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Analysis of the food and feeding habit of fresh water carnivorous fish *Wallago attu* (Bloch & Sneider, 1801) collected from the local fish markets of Agartala, Tripura

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Abstract
Wallago attu (Bloch & Sneider, 1801), which is popularly known as freshwater shark is a carnivorous fish belong to the family Siluridae. It is locally known as boal in different places of Agartala, Tripura. A total of 30 specimens including male and female of fish species of *Wallago attu* (Bloch & Sneider, 1801) were collected during the different months from 2023 to 2024. Following the measurements of length and weight of the studied fish species the Relative gut length was also found out after measuring the gut lengths of the studied fish species. The relative gut length value which is less than one show the carnivorous nature of *Wallago attu* (Bloch & Sneider, 1801). After this the fish specimens were dissected and the gut contents were studied, where the gut contents were *Puntius* sp., *Telapia* sp., small fishes, *Gudusia chapra*, *Amblypharyngodon mola*, some crustaceans, molluscs etc. And among the plant matter many algal contents were found e.g. *Spirogyra* sp. The above mentioned gut contents indicates the carnivorous nature of *Wallago attu* (Bloch & Sneider, 1801).

Keywords: Relative gut length, gut contents, carnivorous, local fish market

1. Introduction
Wallago attu (Bloch & Sneider, 1801) is a freshwater catfish of the family siluridae. It is carnivourous and voracious fish in nature. It is found in all the major rivers of India, Pakistan, Bhutan, Nepal and Bangladesh such as the Ganges, Indus, Narmada, Godabari, Krishna and Mahanadi as well as the island of Srilanka. *Wallago attu* reside in the lotic ecosystem of various corners of India. It inhabit fast running as well as sluggish water of deep and shallow pools, rivers and streams. *Wallago attu* (Bloch & Sneider, 1801) have enormous digestible capabilities of its meat (Lilabati and Viswanath, 1996) [45]. It is found in all the major rivers of India, Pakistan, Bhutan, Nepal and Bangladesh such as the Ganges, Indus, Narmada, Godabari, Krishna and Mahanadi as well as the island of Srilanka. *Wallago attu* (Bloch & Schneider, 1801) are critically endangered species Tripura as per Red list guidelines July 2022, It is locally known as Boal in different parts of Tripura. Due to the carnivourous nature of *Wallago attu* it cannot be cultured with other fishes. So the culture of *Wallago attu* is very difficult due to its voracious feeding nature. Its distribution, habit and habitat, nutritional value has been studied by several workers (Lilabati and Vishwanath, 1996) [45]. Regarding the IUCN Status of the fish species is according to the latest available IUCN red list is endangered. *Wallago attu* (Bloch & Schneider, 1801) are critically endangered species Tripura as per Red list guidelines July 2022, the IUCN status of the fish species. Food is an essential component of an organism as its growth, development, reproduction and other physiological activities are dependent on the energy generated by the consumed food material. Jhingran (2010) [24] stated that the natural food of fishes are classified under three groups (i) Main food (ii) Occasional food and (iii) Emergency food (M R Manon, 2011) [32]. The study of food and feeding habits of fish is always depend upon the analysis of stomach content (Ajah and Udoh 2012) [46]. Analysis of the stomach contents or gut contents reflect the fish feeding methods and quantitative evaluation of food habits is an essential result of fisheries management.

According to Adewumi and Amoo (2014) [47] study on food and feeding habits of fish can provide valuable data for formulation of artificial feed for the species during culture and for proper management of the fish. Gut length and gut content of different sized group of fish species were analyzed. Gut of *Wallago attu* consist of a thick, muscular, roughly spherical, highly extensible stomach and narrow, medium, thick intestine. For the gut content analysis, the collected gut content was used. The food and feeding habits of *Wallago attu* (Bloch & Schneider, 1801) were studied and revealed that this fish species feed mostly on food from animal origin. Relative gut length is used for the classification of different sized fish as a carnivore, herbivore and omnivore as a main morphological variable and as for feeding intensity determination. The carnivorous fish generally have a ratio of gut length to body length less than one, signifying the carnivorous nature of fish species. *Wallago attu* (Bloch & Sneider, 1801) being a carnivorous feeder ingest a wide variety of food items such as algae, different zooplankton, insects, small fish, crustaceans, aquatic insect etc. Relative gut length is measured out by measuring the gut length and body length of *Wallago attu* (Bloch & Schneider, 1801) and then by dividing the gut length by body length., which was less than 1. The value of relative gut length is also studied and it also determines the carnivorous nature of the fish species. Relative gut length (RGL) is also a good indicator of feeding nature of any fish species, used for the classification of different sized fish as a carnivore, herbivore and omnivore as main morphological variable and as for feeding intensity determination. The purpose of this paper is the analysis of the food and feeding intensity. of fresh water carnivorous fish *Wallago attu* (Bloch & Sneider, 1801) collected from the local fish market of Tripura, India.

