



STUDY OF POTENTIAL OF ORNAMENTAL FISHES IN KATHMANDU

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Abstract: Ornamental fishes are the peaceful, generally attractive fishes used for aesthetic, decorative, recreational and therapeutic purposes and a thriving industry supporting millions of people throughout the world. This study was conducted to learn about the status, sources, challenges and potential of ornamental fishes in Kathmandu (Nepal). Interviews were conducted with the major ornamental fish suppliers, traders and owners of aquarium shops and production farms to extract necessary information along with direct visits to the concerned places. Several secondary sources like published and unpublished reports, journals, books, photo books and pictorials were also used for data collection and analysis. The average number of customers per day in the studied shops was found to be 10-15 people in most of the shops. An increasing trend of customer flow was noticed in most of the shops in recent years. The average estimated profit margin was found to be 20-30%. Government support is recommended to tackle the major existing challenges including high mortality and maintenance issues of fishes. The increase in the number of shops, flow of customers and good profit margin shows the blooming status of the ornamental fish industry and helps to provide insights for the future of the industry.

Keywords: Aquaculture, Aquarium, Breeding, Kathmandu, Ornamental fishes.

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INTRODUCTION

Ornamental fishes are the peaceful, generally tiny fishes available in attractive colours and capable of living in confined spaces like aquarium and garden pools (Ghosh *et al.*, 2003). All the fishes including cat fishes and ornamental fishes are the exclusively poikilothermic and aquatic vertebrates with streamlined body and feed the micro-organisms, invertebrates and decaying plants (Ashok, 2016; Verma and

Prakash, 2020). They contribute significantly to the national economy (Chakraborty *et al.*, 2021a and 2021b; Chakraborty and Mome, 2022) however, climate change, pollution, pesticides and other anthropogenic activities influence almost every living beings including fishes (Prakash and Verma, 2014; Singh *et al.*, 2023).

Aquarium fish keeping is a centuries old popular hobby and the growing interest in this field has



resulted in a steady expansion in its trade in more than 125 countries (Dey, 2008). Today aquarium keeping is said to be the second largest hobby in the world after photography with a global industry of 15 to 30 billion US dollars (Wood, 2001; Tlusty *et al.*, 2013). The flamboyant and brilliant colour and exotic appearance of fish appeals to people of all ages (Sharma, 2020) and have been used to uplift the aesthetic value of a place. A typical ornamental fish, irrespective of species is captured (or bred and raised in captivity), transported to a capture station, then to a retailer's display tanks via wholesale facility and reaches customer's home aquarium in a dip-netted bag, and is typically kept until it dies (Torgersen, 2020).

Ornamental fishes, also known as living jewels, provide relaxation to people, create self-employment opportunities and some ornamental fishes like Arowana are even believed to bring good luck, wealth and prosperity (ICAR, 2011). MHA (2022) focused on the therapeutic value of ornamental fishes implying that they help in relieving stress, alleviating anxiety, improving mental stability and mood, relaxing and can even help children with autism disorder. Some species such as *Garra rufa* are used to get pedicure and have been used in the Middle East for the treatment of diseases like psoriasis (U.S. Fish and Wildlife Service, 2012).

Ornamental aquaculture industry is a global industry where it is estimated that more than two million people are involved both directly and indirectly including hobbyists (Dominguez and Botella, 2014). An international trade of 6,000 aquarium fish species is estimated each year in general including both freshwater and marine ornamental fishes (Husen *et al.*, 2021). Ornamental fish industry has tremendous economic value and prospects with many challenges (Marchio, 2018).

In Nepal about 232 fish species are found occupying approximately 5.5% of the total area (Gurung, 2018). Among them about 15 species are ornamental fishes or have the potential to become ornamental fishes (Husen, 2019). In recent times,

aquariums housing a plethora of ornamental fishes and other aquatic animals have been an integral part of many Nepali houses (Shrestha, 2018). Annual import of ornamental fishes in Nepal was 318.1 metric ton of value NRs 13.3 million in 2009 A.D., which has increased to 1233 metric ton of value NRs 153.4 million in 2017 A.D. (Husen, 2019). Former studies showed that 85% of ornamental fishes are imported from India and 15% from Thailand, China and other countries. Husen (2019) reported about 43 aquarium shops in Kathmandu and Pokhara valley that sold 27 exotic ornamental fish species. The popularity of ornamental fishes and their use in different sectors are evident but the current status, market, scope and potential of ornamental fishes is still to be explored. Authors aim to explore the sources, market, production, challenges, and potential of different native and exotic ornamental fishes found in Kathmandu, the biggest market of ornamental fishes in Nepal.

