JUST AGRICULTURE
multidisciplinary e-Newsletter

Gut Content of Shark (Scoliodon Sorrakowah) Along Munambam Coast, Kerala

Nasreen M.N[1] and Payoja Mohanty[2]
[1]MES Asmabi College,Vemballur, Calicut University,Kerala,India
[2]College of Fisheries Science, Birsa Agricultural University, Ranchi, Jharkhand, India

ARTICLE ID: 23

Abstract:

Fish gut content analysis offers critical insights into their diets and feeding patterns, essential for understanding aquatic food webs. Direct observation in natural habitats is nearly impossible, making gut content examination the best method. This study focuses on Scolidon sorrakowah samples collected from Munambam harbor, Thrissur district. Both qualitative (organism identification) and quantitative (numerical, gravimetric, volumetric) methods were employed. Findings highlight shrimp, fish, and polychaetes as primary diet components, with detritus also frequently present. The study underscores the importance of gut content analysis in evaluating fish feeding habits, which informs fisheries management, aquaculture practices, and conservation efforts.

Introduction:

Fish gut content analysis offers vital insights into their diets and feeding patterns, crucial for understanding aquatic food webs. Direct observation in natural habitats is nearly impossible, so examining gut contents is the best method (FAO, 1974). This involves recording the fish's length, weight, sex, feeding intensity, and sexual maturity. Methods for analysis are qualitative, identifying organisms in the gut, and quantitative, including numerical, gravimeter, and volumetric approaches. Sharks, as apex predators, play a significant role in marine ecosystems, but studies on their feeding ecology are limited (Baughman and Springer 1950; Clark and von Schmidt 1965; Rendall 1967; Dahlberg and Heard 1969). Understanding shark digestion involves examining digestive morphology, strategies, biochemistry, and microbiomes. Despite challenges in correlating feeding studies with other research, such investigations are essential to grasp the broader marine environment.

Distribution:

JUST AGRICULTURE
multidisciplinary e-Newsletter

Zanzibar to Ceylon (Sri Lanka), to the Indonesia with in Indian ocean, Bay of Bengal, Eastern pacific from Mexico to Panama, west Indies and Eastern coasts of South America**.**

Materials and methods:

Scolidon sorrakowah, is a species of marine fishes belonging to the family Carcharhinidae. The samples were collected from Munambam harbour, Thrissur district. There is total 10 samples are collected on different dates of 7 days interval starting from 3/01/2024 and all these were females and males.

Samples were collected from Munambam Harbor in Thrissur district. A total of 10 samples were collected including males and females over different dates at seven-day intervals starting from January 3, 2024, and included both male and female specimens. These were immediately transported from the harbor in polythene covers containing crushed ice to the laboratory. It is determined by Numerical Method (e.g. Eye Estimation method), Volumetric and Gravimetric Method.

Each fish was weighed to the nearest gram using an electronic balance before gut analysis. After weighing, the fish were dissected by cutting from the anus to the gills and then laterally up to the mouth, ensuring the digestive system was free from blood and dirt. Gonads were examined for sex identification and maturity stages, revealing all specimens were female, with three carrying immature eggs and one with ripe eggs. Stomach fullness was estimated visually as full, moderate, or flaccid, with no flaccid guts observed. One fish had a full stomach, and three had moderately full guts. The stomachs were split longitudinally, and contents were transferred to Petri plates with clean water. The contents were filtered, placed in a measuring jar with 10ml water, and displacement volume was noted. Larger food items were weighed, while too-small contents were not.The contents were then observed under microscopes, with small items transferred to cavity blocks for identification using 40x and 10x lenses. Occurrences were recorded, photos taken, and data tables created. The frequency of occurrences was emphasized, and ranks were assigned to food items based on frequency and number for both individual fish and the species as a whole.

Morphometric Feature Of Specimens Used:

- Total Length- 27.6 to 39.5 cm (Average)
- Standard Length- 22.7 to 38.6 cm (Average)
- Weight – 80g to 220g (Average)

JUST AGRICULTURE
multidisciplinary e-Newsletter

Figure 1.a Cutting the Fish

Figure 1.b Exposing the Gut

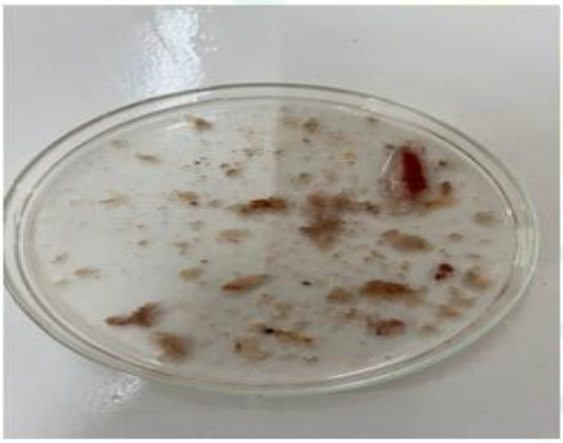

Figure 1.c Gut content of male transferred

Figure 1.d Gut content of Female transferred

Result:

The gut content analysis of ten shark samples, consisting of five males and five females, revealed a variety of prey items. The species commonly found in the gut across different samples included shrimp, fish, and polychaetes. Here's a summary of the key findings:

- **Shrimp and Shrimp Parts:** Found in 6 out of 10 samples, shrimp was a common food item. Both whole shrimp and shrimp body parts were observed.
- **Fish and Fish Flesh:** Present in 6 out of 10 samples, fish (including fish flesh and bones) was frequently consumed.

JUST AGRICULTURE
multidisciplinary e-Newsletter

- **Detritus:** Detritus was identified in 5 samples, indicating a significant portion of the diet.
- **Polychaetes:** Detected in 3 samples, polychaetes were another common prey item.
- **Other Crustaceans:** Crustacean body parts were noted in 3 samples, highlighting their role in the diet.

Observation:

Common Species Across Samples are as follows;

- **Shrimp (including parts):** Found in 6 samples.
- **Fish (including flesh and bones)**: Found in 6 samples.
- **Detritus:** Found in 5 samples.
- **Polychaetes:** Found in 3 samples.

The analysis highlights that shrimp, fish, and polychaetes are the most common prey items in the diet of the sharks sampled. Detritus was also frequently found, indicating that these sharks may consume a wide variety of available food items.

Tables:

Sample 1: Male

Total length of fish : 32cm
Total weight of fish : 105.5g
Stomach weight (total weight of food/gut content) : 6.7g
Displacement volume : 7ml
Stomach fullness : Half

Sl.No.	**Food components**	**Numbers counted**
1	Shrimp	1
2	Fish	2
3	Crustacean body parts	1

Sample 2: Male

Total length of fish : 30cm
Total weight of fish : 96.7g
Stomach weight (total weight of food/gut content) : 5g
Displacement volume : 5ml
Stomach fullness : Moderate

JUST AGRICULTURE
multidisciplinary e-Newsletter

Sl.No	*Food components*	*Number counted*
1	Shrimp body parts	3
2	Detritus	2
3	shrimp larvae	1

Sample 3: Female

Total length of fish : 28.6cm

Total weight of fish : 80g

Stomach weight (total weight of food/gut content) : 5g

Displacement volume : 3ml

Stomach fullness : Moderate

Sl.No	*Food components*	*Number components*
1	Fish	2
2	Shrimp body part	3
3	Detritus	1

Sample 4: Female

Total length of fish : 27.8cm

Total weight of fish : 81.9g

Stomach weight (total weight of food/gut content) : 1.7g

Displacement volume : 2ml

Stomach fullness : Moderate

Sl.No.	*Food Components*	*Numbers counted*
1	Fish	1
2	shrimp	2
3	Detritus	1

Sample 5: Male

Total length of fish : 32cm

Total weight of fish : 111.5g

Stomach weight (total weight of food/gut content) : 3.6g

Displacement volume : 2ml

JUST AGRICULTURE
multidisciplinary e-Newsletter

Stomach fullness : Moderate

Sl.No	*Food components*	*Numbers counted*
1	shrimp parts	2
2	fish flesh	2
3	crab body part	1

Sample 6: Male

Total length of fish : 37.4cm

Total weight of fish : 190g

Stomach weight (total weight of food/gut content) : 5g

Displacement volume : 5ml

Stomach fullness : ¾ full

Sl.No.	Food components	Numbers counted
1	Polychaete	2
2	shrimp	1
3	copepods	2
4	crustaceans	1
5	ostracods	2
6	unidentified	1
7	fish	1
8	amphipod eggs	3
9	detritus	2