2. Materials and Methods

The present study is related to the analysis of the food and feeding habit of carnivorous fish *Wallago attu* (Bloch & Sneider, 1801) from the local fish market of Agartala, Tripura. A total of 30 samples including male and female species of *Wallago attu* were collected from local fish markets of Agartala, Tripura during the different months from 2023 to 2024. After collecting the sample fishes from the market these were brought in the laboratory. After this the body length of the fishes were measured with the help of scale. The length of the fishes both male and female fish species of *Wallago attu* range from 25 cm to 80 cm. After completion of the measurement the fishes were dissected by making incision at anus and then the whole gut or the digestive system was removed carefully and kept on the dissecting tray. After measuring the gut length with the help of a scale, the gut contents or the stomach contents were removed and kept on petridish. And then the gut contents were studied under microscope. Gut contents consist of food animal and plant origin.

2.1 Relative Gut length or Intestinal Quotient: The Relative gut length is ratio between the total length of the gut and the total length of the fish.

Relative gut length (RGL) = length of the gut /total length of the fish

3. Results

A total of 30 samples including male and female species of *Wallago attu* were collected from local fish markets of Tripura during the different months from 2023 to 2024. After collection the lengths of male and female species of *Wallago attu* (Bloch & Sneider, 1801) were measured and then the gut lengths were also measured. Thus the Relative gut length was calculated applying the formula: RGL= length of the gut /total length of the fish, the value of which was found less than 1, signifying the carnivorous nature of the fish species *Wallago attu* (Bloch & Sneider, 1801). Thus the feeding habit was analyzed. The gut contents or the stomach contents were observed under microscope and for this 30 fish samples of *Wallago attu* were dissected for determining the food and feeding habits. The maximum food items were found to be animal origin and minimum amount was of plant origin. The most frequent food item observed in the diet of *Wallago attu* was (Bloch & Schneider, 1801) *Gudusia chapra., Puntius* sp., crustaceans and digested fish, *Mystus* sp., *Amblypharyngodon* sp. *(*moka) etc inn all the months. Telapia fish species. was also found. Among the algal contents *Spirogyra* sp. was found. Sometimes some unidentified semi digested fish bodies were also found. The above mentioned all food items give confirmation about the carnivorous nature of the *Wallago attu* (Bloch & Sneider, 1801).

Table 1: Showing the Relative gut length of *Wallago attu* (Bloch & Schneider, 1801) collected from the local fish market of Tripura.

Observation	Body Length (cm)	Gut length (cm)	Relative gut length
1	36	22	0.61
2	40.5	28	0.69
3	41	26	0.63
4	44.5	28	0.62
5	50.5	40	0.79
6	53	41	0.77
7	45.5	35.5	0.78
8	50	37	0.74
9	50	36	0.72
10	52	37	0.71
11	48	35	0.72
12	51	36	0.70
13	35	30	0.85
14	49	32	0.65
15	56	35.5	0.63
16	46	26	0.66
17	44.4	35	0.78
18	39	20	0.51
19	34	21	0.61
20	71	60	0.84
21	51	37	0.72
22	57	38	0.66
23	49.5	34	0.71
24	41	27	0.65
25	65	42	0.70
26	35	30	0.85
27	50	37	0.74
28	43	26	0.60
29	39	23	0.58
30	52	32	0.61