MATERIALS AND METHODS

The authors used camera (Cannon EOS 1500D) for capturing pictures and questionnaire sheets, notebook and pen to obtain the data. A total of 123 aquarium shops, one production farm and 15 ornamental fish suppliers were located in Kathmandu. Data was collected from 50 aquarium shops, one production farm, 8 suppliers/importers and 3 retailers. Direct visits were made to 45 aquarium shops and structured interviews with 45 aquarium shop owners and 3 retailers were conducted from December, 2022 to July, 2023 to know the ornamental fish species availability and their price in the market and marketing channel. Semi structured interviews with suppliers was also done to learn about the sources of ornamental fishes. Semi structured questionnaire was personally administered to 5 aquarium shop owners via electronic media to collect further information. Data was compiled and analyzed with the help of MS Excel. Secondary data was collected from published books such as of Amatya and Gurung (2005) and other literature like Torgersen (2020), Shrestha (2018) and Chand (2021) etc.

The study was conducted in Kathmandu District, the capital city of Nepal. It is found at an elevation of 1400m from sea level with coordinates of 27° 42'2.7684"N and 85° 18'0.5040"E (Fig. 1; Ghimire and Shrestha, 2014). It has an area of 49.45 Km² and has a population of about 2,017,532 (NSO, 2021).

RESULTS AND DISCUSSION

Authors identified 57 species out of which 4 were native and 53 exotic ornamental fishes. The names of all the identified fishes along with their local and scientific names with origin are tabulated in Table 1.

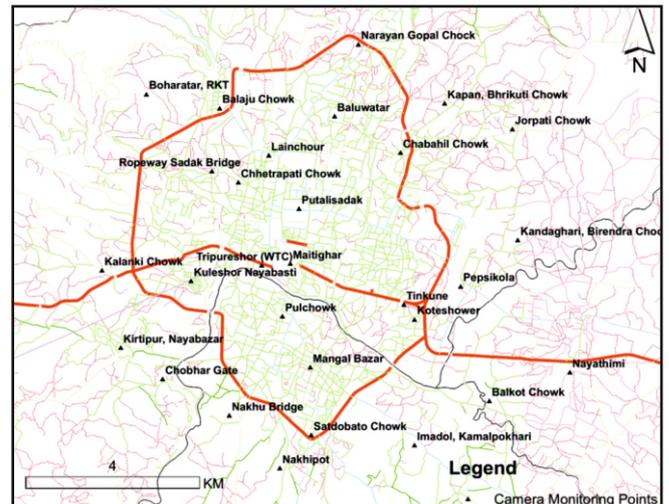


Fig. 1: Location Map of Kathmandu.

Table 1: List of Native and Exotic ornamental fishes found in Kathmandu.

