



CHARACTERISTICS OF VILLORITA CYPRINOID POPULATION IN VEMBANAUD LAKE

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ABSTRACT

A class of research on the population features of Villorita cyprinoides in Vembanaud Lake is based on the age distribution and several hydrographic parameters that caused the black clams to be distributed throughout the lake. The purpose of this research is to examine the age structure and growth patterns of Villorita cyprinoides in Vembanaud Lake, as well as the effects of different parameters.

The most important factor in the spawning process is a change in salinity; 10 to 12 ppt is the optimal salinity range for spawning. The closure of the Thaneermukkom Barrage at Vembanaud Lake, routine dredging, pollution from factories and plants that process shrimp, ecotourism, and water hyacinth weed are some of the other dangers mentioned.

INTRODUCTION

Most of the Vembanaudlake is fresh water and when it is nearing the Arabian sea, the water is salty. When the flow of the river reduces due to low rain, the saline water is introduced into Vembanaud lake. Vembanaud lake – Kol – Wetland, Ramsar site number 1214. Vembanaud lake – Kol – Wetland system, one of the three Ramsar sites in Kerala (Nov 2022), is the largest estuarine system of the western coastal wetlands and is spread over the districts of Aalapuzha, Kottayam, Ernakulam and Thrissur. It's a complex aquatic system of 96 km. Long coastal backwaters, lagoons, marshes, mangrooves and reclaimed lands with intricate network of natural channels and man-made canals extending from Kuttanaud in the south to the kol lands of Thrissur in the north. The total area of the wetland system is 1521.5 sq.km approximately 4% of state geographic area.

The wetland is typically divided into two distinct segments, the fresh water dominant southern zone and the salt water dominant northern zone. VKW is fed by 10 rivers originating from western ghats flowing westwards through wetland system to join the Lakshadweep and Arabian sea. The area enjoys the full benefit of southwest monsoon. The estuarine zone and organics rich sedimentary substratum of the inshore region make it a highly preferred and desirable habitat for shrimp breeding. Vembanaud lake is renowned for its live clam resources and sub fossil deposits. The fish fauna identified from the whole area comes to 102 species. Mollusca includes: The black clam: Villorita cyprinoides, Villorita cornucopid, Mertrixmertrix, Mertrix costa, Ostria calculate, etc.. The mussels Perna viridis and Perna indicate and the brackish water oyster Crassostrea madrasinsis occurs abundantly in the backwaters and river mouths. The soft – organic matter rich sediment substratum of the inshore region are an ideal habitat for shrimps

Mariculture or marine farming is a specialized branch of aquaculture involving the cultivation of marine organisms for food and other animal products in enclosed sections of the open ocean, fish farms built on littoral waters or in artificial tanks, ponds or rare ways, which are filled with sea water.

SIGNIFICANCE OF WETLANDS

Wetlands directly and indirectly support lakhs of people providing goods and services to them. They help to retain water during dry periods, thus keeping the water table high and relatively stable. During periods of flooding, they act to reduce flood levels and to trap suspended solids and nutrients to the lakes that if they flow directly into lakes. They prevent costal erosion and mitigate the effects of natural disasters like cyclones and tidal waves. They retain excess flood water during heavy rain fall and maintain a constant flow regime downstream, preserving water quality and increasing biological productivity of both aquatic and human communities. They function as a green barrier to protect coastlines and coastal communities. They act as natural filters and help remove a wide range of pollutants from water. They retain nutrients by storing eutrophic parameters like N, P as in the sub soil. In addition, wetlands are important feeding, breeding and drinking areas of wildlife and provide a stopping pace and refuge for water fowl. As with natural habitats, wetlands are important in supporting species diversity and have a complex and important food web. The millennium assessment of ecosytem puts fresh water biodiversity as the most threatened of all types of biodiversity.

THREATS TO WETLANDS

Wetlands are increasingly facing several anthropogenic pressures. The rapidly expanding human population, large scale changes in land use/ land cover overgrowing development projects and improper use of watersheds have all caused a substantial decline of wetland resources of the country. Absence of reliable and updated information and data on the extend of wetlands their construction values and socio economic importance has greatly hampered development of policy, legislation and administrative inventions by the state.

