



## Fisheries education in Sri Lanka: current status, constraints and future outlook


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### Abstract

Sustainable utilization of the fishery resources along with manpower is one of the most important aspects of fisheries science. Although a huge manpower is available in the fisheries sector, lapses in knowledge also prevalent in various subsections of fishery related occupations. In this scenario, this paper attempts to evaluate the various levels of fisheries education in Sri Lanka. It has been observed that clear demarcation of the level of fisheries education such as undergraduate, postgraduate, and basic level exists in Sri Lanka. Although a low level of student enrolment, university education of fisheries and aquaculture is at satisfactory level. Expansion of fisheries education for basic levels such as education of fisherwomen needs to be improved. Scientific dissemination of knowledge by published works such as journals should further be expanded and indexing of those journals in reputable and reliable databases is needed. Several constraints in Sri Lankan fisheries education such as inadequate funding, low level of student enrolment, quality of the students and less cooperation with industries etc. were also identified. Therefore, finding possible solutions to these issues is necessary to ensure the quality of the education in Sri Lanka.

**Keywords:** Fisheries education; Sri Lanka; scientific dissemination; fisheries graduates

## 1 | INTRODUCTION

Being an island nation in the Indian Ocean, Sri Lanka owns a vast sea area comparing to its total land area. Sri Lanka's exclusive economic zone spreads more than 7.8 times (517,000 km<sup>2</sup>) of its total land area (65,610 km<sup>2</sup>) and within this region, the country has sole property to manage, exploit, and conserve both abiotic and biotic resources (Joseph 2001). Inland sector of the country is also teeming with numerous tanks and the reservoirs in addition to brackish water resources. Country's water to land profile is 3 ha per km<sup>2</sup> and it is considered as the highest water to land ratio in the world (MOFE 2001). All these reveal that there is a huge potential in developing fisheries sector in Sri Lanka in terms livelihood develop-

ment, earning significant foreign exchange and food security. The contribution of the fisheries sector to the gross domestic product (GDP) in Sri Lanka has increased from 1.6% to 1.8% from 2009 to 2014 (MFARD 2015). Moreover, marine and inland fisheries production showed significant growth in 2013, showing values 445,930 MT and 66,910 MT respectively (MFARD 2015). Fish is the most important source of animal protein for Sri Lankans which is 70% of the total protein consumption (Amarasinghe 1988; Sugathapala *et al.* 2011).

Human resource component in the fisheries sector of Sri Lanka indicates that the number of active fishermen engaged in marine fishery industry is gradually increasing

despite stagnant situation in the inland fisheries sector (Fisheries Statistics 2014). Although the quantity of manpower is increasing, the quality of well trained and knowledgeable fishermen in marine fishery sector is gradually declining. Wijayaratne (2001) stated that as far as the education level of fishers is concerned, 80% of the active fishers have attended only primary schools. This phenomenon acts as one of the major impediments for developing fisheries sector in Sri Lanka. However, situation is more or less the same in other South Asian countries like Bangladesh where low level of education of fishermen is well-documented (e.g. Islam *et al.* 2013; Galib *et al.* 2016).

In terms of aquaculture sector, although some forms of novel approaches such as mariculture are still underway, inland capture based culture fishery is well practiced. In addition, shrimp farming is a well-thrived industry in the north western region. Apart from labour, educated manpower to successfully handle those two sectors is essential. Lack of knowledge is a major impediment to the biosecurity measures in shrimp farms in Sri Lanka (Munasinghe *et al.* 2010).

Though marine fisheries production is showing an increasing trend, unavailability of capital based utilizing devices such as sophisticated vessels is a major barrier to harvest the deep sea marine resources. Moreover, human capacity development in fish post-harvest industry is very important for further development of fisheries sector in Sri Lanka. In Sri Lankan context, it was noted that deterioration of fish products happens before final processing due to lapses in the fish distribution channels, rough handling procedures and poor storage conditions (NSC 1980). These problems derive mainly due to inadequate knowledge of proper handling of raw and processed fish (NSC 1980).

These factors have highlighted the importance of reliable and quality fisheries education for sustainable utilization of the fisheries resources. In return, sustainable utilization of fisheries resources will ensure food security and significant economic benefits. In that context, this paper attempts to describe the fisheries education in Sri Lanka with possible enhancements of institutional set up and future outlook for the major constraints.

## 2 | FISHERIES EDUCATION IN SRI LANKA

### 2.1 | Undergraduate education

While the course modules in fisheries and aquaculture are included in many undergraduate curricula in universities of Sri Lanka, six major universities under the purview of University Grants Commission (UGC) offer the Bachelor of Science (BSc) degree related to fisheries and aquaculture disciplines (Table 1). National Institute of Fisheries

and Nautical Engineering (NIFNE) also offers special degree programme (BSc in Fisheries and Marine Sciences) for the undergraduates.