S. No.	Local Name	Scientific Name	Origin
1.	Swordtail	<i>Xiphophorus hellerii</i>	Exotic
2.	Green Bichir	<i>Polypterus retropinnis</i>	Exotic
3.	Redgarra	<i>Garra rufa</i>	Exotic
4.	Goldfish	<i>Carassius auratus</i>	Exotic
5.	Glowlight Tetra	<i>Hemigrammus erythrozonus</i>	Exotic
6.	Angel fish	<i>Pterophyllum scalare</i>	Exotic
7.	Silver Arowana	<i>Osteoglossum bicirrhosum</i>	Exotic
8.	Bluebase Arowana	<i>Scleropages formosus</i>	Exotic
9.	Comet	<i>Calloplestius altivelis</i>	Exotic
10.	Red-bellied Piranha	<i>Pygocentrus nattereri</i>	Exotic
11.	Snakehead	<i>Channa punctata</i>	Native
12.	Ghost Knife	<i>Apteronotus albifrons</i>	Exotic
13.	Striped Raphael Catfish	<i>Platydoras armatulus</i>	Exotic
14.	Neon Blue Acara	<i>Andinoacara pulcher</i>	Exotic
15.	Ropfish	<i>Erpetoichthys calabaricus</i>	Exotic
16.	Endliche Bichir	<i>Polypterus endlicheri</i>	Exotic
17.	Alabama hog sucker	<i>Hypentelium etowanum</i>	Exotic
18.	Red-spotted Severum	<i>Heros efasciatus</i>	Exotic
19.	Dwarf Gourami	<i>Trichogaster lalius</i>	Exotic
20.	Mascara Barb	<i>Dawkinsia assimilis</i>	Exotic
21.	Green Texas	<i>Herichthys carpintis</i>	Exotic
22.	Pearl Gourami	<i>Trichopodus leerii</i>	Exotic
23.	Southern Platyfish	<i>Xiphophorus maculatus</i>	Exotic
24.	Zebrafish	<i>Danio rerio</i>	Native

25.	Silver Dollar	<i>Metynnis argenteus</i>	Exotic
26.	Rainbow Snakehead	<i>Channa bleheri</i>	Native
27.	Molly	<i>Poecilia sphenops</i>	Exotic
28.	Guppy	<i>Poecilia reticulata</i>	Exotic
29.	Electric Blue Ram	<i>Mikrogeophagus ramirezi</i>	Exotic
30.	Fighter Fish	<i>Betta splendens</i>	Exotic
31.	Koifish	<i>Cyprinus rubrofasciatus</i>	Exotic
32.	Flowerhorn	<i>Amphilophus hybrid</i>	Exotic
33.	Denison barb	<i>Puntius denisonii</i>	Exotic
34.	Cherry barb	<i>Puntius titteya</i>	Exotic
35.	Tigerbarb	<i>Puntius tetrazona</i>	Exotic
36.	Oscar	<i>Astronotus ocellatus</i>	Exotic
37.	Greenterror	<i>Andinoacara rivulatus</i>	Exotic
38.	Parrot Fish	<i>Scarus psittacus</i>	Exotic
39.	Sweeper	<i>Pempheris schomburgkii</i>	Exotic
40.	Shark	<i>Balantiocheilos melanopterus</i>	Exotic
41.	Vieja	<i>Vieja melanurus</i>	Exotic
42.	Coloured Tetra	<i>Gymnocorymbus ternetzi</i>	Exotic
43.	Tinfoil Barb	<i>Barbonymus schwanenfeldii</i>	Exotic
44.	Redtail Shark	<i>Epalzeorhynchus bicolor</i>	Exotic
45.	Discus	<i>Symphysodon aequifasciatus</i>	Exotic
46.	Pleco	<i>Hypostomus plecostomus</i>	Exotic
47.	Hockeystick	<i>Thayeria boehlkei</i>	Exotic
48.	Rosybarb	<i>Puntius conchonius</i>	Native
49.	Kissing Gourami	<i>Helostoma temminckii</i>	Exotic
50.	Marine Gobi	<i>Glossogobius giuris</i>	Exotic
51.	Siamese algae eater	<i>Crossocheilus oblongus</i>	Exotic
52.	Cardinal Tetra	<i>Paracheirodon axelrodi</i>	Exotic
53.	Jewel Fish	<i>Hemichromis bimaculatus</i>	Exotic
54.	Texas Cichlid	<i>Herichthys cyanoguttatus</i>	Exotic
55.	Cory Catfish	<i>Corydoras spp.</i>	Exotic
56.	Neon Tetra	<i>Paracheirodon innesi</i>	Exotic
57.	Acara	<i>Cichlasoma bimaculatum</i>	Exotic

It is a significant increase compared to what Husen (2019) reported on his study 'Status of ornamental fish import, research and scope in Nepal'. The major reason behind the increase in the number of shops and species of ornamental fishes may be because of the increase of aquarium keeping/ornamental fish keeping as a hobby, recreational activity and decoration. It was also noticed that the import ratios of the countries has changed. Previously, India seemed to dominate the import of aquarium fishes to Nepal while others hold small portions. Now, it has been observed that the import of ornamental fishes from Thailand has increased and is almost on par with India and new destinations of import such as Singapore and Japan were also discovered. It may be because quality of ornamental fishes imported from Thailand is much better than those imported from India and the cost of import is also not very high in comparison to India.

