International Journal of Science and Research Archive
eISSN: 2582-8185
Cross Ref DOI: 10.30574/ijsra
Journal homepage: https://ijsra.net/

(RESEARCH ARTICLE)

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Food and Feeding habits of *Glossgobius giuris* (Hamilton, 1822): A Historical Perspective from 1995 Data in Matsyagedda Stream, Alluri Sitharama Raju District, Andhra Pradesh, India

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International Journal of Science and Research Archive, 2025, 16(01), 1172-1179

Publication history: Received on 02 June 2025; revised on 13 July 2025; accepted on 16 July 2025

Article DOI: https://doi.org/10.30574/ijsra.2025.16.1.2122

Abstract

The present study provides a historical insight into the food and feeding habits of *Glossogobius giuris* based on gut content data collected in 1995 from Matsyagedda Stream, located in the Alluri Sitharama Raju District of Andhra Pradesh. A total of 254 specimens were examined monthly to determine diet composition using percentage index of preponderance and frequency of occurrence methods.

The diet was categorized into nine major groups: rotifers, nematodes, crustaceans, insects, prawns, molluscs, fish and fish larvae, fish scales and spines, and digested matter. Crustaceans, insects, prawns, and fish formed the principal diet, with seasonal and ontogenetic variations. Juveniles primarily consumed crustaceans and insects (82%), while adults fed predominantly on fish and prawns (69%). Fish and larvae were dominant during rainy and winter seasons, while crustaceans and insects increased in summer.

These findings highlight the opportunistic carnivorous feeding behavior of *Glossogobius giuris* reflecting its adaptability to prey availability and environmental fluctuations. The study also indicates a shift in dietary preference with growth, emphasizing the species' role as both predator and prey in the freshwater ecosystem.

This historical dataset offers a valuable baseline for future comparative ecological studies, particularly in understanding dietary shifts due to habitat disturbance or climate change. Preserving such freshwater habitats is crucial for sustaining the biodiversity and trophic balance of native ichthyofauna like *Glossogobius giuris*.

Keywords: Food and Feeding habit; *Glossogobius giuris;* Matsyagedda Stream; Seasonal Variation; Preponderance

1. Introduction

Glossgobius giuris, (Hamilton, 1822) belongs to the family Gobiidae of order perciformes commonly known as tank goby. It is a common fish in the agency area of Alluri Sitharama Raju District inhabiting the streams, rivers, ditches as well as mudflats. Because of its exceptional taste, low fat and high protein content, the fish is preferred well in the diet by the people (Roshni K, Renjithkumar C.R, & Kurup, 2015). An understanding of food of the fish, its natural habitat, growth rate and nutritional requirements will help in managing the species for aquaculture. Detailed understanding on the diet, feeding ecology and trophic inter-relationship of fishes is fundamental for better understanding of fish life history including growth, breeding, and migration (Sonowal, et al., 2017).

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A number of studies on the food and feeding habits of fish of *Glossogobius giuris* from various regions of India was done by Alikunhi et al., 1947; Das and Morita, 1963; Tandon, 1963; Srivastava and Desai, 1979; Dutta-Munshi, et al. 1991; Rao, L. M., and Rao, P. S. 2011; Roshni, K, et al., 2015); Sonowal, et al., 2017; Peyami, F.Y., 2021; Dinh, Q. M., et al., 2022 and Chi, V. V, et al., 2025. Most of the studies from various habitats shown that they differ in time and space with regards to food requirement at different stages of growth. So far there is no work on the food and feeding habits of the fish from agency area of Alluri Sitharama Raju District, Hence, an attempt has been made to study the food and feeding habits of fish *Glossogobius giuris.*

This paper aims to formally document the study of food and feeding habit of *Glossogobius giuris*, data collected in 1995 from the Mastyagedda stream which was remained unpublished until now, serving as a valuable historical baseline for future comparative studies and conservational assessments.

2. Materials and Methods

2.1. Study Area

Matsyagedda Stream is located in Pedabayalu mandal of Alluri Sitharama Raju district, Andhra Pradesh, India. The stream is shallow, rainfed, and springfed originating in the hills of Eastern Ghats, situated between $18^0$16' and 18^0 18' N latitudes and 18^0 37' and 18^0 40' E longitudes in the vicinity of Pedabayalu mandal (Fig. 1). It is one of the major water source for the Jolaput reservoir, which was constructed across the river Manchkund at Jolaput village, nearly 200 km from Visakhapatnam. It often experienced flash floods due to their elevated terrain and rapid runoff. The region is influenced by both the South-West and North-East monsoons, with the South-West monsoon contributing the majority of annual rainfall, while the North-East monsoon brings comparatively less precipitation. During the study period, the mean monthly rainfall ranged from 87.33 mm to 127.41 mm, reflecting moderate to high precipitation levels. The atmospheric temperature during sampling was recorded at approximately 30°C, while the water temperature varied between 28°C and 29°C (Rao, T. B., et al., 2025).

