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# Food and Feeding Habit of Some Freshwater Fishes from Are-Laung-Wei-Tode In (Lake), in Sagaing Township

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## Abstract

The food and feeding habits of seven fish species from Are-laung-wei-tode In (Lake) were investigated between July and December, 2017. The fish samples were collected from the local fishermen during study period. Observation of total length, standard length, body weight, relative length of alimentary canal and analysis of stomach contents were made. The relative length of alimentary canal was described in relation to feeding habit. Results from the stomach content analyzed using frequency of occurrence method show that three species were carnivores ( *Mystus cavasius, Parambasis ranga, Glossogobius giuris),* two species omnivores (*Puntius chola, Salmophasia sardinella)* and another two species herbivores (*Catla catla, Trichogaster pectoralis*).


Key words: Food, Feeding habit, stomach content.

## Introduction

Fish play an important role in the development of a nation. Apart from being a cheap source of highly nutritive protein, it also contains other essential nutrients required by the body.The food fish for the world population is produced from both aquaculture and capture fisheries. The fish consumed by human can either be freshwater or marine fish (Adadu *et al.*, 2014).

Feeding is the dominant activity of the entire life cycle of fish (Royce, 1972). Therefore, the study of food and feeding habits of a fish is very important. This is also essential for any fishery management. Food and feeding habit of fish are important biological factors for selecting a group of fish for culture in ponds to avoid competition for food among themselves and live in association and to utilize all the available food (Dewam and Saha,1979).

The knowledge of food and feeding habit help to select such species of fish for culture and produce an optimum yield by utilizing all the available potential food of the water bodies without any competition. So, the study of food and feeding habit of freshwater fish species is a subject of continuous research because it constitutes the basis for the development of a successful fisheries management programme on fish capture and culture (Oronsaye and Nakpodia, 2005).

Study of dietary habits of fish is based on stomach content analysis which is widely use in fish ecology as an important means of investigating tropic relationship in the aquatic communities. Understanding the stomach content of fish is useful in guiding towards formulation of artificial diets in fish culture (Fagade,1978). It is virtually impossible to gather sufficient information of food and feeding habit of fish in their natural habitat without studying its gut contents (Manon and Hossain, 2011). Pius and Benedicta (2002) also reported the use of stomach content in reducing intra and inter specific multi species competition for ecological niche.

The length of the gut of a species of fish or any other animal, reflects its diet and the percentage composition of food items present in the stomach also showed the feeding habits of fish (Mookerjee *et.al.*,1941).

Analysis of content in the stomach and features of the alimentary system provide information on food, feeding habits and selective feeding, if any, in fishes (Arthi,*et.al.*, 2011).


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So food and feeding habit of the fish were determined on the basis of stomach contents and relative length of alimentary canal.

The Ayeyawady River flows from north to south through the center of Myanmar. It is the country's largest river and Myanmar's most important commercial waterway. Smith *et al*.,(2002) stated the highest amount of fishes is produced from Ayeyawady River and its floodplains.

The floodplains of the Ayeyawady River are highly productive and play an important role in the ecology of the river system. All of floodplains (In) are connected to the main Ayeyawady River via water channels (Lowe_ Mc Connell, 1987; Welcomme, 1985)

Are-laung-wei-tode In (Lake) is one of the 35 floodplains of Sagaing Township in the Dry zone belt of Myanmar (Sagaing Region Fishers Department). It is probably natural but during the rainy season the water level rise and fairly extensive and flooded around the In environs. Most people who live in Are-laung-wel-todeIn environs depend on that In for their livelihoods and a source of protein supplement for the local people.

The objective of the present research is

- to investigate the variation in the food composition and feeding habits of some fresh water fishes
- to abundance of natural foods needed by the fishes

## Materials and methods

### Study Area

The fish specimens in the present study were collected from Are-laung-wei-tode In (Lake), Sagaing Township. It lies between 21° 56′ 03.00′′ and 96° 42.81′′ E (Plate. 1).

