



LOSS OF AQUATIC FAUNA DURING COLLECTION OF *Penaeus monodon* POST LARVAE IN COX'S BAZAR COASTS, BANGLADESH

Roll No.: 0120/17

Registration No.: 869

Session: 2020-2021

**A thesis submitted in the partial fulfillment of the requirements for the degree of
Master of Science in Fisheries Resource Management**

Department of Fisheries Resource Management

Faculty of Fisheries

Chattogram Veterinary and Animal Sciences University

Chattogram-4225, Bangladesh

AUGUST 2022

AUTHORIZATION

I hereby declare that I am the sole author of the thesis. I also authorize the Chattogram Veterinary and Animal Sciences University (CVASU) to lend this thesis to other institutions or individuals for the purpose of scholarly research. I further authorize the CVASU to reproduce the thesis by photocopying or by other means, in total or in part, at the request of other institutions or individuals for the purpose of scholarly research.

I, the undersigned, and author of this work, declare that the electronic copy of this thesis provided to the CVASU Library, is an accurate copy of the print thesis submitted, within the limits of the technology available.

The Author

AUGUST 2022

ACKNOWLEDGMENTS

All praises are due to **Almighty Allah** for blessing me with the strength, aptitude and patience and enabled me to pursue higher education and to complete the thesis for the degree of **Masters of Science (MS) in Fisheries Resource Management** under Department of Fisheries Resource Management, Chattogram Veterinary and Animal Sciences University, Chattogram, Bangladesh.

The author expresses her gratitude and indebtedness to Vice-Chancellor, **Professor Dr. Goutam Buddha Das** and Dean, **Professor Dr. Muhammad Nurul Absar Khan** from the bottom of her heart for their immense administrative support to complete her research work.

The author would like to express her deepest sense of gratitude, sincere appreciation, profound regards to her respected teacher **Dr. Sk. Ahmad Al Nahid**, Head and Associate Professor, Department of Fisheries Resource Management, Faculty of Fisheries, Chattogram Veterinary and Animal Sciences University, for his unflinching co-operation, constant inspiration, warmth and indomitable guidance throughout the period of research work and preparation of the manuscript.

The author also sincerely expresses his gratitude to his supervisor **Fatema Akhter**, Assistant Professor, Department of Fish Biology and Biotechnology, Faculty of Fisheries, CVASU for valuable supervision and guidance. It was really a great pleasure and amazing experience for him to work under his supervision.

The author finds it a great pleasure in expressing her heartfelt gratitude to her research co-supervisor **Mrs. Shahida Arfine Shimul**, Assistant Professor, Department of Fisheries Resource Management, Faculty of Fisheries, Chattogram Veterinary and Animal Sciences University, for her valuable suggestions for the completion of the research work.

The author expresses her gratefulness to Mohammad Bokhteyar Hasan, Mrs. Supriya Biswas and all other laboratory technicians, Faculty of Fisheries, Chattogram Veterinary and Animal Sciences University, for their sincere cooperation.

The author finds it important to mention Saifuddin Rana and Nargis Sultana for their sincere support and help for the completion of the research work.

Last, but not the least, the author expresses her heartfelt gratitude to her beloved parents Nazim Uddin and Rezia Begum for their selfless love, blessings, care, dedicated efforts, valuable prayers and continuous support during the academic life.

The Author

CONTENTS

Title	Page No.
Title Page	i
Authorization	ii
Signature page	iii
Acknowledgements	iv
List of Abbreviations	vii
List of Figures	viii
List of Tables	ix
List of Appendices	ix
List of Plates	x
Abstract	xi
Chapter One: Introduction	1-4
1.1 Background	1-3
1.2 Objectives	4
1.3 Scope of the study	4
Chapter Two: Review of Literature	5-10
2.1 Giant tiger shrimp	5
2.2 Wild PL Collection in Bangladesh	5-6
2.3 Causes of Wild PL Collection	6- 7
2.4 Use of Gears for Wild PL Collection	7
2.5 Impact of Indiscriminate Wild PL Collection on Aquatic Biodiversity	7-8
2.6 Impact on Coastal and Marine Fish Stock	8-9
2.7 Abundance and Seasonal variation	10
Chapter three: Methodology	11-14

3.1 Study area	11
3.2 Sampling procedure	11
3.3 Sample Transportation	11
3.4 Sorting and grouping	12
3.5 Identification of Shrimp PL, Crustacean, Finfish	12
3.6 Preservation	13
3.7 Analysis and visualization of collected data	13-14
Chapter Four: Results	15-24
4.1 By-catch Composition	15
4.2 Relative abundance of different catch groups	16
4.3 Destruction of other individuals during collection of <i>P. monodon</i> PL	18
4.4 Seasonal variation of different catch groups	19
4.5 Temporal variation of different taxa in four different sampling stations	22
Chapter Five: Discussion	25-29
5.1 Catch composition of different groups	25
5.2 Destruction of other individuals during collection of <i>P. monodon</i> PL	26-28
5.3 Monthly abundance and Seasonal variation of different catch groups	28-29
Chapter Six: Conclusion	30
Chapter Seven: Recommendation and Future perspectives	31
References	32-38
Photo Gallery	39-42
Appendices	43-45