Sample 7: Female

Total length of fish : 29.4cm

Total weight of fish : 130g

Stomach weight (total weight of food/gut content) : 3.8g

Displacement volume : 2ml

Stomach fullness : Moderate

Sl.No.	Food components	Numbers counted

JUST AGRICULTURE
multidisciplinary e-Newsletter

1	Polychaete	4
2	Detritus	2

Sample 8: Male

Total length of fish : 34cm

Total weight of fish : 142.1g

Stomach weight (total weight of food/gut content) : 3.5g

Displacement volume : 3ml

Stomach fullness : Moderate

Sl.No.	Food components	Numbers counted
1	Polychaete	5
2	Detritus	2

Sample 9: Female

Total length of fish : 38.7cm

Total weight of fish : 200g

Stomach weight (total weight of food/gut content) : 7.5g

Displacement volume : 4ml

Stomach fullness : Full

Sl.No.	*Food components*	*Numbers counted*
1	flesh of fish	1
2	fish bone	4

Sample 10: Female

Total length of fish : 34.7cm

Total weight of fish : 160.2g

Stomach weight (total weight of food/gut content) : 4.7g

Displacement volume : 2ml

Stomach fullness : Moderate

JUST AGRICULTURE
multidisciplinary e-Newsletter

Sl.No.	Food components	Numbers counted
1	fish flesh	2
2	shrimp	2

Qualitative estimation

The food components contain numerous items including shrimp body parts, Fish body parts, crustaceans body parts, detritus, polychaetes. These are the most occurring. Besides miscellaneous items such as shrimp larvae, copepods, ostracod, amphipod, Fish bone are also seen.

Quantitative estimation

In this we have used the displacement method. It is one of the most accurate one for assessing volume. The volume of each food item is Measured by displacement in a container. This method is suited in estimation of food of carnivorous fishes. Another method we followed is the points (numerical) method here consideration is given to the bulk of food items. The food items are separated and counted and presence or absence of each food item in a stomach is recorded. They are classified as common, frequent, rare based on occurrence.

Discussion

Food availability is one of the critical factors that influenced the survival of fish. The quality of the available natural food influences feeding habit of fish. The study of the food and feeding habits of fish species is a subject of continuous research because it constitutes the basis for the development of a successful fisheries management programmed on fish capture and culture and because the aquatic ecosystem is dynamic. The gut content is a reflection of the water quality, all other factors being constant. Examining the food and feeding habits of a species is important for evaluating the ecological role and position of the species in the food web of ecosystems. Information on their diet provides further support on practices of aquatic management, especially agriculture, aquaculture and conservation. The adaptive significance of a broad trophic spectrum (high diet diversity) ensures a constant energy source. These facilitate adequate utilization of available food resource and enable the fish to move easily from one source to another in response to natural pulses in their relative abundance. Here we have used both qualitative and quantitative methods.

JUST AGRICULTURE
multidisciplinary e-Newsletter

Reference

Amanda Buckland, Marcus Sheaves, et al. (2017). Standardising fish stomach content analysis: the importance of prey condition. P. 126-140.

Amundsen, J. S. Hernandez. (2019). Feeding studies takes gut – critical review and recommendations of methods for stomach contents analysis in fish. P. 1364-1373.

B. Saidi, S. Enajjar, et al. (2009). Diet composition of smooth-hound sharks.P. 113-118.

Bradley M, Wether bee, et al. (1990). Diet feeding habits, digestion, and consumption in sharks. P. 29-47.

Chipps S. R., E. J. Gravey. (2002). Assessment of food habits and feeding patterns. P. 115-255.

Donovan P. Germa, Samantha C. Leigh, et al. (2021). Gut microbial diversity and digestive function. P. 1-8.

E. Cortes. (1997). A critical review of methods of studying fish feeding based on analysis of stomach contents: application to elasmobranch fishes. P. 726-738.

Enric Cortes, Samuel H. Gruber, et al. (2004). Food consumption and feeding habits. P. 225-246.

Hansson, Hjerne, et al. (2012). Evaluating fish diet analysis methods by individual-based modelling. P. 1184-1201.

Heidi Pethybridge, Ross K. Daley, et al. (2011). Diet of demersal sharks and chimaeras. P. 290-295.

Hynes, H. B. N. (1950). The food of freshwater sticklebacks with a review of methods used in studies of the food of fishes. P. 36-58.

HysloP, E. J. (1980). Stomach contents analysis-a review of methods and their application. P. 411-429.

John K. Carlson, Lara Ferry-Graham, (2008). Feeding and digestive functions of fishes. P. 393-443.

Mahesh V., Ambarish P.Gop, et al. 2019. Stomach content analysis techniques in fishes. P. 104-114.

P. U. Zacharia. (1974). Trophic levels and methods for stomach content analysis of fishes. P.278-288.

Papastamatiou, Lowe, et al. (2007). Postprandial response of gastric Ph in sharks. P. 225-232.

Peter Manko. (2016). Stomach content analysis in freshwater fish feeding ecology. P. 8-45.

JUST AGRICULTURE
multidisciplinary e-Newsletter

Ronald Baker, Marcus Sheaves, et al. (2014). Fish gut content analysis: robust measures of diets composition. P. 170-177.

Samantha C. Leigh, Donovan P. German, et al. (2017). The nutritional physiology of sharks. P. 561-585.

W. N. Joyce, S. E. Campana, et al. (2002). Analysis of stomach contents of the sharks. P. 1236-1269.