Plate. 1 Map of Study Area
(Source from Google Earth)

### Study Period

The study period started from July to December, 2017.

### Collection of Specimens

An average of ten specimens of each fish species was used in this present study. A total of seventy fish samples were weekly collected from Are-laung-wei-tode In (Lake) with the help of local fishermen.

### Identification of Specimens

Each fish specimen used in present study was identified using the description of Talwar and Jhingran (1991), Ferraris (1998) and Jayaran(2013).

### Measurement of Specimens

After measuring the total length, standard length and body weight, fishes were dissected ventrolaterally with the help of a pair of fine scissors. After that the alimentary canal of each fish was stretched out and the length was measured.

### Analysis of Data

To study the food composition, stomach contents were examined. The stomachs were removed and the conditions were assessed on the two point seals, 0 (empty) to food contains

stomach and the contents emptied into clean petri-dish. The food substances found in the stomach were identified under a microscope.

Food items were identified at the general level, wherever possible, using information provided by Imms (1964), Edmondson (1966), Jordan and Verma (1996).

The stomach contents were analyzed using frequency of occurrence methods based on Hyslop (1980). In the frequency of occurrence method, the occurrence of food items was expressed as the percentage of the total number of stomach.

$$O_i\,\% = \frac{FO_i}{NS} \times 100$$

Where, $O_i$ = percent frequency of occurrence of "i"
$FO_i$ = frequency of occurrence of prey "i", i= each food items
NS = total number of stomach (Hyslop, 1980)

Calculation of relative length of alimentary canal (RLA) was done by the Taki (1978) method.

$$RLA = \frac{ACL}{SL}$$

Where, RLA = Relative length of alimentary canal
ACL = Alimentary canal length
SL = Standard length

(Taki, 1978)

## Results

A total of seven fish species confined to three orders, five families and seven genera were utilized in the study of stomach contents and relative length of alimentary canal (Table.1).

The total length, standard length and body weight for each studied species were measured and recorded (Table. 2). The alimentary canal length and ratio of alimentary canal length to standard length were given in Table. 3. The categorizations of stomach fullness of studied species were given in Fig. 1. The categorization of the percentage composition of occurrence of food items in the stomach contents of studied species were shown in Fig. 2. Summary of food items of studied fish species were shown in Table. 4. Determination of feeding habits of studied fish species were shown in Table. 5.

In the present study, determination of food composition and feeding habit of studied species has been made on the basis of occurrence of food items in the stomach contents and relative length of alimentary canal.

### Food composition and feeding habit of *Catla catla*

*C. catla* feed on phytoplankton, zooplankton, insects, algae and plant material. Of these food items they consumed, highest percentage of phytoplankton (70%) and lowest percentage of insect and algae (10%) were observed.

The length of alimentary canal ranged from 145 cm to 321 cm. The relative length of alimentary canal ranged from 4.23 to 7.33 with a mean value of 5.57 (Table. 3). This ratio is longer than 3 times of standard length of this species.

Therefore, the feeding habit of *Catla catla* is herbivorous in nature.

**Food composition and feeding habits of *Puntius chola***

The food item of *Puntius chola* consists of phytoplankton, zooplankton, fish, molluscs, plant material and mud and sand. Of all the food items examined, the highest composition was phytoplankton (40%) and the lowest was molluscs, plant material and mud and sand (10%).

The length of alimentary canal ranged from 15 cm to 27 cm. Relative length of alimentary canal ranged from 2.4 to 3.6, with a mean value of 2.76 (Table. 3). This ratio is between 1.5 and 3 times of the standard length.

Therefore, it is considered that the feeding habit of *P. chola* is omnivorous in nature.

**Food composition and feeding habit of *Salmophasia sardinella*.**

According to the analysis of stomach contents, *S. sardinella* feed on phytoplankton, zooplankton, insect and algae. Of these food items they consume, the highest percentage of phytoplankton (50%) and the lowest of insect and algae (10%) were observed.