LIST OF ABBREVIATIONS

Acronym	Definition
PL	Postlarvae
MSBN	Marine Set Bag Net
Ft	Feet
Mm	Millimeter
ANOVA	Analysis of variance
Jan	January
Feb	February
Mar	March
Apr	April
May	May
Jun	June
Jul	July
Aug	August
Sep	September
Oct	October
Nov	November
Dec	December
BFRI	Bangladesh Fisheries Research Institute

LIST OF FIGURES

Figure No.	Title	Page No.
1	Map of study sites of Ukhiya-Teknaf Peninsula of Cox's Bazar	11
2	Morphological development of mysis, megalopa (I-III) and juvenile (IV-XII) of <i>P. monodon</i>	14
3	Percentage of different groups in different sampling stations	17
4	Destruction of individuals per 100 <i>P. monodon</i> PL collection from four different sampling stations	19
5	Seasonal variation of catch composition (mean) in four different stations (A=Sonarpara, B=Rezukhal, C=Rajarchora, D=Marishbuniya)	21
6	Temporal variation of Different Groups (<i>P. monodon</i> , Crustacean and Finfish) at Sonarpara Staion	23
7	Temporal variation of Different Groups (<i>P. monodon</i> , Crustacean and Finfish) at Rezukhal Staion	23
8	Temporal variation of Different Groups (<i>P. monodon</i> , Crustacean and Finfish) at Rajarchora Station	24
9	Temporal variation of Different Groups (<i>P. monodon</i> , Crustacean and Finfish) at Marishbuniya Station	24

LIST OF TABLES

Table No.	Title	Page No.
1	Family composition of by-catch (Individual No.) during wild PL collection	15
2	Number of individuals of different groups destroyed for each 100 <i>P. monodon</i> PL collection	18
3	Abundance and seasonal distribution of different catch groups	20
4	Temporal distribution of different taxa in four sampling stations of Cox's Bazar coast	22

LIST OF APPENDICES

Sl. No.	Title	Page No.
1	Family composition of by-catch (Individual No.) during wild PL collection	43
2	One-way Analysis of Variance Examining mean destruction of different groups (<i>P. monodon</i> , Crustacean, Finfish) from four different sampling stations	44
3	One-way Analysis of Variance Examining mean catch composition of <i>P. monodon</i> from different sampling stations	45

LIST OF PLATES

Plate No.	Title	Page No.
1	Sampling by Marine Set Bag Net	39
2	Collected sample in container	39
3	Sample Sorting and Grouping	39
4	Larvae Identification under stereo microscope	39
5	Identified samples were preserved with 90% ethanol	39
6	Labeling and Storage	39
7	Carangidae	40
8	Gerridae	40
9	Mugilidae	40
10	Haemulidae	40
11	Serranidae	40
12	Dacylopteridae	40
13	Engraulidae	40
14	Clupeidae	40
15	Gobiidae	40
16	Muraenesocidae	40
17	Terapontidae	40
18	Lutjanidae	40
19	Blenniidae	41
20	Leiognathidae	41
21	Megalopidae	41
22	Uranoscopidae	41
23	Ophichthidae	41
24	Myctophidae	41
25	Lactariidae	41
26	Siganidae	41
27	Mullidae	41
28	Penaeidae	42

29	<i>P. monodon</i>	42
30	Portunidae	42
31	Portunidae	42
32	Palinuridae	42

Abstract

In Bangladesh, due to a lack of hatchery-produced post-larvae compared to demand, shrimp farming is dependent on wild post larvae (PL). The activity of indiscriminate wild PL fishing has a notorious impact on biodiversity in coastal ecosystems due to significant amounts of by-catch. To analyze the quantity of black tiger shrimp's (*Penaeus monodon*) post larvae (PL) and estimate the harm to various aquatic species during shrimp PL collection, samples were collected monthly (January to December 2021) from four different selected spots (Sonarpara, Rezukhal, Rajarchora, and Marishbuniya) on the Cox's Bazar coasts by using a small-sized marine set bag net (MSBN). The investigation revealed that at the time of collection of every 100 PL of *P. monodon* approximately 2,641 PL of crustacean, 186 fin fish larvae, 807 PL of crustacean, 145 fin fish larvae, 689 PL of crustacean, 84 fin fish larvae, and 614 PL of crustacean, 237 fin fish larvae were cruelly destroyed from Sonarpara, Rezukhal, Rajarchora, Marishbuniya stations respectively. *P. monodon* larvae were found to occupy a small portion of the total annual catch composition, such as 3.42%, 9.50%, 11.45%, and 10.51% in Sonarpara, Rezukhal, Rajarchora, and Marishbuniya, respectively. The highest rate of *P. monodon* capture (10.44%) was recorded at Rajarchora station, while the lowest rate was recorded at Sonarpara station (3.21%). Although *P. monodon* PL is available throughout the year, its density was high in Razarchora station. A higher number of *P. monodon* PL was found in the months of October and March in all stations. Data revealed that in the rainy season (July, August, September and October), larvae of *P. monodon* were found to be higher compared with the other seasons in all stations. Whereas, the abundance of *P. monodon* reduced during the winter season (November, December, January and February). The findings show that the current seed harvesting approaches are severely harming other valuable aquatic fauna, which will ultimately put negative impact on the faunal diversity, natural productivity and self-recruitment pattern of mother stock.

Keywords: *P. monodon*, post larvae, finfish, crustacean, catch composition