Research article

Teaching statistics and informatics for fisheries students: retrospect and prospects

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ABSTRACT

The role of Statistics and Informatics (S&I) Faculty in India's fisheries education, training and research has been discussed in this paper. An attempt has also been also made to ascertain the present cadre strength of S&I faculty in the eight fisheries institutes under Indian Council of Agricultural Research (ICAR) [including CIFE] and in 25 fisheries colleges from all over India. A key observation that emerged out of survey among students of ICAR-CIFE, Mumbai is that, for teaching S&I courses, mostly there are no regular faculty available and these are being taught by hiring guest/ part time/ contractual personnel and at times in few colleges by even non-S&I faculty. The need for conduct of systematic survey to ascertain the actual trained human resource requirements of S&I faculty in the various fisheries sectors has been emphasized. The prospects of S&I faculty are highlighted for teaching and training statistical methods and ICT to fisheries students. There is a dearth of trained and qualified S&I faculty to help fisheries sector of our country to realise its true potential. In most of the fisheries colleges, adhocism is usually adopted when it comes to teaching courses related to S&I. Hence concerted efforts are to be made to have permanent faculty for S&I in all fisheries colleges to maintain quality of education.

INTRODUCTION

In our country with a population of around 1.27 billion, about 65% of which is directly or indirectly involved in agriculture and allied sectors including fisheries, the task of providing Statistical and ICT/ Informatics (henceforth S&I) support in commensuration with the demand is huge. Fisheries sector, earlier considered to be a minor part of agriculture, has grown to be a major component owing to pressure on per capita available land on one hand and the increasing realisation of vast but underutilized fisheries resources. A few studies have been conducted by NAARM, Hyderabad and NILERD, Delhi (formerly IAMR, Delhi) on agricultural manpower requirements in which fisheries can be found as one of the subsectors. Verma (1985) has documented the efforts done in assessing skilled manpower in India including, but not limited to, agricultural sector. Rao *et al.* (2004) have done projections of trained agricultural manpower using stakeholders' perceptions. Rao *et al.* (2011) have assessed future human capital requirements in the agricultural and allied sectors. Agrawal *et al.* (2013) have described ahuman resource analysis method which is more adaptable to Indian agriculture. Sasidhar and Reddy (2013) have done a quantitative analysis of supply and demand of veterinary manpower in India. Lakra *et al.* (2014a) have studied shortage of human

capital in aquaculture and suggested strategies for its development. They have also dealt with para-professionals in aquaculture and have discussed related constraints, strategies and solutions.

MATERIALS AND METHODS

Study has been conducted, among other things, by means of survey from the students of ICAR-CIFE, Mumbai. As the post graduate and doctoral level students studying at this institute have come from various fisheries colleges spread over India, having done their B.F.Sc. fisheries courses from these colleges, the respondents formed a sound representation of target population from whom the S&I status can be reasonably ascertained. Mailed questionnaire has been used as an instrument of data collection for elicitation of information from them.

RESULTS AND DISCUSSION

ICAR- Central Institute of Fisheries Education (CIFE) at Mumbai is a premier institute cum Deemed University, and conducts academic programs (Masters & Ph.D.) in eleven core and emerging disciplines of fisheries sciences. In addition, the institute also conducts basic and strategic research in frontier areas of fisheries. The institute occupies

a place of pride in organising demand-driven training and educational programs, providing technical support, inputs for policy development and consultancy services to various stakeholders in fisheries, aquatic and aquaculture sectors. Among the six Divisions of the institute, Fisheries Economics, Extension and Statistics (FEES) Division is one of the important Divisions, in which the Statistics Faculty are engaged in teaching Statistical methods, Research methodology, Linear programming, Mathematics, Econometrics not only to Fisheries Economics and Extension students, but also to nine other disciplines *viz.*, Aquaculture, Fisheries Resource Management, Fish Genetics, Fish Biotechnology, Aquatic Health, Nutrition, Environment, Fish Physiology and Post-Harvest Technology. Moreover, S&I faculty are not only involved in research in fisheries statistics and modelling but also playing a crucial advisory role for data analysis and interpretation in the research of both students and fisheries faculty.

As most of the fisheries colleges are affiliated to agricultural universities and, of late, to veterinary universities, it seems, when it comes to S&I faculty status, less priority is given to fisheries social sciences, as compared to the parallel departments in those of agriculture or veterinary colleges. However, the role of S&I faculty in country's fisheries education, training and research is immense. While efforts have been made to study the developments in fisheries education (Jain, 1999), such an exercise has not been done particularly for S&I faculty in the context of statistics and informatics education. The present cadre strength of S&I faculty indifferent fisheries institutes under ICAR and in 25 fisheries colleges of India are depicted in Table 1 and 2 respectively and the places where fisheries colleges are situated are shown in a map of India (by giving numbers as listed below - Fig 1). This gives the geographic distribution of fisheries colleges. It is mentioned here that in Table 2, the colleges whose names do not appear does not have permanent faculty for teaching S&I courses, as far as our knowledge is concerned.

