

Review Article

A review of fisheries education in University of the Punjab, Lahore, Pakistan

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Article history

Received: April 25, 2017

Revised: December 12, 2017

Accepted: December 13, 2017

Authors' Contribution

ZI: conceive the idea and draft the manuscript

Key words

Punjab University
Fisheries, Education
Fish Disease and Health
Management

Abstract

In Pakistan, out of 291 institutions, Punjab University is ranked number one. This is the oldest multi-disciplinary university which was established in 1882. During last six years (2010-2015) 3187 research papers were published in journals with impact factors by university's teaching faculty. In last eight years (2008-2015) 1153 scholars were awarded PhD degrees by the University. The zoology department was established in 1921 and is now ranked among top departments. Significant contributions have been made by some past faculties and alumni of zoology department in development of fisheries sector in the country. Teaching and research in freshwater fisheries is an old and dominant area of study in the zoology department. At present the fisheries courses are offered in all degrees programs. The research on freshwater cultivable and ornamental fishes is carried out in the department. Recently twelve PhD scholars completed their projects on different topics in fisheries. Fish Disease and health Management laboratory (FDHM) was established in 2004 and it is providing research facilities in Fish Parasitology, Fish Mycology and Fish Bacteriology to researchers. Over 60 students have completed their research projects in fish disease and health management. The future aspects of "Fisheries Education" needed in aquaculture industry in Pakistan and Asia Pacific Region is discussed.

To cite this article: IQBAL, Z., 2017. A review of fisheries education in University of the Punjab, Lahore, Pakistan. *Punjab Univ. J. Zool.*, **32**(2): 277-282.

INTRODUCTION

University of the Punjab was established in 1882 at Lahore. The university is both teaching and examination body (Anon, 2016a). This is the oldest and the largest university in the country. According to Consejo Superior de Investigaciones Cientificas Spain (CSIC, 2015) in Webometrics Ranking of the World Universities, Punjab University is included among top 8% well ranked universities of the world (out of 24000 world universities). There are two main university campuses in Lahore. These are Allama Iqbal campus and Quaid-i-Azam campus. Both these campuses are 12km apart from each other. The Quaid-i-Azam campus is vast campus with an area of 1781 acres. The academic and administrative activities are centered here. The Allama Iqbal campus (the city campus) represents the beautiful Islamic architectural master piece. The Quaid-i-Azam campus has green and scenic

landscape. A canal passes between teaching departments and student hostels. There are three more campuses in other cities of Pakistan. They are at Gujranwala and at Jhelum in the province of Punjab and third one at Ayubia in Khyber Pakhautoonkhan province (Anon, 2015a). According to Anon (2016a) the University has distinction by having two Nobel Laureates and a former staff member. These honorable alumni and professors were: Har Gobind Khorana (1922-1990) Physiology/Medicine Nobel Prize (1968); Abdus Salam (1926-1996) Physics Nobel Prize (1979) and Subrahmanyam Chandra Sekhar (1910-1995) Physics Nobel Prize (1983).

Administration of the Punjab University

During last sixteen years under leadership of two former Vice Chancellors, Lt. Gen. (R) Khalid Mahmood (2000-2007) and Prof. Dr. Muhjid Kamran (2008-2016) the University made continuous progress in

research and teaching. The infrastructure was extensively developed and new departments were established during this period. In 2012, the University of the Punjab was ranked as first among the large sized multiple faculty universities in the country by Higher Education Commission of Pakistan (HEC, 2013). Under the present administration and visionary leadership of the Vice Chancellor (Prof. Dr. Zafar Mueen Nasir) the University of the Punjab is progressing and hoped to excel in research and teaching and will attain high level of excellence regionally and worldwide.

Teaching and research in Punjab University, Lahore

There are 13 faculties, 10 constituent colleges and 73 academic departments, research centers and institutes in the university. The faculties are: Art and Humanities; Behavioral and Social Sciences; Commerce; Economics and Management sciences; Education; Islamic Studies; Engineering and Technology; Life Sciences; Medical and Dentistry; Pharmacy; Science; Oriental learning and Law.

The university is spending lot of funds on faculty development, capacity building and training (Table II). During the last four years, 46 faculty members proceeded abroad for PhD studies. Large numbers of faculties attend International conferences abroad to present their research papers (PUFT, 2014). From 1990-2007 a total of 734 PhD degrees were awarded by the university. Another, 861 PhD degrees were awarded in six years (2008-2013). In last three years (2014 to 2016) 442 PhD degrees were awarded. A record 4883 research papers were published in last six years (2010-2015) by faculties. The impact factor publications are increasing annually (Table III, IV).

