E-ISSN: 2347-5129
P-ISSN: 2394-0506
(ICV-Poland) Impact Value: 5.62
(GIF) Impact Factor: 0.549
IJFAS 2019; 7(4): 182-186

www.fisheriesjournal.com
Received: 13-05-2019
Accepted: 16-06-2019

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Species availability and business trend of ornamental fish in Sylhet division

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Abstract
This study investigated the marketing channels and present status of aquarium fish trade in different districts of Sylhet division in Bangladesh over the period of six months from 5 December 2017 to 4 June 2018. Two upazilas from each district were considered for data collection. Data were collected by questionnaire interview method. Among four districts, the highest number of aquarium shops was recorded in Sylhet district. Aquarium fish shops not found in Sunamganj district. Eleven (11) number of aquarium shops were found in Sylhet division, where 26 aquarium fish species were accounted. Amongst, 25 were exotic ornamental fish species and an indigenous species (Rosy barb) has been observed. The fishes from order Cypriniformes were dominant in market. In the present study, Discus was the most expensive species (1300-1500 BDT/Pair) followed by Parrot (450-700BDT/Pair), Oscar (280-450BDT/Pair), Butterfly (250- 350 BDT/Pair). Most of the other species were sold usually below 100 BDT/Pair. All aquarium fish species were imported from the internationals markets like Singapore, Malaysia, Thailand, etc. Importer/Wholesalers and breeders sell them to retailers, shopkeepers and finally the shop keepers sell them to the aquarium owners. During this survey, it was recorded that fish selling intensity decrease during winter months especially in January and February; and that time retailers engage themselves to other subsidiary business. The aquarium fish traders of Sylhet division were categorized into three groups such as (A) Aquarium fish traders of Sylhet district (63.63%) (B) Aquarium fish traders of Moulavibazar district (27.27%) and (C) Aquarium fish traders of Habiganj district (9.09%). The economic analysis shown that the Group A represent the highest benefit cost ratio and rate of return on total cost which were 1.42 and 27.034% respectively.

Keywords: Aquarium fish, species varieties, marketing channel, business, economic analysis

1. Introduction
Ornamental fish are colorful aquatic organisms, people reared them as pets and normally used for aesthetic pleasure or home and business decoration. Throughout the world ornamental fish has high market demand and it is a most profitable business in the developed country where it has been considered as most popular hobby **[1].** More than 125 countries of the world doing his business that provides employment opportunities for thousands of rural people in developing countries. The global ornamental fish industry deals with over 2500 species of ornamental fish of which freshwater origin cover over 60% of them. Now-a-days it turns into million dollar business all over the world. It was recorded that about 150 million marine and freshwater ornamental fish were sold each year in the world market, in the late 1980s [2]. Day by day the business is increasing throughout the world. USA, Europe and Japan imported more than 65% ornamental fish from Asia; it is great news for the developing countries [3]. Naturally, the people of Bangladesh are beauty seeker and this sector has great potentialities for profitable business. In Bangladesh 80% aquarium shops are located in Dhaka kataban market area from which ornamental fish are distributed throughout the country [13]. Sylhet division has vast natural water bodies such as numerous *haors, baors, beels*, rivers and the suitable climate that increase the species diversity. Ornamental fish business is a newly emerging sector in this area. The people of this area are traditionally pleasure seeker and this region has great abundance of indigenous ornamental fish which have business possibilities. In this context, a survey was conducted to record the present status of ornamental fish business, species availability and marketing channels of ornamental fish business in Sylhet division of Bangladesh.

2. Materials and Methods

The study was conducted in Sylhet division over the period of 6 months from 5 December 2017 to 4 June 2018. Target groups were aquarium shopkeepers, aquarium users and various stakeholders. The simple random sampling method was used for data collection. The sample size was 39 among them 11 individual respondents of aquarium fish traders and 28 respondents of aquarium users. The responses of each respondent were compiled and tabulated to indicate frequency and percent distribution for different categories of the questionnaires.

2.1 Data analysis

The collected data were analyzed by enterprise-costing technique [4] and the results were presented in the tabular form with the help of simple statistical measures like arithmetic mean, percentage and ratio. The indicators of performance are as follows.