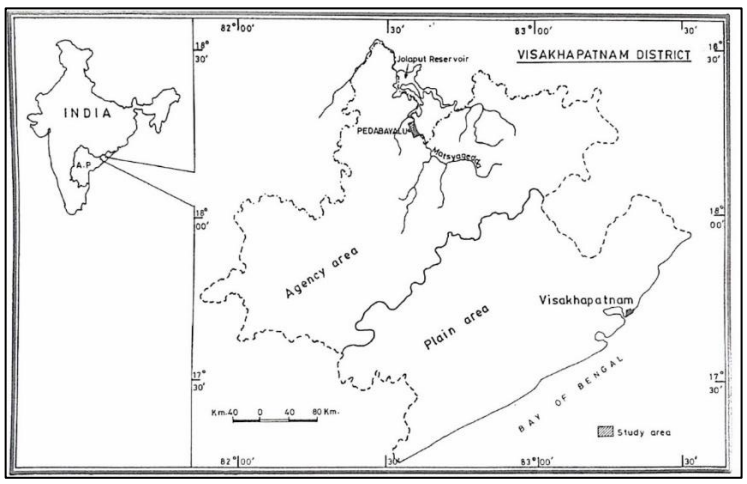

Figure 1 The map of Maatsyagedda Stream, Alluri Sitharama Raju District, Andhra Pradesh, India

Figure 2 The view of Matsyagedda stream

2.2. Sampling and Collection of Fishes

The study was conducted from January 1995- December 1995 from different stations in the stream. A total of 246 specimens of *Glossogobius giuris* were collected randomly using hooks and line fishing and few by cast nets. Total length, standard length, sex, weight and stage of maturity of each fish were noted. The collected specimens was immediately preserved in 10% formalin to avoid unnecessary digestion of ingested food, and were brought to the laboratory for further investigation. The contents of each stomach were collected in a petri dish and examined under a binocular microscope.

2.3. Data Analysis

The occurrence method (Hynes, 1950; Pillay, 1952) was employed to express the percentage occurrence of each item in the total number of stomach with food that were examined for each month. The index of preponderance method (Natarajan and Jhingran, 1962) was employed in order to find out the relative importance of the different groups of organisms in the diet.

$$Ii = \frac{ViOi}{\sum ViOi} \times 100$$

Where I_i is the index of food, V_i and O_i are the volume and occurrence of food

3. Results

The food composition of *Glossogobius giuris* grouped into 9 categories they are rotifers, nematodes, crustaceans, insects, prawns, molluscs, fish and fish larvae, fish scales and spines and digested matter. Percentage index of preponderance and occurrence of various food items in different months were shown in Table 1 and 2.

Crustaceans, insects, prawns, teleost fish and fish larvae formed the major part of the diet.

Crustaceans: The freshwater prawns *Macrobrachium sp*. were found in considerable number. Larval crabs, zoea, megalopa, nauplii, cyclopus, other shrimps were also noticed in the gut contents.

Insects: Water beetles (Coleopteran) dragon fly nymphs (Odonata); Chironomids (Diptera), water bugs Ranatra (Hemiptera) and other insect larvae were found in the gut contents. Parts of insects like pieces of exoskeleton, wings, legs etc. were also common.

Rotifers, nematodes and molluscs appread in traces. Partly digested fishes, shrimps and parts of fin rays, scales and bones were commonly encountered in the guts (Figure 3).

Food of juveniles and adults: The food of juveniles and adults were analysed separately. It was found that juveniles fed mainly on crustaceans and insects which forms 82% of their diet. Fish and fish larvae constitute only 4.65% on their diet and remaining prawns, rotifers, nematodes and molluscs are very negligible in the gut of juveniles. Fish and fish larvae were dominated in adult fishes (43.29%) followed by prawns (25.86%) and crustaceans (12.07%) (Table 3 & 4).