The length of alimentary canal ranged from 13.5 cm to 22 cm; whereas the relative length of alimentary canal ranged from 1.58 to 2.63 with a mean value of 2.15 (Table. 3). This ratios is between 1.5 and 3 times of the standard length.

Therefore, the feeding habit of *S. sardinella* is omnivorous in nature.

**Food and feeding habit of *Mystus cavasius*.**

*Mystus cavasius* feed on fish, insects, crustaceans, and molluscs. Of these food items, the highest percentage of molluscs (50%) and the lowest of insects and crustaceans (10%) were observed in the stomach of *M. cavasius*.

The length of alimentary canal ranged from 11.9 cm to 13.8 cm, whereas the relative length of alimentary canal to standard length ranged from 0.84 to 0.95 , with a mean value of 0.88 (Table.3). This ratio is shorter than 1.5 times of the standard length.

Therefore, the feeding habit of *M. cavasius* is determines as carnivorous in nature.

**Food and feeding habit of *Parambassis ranga***

According to the analysis of stomach contents, *P. ranga* feed on zooplankton, fish, insects, crustaceans and worm. Of these food items, the highest percentage of insect (50%) and the lowest of fish and worm (10%) were observed in the stomach of *P. ranga*.

The length of alimentary canal ranged from 2.1 cm to 5.1 cm. Relative length of alimentary canal range from 0.75 to 0.88 with a mean value of 0.83 (Table. 3). This ratio is shorter than 1.5 times of the standard length.

Therefore, the feeding habit of *P. ranga* is determined as carnivorous in nature.

**Food and feeding habit of *Glossogobius giuris***

According to the analysis of stomach content, *G.giuris* feed on fish, insect, crustaceans and worm. Of these food items, the highest percentage of fish (50%) and the lowest of worm (10%) were observed.

The length of alimentary canal ranged from 9.3 cm to 9.8 cm, whereas relative length of alimentary canal to standard length ranged from 0.8 to 0.89 , with a mean value of 0.86 (Table. 3). This ratio is shorter than 1.5 times of the standard length.

Therefore, the feeding habit of *G. giuris* is determined as carnivorous in nature.

**Food and feeding habit of *Trichogaster pectoralis***

According to the analysis of stomach contents, *T. pectoralis* feed on phytoplankton, zooplankton, worm and plant materials. Of these food items, the highest percentage of phytoplankton (50%) and the lowest of fish and worm(10%) were observed.

The length of alimentary canal ranged from 40 cm to 78 cm , whereas the relative length of alimentary canal ranged from 3.1 to 5.9, with a mean value of 4.05 (Table. 3). This ratio is longer than 3 times of standard length.

Therefore, the feeding habit of *T. pectoralis* is determined as herbivorous in nature.

Table.1 Scientific position of studied fish species from Are-laung-wei-tode In (Lake)

| Order | Family | Scientific Name |
|---|---|---|
| 1. Cypriniformes | 1. Cyprinidae | 1.*Catla catla* (Ham.,& Buch.,1822) |
| | | 2. *Puntius chola* (Ham., & Buch.,1822) |
| | | 3. *Salmophasia sardinella* (Valenciennes, 1842) |
| 2. Siluriformes | 2. Bagridae | 4. *Mystus cavasius* (Ham., & Buch.,1822) |
| 3. Perciformes | 3. Ambassidae | 5. *Parambassis ranga* (Ham., & Buch.,1822) |
| | 4. Gobiidae | 6. *Glossogobius giuris* (Ham., & Buch.,1822) |
| | 5. Belontidae | 7. *Trichogaster pectoralis* (Regan, 1909) |