WETLANDS IN KERALA

Kerala with its area of 38,864 km² consist of 44 rivers, harbours several natural lakes, man made lakes and canals. Physiographically, Kerala is divided into three zones – the low, mid land and high ranges. Twenty percent of the total geographic area of the state is water logged due to the distinct rainfall patterns and undulating topography. The inter – hill basins or valleys in the mid lands and low lands characeterised by lagoons and backwaters constitute the major wetlands of Kerala. The wetlands of Kerala comprise of back waters, estuaries, natural lakes, man – made lakes and canals. 217 wetlands are identifies in Kerala of which 157 have an area more than 52.25 ha. with an areal extend of 127930 ha. 64 wetlands are inland wetlands and 93 wetlands are designated as costal wetlands. There are several major freshwater lakes in Kerala without direct connection with the Arabian sea. Man made lakes and reservoirs created by construction of dams in western ghats contributes to a sizeable proportion of artificial wetlands. The unique wetland ecosystems of Kerala includes marshy and water logged areas and vast polders (paddy fields) associated with backwaters and lakes and the myristica swamps in the western ghats forests with majority in Kulathupuzha and Anchal forest areas, part of Shenudurney wildlife sanctuary.

ESTUARIES AND BACKWATERS

Thirty backwaters and estuaries occur along 590 km. long coastal line, covering an area of 242000 ha. These wetlands are extremely productive and are habitats of various flora and fauna. In addition to the ecological functions they serve for inland – water transport also.

NATURAL FRESH WATER LAKES

Fresh water lakes contributes significantly to the ecological and economic sustainability of the state. Vellayani, Sasthamkotta, Kottakambal, Manakkodi, Enamakal, Muriyad and Pookode are the lakes without direct connection to the sea.

METHODOLOGY

CLAM RESOURCE

Vembanad lake's entire clam population is examined based on a number of criteria. Clam specimens were gathered, and their size, flesh content, and other characteristics were all examined.

STUY PERIOD

March 2021 to July 2023 was the study period that was chosen for the duration. The constrained time frame offers the opportunity to carry out ecological experiments through the selection of suitable tools.

STUDY AREA

To evaluate the impact of the Thanneermukkom bund on clam growth, survival, and biochemical composition, two sampling locations in Vembanad Lake were selected. Two locations were selected: one north of the bund (Zone B) and one south of the bund (Zone A). A riverine (C) joining that is south of the bund was also selected.

MATERIALS REQUIRED

To determine the population features, we need fishing rods, fishing boats, sample packets, canoes, chemicals for the biochemical analysis, survey record sheets, camera, fishing nets, measuring tapes, clam seeds, and note books.

METHODS USED TO DETERMINE VILLORITA CYPRINOIDES CHARACTERISTICS INCLUDES THE FOLLOWING:

1. THE AGE STRUCTURE OF VILLORITA POPULATION IN VEMBANAUD LAKE

The size at the juvenile-to-adult transition must be ascertained in order to calculate the percentage of juveniles that are exploited. Clams were gathered from the three zones, and different groups were classified as juvenile, subadult, and adult based on the characteristics. In doing so, it is assumed that most animals in the population would have an opportunity to become mature and spawn without prejudice to the selection factor of the gear. The weight corresponding to MLS is the minimum legal weights (MLW).

2. SEASONAL VARIATION IN BIOCHEMICAL COMPOSITION OF BLACK CLAM WITH SPECIAL EMPHASIS ON THE IMPACT OF THANNERMUKKOM BUND.

Clam Farming

In clam farming, seeds are generally collected from the natural grounds and transplanted in suitable areas for growing them to market. This practice of relaying the seeds on the ground in sheltered water bodies and growing them to marketable size is simple to adopt, involving little farm maintenance work. Seed collection from wild

In the commercial cultivation of clams in other countries, seed requirements are mostly met by collections from the natural beds and supplemented to a smaller extent from the hatcheries. A hand-operated scoop net or a dredge having 2-5 mm mesh bag is used for seed collection. A spade or shovel is also used for scraping the top layer of the substratum and the sediment is sieved.

Sampling procedure

Clams were collected from the natural bed during early morning hours and they were kept in water with aeration for 48 hours to get rid of the debris and food materials present inside the body. Then clams were cut open to collect soft body parts for the biochemical analysis.