2.2 Benefit cost ratio (BCR): The ratio is calculated by dividing the quantified benefits by a measure of the cost. BCR = Total income ÷ total costs

2.3 Rate of return (RR) on total costs: It is obtained by dividing the profit by the total operating cost.

2.4 RR on total cost (%) = (Profit ÷ total costs) × 100

2.5 Group: To facilitate the economic analysis of collected data the aquarium fish traders of Sylhet division has been classified into three categories:
Group A: Aquarium fish traders of Sylhet district
Group B: Aquarium fish traders of Moulavibazar district
Group C: Aquarium fish traders of Habiganj district

3. Results and Discussion

3.1 Available aquarium shops in Sylhet division

Eleven (11) number of aquarium fish shops were recorded in Sylhet division, where 7 shops were located in Sylhet district, 3 shops were in Moulavibazar district and only 1 shop was in Habiganj district. There was no aquarium shop in Sunamganj district. However, one more shop was in the Sylhet sadar upazila but it closed due to less selling and low profit. The number of aquarium shops was found much lower than that of Dhaka city where more than 28 aquarium shops are located only in Katabon market area [5]. Alam *et al.* [6] reported 19 aquarium shops in Barisal division which was higher than Sylhet division. The findings reflect that aquarium fish business condition in the studied areas is moderate in comparison to other division.

3.2 Available aquarium fish in Sylhet division

In our country, continuously new species of ornamental fish are introducing. So it is very difficult to count the actual number of ornamental fish used as aquarium pet. The total numbers of 26 varieties (Table 1) were recorded during study period which belongs to four orders- Cypriniformes (42.30%), Perciformes (38.46%), Siluriformes (15.38%) and Characiformes (3.84%). Amongst, 25 species were exotic ornamental fish and only Rosy barb was indigenous fish species. Due to colorful body orientation and active appearance, exotic fishes are preferable in aquarium business than indigenous species. Moreover, lack of local fish breeders leads to less availability of indigenous species for business. The study revealed that the order Cypriniformes emerge as most dominant groups among the available ornamental fish community. Mohsin *et al.* [7] reported that Cypriniformes were the most common and dominant fish order in Bangladesh which supported our findings. Kangkon [11] had documented 31 potential indigenous ornamental fish and non-fish species, as well as 79 exotic ornamental fish varieties in Bangladesh. In the present study, 26 varieties of ornamental fish were recorded which indicate that, the species diversity was not satisfactory in the study area.

Table 1: Available aquarium fish species in Sylhet division

Ornamental fishes					District			
Sl. No.	**Order**	**Family**	**Local name**	**Scientific name**	**Sylhet**	**Habiganj**	**Moulavibazar**	**Sunamganj**
1.	Cypriniformes	Cypriniidae	Gold Fish	*Carassius auratus*	√	√	√	Aquarium fish shops not found
2.	Cypriniformes	Cypriniidae	Comet	*Carassius auratus*	√	√	√	
3.	Cypriniformes	Cypriniidae	Tiger barb	*Barbus tetrazona*	√	√	√	
4.	Cypriniformes	Cypriniidae	Yellow barb	*Labidochromis caeruleus*	√	X	X	
5.	Cypriniformes	Cyriniidae	Silver shark	*Balantiocheilos melanopterus*	√	X	√	
6.	Cypriniformes	Cyriniidae	Rainbow shark	*Epalzeorhynchos frenatus*	√	X	√	
7.	Cypriniformes	Cyriniidae	Discus	*Symphsodon discus*	√	X	√	
8.	Cypriniformes	Cyriniidae	Koi carp	*Cyprinus carpio*	√	√	√	
9.	Cypriniformes	Cyriniidae	Zebra	*Brachydanio rerio*	√	X	√	
10.	Cypriniformes	Cyriniidae	Black moor	*Carassius auratus*	X	√	√	
11.	Cypriniformes	Cyriniidae	Rosy barb	*Puntius conchonius*	X	X	√	
12.	Perciformes	Osphronemidae	Golden gourami	*Trichogaster trichopters*	√	X	√	
13.	Perciformes	Osphronemidae	Blue gourami	*Trichogaster trichopters*	√	X	√	
14.	Perciformes	Helostomatidae	Kissing gourami	*Heloistoma temmineki*	√	X	X	
15.	Perciformes	Cichlidae	Angel	*Pterophllum scalare*	√	√	√	
16.	Perciformes	Cichlidae	Parrot	*Scarus rivulatus*	√	X	√	
17.	Perciformes	Cichlidae	Oscar	*Astronotus ocellatus*	√	√	√	Aquarium shops not found
18.	Perciformes	Poeciliidae	Black moly	*Poecilia sphenops*	√	X	√	
19.	Perciformes	Poeciliidae	Guppy	*Poecilia reticulate*	√	X	√	
20.	Perciformes	Chaetodontidae	Butterfly	*Pantodon buchholzi*	√	X	X	
21.	Perciformes	Ambassidae	Glass fish	*Kryptopterus bicirrhis*	√	X	√	
22.	Siluriformes	Clariidae	Albino catfish	*Clarias batrachus*	X	X	√	
23	Siluriformes	Pangasiidae	Tiger shark	*Pangasius hypophthalmus*	√	√	√	