Among the exotic ornamental fishes Bluebase Arowana (*Scleropages formosus*) was most highly priced and Guppy (*Poecilia reticulata*) had the lowest price range and among the native fishes Rainbow Snakehead was most highly priced and Zebra fish had the lowest price range. Goldfish, Guppy and Japanese Koi were found to be the most popular ornamental fish species sold in Kathmandu.

The market price range of the fishes was also found to be very wide. It is because the market price of fishes not only depends on the species of the fish but also on the size, gender, shape, age, weight and also the country of import. The most popular species sold in Kathmandu were found to be Goldfish, Guppy and Koi carp. It may be because they are smaller, cheaper, more colourful and are considerably easier to look after compared to other species. Also all the previous studies concluded that all the fishes were imported and there was no production farm for ornamental fishes. However, in this study a small scale production farm called Urban Tails was reported. The marketing channel of ornamental fishes of Nepal consisted of importers, suppliers, traders, ornamental fish shop owners, local

breeders and fishermen. Also the trend of increase in the establishment of new shops was found along with the increase in customer flow. Breeding of some small fishes such as Guppy and Molly was found to have started in 8-10 shops and domestication of native fishes such as Zebra fish and Rosy barb have also started in the production farm and few shops aligning with Domestication and breeding of native ornamental fish species in Nepal (Husen *et al.*, 2021).

Sources of ornamental fishes in Kathmandu

It was found that majority of ornamental fishes were imported from other countries. Although a large-scale production farm is in operation in Dharan, Nepal, the cost of ornamental fish purchased from the farm was more than that of imported fish. As a result, practically all retailers purchased imported fish. It was discovered that a small-scale production farm called Urban Tails is operating in Basundhara, Kathmandu, breeding 14 kinds of exotic ornamental fish and domesticated native ornamental fish. However, the fishes are in limited supply and are only sold in a 2-3 shops. One-third of the shops also bred small fish like Guppy, Molly, and Zebra fish. It was found that majority of the fish were imported from India and Thailand, with a few also coming from China, Japan, Malaysia, Indonesia, and Singapore (Fig. 2).

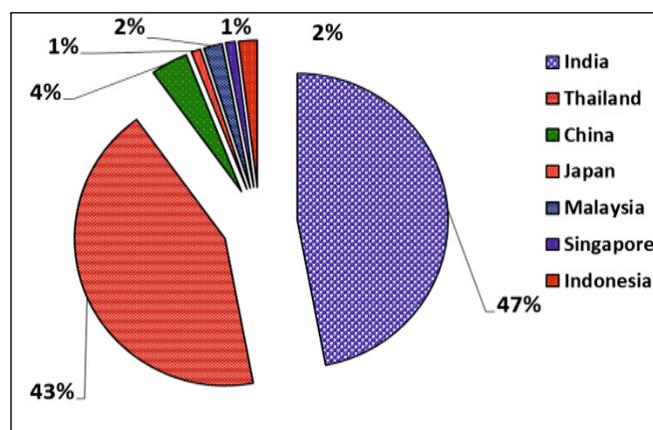


Fig. 2: Market share of importing ornamental fishes.

Marketing channels of ornamental fishes in Kathmandu

The study discovered that there are five marketing channels for ornamental fish in

Kathmandu. The majority of ornamental fishes were found to be delivered to shop owners by importers through suppliers. Some ornamental fishes imported from India were discovered to be sold directly by traders. Many small ornamental fishes, like Guppy and Molly, were bought from local breeders. A limited number of shops bought fish from the producing farm. Native ornamental fishes such as zebra fish, snakeheads, and rosy barbs were discovered to be harvested straight from natural habitats and sold by fishermen to clients or shop owners.