Hydrographic parameters and biochemical analysis have been analysed:

Parameters that have been analysed include temperature, salinity, Estimation of protein, Estimation of carbohydrate, Lipid estimation, Gonado-Somatic Index, Percentage of Edibility, The flesh was weighed as soon as it was removed from the shell and after it had dried in order to determine the

moisture content of the meat (whole clams and individual organs).The proportion of moisture found in the difference between the fresh and dry weights.

3. STUDY ABOUT THE WEIGHT COMPOSITION OF VILLORITA GROWING UNDER THREE DIFFERENT CONDITIONS.

Clams were collected from three different zones from the lake and the length width analyses were taken. the size parameters upon various localities were taken to know about the weight of various shells collected categorised as adult, sub adult and juvenile. the dry matter that is the flesh is dried and the weight is recorded in a weighing machine. Seasonal changes in meat weight and biochemical composition are associated with reproduction, storage and utilization of reserves. The main period of increase in biochemical constituents corresponds to gametogenesis and maturation of gonads just before breeding.

Spawning, which is biannual in nature, produces a marked fall in the meat weight and biochemical composition. October to January appears to be the most suitable period for harvesting these clams.

4. A STUDY ON COLLECTING AND DISTRIBUTION OF LIME SHELL IN THE CO-OPERATIVE SOCIETY AND THE BLACK CLAM, VILLORITA CYPRINOIDES, FISHERY IN THE STATE OF KERALA.

The most integral part of the study was the collection process.

The observations were made of the activities in eight villages in Vembanad Lake and in the lake itself. The villages are where most of the families that are supported by the black clams live. The villages were Chempu, Vaikom, Vechoor, Kuthiathodu, Thycattussery, Muhamma, Aaryad, and Kavalam distributed among the districts of Kottayam and Alappuzha. The survey was conducted by making observations and interviewing the fishermen and their families using standard techniques and further documenting the observations with photographs.



OBSERAVTIONS

To study about the weight composition of villorita growing under three different conditions.

NORTHOFVEMBANAUDLAKE

SAMPL E	ADULT			SUBADULT			JUVENILE		
	HT(cm)	WTH(cm)	DM(gm)	HT(cm)	WTH(cm)	DM(gm)	HT(cm)	WTH(cm)	DM(gm)
1	3.5	3.8	0.056	3	2.8	0.008	1.8	1.6	0.002
2	3.8	3	0.05	2.9	2.7	0.006	1.3	1.2	0.0024
3	4.2	3.5	0.062	2.5	2.3	0.006	1.6	1.4	0.003
4	4	3.4	0.058	2.4	2.1	0.005	1.1	0.8	0.001
5	3.2	3	0.04	2.5	2.5	0.005	1.3	1.2	0.003
6	3.9	3.4	0.049	2.3	2.1	0.004	1.6	1.1	0.001

SOUTHOFVEMBANAUDLAKE

SAMPL E	ADULT			SUB ADULT			JUVENILE		
	HT(cm)	WTH(cm)	DW(gm)	HT(cm)	WTH(cm)	DW(gm)	HT(cm)	WTH(cm)	DW(gm)
1	3.8	3.5	0.054	3	2.5	0.008	2	1.9	0.002
2	3.4	3.2	0.044	3	2.8	0.007	1.8	1.6	0.0016
3	3.4	3.6	0.047	2.9	2.5	0.0068	1.6	1.5	0.003
4	3.1	2.6	0.042	2.9	2.3	0.008	1.7	1.6	0.002
5	3.5	3.5	0.041	3	2.6	0.006	1.9	1.5	0.002
6	3.4	3.9	0.045	2.7	2.5	0.0075	1.3	0.9	0.001