24.	Siluriformes	Loricariidae	Sucker mouth	*Plecostomus punctatus*	√	X	√	
25.	Siluriformes	Pangasiidae	Albino tiger shark	*Pangasius hypophthalmus*	X	X	√	
26.	Characiformes	Serrasalmidae	Silver dollar	*Metynnis argenteus*	√	X	√	

3.3 Demand of aquarium fish in Sylhet division:

The most demandable species of ornamental fish were gold fish (80%), comet (60%), angel fish (55%), koi carp (45%), guppy (40%) and dollar (35%) (Figure 1), in Sylhet division. Faruk *et al.* [10] noticed that the most demandable species of ornamental fish were gold fish, angel fish, comet fish, koi carp, platy, guppy, fighter fish, parrot fish and discuss fish in aspects of Bangladesh that supported the results of present study. These fishes are most demandable due to their body coloration, active behavior, attractive body structure and comparatively low price than other fish.

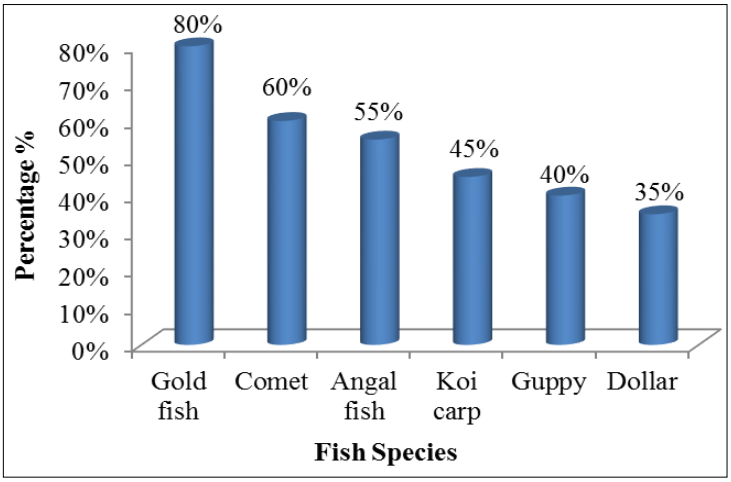

Fig 1: Demand (%) of ornamental fish by the aquarium users

3.4 Available fish feed and prices in Sylhet division

In Sylhet division both aquarium fish traders and customers are used artificial fish feed for rearing aquarium fish. These feeds are imported from different countries and some are available in Bangladesh. There are several types of feed from different companies available in the market. Aquarium fish traders of Sylhet division purchase their required feeds mostly from Dhaka katabon market, Feni and Chittagong aquarium fish market (Table 2).

Table 2: Available fish feed and prices in Sylhet division

Feed name	Sylhet district Price (BDT/200g)	Moulavibazar district Price (BDT/200g)	Habiganj district Price (BDT/200g)	Sunamganj district Price (BDT/200g)
1.Nova	160	120	150	×
2.Osaca	120	140	140	×
3.Taiyo	100	×	×	×
4.Optimum	180	150	180	×
5.Tokyo	×	120	×	×

3.5 Pricing and selling status of ornamental fish

The present study reveals that the price of ornamental fish in Sylhet division ranged within 50-1500 BDT. The wholesale and retail prices are shown in Table 3. The maximum wholesale price was recorded for discus (1300 BDT/pair) followed by parrot (450 BDT/pair) and Oscar (BDT/pair) (Table 3). The highest retail price was found for discus (1400BDT/pair) followed by parrot (700 BDT/pair) and Oscar (420BDT/pair) (Table 3). Except winter, daily selling of aquarium fish worth 1000 to1500 BDT was recorded. However, fish selling reduces when temperature drops during winter. The most expensive aquarium fish was red or blood parrot (1000-1500 BDT/pair) in Khulna city followed by discus and Oscar [8]. Galib and Mohsin [9] recorded silver arowana (*Osteoglossum bicirrhosum*) as the most expensive aquarium fish species in Bangladesh costing 30,000 BDT per pair. However, silver arowana were not found to be sold in the study area. This may be due to less interest of the people to purchase or to maintain aquarium at their home or business places.