**TABLE 1** Major universities in Sri Lanka offering degrees in fisheries and aquaculture disciplines.

University	Faculty or department	Title of the degree
University of Ruhuna	Faculty of Fisheries and Marine Sciences and Technology	BSc in Fisheries and BSc in Aquaculture
University of Jaffna	Faculty of Science Department of Fisheries Science	BSc in Fisheries
Wayamba University of Sri Lanka	Faculty of Livestock, Fisheries, and Nutrition Department of Aquaculture and Fisheries	BSc in Fisheries and Aquaculture
Rajarata University of Sri Lanka	Faculty of Applied Sciences Department of Biological Sciences	BSc in Fisheries and Aquaculture Management
Uva Wellassa University of Sri Lanka	Faculty of Animal Science and Export Agriculture Department of Animal Science	BSc in Aquatic Resource Technology
University of Peradeniya	Faculty of Science Department of Zoology	BSc in Animal Science and Fisheries

Apart from these major universities majority of the national universities of Sri Lanka also offer fisheries and aquaculture course modules for the undergraduates following degree programs in biological sciences or agriculture streams (Jayasinghe 2009). Majority of these courses follow a common approach and some differences may be found in course modules. In the course curricula, substantial importance has been given to the practical components. Major subsectors of the fisheries including inland fisheries, marine fisheries, oceanography, and aquaculture related course components are primarily taught in these universities.

Provision of updated knowledge and assurance of quality of education in these degrees offering institutions and course modules are gaining a paramount importance. In this context, UGC affiliated Quality Assurance and Accreditation Council (QAAC) plays a major role. Quality Assurance (QA) is the means (*i.e.* policies, attitude, actions, procedures etc.) by which an institution can guarantee with confidence and certainty, that the standards and quality of its educational provision are being maintained and enhanced (UGC 2009). Periodically, QAAC of the UGC conducts the institutional reviews and subject reviews in those institutions. As a part of the specialized degree programme, industrial training/internships for special degree

students are supported by various government and non-government institutes in most of the universities. Faculty of Fisheries and Marine Sciences and Technology, University of Ruhuna; Faculty of Animal Sciences and Export Agriculture in Uva Wellassa University; Department of Fisheries Science in the University of Jaffna offer industrial training for undergraduate students.

## 2.2 | Postgraduate education

Three major universities in Sri Lanka offer postgraduate education (Master of Science) relevant to fisheries and aquaculture (Jayasinghe 2009). These universities are University of Peradeniya, University of Sri Jayawardenepura and University of Kelaniya. Duration of these courses is normally two years consisting of four academic semesters which cover both theoretical and research components (Table 2). Master of Philosophy (MPhil) and Doctor of Philosophy (PhD) degrees in fisheries and aquaculture disciplines are offered by various universities in Sri Lanka. The outcomes of these master courses geared towards the common approach. The primary objective of these courses is to develop the aquaculture and fisheries sectors of Sri Lanka by producing experienced, talented scientists and managerial personnel. In addition, conservation of fishery resources in inland and marine waters is also highlighted.

**TABLE 2** Master degrees provided by Sri Lankan universities relating to fisheries and aquaculture

University	Master degree offered
University of Kelaniya	MSc in Aquaculture and Fisheries Management
University of Sri Jayawardenepura	MSc in Fisheries and Aquatic Resource Management
University of Peradeniya	MSc in Fish and Wildlife Management

## 2.3 | Basic education

Basic fisheries education, supported by NIFNE, is targeted for the fishermen and fisherwomen who are directly engaged in fishing operations. Usually, fishers exit from the formal education at very early stage (Wijayarathne 2001; Jayasinghe 2009). By understanding this scenario NIFNE has started offering a number of vocational training courses to cater the requirement of fishermen. Entry requirements for these courses are low and it could be a promising factor to encourage the fishermen to attend the courses. These courses differ in nature and primarily focus on the technical knowledge of deep sea operations and maintenance of boats. However, some of these courses also include aquaculture, especially ornamental fish farming and inland aquaculture (Table 3).

