology Department has assisted many students from the Indian Fisheries Colleges to obtain higher education in aquaculture. Deakin University in Australia offers a two year Master degree program in Aquaculture. The distance education program in aquaculture started by that University has good relevance to our country and the University is interested to explore various options with other interested



Ramakrishna Mission is movement started by Swami Vivekananda in India to bring social development and it has excelled in building values in Society. The mission is one of the most successful organizations in the NGO sector of India in demonstrating fish culture potential. Students are exposed to the opportunity and necessity of combining science with values to bring peace and prosperity

groups. Professor Sena S. De Silva, a well known scientist on Asian Aquaculture systems is leading the program in that University. He has taken lead in organizing two workshops on Aquaculture Education in the past three years in partnership with NACA and as a result of these workshops the formation of an “Aquaculture Education Consortium” has been proposed by NACA. This is an exciting program, which aims to use modern information technology tools to derive the best expertise available in aquaculture from each country of the region and make them available to all at a reasonable cost.

Besides the institutions in Asia, a number of institutions in North America and Europe have been providing places for training of students at a higher level. The bilateral linkage between the College of Fisheries, Mangalore and ODA-UK in late 1990s contributed significantly for the faculty improvement and creation good instrumentation facilities. Tamil Nadu Fisheries College also has received major support through the World Bank for staff and facilities improvement in the recent past.

Changing Scenario: Job seekers to job providers

Until now, graduates from various Colleges have been absorbed largely in various Government sectors of the country. Shrimp culture expansion in the early stages provided good lot of opportunities, but with the outbreak of diseases and restrictions in coastal aquaculture activity through recent regulations have changed the situation. With the declining job opportunities in the Government and private sectors, graduates have to find new ways to secure their livelihood and self-employment is one of the options available. India, with a population of one billion and with fast changing food habits will experience increased demand in most parts of the country. Market opportunity studies are essential to support graduates to venture into self-employment through aquaculture. Some graduates have already ventured into self-employment in aquaculture and they have been reasonably successful. Discussions with such self-employed graduates reveal those opportunities that exist in the field and the necessity to improve instructional and teaching



A good catch from sewage fed ponds in Kolkata. Students learn the potential of recycling wastes through aquaculture (Photo courtesy: Dr. V. Sugunan, CIFRI, Kolkata)

“A good education is fundamental to all other development”

facilities at the Colleges. Entering into self-employment requires not only adequate skills and knowledge in aquaculture, but also some knowledge of business and community management. This calls for examination of existing facilities in various institutions and creation of opportunities for sharing of resources and knowledge available in each of the institutions.



Students watching a reservoir catch of fish. India has enormous opportunity to develop fish culture in reservoirs. Experience of China might be helpful in this direction to harness this huge potential (Photo courtesy: Mr. Puroshotham, CIFE, Mumbai)



Dr. S. Ayyappan receiving Professor H.P.C. Shetty award from Dr. Panjab Singh, the then Director General of ICAR during the VI Indian Fisheries Forum held in Bombay during 2002 (photo courtesy: Asian Fisheries Society, Indian Branch)

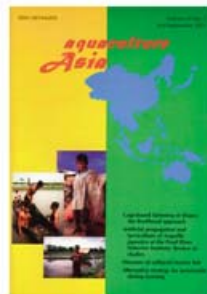
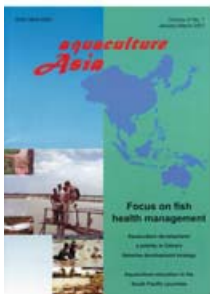
(Fisheries). He is the first fisheries graduate to secure this highest position of the country in the fisheries sector. With all his interest to improve fisheries in the country, aquaculture education being fundamental to all other developments in the aquaculture sector, he is already implementing plans to assist the Colleges in several ways. Learning from each others experiences being one of the best options, it is necessary that discussions are held at various levels to identify the strengths of various institutions and areas that require support. Already NACA, in partnership with Deakin University, is carrying out assessment and assistance strategies at the Asian level. The proposed Aquaculture Education Consortium would be a good platform to streamline aquaculture education in Asia. As is well known, "Only the candle that is lit can light other candles". A good education is fundamental to all other development.

Conclusion

During the past three decades aquaculture education has developed significantly in India. State Governments play key role in shaping aquaculture education in their respective jurisdictions. Colleges have to depend largely on State finance to meet basic necessities like staff and instructional facilities. Hence, ensuring parity among all Colleges is not an easy task with each

State having its own priorities and development needs. The National University of Fisheries can play a greater role in coordinating aquaculture education in the country. As stated earlier, ICAR is a nodal agency for Agricultural Education in the country and the organization is making efforts to bring excellence in education through various approaches. Currently, ICAR Fisheries division is headed by Dr. S. Ayyappan, Deputy Director General

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