Research funding by the university

The University of the Punjab provides funds for research projects to faculty members (Professor, Associate Professor and Assistant Professor (@ Rupees 250,000; 200,000; 150,000 respectively) annually (DRA-1, 2016). In addition to these, special grants are also provided by the University for strengthening laboratories, purchase of machinery/equipment and chemicals. Higher Education Commission (HEC) of Pakistan also provides funds to their PhD research scholars. The students of under developed areas of the country get fee waiver as per Government of Pakistan policy. The aim of

this review is to highlight some features of fisheries education in zoology department carried from last fifteen years.

Zoology department Punjab University, Lahore

The zoology department was established in 1921. The postgraduate classes were started at Government College, Lahore. However, the University of the Punjab shifted department of zoology to its present site in 1963. During last 50 years the zoology department has earned a prestigious national and international reputation in teaching and research in various disciplines of zoology. The department is currently headed by Prof. Dr. Javed Iqbal Qazi. The faculty in the department includes 17 senior and highly qualified permanent members (1 Professor Emirates, 2 Professors, 9 Associate Professors, 5 Assistant Professors) and 4 contract faculty members (1 professors, 1 Associate Professor, 2 Assistant Professors). The basic zoology courses are offered in the department. These courses are: Biochemistry, Physiology, Development Biology, Genetics, Cell and Molecular Biology, Animal Diversity and Wildlife, Palaeontology, Evolution and Ecology. The specialized courses offered are in the areas of; Microbiology, Entomology, Endocrinology, Fisheries, Parasitology, Immunology, Arachnology, Apiculture. The research facilities and expertise are available in these basic and specialized areas of zoology too (Anon, 2015b, 2016b). The department of zoology is top ranked in the university on the basis of PhD degrees awarded and research paper published. Up to December 2017, not less than 172 scholars completed their PhD projects and were awarded degrees. In last four years (2013-2016) 360 research papers were published in National and International Journals. The department of zoology also publishes a biannual HEC recognized "Y" category, journal, "Punjab University Journal of Zoology". The author serves the Journal as "Associate Editor" (Qazi, 2015). In 2014-15 an amount of Rs. 2.5 million was sanctioned to all the permanent faculties of department of zoology as research grants. During last seven years Rs. 26.0 million was provided to department of zoology by the University for Research Projects.

Zoology department and fisheries sector in the Punjab

Two former faculty members of Zoology Department (Dr. Muhammad Yaquab Javid,

1933-2006; Dr. Muhammad Sharif Bhutta (1936-2002) and a former alumni (Dr. Muhammad Nazir Bhatti) along with their team of dedicated officers (including author) made significant contributions in development of fisheries sector in the province of Punjab (from 1973 to 2001). All three of them served as Director General Fisheries, Government of the Punjab. They developed vast infra structure of fisheries department; including the establishment of "Fisheries Research and Training Institute" (FR&TI) Lahore, a network of carp hatcheries and nurseries units and development of small dam fisheries in the province. The start of private fish farming, conservation of fisheries in public sector and foreign trainings of officers

(PhD fellowships/ M.Sc. studentships and short courses) were the salient features of that period. Later on, the development of fisheries in Public sector continued steadily during the tenure of Dr. Muhammad Ayub and Ch. Muhammad Ashraf as Director General Fisheries respectively. The progress was in the areas of; breeding and culture of *Tor macrolepis* (Pervaiz, 2013); culture of GIFT tilapia, establishment of Quality control laboratory at Lahore, establishment of Fish Biodiversity Hatchery at Chashma reservoir district Mianwali (Qurashi, personal communication). However, it is hoped that under the leadership of the present D. G. Fisheries (Mr. Iftilhar Ahmad Qurashi), the department will progress even more in the days to come.