**TABLE 3** List of courses provided by the NIFNE and the entry requirements related to fisheries and aquaculture courses (Ocean University 2015)

Course Title	Duration	Entry requirements
Higher certificate in aquaculture and management	09 months	G.C.E. (A/L) * passed
Higher certificate in fiberglass technology and boat manufacturing	09 months	G.C.E. (O/L) * passed
Higher certificate in computer technology	6 months	G.C.E. (O/L) passed and followed a basic computer course
Scuba diving course	1 months	Passed the grade 8 or field experience
Fisheries technology	5 months	Passed the grade 8 or field experience
Ornamental fish farming and management	15 days	Passed the grade 8
Certificate course in refrigerators and air conditioners	6 months	Passed the grade 8
Swimming course	1 months	Passed the grade 8 or field experience
Course on life saving	3 months	Passed the grade 8 or field experience
Marine chart reading, communication and satellite activities	10 days	Passed the grade 8 or field experience

\*G.C.E. (A/L), General Certificate of Education (Advanced Level);  
 G.C.E. (O/L), General Certificate of Education (Ordinary Level)

## 2.4 | Education of fisherwomen

Throughout the country, women are involved in many fisheries based activities such as fish wholesale marketing and fish post-harvest activities (Dissanayaka and Wijeyaratne 2009). The education level of these fisherwomen is very low in Sri Lanka. Adult education programmes for the fisherwomen with the aid of universities, non-government organizations and governmental institutions is recommended to enhance socio-economic conditions (Dissanayaka and Wijeyaratne 2009). Currently, a number of non-governmental organizations, governmental organizations, and universities provide opportunities for female education. Education programmes for women are non-formal and primarily livelihood development biased. Initiatives by FAO Regional Fisheries Livelihood Program (RFLP) is currently sponsoring a training program on producing quality and value-added dried fish that would boost their current income in the Negombo area and this is an important example of this practice (Pieris 2012). In addition to that, there are many other adoption strategies can be seen in Sri Lanka (Table 4).

## 2.5 | Other education and training

Apart from the formal university education system, there are two major institutes in Sri Lanka provide education for the students and other interested groups - National

Aquatic Resources Research and Development Authority (NARA) and National Aquaculture Development Authority (NAQDA). Currently, NAQDA offers different training courses (Table 5) and the majority of these courses are based on the ornamental fish culture. National Inland Fisheries and Aquaculture Training Institute (NIFATI) owned by NAQDA also offers various training programs related to the inland fisheries and aquaculture.

**TABLE 4** Various adoption strategies taken by different institutes to uplift female education with livelihood biased

Institute/ Organization	Adoption strategies
Food and Agricultural Organization (FAO) Regional Fisheries Livelihood Program (RFLP)	Computer skills program (RFLP 2012b) Financial management program (RFLP 2012b) Fish drying technique program (RFLP 2012a)
Mangroves for the future	Awareness program on <i>Aloe vera</i> cultivation, awareness program on lobster fishery, handicraft production training program and goat, buffalo husbandry training (Mahindapala and Ekarathne 2010)
National Fisheries Solidarity Movement	Organic farm training (Perera 2014)
Seva Lanka Foundation	Training community members, particularly women, in state-of-the-art techniques for drying, preserving and processing fish (Sevalanka Foundation 2015)
SEED initiative	Awareness and training programs on <i>Aloe vera</i> cultivation, processing and post-harvest production among fisherwomen, Kalpitiya area (Vithanage 2011)

**TABLE 5** A list of crash programs that are conducted by the NAQDA (NAQDA 2010)

Course Title	Duration (day)
Propagation and cultivation of ornamental aquatic plants	3
Ornamental fish breeding	3
Disease diagnosis and fish health management	3
Ornamental fish feed and nutrition	3
Ornamental fish farming	10

### 3 | DISSEMINATION OF THE KNOWLEDGE

#### 3.1 | Scientific journals

Two major journals in Sri Lanka publish papers relevant to fisheries and aquaculture. Sri Lanka Journal of Aquatic Sciences, published by the Sri Lankan Association for Fisheries and Aquatic Resources (SLAFAR), has indexed in several databases such as FAO aquatic sciences, fisheries abstracts etc. (SLAFAR 2015). Journal scope includes the subject areas related to fisheries, limnology and aquatic

biology. Publication frequency of this journal is twice a year with two issues per volume (SLAFAR 2015).

National Aquatic Resources Research and Development Authority (NARA) also publishes a biannual journal named Journal of National Aquatic Resources Research and Development Agency. Articles in various fields of fisheries and aquaculture including marine biology, post-harvest technology, aquaculture, aquatic plants, ornamental fish etc. can be submitted to this journal (NARA, 2010). In addition to these two journals, a number of other journals also available in the field of agriculture and zoology. Most of these journals are university-affiliated. However, very few of these journals are adequately indexed in reputable databases (e.g. Web of science, Scopus).