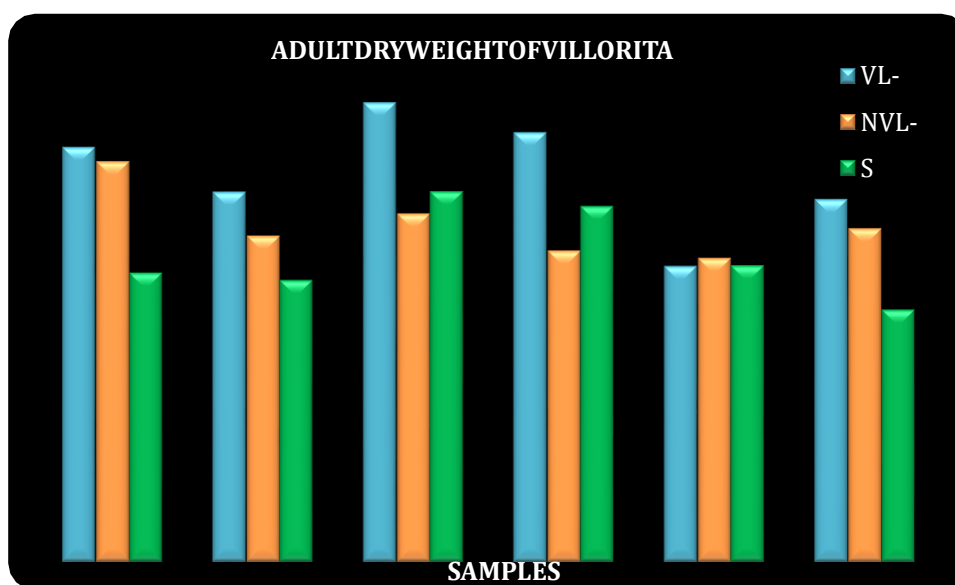
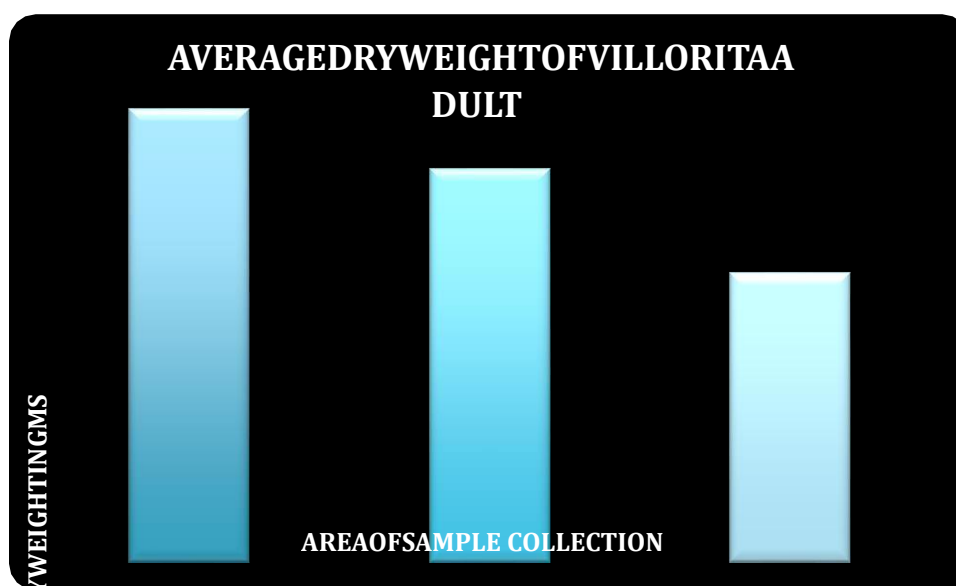
RIVERINETHATENTERSSSOUTHOFVEMBANAUDLAKE

SAMPL E	ADULT			SUBADULT			JUVENILE		
	HT(cm)	WTH(cm)	DW(gm)	HT(cm)	WTH(cm)	DW(gm)	HT(cm)	WTH(cm)	DW(gm)
1	3.2	2.8	0.039	3	3	0.0079	1.8	1.2	0.002
2	3.5	2.7	0.038	2.9	2.7	0.008	1.9	1.4	0.002
3	3.4	3.5	0.05	2.8	2.5	0.005	1.6	1.4	0.002
4	3.3	2.2	0.048	2.5	2.1	0.005	1.5	0.8	0.002
5	3	2.8	0.04	2.4	2.3	0.003	0.9	0.4	0.002
6	3.4	2.4	0.034	2.3	2.2	0.004	0.8	0.5	0.001