Seasonal Variations: In rainy season, fish and fish larvae was found dominated having 45.95% followed by prawns 12.89% and crustaceans 11.80%, and remaining rotifers, nematodes, insects, molluscs and fish scales and spines are low. In winter season, fish and fish larvae was found dominated having 46.88% followed by prawns 26.36% and crustaceans 17.00%, and remaining rotifers, nematodes, insects, molluscs and fish scales and spines are low. In summer season, crustaceans were dominated with 27.26% followed by insects 18.34% and prawns 14.17% (Figure 4).

4. Discussion

The present study on the gut content analysis of *Glossogobius giuris* reveals significant insights into the species feeding ecology, highlighting its opportunistic and carnivorous feeding nature with clear ontogenetic and seasonal dietary variations. Crustaceans, insects, rotifers, and fish (including larvae) formed the bulk of the diet, which aligns with the known carnivorous tendencies of gobiid fishes. Among crustaceans, *Macrobrachium spp.,* larval crabs, zoea, and nauplii were frequently encountered, indicating the availability and preference of *Glossogobius giuris* for benthic and planktonic prey. The presence of large number of cycloid and ctenoid scales occurring in the gut contents probably indicating its chasing and biting habits. The frequent occurrence of insect parts such as wings, exoskeletons, and legs in gut contents confirms active predation rather than incidental ingestion. Fish and fish larvae were significantly represented in adult diets and during the winter and rainy seasons, indicating a dietary shift towards higher trophic level prey as the fish grows.

Table 1 Percentage of Index of preponderance of various food items of *Glossogobius giuris* in 1995.

Months	JAN	FEB	MAR	APR	MAY	JUN	JULY	AUG	SEPT	OCT	NOV	DEC
Rotifers	0.15	2.22	4.03	4.18	1.21	2.75	5.28	6.04	4.64	---	0.03	0.15
Nematodes	0.49	6.89	3.22	7.83	15.11	6.86	6.17	20.69	19.32	---	0.25	---
Crustaceans	41.67	12.22	13.71	5.22	37.76	50.78	23.26	12.41	22.52	0.39	25.4	0.58
Insects	7.44	15.56	18.71	14.41	19.94	12.35	13.48	1.68	3.53	1.08	0.36	---
Prawns	17.26	15.56	24.17	16.7	4.53	12.35	4.41	4.47	12.25	25	22.11	40.83
Molluscans	--	0.44	2.42	--	0.3	0.46	2.64	6.38	6.62	0.1	2.14	0.97
Fish & fish larvae	19.84	26.67	24.17	31.31	2.02	4.4	37.71	35.91	22.07	57.84	46.36	56.12
Fish scales & spines	1.49	0.44	5.08	14.09	10.32	0.73	5.29	5.37	2.43	6.18	1.95	0.87
Digested Matter	11.66	20	4.83	6.26	8.81	7.32	1.76	7.05	6.62	9.41	1.4	0.48

Table 2 Percentage of occurrence of various food items of *Glossogobius giuris* in 1995.

Months	JAN	FEB	MAR	APR	MAY	JUN	JULY	AUG	SEPT	OCT	NOV	DEC
No. of fish examined	20	17	16	14	17	13	15	15	15	22	54	28
No. of fish contains food	13	12	12	10	13	10	11	12	12	15	33	19
Rotifers	7.69	16.67	16.67	20.00	15.38	20.00	27.27	25.00	25.00	-	3.03	3.50
Nematodes	7.80	25.00	24.00	30.00	38.46	30.00	18.18	41.67	41.60	-	6.06	-
Crustaceans	38.46	28.00	25.00	20.00	38.46	50.00	36.36	25.00	33.33	13.33	39.39	10.53
Insects	15.38	28.15	25.00	30.00	46.15	30.00	27.30	8.33	16.67	13.33	39.39	10.53
Prawns	30.77	29.56	28.25	20.00	15.30	30.00	18.18	8.30	25.00	40.00	30.30	31.58

Molluscans	-	8.33	25.00	-	7.69	10.00	18.18	25.00	25.00	6.67	9.90	10.53
Fish & fish larvae	30.00	32.75	30.45	30.00	38.00	20.00	36.36	25.00	34.00	33.33	36.36	36.84
Fish scales & spines	15.50	9.25	27.49	50.00	7.69	20.00	27.27	25.00	16.00	40.00	21.21	10.53
Digested Matter	37.00	50.00	32.00	30.00	38.46	40.00	18.18	25.00	25.00	40.00	15.15	10.50