Table I: PhD degrees completed in "Fisheries" from Zoology Department

Sr. No	Name	Year of completion	Research area
1	Dr. Muhammad Ashraf Mirza	1998	Fish Immunology
2	Dr. Ijaz Ahmad Sandhu	2000	Anatomy and histology of catfish
3	Dr. Tayybah Shaheen	2006	Chromium toxicity in common carp
4	Dr. Asma Chaudhry	2008	Probiotics roll in <i>Labeo rohita</i>
5	Dr. Muhammad Abid	2009	Growth of <i>Labeo rohita</i> in intensive culture.
6	Dr. Khalid Pervaiz	2013	Biology of <i>Tor macrolepis</i>
7	Dr. HafizAbdullah Shakar	2013	Heavy metals load in fishes from River Ravi
8	Dr. Fauzia Haroon	2015	Diseases of imported ornamental fishes
9	Dr. Ansar Chatta	2017	Chemical and Microbial load in fresh carps.
10	Dr. Sumera Siddiqui	2017	Low cost protein feed for <i>Labeo rohita</i>
11	Haji Muhammad	2016	Fish Diversity of Indus River (thesis submitted)
12	Khuram Shazad	2017	Genotoxicity in major carps (thesis submitted)
Ongoing PhD Research Projects in "Fisheries" in Zoology Department			
1	Syed Zulfiqar Ali: Title: Replacement of conventional piscicide with indigenous plant material: Isolation purification and its effects on target and non-target-fish		
2	Saadia Tabassum: Title: Effect of Titanium dioxide nano-particles on growth, hematocrite and accumulation in tissue of <i>Labo rohita</i> fingerlings.		
3	Sonia Mushtaq: Title: Impact of Vitamin C on growth and reproduction in rohu, <i>Labeo rohita</i> .		
4	Atifa Saghir: Title: Molecular genetics of <i>Labeo rohita</i> phylogenetic, phylo-geographic		
5	Najamul Huda: Title: Seasonal variation in freshwater fish population: phylogenetic, phylogeographic and ecological approaches.		
6	Saira Saleemi: Title: Isolation, characterization and pathogenicity of some fungi isolated from commercially important fish silver carp <i>Hypophthalmichthys molitrix</i> .		

Fisheries education in Zoology department

The fisheries courses were not offered at M.Sc. and PhD. level in the zoology Department earlier. The enrolments in PhD were very low. During 1970s' two scholars (Dr. Daulat Ali Zadi and Dr. Muhammd Nazir Bhatti) completed their PhD's in "Fish Parasitology" and "Fish reproductive physiology" respectively from Zoology department. In 1973, Dr. M. Y. Javed and in 1985 Dr. M. S. Bhutta left Zoology department and joined department of Fisheries,

Govt. of the Punjab. After their departure, the research work on fish endocrinology, fish taxonomy and fish parasitology continued but to a lesser extent at postgraduate level. The Zoology department entered into a new phase, when teaching and research of freshwater fisheries started in 2002. During the same year Punjab University Research Fish Farm (area 5 acres, No. of ponds 5) was established under the supervision of then chairman (Prof. Dr. A. R. Shakoori). This fish farm provided basic facilities

to the researchers to pursue their research projects on fish feed, fish growth and fish diseases. A glance at the research publications of the Department will show a prominent shift to the above subjects after these facilities were created (Shakoori, personal communication).

The regular teaching of fisheries courses started in 2002-03, when Dr. Muhammad Shafiq Ahmad and author joined department as Assistant Professors. Now the Fisheries courses are offered in BS, M.Sc, MS/MPhil and PhD Programs for students of morning, replica / evening and in-service programs. Some of the courses provided in fisheries are: Fish Physiology and Breeding, Principles of Fish Biology, Applied Fisheries,

Aquaculture, Fish Diseases and Health Management, Freshwater Fish Parasitology. The expertise in research supervision in the areas of Aquaculture, Aquatic Toxicology, Fish Microbiology, Fish Biology, Fish Parasitology, Fish Bacteriology and Fish Mycology are available. The field and laboratory facilities such as; Research Fish farm; Central laboratory facilities: PCR; Real time PCR; Atomic Absorption Spectrophotometer; HPLC; Histology etc. are available to research students. The enrolment in fisheries courses is increasing annually. The research work in fisheries in all academic programs has gained momentum in last fifteen years.

Table II. Funds allocated for Research in Punjab University, Lahore.

Progress	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16
Research Budget*	73.0	75.0	85.0	100.0	100.0	110.0
Research grants* to teachers	27.175	37.225	47.989	54.893	63.700	57.721
Teachers awarded research grants	166	237	310	351	396	360
Papers Presented by Faculty abroad	70	83	122	145	241	278
Papers presented in National/International conferences in Pakistan	50	63	109	92	227	201

*million Rupees

Zoology department Punjab University, Lahore

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Biochemistry, Physiology, Development Biology, Genetics, Cell and Molecular Biology, Animal Diversity and Wildlife, Paleontology, Evolution and Ecology. The specialized courses offered are in the areas of; Microbiology, Entomology, Endocrinology, Fisheries, Parasitology, Immunology, Arachnology, Apiculture. The research facilities and expertise are available in these basic and specialized areas of Zoology too (Anon, 2015b, 2016b).