#### 3.2 | Other publications by NARA and NAQDA

Apart from journal, NARA also publishes various books, pamphlets, posters and stickers in bilingual languages (Sinhala and Tamil). Broad discipline of subjects including brackish water fisheries, ornamental fish breeding, culture of various prawns and shrimps etc. are focused in these publications and these are available at a reasonable price (NARA 2010). One of the important publications is Sri Lanka fisheries yearbook that encompasses the information of fisheries sector contribution to the national economy, production status, trade, marketing status of fish and socio-economic information about fishing communities. Sri Lanka fisheries yearbook is an annual publication published by socio-economic and marketing research division of NARA.

### 4 | CONSTRAINTS AND POSSIBLE SOLUTIONS OF FISHERIES EDUCATION

#### 4.1 | Low level of enrolment in fisheries science degrees

Major fisheries related degree programs are currently being carried out mainly by the government universities along with few other institutions (e.g. NIFNI). Enrolment in higher education is highly competitive in Sri Lanka which results in high dropout during the selection process. However, minimum entry qualifications in government universities for fisheries degrees are comparatively lower than the other degrees. Despite this, very few students are being enrolled in these courses. One of the reasons for low enrollment could be the people's attitude towards the fisheries education. Fishing is considered as a sinful act in Sri Lanka where the majority of the people strictly follows Buddhism. In general, the majority of the people also believe that fisheries based occupations are not lucrative as other occupations. Therefore, building the trust in fisheries occupations among people and provide proper professional respect for fisheries occupations are imperative.

#### 4.2 | Inadequate funding for fisheries education

Sri Lankan education system primarily depends on the government funding. However, more than 80% of the annual allocation for the universities is spent for the recurrent expenditure and remuneration. Also, Gross domestic expenditure on the research (GDER) is particularly low when compared to other neighboring countries (Gunasensa 2014). Lack of funding deprives basic infrastructure facilities needed for the continuation of the quality education. In most cases, additional funding to universities/ institutions may be gained by projects that are in cooperation with NGOs/other collaborative partners (Greenberg and Sadowsky 2002). Since Sri Lanka is surrounded by ocean with many exploitable fishery resources, it would be wise to increase the fund allocation to fisheries education for maximizing the future benefits.

#### 4.3 | Less cooperation with industries

This is one of the most significant issues in fisheries education sector in Sri Lanka. Fisheries industry in Sri Lanka composed of numerous sectors including fishery related infrastructure manufacturing (boats, nets, and others), fish post harvesting etc. But most of the problems faced by these industries remained unanswered. This situation is much more prevalent in Asian fisheries education in comparison with European education where higher cooperation exists between industries and universities. Asian Fisheries Society (1988) pointed out that as a result of less cooperation, many governmental and university personnel lack practical exposure related to the fishery industry. Universities/national institutes are responsible for consulting industry-relevant issues. On the other hand, industry should be a platform for providing technical training, internships, employability and research funds for the universities. The latter is much important as most of the universities depend upon the financial support by the government, which is inadequate for quality education.

#### 4.4 | Quality of the students

Selection of students to a certain university degree is completely under the purview of UGC, based upon applicant's performance at secondary education. This situation creates a contradiction between students will and selection. As a result of that their skills may not be fully exploited.

Currently, BSc degrees in fisheries primarily teach in English (e.g. University of Ruhuna, University of Uva Wellassa). Though intensive English language courses are conducted by universities to cater the English language requirement, there is a reasonable question that, can these expedited/crash courses compensate full language requirement for the undergraduates who are coming from various knowledge levels. As a result, students who

had limited access to the English language in their secondary education tend to show less progress during their undergraduate program. Possible solutions could be an enhancement of the language learning capabilities from the secondary school level and supply better language learning aids for the students in rural areas.

#### 4.5 | Employment opportunity

Most of the fisheries science graduates have avenues for widening the exposure in the fisheries industry. There are a number of fish processing plants located throughout the country and graduates are recruited as supervisors, quality control managers etc. But long working hours, less salary make these jobs less attractive to the graduates. Other opportunities include scientific personnel in major fisheries institutions such as NARA and NAQDA. However, the selection process is highly competitive in these job titles.

### 5 | CONCLUSION

This extensive analysis shows current status, limitations, and prospects of fisheries/aquaculture education in Sri Lanka. Most of the issues faced by Sri Lankan fisheries education could be managed by regular supervision and strong educational framework. Strong and firm educational framework would empower workforce in fisheries sector with knowledge and necessary skills. Ultimately, this knowledge and skills would lead to sustainable utilization of fishery resources of the country.

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#### CONTRIBUTION OF THE AUTHORS

TNBH primary data collection; KR supervised the study