Present status of ornamental fish business in Kathmandu

It was found that 26 out of 50 studied shops had been established during the last five years. Thirteen establishments were discovered to have opened within the last five to ten years, four within the last ten to twenty years, four within the last twenty to fifty years, and three within the last fifty years. It was also noted that the expected number of customers at aquarium shops was found to be higher in the spring and summer seasons, which are considered peak seasons, and lower in the autumn and winter seasons, which are considered off-seasons due to increased fish mortality rates. As this survey was conducted during the off season, it was also discovered that the flow of consumers in nearly all of the establishments was below normal or dropping.

Because of the chilly weather, most shops reported considerable fish mortality, with some reporting more than 65% of the total imported batch. The anticipated number of consumers visiting the examined shops per day ranged from 2 to 30. It was also found that the majority of shops had an average of 10-15 customers per day. It was also found that establishment's aquarium shops near tourist attractions or city centers with a long history of operation had a higher average number of customers per day.

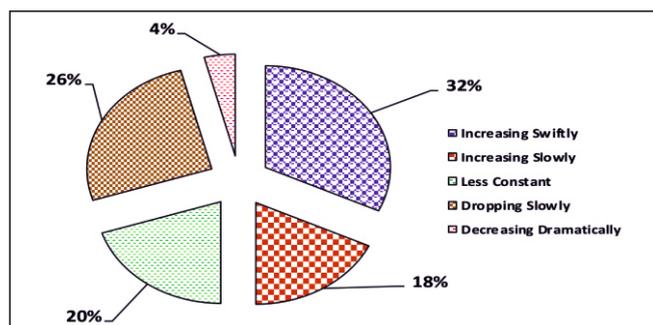


Fig. 3: Yearly trend of Customer flow in the interviewed shops.

It was also found that customer flow (Fig. 3) in half of the shops was increasing (32% swiftly and 18% slowly). Twenty percent reported that client flow is more or less constant, whereas thirty percent reported a falling trend in customer flow (26% dropping slowly and 4% decreasing dramatically). It was found that the average number of customers per day in most shops was between 10 and 15. The average anticipated profit of most shops was determined to be between 20 and 30%. Most shops likewise reported a sluggish increase in consumer flow. The main cause for the surge was the growing popularity of aquarium keeping as a pastime, as well as the cheap pricing of fish. The use of aquarium fish for decoration has also been shown to expand in recent years. In all of the establishments visited, word-of-mouth and social media were the primary marketing methods. Shop competition is mostly high, with some remote locations experiencing low to no competition, and niche ornamental fish's shops experiencing marginal competition.

Challenges of Ornamental Fish Business in Kathmandu

From the collected data, it was found that the major challenges noted were a high mortality rate and difficulty in maintaining optimum conditions for fish. Some notable constraints were found to be a lack of knowledge about ornamental fish, difficulties during the import of fish, and a lack of unity among the people involved in this business. A few less relevant challenges were difficulty in convincing customers and government import restrictions for some species of fish.

The average number of customers per day in most of the shops was found to be 10 to 15. High profit margins were also noted which aligned with the previous studies. The yearly trend of customer flow was found to be in increasing order, aligning with the study of ornamental fish in Lalitpur (Jha and Prasad, 2015). A high mortality, hygiene and maintenance issues were the major problems found in the industry, which differed from the challenges presented in Global Trade in Ornamental Fish (Dey, 2008). The difference may be because the people involved in this business in Kathmandu are still not familiar with the proper techniques and advanced methods used to ensure

high survival rates of the fish and their quality maintenance. Most of the interviewees firmly recommended further support from the government during import and training programs to the associated people regarding the ornamental fishes and their qualitative maintenance to be most helpful for further growth and development of the ornamental fishes and the ornamental fish industry.

CONCLUSION

Considering all the findings of this study and comparing it with the available secondary data, an increase in the number of aquarium shops, varieties of ornamental fish, the number of countries of import, and customers can be noticed. The increasing trend of annual increases in customer flow is seen in the majority of shops. While a few challenges, such as a high mortality rate, maintenance problems, a lack of knowledge, and others, persist in the industry, it can benefit further from more consideration and support from relevant people and the government. Hence, the ornamental fish industry of Kathmandu has immense potential to become a huge commercial sector and contribute to the economy in Kathmandu, and the scope of the industry is very vast.

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