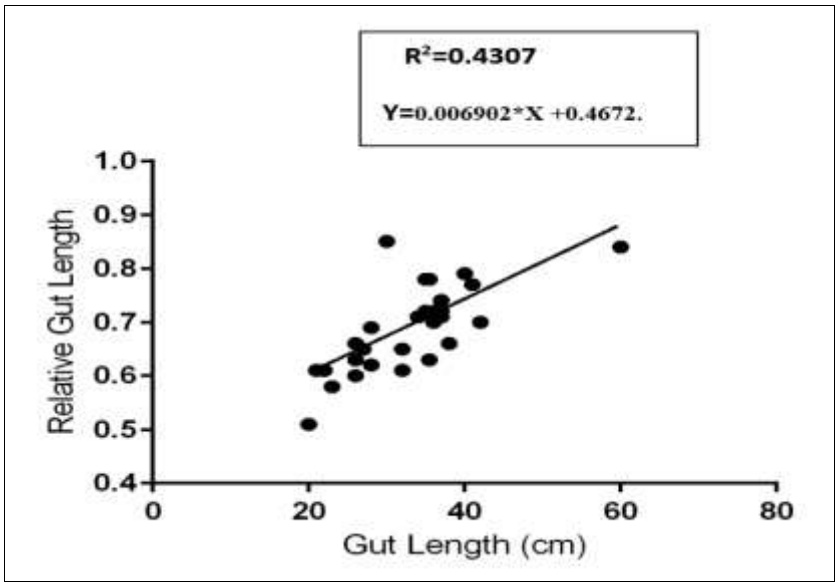
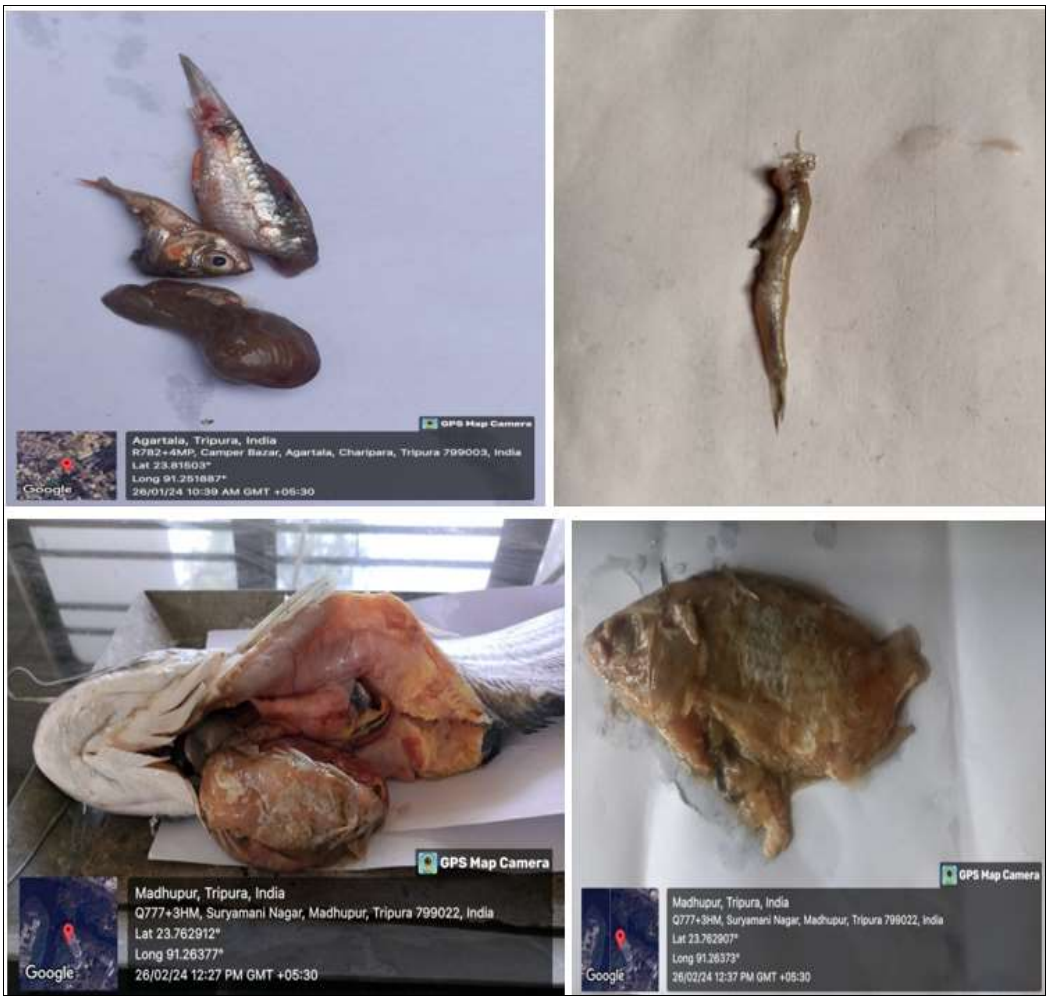


Fig 1: Showing Linear regression analysis of Relative gut length of *Wallago attu* (Bloch & Schneider, 1801).