Table 3: Wholesale and retail price of aquarium fish in Sylhet division

Fish Name	Sylhet district		Moulavibazar district Habiganj district			
	Wholesale Price (BDT/Pair)	Retail Price (BDT/Pair)	Wholesale Price (BDT/Pair)	Retail Price (BDT/Pair)	Wholesale Price (BDT/Pair)	Retail Price (BDT/Pair)
1.Gold fish	60	100	60	90	60	100
2.Comet	40	80	40	90	40	90
3.Tiger barb	44	70	44	60	44	80
4.Yellow barb	100	200	×	×	×	×
5.Silver shark	80	120	80	120	×	×
5.Silver shark	80	120	80	120	×	×

6.Rainbow shark	60	100	60	90	×	×
7.Discus	1300	1500	1300	1400	×	×
8.Koi carp	50	80	50	75	50	80
9.Zebra fish	50	80	50	90	×	×
10.Silver dollar	140	200	150	200	×	×
11.Tiger shark	50	100	50	120	50	120
12.Sucker mouth	40	80	40	70	×	×
13.Golden gourami	50	100	50	100	×	×
14.Blue gourami	60	100	60	120	×	×
15.Kissing gourami	50	80	×	×	×	×
16.Angel	40	60	40	70	40	70
17.Parrot	450	600	450	700	×	×
18.Oscar	280	400	280	420	280	450
19.Black moly	40	60	40	70	×	×
20.Guppy	32	50	32	50	×	×
21.Butterfly	250	350	×	×	×	×
22.Glass fish	80	120	80	120	×	×
23.Rosy barb	×	×	40	80	×	×
24.Albino tiger shark	70	100	700	100	×	×
25.Black moor	×	×	80	150	80	150
26.Albino catfish	×	×	50	100	×	×

3.6 Average annual income

Study shown that among three districts, Sylhet district was belonged to high income group with annual earnings in the range of BDT 5-6 lakh. On the other hand Moulavibazar and Habiganj district earned annually BDT 5 lakh and BDT 5.5 lakh respectively.

Table 4: Average annual income in Sylhet Division

District Name	Average annual Income (BDT)
1.Sylhet district	6-7 lakhs
2.Moulavibazar district	5 lakhs
3.Habiganj district	5.5 lakhs

3.7 Marketing channels of aquarium business in Sylhet division

In Sylhet division, two different marketing channels have been identified that are used for distribution and commercialization of ornamental fish species. So the marketing channel is quite simple in this area. In Bangladesh, approximately 70% ornamental fish species are imported from international markets like India, Singapore, Thailand, etc. and rest of the species are come from local breeders (Dhaka, Feni and Chittagong). The retailers and breeders of different area of the country collect their fish from importers/ wholesalers of Dhaka kataban aquarium fish market. Sometimes wholesalers also collect their fish from local breeders. Finally the customers buy aquarium fish from local shopkeepers/retailers. In Sylhet district, (Figure 2) importer supply fish to retailers/shopkeepers (Dhaka) and breeders (Chittagong). Shopkeepers (Sylhet) collect their fish from wholesalers of Dhaka kataban Market and/or from breeders in Dhaka, Feni and Chittagong. Then, they directly sell fish to customers. On the other hand, a little variation observed in Moulavibazar and Habiganj districts (Figure 2), the both districts collect their fish from shopkeepers of Sylhet district as well as retailers/shopkeepers of Dhaka. Four types of marketing channels were identified by other author in the Bangladesh [10]. However, small marketing channel is helpful to keep fish price affordable but long distance transportation could increases the final price. The above discussion reveals that, the number of business intermediaries was more in Habiganj and Moulavibazar districts than Sylhet district, that's why the fish price is high in these two districts than Sylhet district.