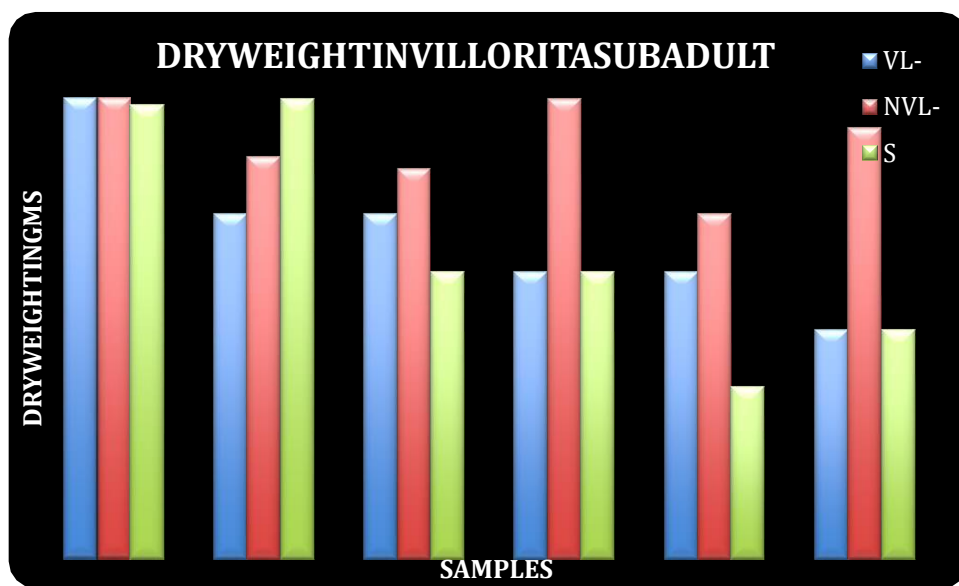
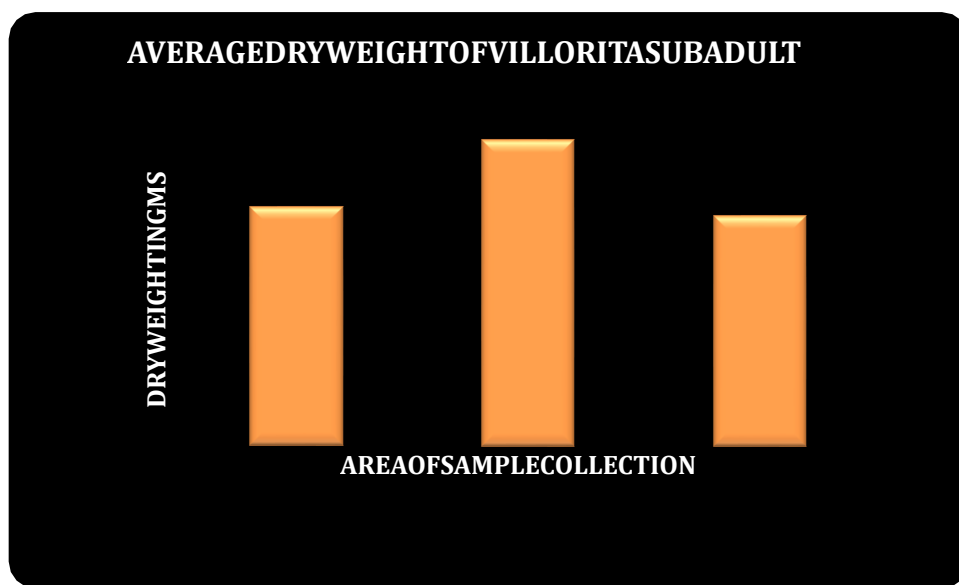
GRAPHS SHOWING DRY WEIGHT OF VILLORITA IN THREE DIFFERENT ZONES ADULT

SAMPLE	DRYWEIGHTOFVILLORITA -ADULT		
	VL-N	VL-S	RVL-S
1	0.056	0.054	0.039
2	0.05	0.044	0.038
3	0.062	0.047	0.05
4	0.058	0.042	0.048
5	0.04	0.041	0.04
6	0.049	0.045	0.034
MEAN	0.0525	0.0455	0.0335