Fig 2: Showing the whole gut of an adult *Wallago attu* (Bloch & Schneider, 1801)

Table 2: Showing some Gut contents of *Wallago attu* (Bloch & Schneider, 1801).

No of Observation	Body Length (cm)	Name of contents Animal and Plant Origin
1	40.5	*Gudusia chapra* (Chapila)
2	36	*Amblypharyngodon* sp.(Moka)
3	44.5	*Mystus* sp.
4	56	*Puntius* sp.
5	49	*Tilapia* sp.
6	71	*Corica sp* (Kachki)
7	50.5	Algal contents, small fish
9	39	Digested small fish bodies
10	56	*Spirogyra* sp.
11	50	Crustacean, *Puntius* sp.
12	57	*Tilapia* sp.
13	57	Semi digested bodies of *Gudusia chapra* (Chapila)
14	65	Small fishes, algae
15	53	*Gudusia chapra* (Chapila)
16	48	*Puntius* sp.



Above figure showing *Tilapia* sp. in the alimentary canal of an adult *Wallago attu* (Bloch & Sneider, 1801).

Fig 3: Showing the gut contents of *Wallago attu* (Bloch & Schneider, 1801) available from local fish market.

4. Discussion

The results of our findings indicate the carnivorous as well as the predatory nature of the *Wallago attu* (Bloch & Sneider). Our findings formulated the value of Relative gut length (RLG) of *Wallago attu* which was found to be less than 1, ranging from 0.51 to 0.85. The RLG values proved the carnivorous feeding habit of our studied fish. The length of the gut of carnivorous fishes is always shorter than the herbivorous fish. RLG. value always has a close relationship with the nature of gut content. The average Relative gut length value was found 0.69. So it confirms that RLG value is very helpful in feeding intensity determination for any type of fish. The R^2 value was significant i.e. 0.4307, and Y= 0.006902*X + 0.4672. Gut content analysis performed on *Wallago attu* collected from the local fish markets of Tripura, India shows the maximum percentage of the consumed food consisted of animal matter. The stomach or gut contents of *Wallago attu* also revealed its piscivorous nature, where maximum percentage of food items consisted of fishes and minimum percentage was algal content. Sometimes the fish food items of *Wallago attu* was found in semi digested condition. The alimentary gut of *Wallago attu* is flexible and muscular in nature. The most frequent animal food items observed were *Puntius sp* (puti), *Gudusia chapra* (chapila) and semi digested fishes in all months. Generally in July, August and September the gut remain in empty condition and in January, February and March the gut was found in full condition.

5. Conclusion

Our findings on the feeding habits of *Wallago attu* (Bloch & Sneider, 1801) collected from the local fish markets of Tripura is carnivorous in nature and the gut analysis of food is found to be mostly animal origin besides some algal contents. The average relative gut length (RLG) was 0.69 which was less than 1 confirming the carnivorous nature of the studied fish. According to the IUCN status the *Wallago attu* is critically endangered in Tripura. as per Red list guidelines July 2022. So for conducting our research work we have to depens on the local fish market of Tripura, India.

6. References

1. Alikunhi KH, Rao SN. An investigation into the food and feeding habits of some of the common freshwater fishes of Madras. Proceedings of the 34th Indian Science Congress; c1947. p. 179.
2. Ash R. Protein digestion and absorption. In: Cowey CB, Mackie AM, Bell JG, editors. Nutrition and feeding in fish. Academic Press; c1985. p. 69-93.
3. Assis CA. A generalized index for stomach contents analysis in fish. Scientia Marina. 1996;60:385-389.
4. Baker R, Buckland A, Sheaves M. Fish gut content analysis: robust measures of diet composition. Fish and Fisheries. 2014;15(1):170-177.
5. Banik S, Malla S. Survival and Growth Rate of Larval Ompok pabda (Hamilton-Buchanan, 1822) of Tripura, India: Related to efficient feed. Proceedings of the Zoological Society; c2014. DOI: 10.1007/s12595-014-