The department of Zoology is ranked on top in the university on the basis of Ph D degrees awarded and research paper published. Up to December 2016 a total of 168 scholars completed their PhD projects and were awarded degrees. In last four years (2013-2016) 360 research papers were published in National and International Journals. The department of Zoology also publishes a biannual HEC recognized "Y" category, journal, "Punjab

University Journal of Zoology”, The author serve the Journal as “Associate Editor” (Qazi, 2015). In 2014-15 an amount of Rs. 2.5 million was sanctioned to all the permanent faculty of

department of Zoology. During last seven years Rs. 26.0 million was provided to Department of Zoology by the University for Research Projects.

Table III. Research Publications of teaching faculty of Punjab University, Lahore

Progress	2010-11	2011-12	2012-13	2013-14	2014-15
Research Papers Published	682	916	1087	1097	1101
Books Published	64	91	106	115	120

Table IV. Impact Factor Publications by teaching faculty of Punjab University

2007	2010	2011	2012	2013	2014	2015
162	362	519	546	520	605	635

Table V. Research Supervision in Fish Diseases and Health Management Laboratory

Program	Thesis completed	In progress	Total
Ph.D.	3	4	7
MS/M. Phil	25	12	37
M.Sc. / BS	33	1+2	36

Fish disease and health management laboratory

Fish Disease and Health Management laboratory was established in 2004 and is currently headed by the author. The research facilities to study parasitic, fungal and bacterial diseases of freshwater cultivable and ornamental fishes are available in this laboratory. The research work conducted in this laboratory is considered as significant contribution in the area of Fish Disease and health management at national and international level. The research supervision of undergraduate and post graduate students is being carried on regular basis (Table V; Pervaiz, 2013; Haroon, 2015; Haji, 2016). The author and students have presented their research work in Science conferences in; Scotland, England, Wales, Vietnam (Iqbal, 2014), Thailand (Iqbal, 2016b), Indonesia (Iqbal, 2017) and Pakistan. The research papers are published (Iqbal, 2016a) in well reputed national and international journals. A book chapter on “Fish Diseases and Health Management” in “*Aquaculture Handbook, Fish Farming and Nutrition in Pakistan*” has been contributed by the author (Iqbal, 2015). So far, eight research projects are completed by the author as principal investigator with a cost of Rs.1.475 million. The author and his students

have published many papers on various aspects of fisheries, fish disease and health management (Iqbal, 2004; Iqbal and Wootten, 2005; Iqbal and Waseem, 2008; Iqbal and Kausar, 2009; Iqbal and Khawar, 2013; Iqbal and Imtiaz, 2016; Ijaz *et al*; 2010, 2011; Haji *et al.*, 2016, 2017).

Conclusions

Fisheries education and research in the University of the Punjab, Lahore, have shown gradual progress since it was reported earlier by Iqbal (2005). The research facilities and funding by the University has made it possible for the faculties and students to show excellent progress in research. The work on Fish Disease and Health Management has been acknowledged internationally. There is need to establish further collaboration with national / international universities and institutes to start new courses in Aquaculture and Fisheries such as: Fish microbiology, Enterprise management Fish Harvest, storage, processing and Fish Marketing, which must be at par with the requirement of industry especially in South East Asia. Adaptation of most modern fish disease diagnostic techniques is also needed. Diseases of economically important wild freshwater fishes and cultured tilapia also need our attention.

ACKNOWLEDGEMENTS

I am grateful to Prof. (Emeritus) Dr. A. R. Shakoori of School of Biological Sciences; Prof. Dr. M. Naeem Khan, Dean Faculty of Life Sciences, Dr. M. Shafiq Ahmad and Dr. Hafiz Abdullah Shakir of Zoology Department for assisting in preparation of this manuscript. Thanks to Mr. Iftiqar Ahmad Qureshi, Dr. Skinder Hyat and Mr. Amjad Rasheed of Punjab Fisheries Department for their help and support. The University of the Punjab, Lahore provided funds to present this paper at, ASEAN Fisheries and Aquaculture conference and exposition / 11th Asian Fisheries and Aquaculture Forum (11th AFAF), Bangkok, 3-7th August 2016. This is gratefully acknowledged.

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