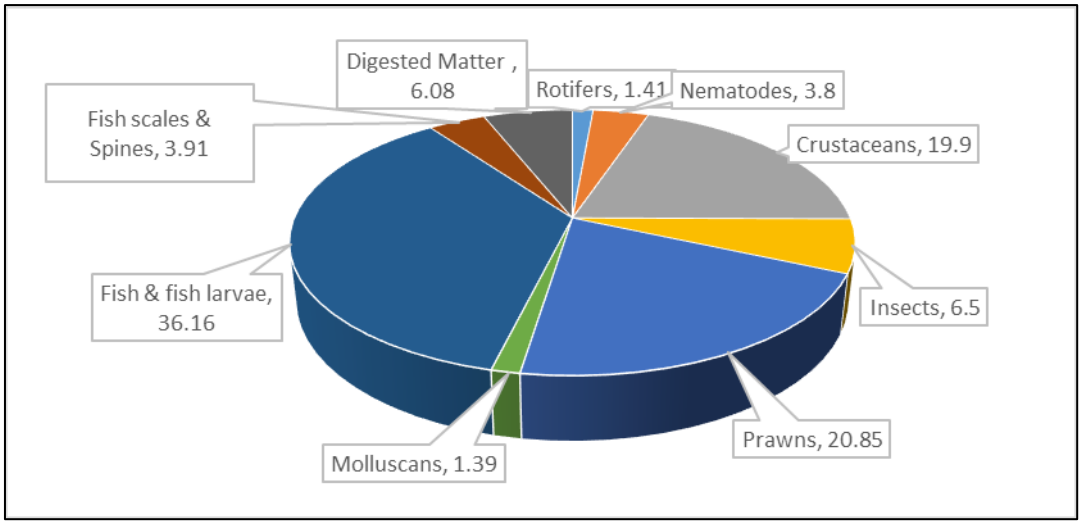

Figure 3 Index of preporderance of various food items of *Glossogobius giuris* in 1995

Table 3 Percentage of Index of preponderance of various food items of *Glossogobius giuris* (Juveniles) in 1995.

	Volume	**Occurrence**	**VO**	**% Index**
Rotifers	25	3	75	0.76
Nematodes	33	4	132	1.33
Crustaceans	372	14	5208	52.62
Insects	271	11	2981	30.12
Prawns	52	3	156	1.57
Molluscans	67	4	268	2.71
Fish & fish larvae	115	4	460	4.65
Fish scales & Spines	49	7	343	3.46
Digested Matter	55	5	275	2.78

Table 4 Percentage of Index of preponderance of various food items of *Glossogobius giuris* (adults) in 1995

	Volume	**Occurrence**	**VO**	**% Index**
Rotifers	126	19	2394	1.42
Nematodes	256	27	6912	4.09
Crustaceans	567	36	20412	12.07
Insects	208	21	4368	2.58
Prawns	1041	42	43722	25.86

Molluscans	105	15	1575	0.93
Fish & fish larvae	1557	47	73179	43.29
Fish scales & Spines	176	24	5984	3.54
Digested Matter	250	42	10500	6.22

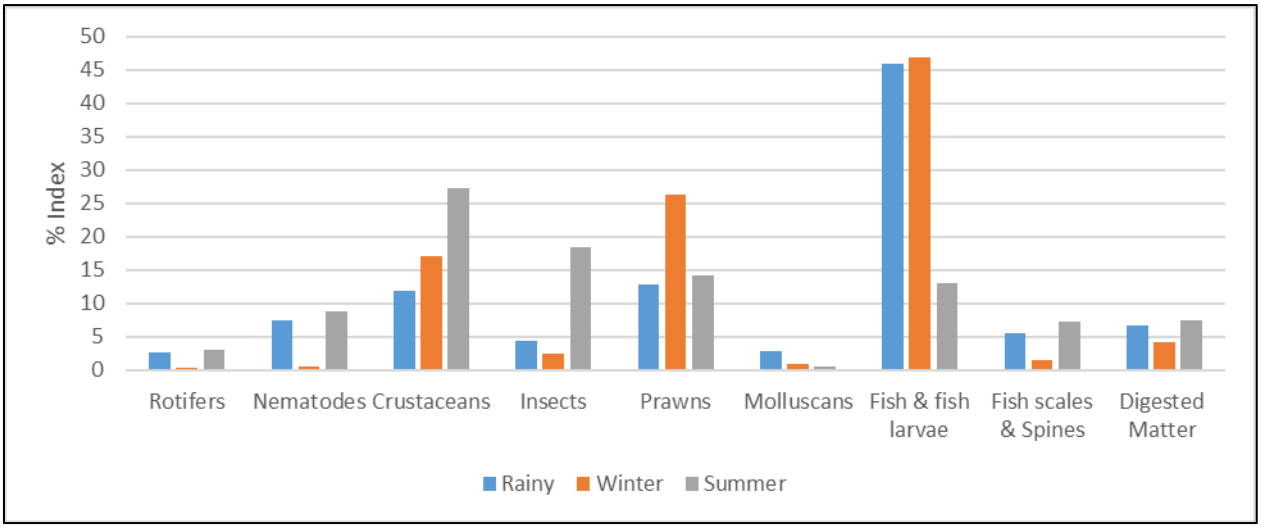

Figure 4 Season wise index of preponderance of various food items of *Glossogobius giuris* in 1995