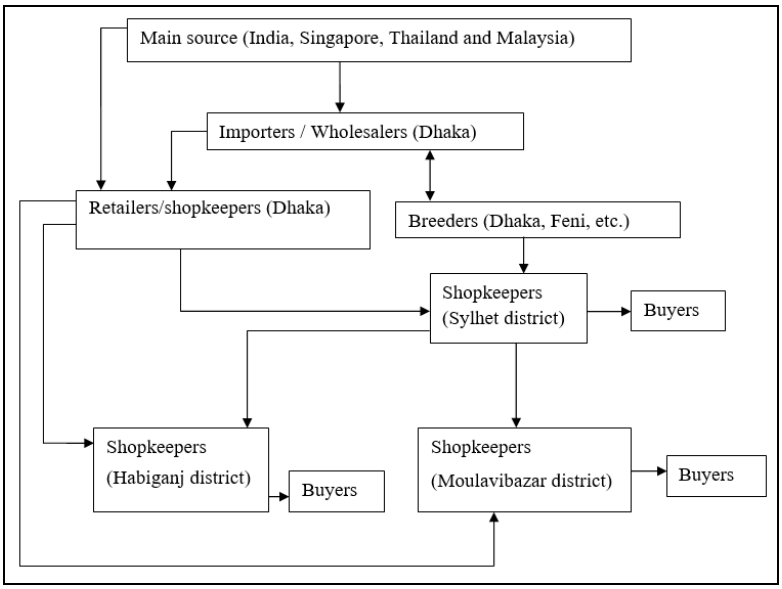

Fig 2: Distribution and marketing channels of aquarium fish in Sylhet division

3.8 Economic analysis

Economic analysis of aquarium fish trades in Sylhet division were done by calculating the Benefit Cost Ratio (BCR) and Rate of Return (RR) on total costs (%) that are shown in (Figure 3 and 4). The aquarium fish traders were classified into three groups according to district, such as Group A (Sylhet district), Group B (Moulavibazar district) and Group C (Habiganj district). Group A represented the highest benefit cost ratio (1.42) who has to invested the lowest money to operate their business, on the other hand others group needed to invest comparatively more money to run their business (Figure 3) and the highest RR (27.034%) (Figure 4) on total cost was also estimated from the members of Group A (Sylhet district) where they had less operating cost than other two groups. Morally, Group A used very simple technical way to operate their business which required very low cost. Rahman *et al*. [8] conducted in Khulna division where the highest benefit cost ratio and the highest RR on total cost were 1.94 and 93.60% respectively that is much higher than Sylhet division.

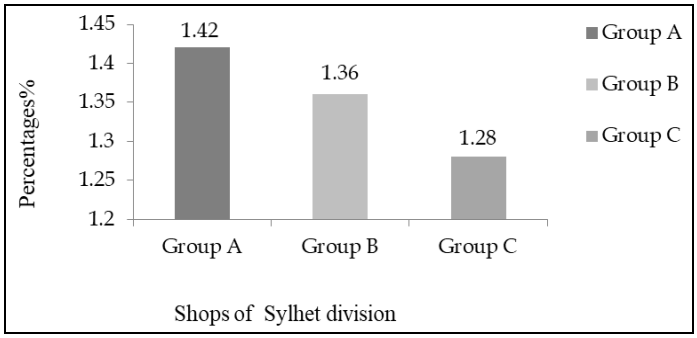

Fig 3: Benefit cost ratio among different districts of Sylhet division

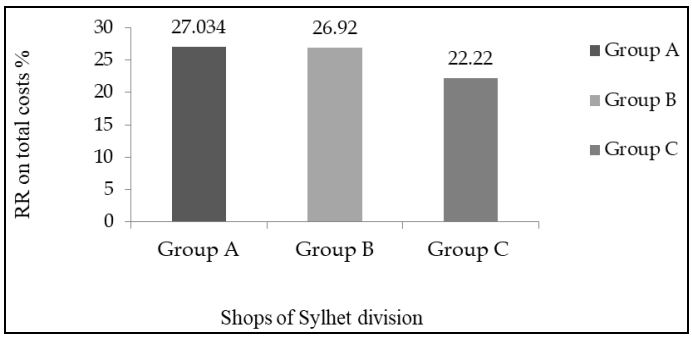

Fig 4: Rate of Return on total costs (%) among different groups.

4. Conclusion

Overall business condition in Sylhet division is moderate. Sylhet district have been performed the best in aquarium fish business in comparison of other districts. The availability of species is low due to lack of local breeders and high cost of exotic ornamental fish. Marketing channels is quite simple which is helpful to keep fish price affordable. There are huge potentialities for business. The vast natural water bodies of Sylhet division studied areas support various indigenous ornamental fish and government should take necessary step to increase marketability of these available species. It will reduce the high importing cost as well as will be helpful to the commencement of ornamental fish business for indigenous species under Sylhet division to keep existence of endangered indigenous ornamental fish.

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