Table. 2 Measurement of body weight, total length and standard length of studied fish species

| No | Scientific Name | BW (g) | | TL (cm) | | SL (cm) | |
|---|---|---|---|---|---|---|---|
| | | Range | mean | Range | mean | Range | Mean |
| 1 | ***Catla catla*** | 650-1250 | 889 | 35.5-47.5 | 41.76 | 32.1-43.8 | 37 |
| 2 | ***Puntius chola*** | 5-10 | 7.38 | 6.9-8.9 | 7.69 | 6.1-7.6 | 6.84 |
| 3 | ***Salmophasia sardinella*** | 4-11 | 7.8 | 8.5-13 | 9.47 | 7.2-9.5 | 7.9 |
| 4 | ***Mystus cavasius*** | 17-45 | 29.1 | 12.9-19.6 | 16.55 | 12.4-15.2 | 14.25 |
| 5 | ***Parambassis ranga*** | 3-6.5 | 4.9 | 3.5-6.5 | 5.23 | 2.8-5.9 | 4.44 |
| 6 | ***Glossogobius giuris*** | 20-27 | 22.1 | 13.6-15.1 | 14.3 | 10.5-11.8 | 10.91 |
| 7 | ***Trichogaster pectoralis*** | 28-78 | 54 | 11.8-16.1 | 13.7 | 10.2-14.2 | 12.2 |

BW = Body Weight; TL= Total Length; SL = Standard Length

Table. 3 Measurement of alimentary canal and relative length of alimentary canal in the studied fish species

| Scientific Name | ACL (cm) | | RLA | |
|---|---|---|---|---|
| | Range | Mean | Range | Mean |
| ***Catla catla*** | 145-321 | 210.8 | 4.23-7.33 | 5.57 |
| ***Puntius chola*** | 15-27 | 19 | 2.4-3.6 | 2.76 |
| ***Salmophasia sardinella*** | 13.5-22 | 18.28 | 1.58-2.63 | 2.15 |
| ***Mystus cavasius*** | 11.9-13.8 | 12.6 | 0.84-0.95 | 0.88 |
| ***Parambassis ranga*** | 2.1-5.1 | 3.66 | 0.75-0.88 | 0.83 |
| ***Glossogobius giuris*** | 9.3-9.8 | 9.38 | 0.8-0.89 | 0.86 |
| ***Trichogaster pectoralis*** | 40-78 | 51.1 | 3.1-5.9 | 4.05 |

ACL = Alimentary Canal Length; RLA = Relative Length of Alimentary Canal

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Table. 4 Summary of food items of studied fish species

| **Animal food items** | **Plant foot items** |
|---|---|
| **Fish** | **Phytoplankton** |
| Whole body, remain of fish body | Diatm |
| scales, bones | *Pediastrum* |
| **Insect** | |
| legs, head, larvae | |
| | **Algae** |
| **Crustaceans** | Filamentous algae |
| small prawn, head of prawn | Spirogyra sp. |
| **Molluscs** | **Plant material** |
| Gastropod | submerged plant material |
| Bivalvia | |
| **Worms** | |
| whole body | |
| **Zoplankton** | |
| Roterifer | |
| Copepods | |

Table. 5 Determination of feeding habits of studied fish species

| Fish species | Feeding habit |
|---|---|
| *Catla catla* | Herbivore |
| *Puntius chola* | Omnivore |
| *Salmophasia sardinella* | Omnivore |
| *Mystus cavasius* | Carnivore |
| *Parambassis ranga* | Carnivore |
| *Glossogobius giuris* | Carnivore |
| *Trichogaster pectoralis* | Herbivore |