Conversely, juveniles primarily consumed crustaceans and insects (82%), with a negligible presence of fish and larvae (4.65%), reflecting the size limitations of their gape and a gradual ontogenetic dietary shift. This transition to piscivory in adults suggests an energy-efficient strategy to meet reproductive and metabolic requirements. Seasonal trends also revealed important feeding patterns. Fish and fish larvae dominated the diet during the rainy (45.95%) and winter (46.88%) seasons, possibly due to increased availability of juvenile fish and aquatic prey in swollen water bodies. Summer feeding was more dependent on crustaceans (27.26%) and insects (18.34%), which could be linked to reduced water levels and higher densities of such organisms. Rotifers, nematodes, and molluscs were found in trace amounts, likely consumed accidentally or as secondary prey. However, their consistent but low-level presence in some months suggests that *G. giuris* exploits a wide range of prey when preferred items are less available. The high incidence of digested matter, fish scales, and spines further supports the conclusion that *Glossogobius giuris* is a voracious feeder with a diverse and shifting diet. These findings are in agreement with earlier studies on gobid feeding ecology, which suggest adaptive dietary flexibility as a key survival strategy in dynamic freshwater ecosystems.

Alikunhi et al., (1947), Srivastava and Desai (1979), Dutta-Munshi et al., (1990) studied the food habits of *Glossogobius giuris* and reported its carnivorous, piscivorous and cannibalistic habit. Through the present study indicates the carnivorous and piscivorous habit of fish, cannibalistic tendancy was not observed. Roshini, K., et al., (2015) studied the gut content of *Glossogobius giuris* and reported seven categories namely teleost fishes, crustaceans, molluscs, insects, algae and undigested items. In this present study also it was noticed. Sonowal, M., et al., (2017) reported that *Glossogobius giuris* is carnivore and predatory fish based on its gut content.

Overall, the trophic adaptability exhibited by *Glossogobius giuris* highlights its ecological significance in freshwater food webs. Its role as both predator and prey underlines the importance of conserving its habitats to maintain ecological balance and fish biodiversity.

5. Conclusion

The present historical study on the food and feeding habits of *Glossogobius giuris* from 1995 data in Matsyagedda Stream provides valuable insights into the trophic ecology of this ecologically significant species. The analysis of gut contents revealed that *Glossogobius giuris* is a carnivorous and opportunistic feeder with a broad dietary spectrum, predominantly consisting of crustaceans, insects, rotifers, molluscs and nematods including fish scale and larvae.

Ontogenetic variations in feeding habits were evident, with juveniles relying heavily on crustaceans and insects, while adults shifted towards a more piscivorous diet dominated by fish and fish larvae. Seasonal fluctuations further influenced dietary composition, with fish and fish larvae being more prevalent during the rainy and winter seasons, and crustaceans and insects forming the bulk of the diet in the summer.

The presence of diverse prey items, including trace amounts of rotifers, nematodes, and molluscs, reflects the adaptive foraging behavior of *Glossogobius giuris* in response to prey availability and environmental conditions. The findings underscore the species' ecological plasticity and its role in maintaining freshwater ecosystem dynamics.

This historical baseline serves as a reference point for future comparative studies on dietary shifts due to environmental changes, anthropogenic impacts, or climate variability. Conserving the habitats like Matsyagedda Stream is essential for sustaining the biodiversity and ecological functions of native fish species such as *Glossogobius giuris*.

Compliance with ethical standards

Acknowledgments

We express our sincere gratitude to our research director Prof. Dr. K. Sree Ramulu, for his valuable guidance, insightful suggestions, and generous encouragement during the conduct of this study. We are also thankful to the Principal of Dr. V. S. Krishna Government Degree and PG College (A), Visakhapatnam, for extending support and facilities that greatly contributed to the successful completion of this research.

Disclosure of conflict of interest

Author has declared that no competing interests exist.

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