0111-x.
6. Benitez LV, Tiro LB. Studies on the digestive proteases of the milkfish, *Chanos chanos*. Marine Biology. 1982;71:309-315.
7. Borlongan IG. Studies on the digestive lipases of milkfish, *Chanos chanos*. Aquaculture. 1990;89:315-325.
8. Chiu YN, Benitez LV. Studies on the carbohydrases in the digestive tract of the milkfish *Chanos chanos*. Marine Biology. 1981;61:247-254.
9. Choudhary S, Singh DK. Food of some common fishes of Birganj (Nepal). Environment & Ecology. 2006;24:345-347.
10. Desai VR. Studies on the fishery and biology of Tor tor (Hamilton) from river Narmada. Journal of Inland Fishery Society of India. 1970;2:101-112.
11. Dasgupta M. Biometry of the copper mahseer *Acrossocheilus hexagonolepis* (McClelland) from northeastern India. Arquivos Do Museu Bocage. 1989;1(25):361-374.
12. Dasgupta M. Biometry of the mahseer Tor tor (Hamilton). Rec. Zool. Surv. India. 1990;87(3):207-214.
13. Edwards DJ. Salmon and Trout farming in Norway. Oxford: Fishing News Books; c1978.
14. Fange R, Grove D. Digestion. In: Hoar WS, Randall DJ, Brett JR, editors. Fish Physiology, Vol. VIII. New York: Academic Press, Inc.; c1979. p. 161-260.
15. Fawole OO, Ogundiran MA, Ayandiran TA, Olagunju OF. Proximate and mineral composition in some selected freshwater fishes in Nigeria. Internet Journal of Food Safety. 2007;9:52-55.
16. Goswami S, Dasgupta M. Morphometric and meristic characters of the fish *Nandus nandus* (Hamilton) from the New alluvial zone of West Bengal. Rec. Zool. Surv. India. 2007;107(part-1):81-90.
17. Gupta S, Banerjee S. Food and feeding habits of *Amblypharyngodon mola* (Hamilton-Buchanan, 1822) in West Bengal, India. International Research Journal of Biological Science. 2013;2(5):67-71.
18. Habib KM, Adugna AA. Stomach content analysis of feed and feeding habit of *Oreochromis niloticus* fish species in Baro-Akobo basin, South West Ethiopia in case of Alwero Dam. Journal of Biology, Agriculture and Healthcare. 2021;11(3):2021.
19. Hansson S. Methods of studying fish feeding: a comment. Can. J. Fish. Aquat. Sci. 1998;55(12):2706-2707.
20. Hepher B. Nutrition of pond fishes. Cambridge: Cambridge University Press; c1988.
21. Huet M. Textbook of fish culture. 2nd ed. Oxford: Fishing News Books; c1986.
22. Hynes HBN. The food of fresh-water sticklebacks, with a review of methods used in studies of the food of fishes. The Journal of Animal Ecology; c1950. p.36-58.
23. Jayaram KC. The Freshwater Fishes of the Indian Region. Delhi, India: Narendra Publishing House; c1999.
24. Jhingran VG. Fish and Fisheries of India. Delhi: Daya Publishing; c2010.
25. Knight B. Feeding behavior and fish culture. In: Cowey CB, Mackie AM, Bell JG, editors. Nutrition and feeding in fish. London: Academic Press, Inc.; c1985. p. 223-24.
26. Lakra WS, Goswami M, Sarkar UK. Conservation biology of Indian Mahseers. Indian J. Animal Sciences. 2010;80(4) (Supp1.1):98-108.
27. Lakra WS, Sarkar UK, Kumar RS, Pandey A, Dubey VK, Gusain OP. Fish diversity, habitat ecology and their conservation and management issues of a tropical river in Ganga basin, India. Environmentalist. 2010;30:306-319.
28. Laleye PA. Length-weight and length-length relationships of fishes from the Oueme River in Benin (West Africa). Journal of Applied Ichthyology. 2006;22:330-333.
29. Le Cren ED. The Length-Weight relationship and seasonal cycle in gonad weight and condition in the perch (*Perca fluviatilis*). J Animal Ecol. 1951;20:201-219.