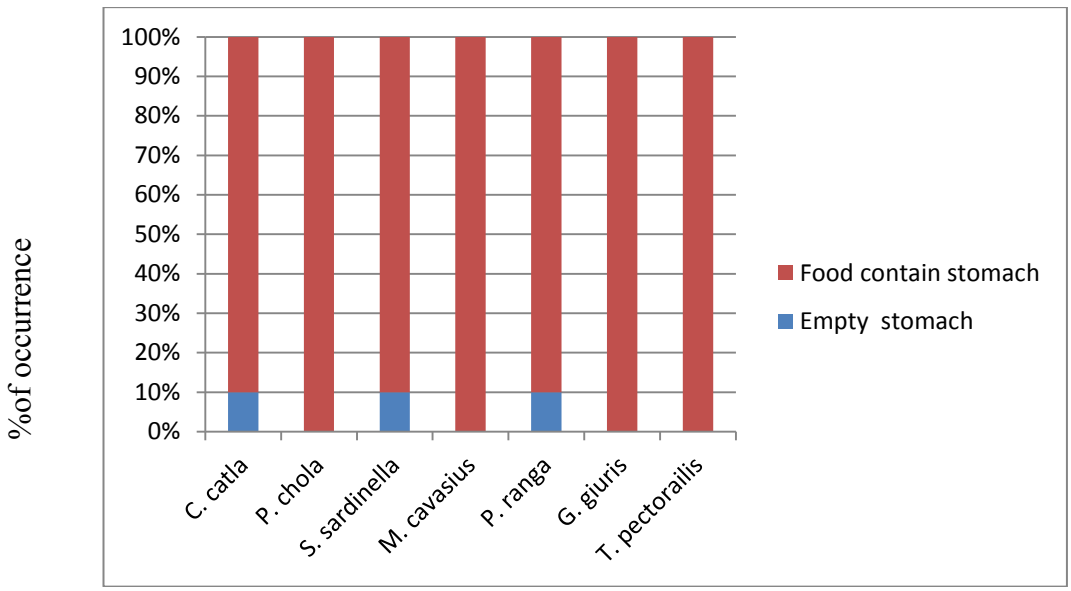


Figure. 1 Categorization of stomach fullness of studied fish species

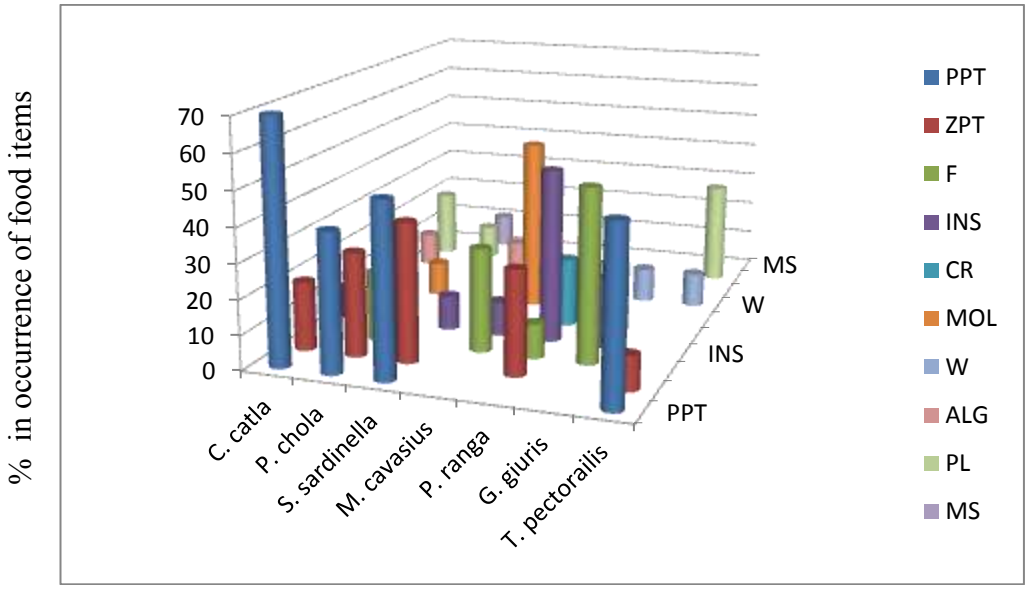


Figure. 2 Percent composition in occurrence of food items in the stomach contents of studied fish species

## Discussion

In the present study, various food item obtained from the stomachs of studied fish species were observed. Determination of food composition and feeding habits during the study period has been made on the basis of percentage composition of the food items in the stomach contents and relative length of alimentary canal. In the present study, frequency of occurrence method was used for stomach content analysis.

Fish, according to the feed type, there are three types of fishes; carnivores, if their food comprises animal matter; omnivores, if they subsist on mixed diet composed of both vegetables as well as animal food and herbivores, if they feed on vegetable matter.