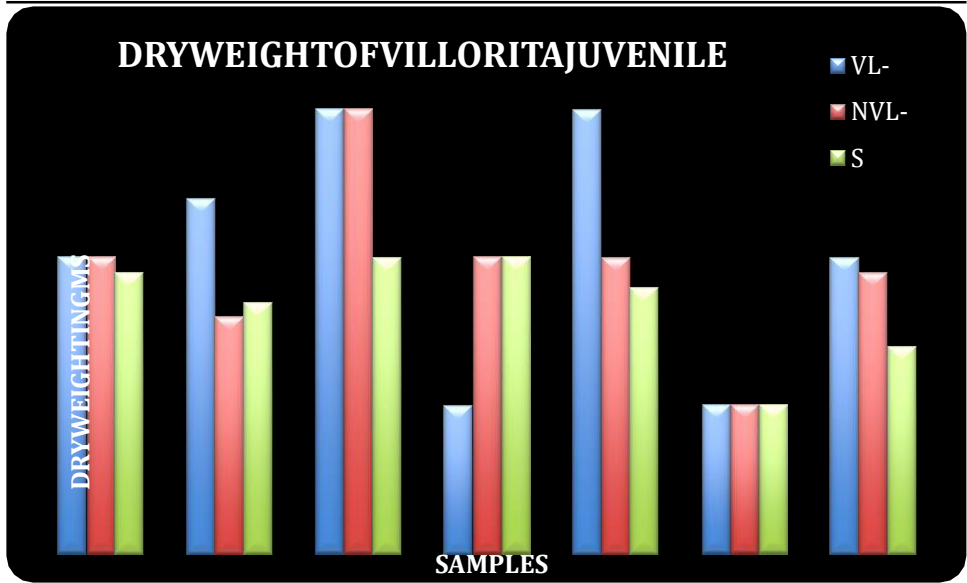
SUBADULT

SAMPLE	DRYWEIGHTOFVILLORITA-SUBADULT		
	VL-N	VL-S	RVL-S
1	0.008	0.008	0.0079
2	0.006	0.007	0.008
3	0.006	0.0068	0.005
4	0.005	0.008	0.005
5	0.005	0.006	0.003
6	0.004	0.0075	0.004
MEAN	0.0056	0.0072	0.0054



JUVENILE

SAMPLE	DRYWEIGHTOFVILLORITA- JUVENILE		
	VL-N	VL-S	RVL-S
1	0.002	0.002	0.0019
2	0.0024	0.0016	0.0017
3	0.003	0.003	0.002
4	0.001	0.002	0.002
5	0.003	0.002	0.0018
6	0.001	0.001	0.001
MEAN	0.002	0.0019	0.0014



TO STUDY ON COLLECTION AND DISTRIBUTION OF LIME SHELL IN THE LIME SHELL CO-OPERATIVE SOCIETY AND THE BLACK CLAM VILLORITACYPRIINOIDES, FISHERY.

COLLECTION AND DISTRIBUTION OF LIME SHELL

TRADITIONAL METHOD

The lime shell co-operative society mainly depends upon traditional method. In this the workers are going to lake in a small country boats with sped and net. These are used to collect shells in deeplake. Under this method an average workers collect to 10 to 25 lime shells in a day. The time of collecting lime shells by the workers in the early morning.

DREDGING

In dredging method large machines are used to collect the lime shell. It is very easy to collect and take less time and they collect 30 to 40 limes per head. Under this method at least 4 people worked in a country boat.

LIME SHELL

The state is deficient in high grade lime stone. Consequently the requirement of limes for chemical industry is depend on the lime shell resources occurring in the backwaters estuaries, river mouth and lagoons along the costal backs. The department of mining and geology by its detailed investigation in certain parts of Vembanad Lake and adjoining areas has established a reserve of 3.29 million tons.

CLAM FISHERMEN

The Vembanad Lake area is home to thirty-two fishing communities. The black clam fishery employs about 6,500 people, of whom 3,658 are fishermen and the remaining individuals are their spouses, kids, and grandparents (Kripa et al, 2004; Sathiadhas et al., 2004). Their primary source of income is the fisheries; some work other part-time jobs. Families that depend on fishing are long-term residents of their villages. Of these, 52% share a home with their parents and grandparents, and 48% are part of nuclear families.

BLACK CLAM FISHERY

The societies handle the sales of the clam shells. They were formed in the late 1940's and early 1950's, so the clam shells could be sold in an organized manner. The societies purchase the clam shells from the fishermen at a rate of Rs.600–700 (US\$13–15)/ton. Out of this, the societies pay Rs.25 (US\$0.55)/t as a royalty to the State Mining and Geology Department.

The society also takes 6 rupees (US\$0.13) and sets it aside for every 30 rupees (US\$0.66) they pay to the fishermen. The money is used for the benefit of the fishermen: 1 rupee is for time lost during the monsoon, 1 rupee pays for the national festival, 2 rupees for the regional festival, and 2 rupees are for emergencies, such as financial trouble of the fishermen.