30. Leger C. Digestion, absorption, and transport of lipids. In: Cowey CB, Mackie AM, Bell JG, editors. Nutrition and feeding in fish. London: Academic Press; 1985. p. 299-332.
31. Manko P. Stomach content analysis in freshwater fish feeding ecology. Presov: University of Presov; c2016.
32. Manon MR, Hossian MD. Food and feeding habit of *Cyprinus carpio* var. Specularis. Journal of Science Fundamental. 2011;9(1-2):163-169.
33. McLaughlin PA. Internal Anatomy. In: Mantel LH, editor. The Biology of Crustacea. Vol. 5. New York: Academic Press, Inc.; 1983. p. 1-52.
34. Njiru M, Okeyo-Owuor JB, Muchiri M, Cowx IG. Shifts in the food of Nile tilapia, *Oreochromis niloticus* (L.) in Lake Victoria, Kenya. African Journal of Ecology. 2004;42(3):163-170.
35. Oso JA, Ayodele IA, Fagbuaro O. Food and feeding habits of *Oreochromis niloticus* (L.) and *Sarotherodon galilaeus* (L.) in a tropical reservoir. World Journal of Zoology. 2006;1(2):118-121.
36. Otieno ON, Kitaka N, Njiru JM. Length-weight relationship, condition factor, length at first maturity and sex ratio of Nile tilapia, *O. niloticus* in Lake Naivasha, Kenya. International Journal of Fisheries and Aquatic Studies. 2014;2:67-72.
37. Smith LS. Digestive Functions in Teleost Fishes. In: Halver JE, editor. Fish Nutrition. 2nd edition. New York: Academic Press, Inc; c1989. p. 331-421.
38. Teame T, Natarajan P, Zelealem T. Analysis of diet and biochemical composition of Nile Tilapia (*O. niloticus*) from Tekeze reservoir and Lake Hashenge, Ethiopia. Journal of Fisheries Livestock Production. 2016;4:172.
39. Temesgen M, Getahun A, Lemma B, Geert PJ. Food and feeding biology of Nile Tilapia (*Oreochromis niloticus*) in Lake Langeno, Ethiopia. Sustainability. 2022;14(2):974.
40. Teferi Y, Admassu D, Mengistou S. The food and feeding habit of *Oreochromis niloticus* L. (Pisces: Cichlidae) in Lake Chamo, Ethiopia. SINET: Ethiopian Journal of Science. 2000;23(1):1-12. https://doi.org/10.4314/sinet.v23i1.18152
41. Vonk HJ. Digestion and metabolism. In: Waterman TW, editor. The Physiology of Crustacea. New York: Academic Press, Inc. 1960;1:291-316.
42. Wagaw S, Mengistou S, Getahun A. Diet composition and feeding habits of *Oreochromis niloticus* (Linnaeus, 1758) in Lake Shala, Ethiopia. Fisheries and Aquatic Sciences. 2022;25(1):20-30. https://doi.org/10.47853/FAS.2022.e3.
43. Wakil U, Haruna A, Mohammed G, Ndirmbita W, Yachilla B, Kumai M. Examinations of the stomach contents of two fish species (*C. gariepinus* and *O. niloticus*) in Lake Alau, North-Eastern Nigeria. Agriculture, Forestry and Fisheries. 2014;3(5):405-409.

44. Wee KL. An overview of fish digestive physiology and the relevance to the formulation of artificial fish feeds. In: Allan GL, Dall W, editors. Proceedings of the Aquaculture Nutrition Workshop, Salamander Bay, 15-17 April 1991. NSW Fisheries, Brackish Water Fish Culture Research Station, Salamander Bay, Australia; c1992. p. 17-24.
45. Lilabati H, Vishwanath W. Nutritional quality of fresh water catfish (*Wallago attu*) available in Manipur, India. Food chemistry. 1996 Oct 1;57(2):197-199.
46. Ajah PO, Udoh SA. Food and feeding habits, condition factor and length-weight relationships of *Mugil cephalus* and *Pseudotolithus elongatus* in Cross River estuary, Cross River State, Nigeria. Tropical Freshwater Biology. 2012 Jul 1;21(2):59-70.
47. Adewumi AA, Amoo OA. Comparative Food and Feeding Adaptations of Two Teleosts in Ado-Ekiti Reservoir. International Journal of Innovative Research and Development; c2014 Apr 12.