The list of fisheries colleges (CoF- College of Fisheries) in India

1. Andhra Pradesh: CoF Science, Muthukur, Nellore (Venkateshwara Veterinary University)
2. Assam: CoF, Raha, Nagaon (Assam Agricultural University)
3. Bihar: CoF, Dholi, Muzaffarpur, Pusa, Samastipur (Rajendra Agricultural University)
4. Chhattisgarh: CoF, Kabirdham, Kawardha (Chhattisgarh Kamdhenu University)
5. Gujarat: CoF, Veraval, Junagadh (Junagadh Agricultural University)
6. Jammu & Kashmir: CoF, Rangil Ganderbal, Srinagar (SKUAST – Sher-e-Kashmir University of Agricultural Sciences and Technology)
7. Karnataka: CoF, Mangaluru, Dakshin Kannada (Karnataka Veterinary Animal Husbandry, Dairy and Fishery Science University)
8. Kerala: Kerala University of Fisheries & Ocean Studies (KUFOS), Panangad, Ernakulam
9. Madhya Pradesh: CoF Science, Jabalpur (Nanaji Deshmukh Veterinary Sciences University)
10. Maharashtra: CoF Science, Ratnagiri (Dr. Balasaheb Sawant Konkan Krishi Vidyapeeth, Dapoli)
11. Maharashtra: CoF Science, Nagpur (Maharashtra Animal and Fishery Science University)
12. Maharashtra: CoF, Udgir, Latur (Maharashtra Animal and Fishery Science University)
13. Orissa: CoF, Rangeilunda, Berhampur (Orissa University of Agriculture and Technology)
14. Punjab: CoF, Ludhiana (Guru Angad Dev Veterinary & Animal Science University)
15. Rajasthan: CoF, Udaipur (Maharana Pratap University of Agriculture and Technology)
16. Tamilnadu: Fisheries College and Research Institute, Thoothukudi (TamilNadu Fisheries University)
17. Tamilnadu: Fisheries College and Research Institute, Ponneri Campus, Chennai (TamilNadu Fisheries University)
18. Tamilnadu: CoF Engineering, Nagapattinam (Tamilnadu Fisheries University)
19. Tripura: CoF, Lembucherra, Agartala (Central Agricultural University)
20. Uttar Pradesh: CoF, Kumarganj, Faizabad (Narendra Dev University of Agriculture and Technology)
21. Uttar Pradesh: College of Fisheries science and Research, Etawah, Kanpur (Chandra Shekhar Azad University of Agriculture and Technology)
22. Uttarakhand: Pantnagar, Udhamsingh Nagar (Govind Ballabh Pant University)
23. West Bengal: Faculty of Fishery Sciences, Kolkata (West Bengal University of Animal & Fishery Sciences)
24. Gujarat: CoF, Navsari, Navsari (Navsari Agricultural University)
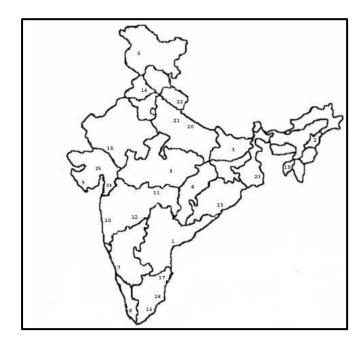25. Gujarat: CoF, Gandhinagar (Kamdhenu University)

Fig 1: Geographical distribution of fisheries colleges in India

Some of the key observations that emerged from survey among students of ICAR-CIFE, Mumbai are as follows. In

most of the colleges, no permanent faculty are available for teaching statistics/ informatics. In some colleges, guest lectures are conducted for this purpose from agricultural colleges nearby or from the colleges from the same university to which the fisheries college is affiliated. In some cases, teachers are employed on part time/ contractual basis. In quite a few colleges, the faculty of other Fisheries departments who have specialization in Mariculture/ Aquaculture/ Fisheries Science/ Fisheries Resource Management/ Fisheries Extension & IT/ Fisheries Processing Technology/ Basic Science & Humanities also take statistics/ ICT classes. In some colleges, students have to go to other campuses for attending statistics classes. There are some instances where retired professors from the same colleges continue taking classes.

Table 1: Cadre Strength of S & I faculty in eight fisheries institutes under ICAR

S. No.	Name of fisheries institute under ICAR	No. of Scientists	
		Statistics	Computer Applications
1	Central Institute of Fisheries Education, Mumbai, Maharashtra	2+(1*)	
2	Central Inland Fisheries Research Institute, Barrackpore, West Bengal	5	2
3	Central Marine Fisheries Research Institute, Kochi, Kerala	4	1
4	Central Institute of Fisheries Technology, Kochi, Kerala	2	1
5	Central Institute of Brackishwater Aquaculture, Chennai, Tamilnadu	1*	1
6	Central Institute of Freshwater Aquaculture, Bhubaneshwar, Orissa	-	1
7	National Bureau of Fish Genetic Resources, Lucknow, Uttar Pradesh	-	-
8	National Research Centre on Coldwater Fisheries, Bhimtal, Uttaranchal	-	-
	Total	**15**	**06**