In one village, Udayamperoor, local women perform all the activities from harvesting, processing, and selling to consumers.



RESULTS

- The shell weight is higher in zone A compared to Zone B.
- The temperature is least in zone B with a range of 26.1-33.46 °C. And zone A and Zone C has a slightly higher temperature.
- The salinity in zone B is high with 0.10.18 ppt while in zone A and zone C salinity is of maximum 8.54 ppt. These analyses indicate that there is a relation between the population characteristics like age structure and various abiotic factors that determine the growth and development of villorita in different parts of Vembanaud lake. The difference in biochemical composition is also related with these factors.
- More detailed further studies required for understanding all the factors contributing to the variation in age structure, biochemical composition and abiotic factors that affect the villorita population in Vembanaud lake.
- When we are considering the way in which the people live using this black clam marketing there are 32 fishing villages around Vembanaud Lake. About 6,500 people are involved in the black clam fishery, 3,658 of these are fishermen and the remainder are their wives, children, and grandparents. This fishery is their main source of income. Fishermen families are permanent residents of their villages. Among them, 52% live jointly with their parents and grandparents, while the remaining 48% belong to nuclear families.
- Marketing Black Clam Meats is by fishermen's wives usually sell the meat. Most is sold in the local village door-to-door, where it is included as an important component in their evening meal for its high nutritional value.
- From these observations it is concluded that, biochemical composition of the clam in the estuary is directly or indirectly influenced by the presence of bund. So closing and opening of bund should be regulated in such a manner that, which affect the clam bed in least adverse level.

DISCUSSIONS

More abundant than mussels and oysters, clams are an abundant source of protein-rich food that are maybe the most commonly used and distributed aquatic mollus. They have economic value as both food and industrial raw materials.

According to a study done to determine the seasonal variations in the biochemical composition of black clams, the size of the clams growing there has a significant impact on the biochemical parameter variation. In this case, the growth is greatest in north of Vembanaud Lake, where adult species predominate, and subadult species is predominant south of Vembanaud Lake. This study indicates that across Vembanaud Lake, salinity is the primary element responsible for the formation of adult and subadult forms.

A study on clam culture and age structure makes evident how clams are harvested from the wild, how seeds are stored in hatcheries, and how clams grow in different parts of coastal zones and other locales. The information gathered makes it clear that the clam production is extremely valuable to the individuals that depend on it. The production and distribution of clams has a significant impact on people's lives, according to the Kumarakom Lime Shell Cooperative Society.

Even though the lime shell businesses benefit from it, the ordinary man's diet and dining experience make it extremely valuable for the nobles.

Around the world, a wide range of clam species have been gathered and raised, depending on the particular habitat and hatchery method used.

They are sold to the industries after being carefully dredged. Due to the fresher water in the southern portion of the lake, black clam stocks appear to be progressively dropping; however, this is not the case in the northern half of the lake. Future fishery declines could pose a serious threat to the landings.

It is the most prevalent species that is readily available in Vembanaudlake because a clam's life mostly depends on its availability. It is dependent upon the local social, cultural, and economic values hence they're the "Charismatic Megafauna".

CONCLUSION

The *Villorita cyprinoides*, or black clam, is the most important species of clam to arrive in India. The State of Kerala has been by far the main producer of this species. The longest estuary on India's west coast, Vembanaud Lake, is 96 km long. Approximately 25,000 tons (t) of landings occur there annually, or almost all of them. Approximately 4,000 fishermen harvest black clams all year long. They pick most of it by hand as they descend into water that is between 2.1 and 2.7 meters (7 to 9 feet) deep. Each person gathers 150–200 kg (3–5 bushels) every day. Sub-fossil black clam shells, buried between 22 and 50 cm (9 and 20 in), are abundant in the lake's layers. They are meticulously excavated and then sold to the same industry. Black clam stocks seem to be gradually declining in the southern part of the lake because of the fresher water there, but this is not the situation in the northern half of the lake.

Small-sized clam harvesting was popular in the past, but these days, fishermen cultivate their clams to larger sizes before harvesting them. Since many homes on the island participate in the clam fishing industry, there is a need to investigate the possibilities of grouping and coordinating the activity for more sustainable collection, improved processing, and effective marketing.

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