Taki (1978) suggested that fish having a relative length of digestive tract shorter than 1.5 times of the standard length were judged to be carnivorous and those with a relative length of digestive tract longer than three times of the standard length were regarded as herbivorous. Tentatively, fish that were intermediate in relative length of digestive tract and showed no other evidence to determine their feeding habit were considered as omnivorous.

In the present study three species are carnivorous, two species are omnivorous and another two species are herbivorous fishes according to the result of these methods.

Of seven species examined in the present study, carnivorous fishes include *Mystus cavasius, Parambassis ranga* and *Glossogobius giuris.*

*Mystus cavasius* mainly feed on molluscs and fish and few on insect and crustaceans. Khin Than Htwe (1998) indicated that *M. cavasius* as carnivorous: feeding on fish, crustaceans, insect, molluscs and worm. *Parambassis ranga* mainly feed on insect and zooplankton and few on fish, crustaceans and worm. Khin Than Htwe (1998) and Khin Myat Maw (1998) described *P. ranga* as carnivorous fish and feed on fish, crustaceans and insect. *Glossogobius giuris* mainly feed on fish and few on insect, crustaceans and worm. Khin Than Htwe (1998) reported that *G.giuris* as carnivorous fish and feed on fish, insect, crustaceans, molluscs, zooplankton and worm.

The ratio of alimentary canal length to standard length for carnivorous fish species ranged from 0.83 to 0.88. All relative length of alimentary canal is shorter than 1.5 times of the standard length. These ratio are 0.88 in *M. cavasies*, 0.83 in *P. ranga* and 0.86 in *G. giuris*. The longest ratio was found in *M. cavasius* and shortest was found in *P. ranga*.

In the present study, the feeding habit of *Puntius chola* and *Salmophasia sardinella* were determined as omnivores. *P. chola* and *S.sardinella* feed mainly on phytoplankton and zooplankton and few on fish, insect, molluscs, algae and plant material. Khin Aye Han (1995) recorded that these two species as omnivores by studying their feeding habits based on relative length of alimentary canal and their pharyngeal teeth.

The relative length of alimentary canal for *P.chola* and *S. sardinella* were 2.76 and 2.15 respectively. These two ratios are intermediate between 1.5 and 3 time of the standard length and it follows the character of omnivores given by Taki (1978).

In the present study, herbivorous fishes include *Catla catla* and *Trichogaster pectoralis*. They feed mainly on phytoplankton. Kumar *et.al.,* (2007;2015) also reported that *Catla catla* as herbivorous fish. Khin Myat Maw (1998) also mentioned *T. pectoralis* as herbivorous fish: feeding on phytoplankton, zooplankton and plant materials.

The ratio of alimentary canal length to standard length for *C. catla* and *T. pectoralis* were 5.57 and 4.05 respectively. These ratios are longer than 3 times of the standard length. In opposite fashion from carnivores, the intestine is elongated and arranged in many loops or convolutions in predominantly herbivorous fishes.

From the stomach content analysis it is seen that there is a variation in the some food items in the study species. This variation of food items are probably related to the way fish feed and the prevalence of various food items in the water body at the time of the study. In this study, some stomachs were observed as empty stomach. Empty stomach may be due to the fact that the food items have been regurgitates or digested as the fish struggled for escape (Arthi, *et.,al,* 2011). Moreover, lower percentage of empty stomach was found in this study, this indicates the food items they consume are abundance in Are-laung-wei-tode In. Therefore, Are-laung-wei-tode In is quite suitable for the fish to thrive.

From the present study, the determination of food composition and feeding habit of studied fish species may give some important information for culture of these freshwater fish species.

## Conclusions

The stomach content analysis and relative length of alimentary canal indicated that three studied species are carnivorous, two species omnivorous and another two species herbivorous. Variation in some food items and percentage composition of different food items in the studied stomach related to fish feeding habit and the prevalence of various food items in the water body. Low percentage of empty stomach was observed. Therefore, Are-laung-wei-tode In provides abundance food items that consume by the fish and one of the ecosystem, sustainable for freshwater fish stock.

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