Note: *Scientist (Statistics) recruited but having MCA qualification

There is indeed a dearth of trained and qualified S&I faculty to help fisheries sector of our country and the number of such experienced personnel working in fisheries colleges and institutes is abysmally small. Lack of human capital and infrastructure resources and optimization of available resources are to be addressed before tackling new challenges. Fisheries educational institutions are running with hugely inadequate S&I faculty. While the scope, mandate and sphere of activities have grown enormously over the years, the faculty in position is woefully low. This has meant over-stretching of available faculty into multi-tasking of academics, research, extension and institution building along with a plethora of non-academic activities. This would reflect on the quality of academic excellence and research output, and results often to the disadvantage of students. Lack of focused research is a concomitant result of depleted faculty strength, infrastructural bottlenecks and limited financial resources. Few S&I faculty have to carry out multifarious activities involving course work and research guidance, undertaking individual research projects, carrying out institutional development related activities compounded with non-academic activities which will not be conducive for focused approach.

No systematic survey has been undertaken for the actual trained human resource requirements of S&I faculty in the various fisheries sectors. Neither the government (both central and state) nor the industries connected with fisheries have identified or planned and projected their requirements. Studies conducted earlier in fisheries manpower requirement are not as comprehensive as in agricultural sector giving little importance for social science and S&I faculty in fisheries. Professional education like S&I faculty specific to fisheries need a long gestation period and need advance planning to arrive at required number of graduates, post graduates and doctorates in this sector. The estimated workforce has been generally worked out by largely focusing on the requirements in government and government supported programmes. Private establishments like self-employment, entrepreneurship, fish-processing industries etc. have not been taken into account. In the context of nationwide demands and dynamic global fisheries scenario, concerted efforts are needed to quantify the human resources required on S&I faculty for fisheries.

Table 2: Cadre Strength of S & I faculty in College of Fisheries across India

Sl. No.	State in which College of Fisheries located	No. of Faculty	
		Statistics	Informatics/ Computer Applications
1.	Andhra Pradesh	2	0
2.	Gujarat	1	0
3.	J & K	2	1
4.	Kerala (KUFOS)	2	2
5.	Maha. (Nagpur)	2	0
6.	Tamilnadu (Ponneri)*	1	1
7.	Tripura	1	0
8.	West Bengal	1	0
	Total	12	4

*Teaching Assistant and not Assistant Professor

With the advances in information technology, the S&I faculty have to all along keep adapting themselves to the

current needs, methodological challenges and quality enrichment of fisheries education. To this end, continuous attempts are to be made to bring out simple and easy to understand course manuals, user-friendly and handy computer aided practical exercise manuals on statistical methods and informatics for catering to needs of fisheries students, most of whom having a non-mathematical background during their tertiary education or some, not even during their higher secondary education.

The major waves in the form of agricultural, industrial, communication and knowledge revolutions have fundamentally transformed the economies, societies, cultures, polity and institutions on the face of the earth and have become the major defining force in the 21st century (Vision 2025-CIFE, 2007). The speed and sweep of advancement and innovations in science and technology are and will be the central elements of this revolutionary era. E-learning can become an important part wherein dual mode and distance education programs can be launched to provide interactive education at doorsteps. Fisheries institutes can also join hands with other IT based agencies to develop tailor-made software programs for fisheries specific data analysis and for this, the expertise of S&I faculty will be crucial. International library with networking capabilities, digital library with simulated learning modules, educational films and multimedia, e-books and e-journals along with conventional print resources, state of the art communication centre consisting of national fisheries data bank, video conferencing facilities and multimedia production units for developing and dissemination of web-based interactive e-learning modules, digital films, animation based training tools, quality text books, instructional materials and other e-learning programs are the need of the hour which can be made possible only with the help of S&I faculty. To conclude, S&I faculty are and will continue to be an asset for teaching and training statistical methods and ICT to fisheries students.

The structure and content adequacy of S&I courses taught in fisheries colleges need a periodic appraisal and improvement to include recent advances and trends specific to fisheries sciences. This exercise should also include ways and means of equipping students with relevant software skills in fishery sciences. The possibilities of initiating a Masters programme in Fisheries Statistics at ICAR-CIFE, Mumbai, which, as of now, is not there, can be explored after carefully making a SWOT analysis of its job prospects vis-à-vis its impact in growth of fisheries sector.

CONCLUSIONS

To sum up, the importance of S&I Faculty towards enhancing India's fisheries education have been highlighted. The current strength of S&I faculty in various fisheries colleges in India is at present in acute shortage. For teaching S&I courses, mostly there are no regular faculty available and these are being taught by hiring guest/ part time/ contractual personnel and at times in few colleges by even non-S&I faculty. Thus there is a dire need for conduct of systematic survey to ascertain the actual trained human resource requirements of S&I faculty in the various fisheries sectors. Concerted efforts have to be made to have permanent faculty for S&I in all fisheries colleges to maintain quality of education in its march towards excellence.

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