

WETLAND ECOLOGY AND SHELL FISH DIVERSITY OF VELI LAKE

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ABSTRACT

Wetland is the general term applied to the land areas that are seasonally or permanently water logged including lakes, rivers, estuaries and fresh water marshes. Now days, the wetlands are depleting in an ever increased rate. Estuarine waters serve as nursery grounds for shell fishes. The present study aimed to provide baseline information on the status and distribution of shell fishes in Veli Lake. The study also assesses the present threats and reasons of diversity loss of shell fish community. Shell fishes play a key role in the provision of ecosystem services essential to the maintenance of wetlands. The Veli Lake is the smallest estuarine wetland in the southwest coast of Kerala situated at Thiruvananthapuram. The Lake has been deteriorated because of the pollution load due to the industrial discharge from Travancore Titanium Products and English Indian clay factory. Shell fish diversity was assessed by the use of standard keys and surveys. A total of 17 species of molluscs, prawns and crabs, belonging to 9 families were identified during the present study. Molluscs were the most abundant group with 6 families. Molluscs (47.04%), prawns (29.38%) and crabs (23.5%) were contributed to the total shell fish population in the present study. *V. cyprinoides* under the family *Corbiculidae* was the most dominant shell fish species, which was common during all collections. The pollution resistant invasive species, *M. tuberculata* was also collected during the study. Most of the shell fish species in the present study were categorized under the not evaluated category specified by IUCN. Low diversity and lower species richness indicates stressed condition of the Lake. The environmental integrity of Veli Lake is in a steady state of decline due to the environmental and climatic disturbances, uncontrolled resource use such as over exploitation of shell fishes mainly for commercial purposes, pollution and eutrophication, mangrove destruction, sand mining, exotic species invasion, habitat loss due to the Lake reclamation along with illegal conversion and encroachment of the Lake.

KEYWORDS: Ecology, Estuary, Shell Fishes, Species Diversity, Veli Lake, Wetland

Wetland is the general term applied to the land areas that are seasonally or permanently water logged including lakes, rivers, estuaries and fresh water marshes (Anderson et al. 2013). Ramsar Convention provided the frame work for the conservation of wetlands (Elliot et al. 2007). According to the Ramsar Convention, wetlands are areas of marsh, fen, peat land or water, whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish or salt, including areas of marine water and the depth of which at low tide does not exceed 6m ([http:// www.ramsar.org](http://www.ramsar.org)).

The wetlands all over the world faces severe ecological crisis (Dugan; 1990). Now days, the wetlands are depleting in an ever increasing rate. Estuarine waters serve as nursery grounds for shell fishes (Fischer; 1997). Shell fishes play a key role in the provision of ecosystem services essential to the maintenance of wetlands. Shell fishes play a key role in the energy flow and bio geochemical cycle of the wetland habitats.

The present hydro-ecological study was conducted in the Veli Lake. The Veli Lake is the smallest estuarine wetland in the southwest coast of Kerala (08° 31' and 08° 31' NL and 76° 522 30' to 76° 532 30' EL) situated at Thiruvananthapuram (fig. 1.). The lake remains separated from the Arabian Sea by a sand bar. During monsoon a temporary connection, 'pozhi', is established

between the sea and the lake due to the sand bar break after the cessation of the rain. The lake is a shallow one with a mean depth of 2.4 meter and has a length of 1.25 km and width 0.44 km.

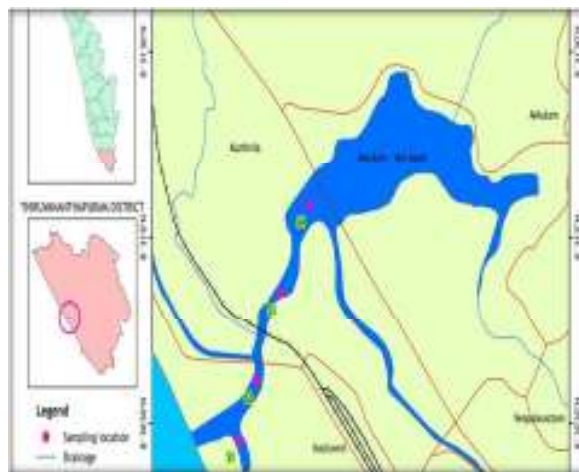


Figure 1: Study Site –Veli Lake

Two canals, the Channankara (Parvathy puthenar) and the Kulathur join the lake at the northern side. On the South, the Veli Lake is connected to the Akkulam Lake by a narrow channel. The Kannammoola canal drains at Akkulam Lake carrying all the water from the city. In the close vicinity of the lake are two factories,

the English Indian clay factory in the southern bank of the lake and the Travancore Titanium Products in the eastern side. The Lake has been deteriorated because of the pollution load due to the industrial discharge from Travancore Titanium Products and English Indian clay factory. Very little is known about the diversity and distribution of shell fish resources of Veli Lake.

OBJECTIVES

The present study aimed to provide baseline information on the status and distribution of shell fishes in wetland Lake Veli. The study highlights the shell fishery potential and diversity in relation to the prevailing wetland ecological status of Veli Lake. The study also assesses the present threats and reasons of diversity loss of shell fish community in Veli Lake.

MATERIALS AND METHODS

Shell fishes were collected using D-frame net and Ekman’s grab for 2 years. Shell fish diversity was assessed by the use of standard keys and surveys. Shellfish samples were preserved in 4% formalin for identification by using standard keys of Pennak (1989), Edmondson (1993) and Fish Base (Froese and Pauly; 2013). Descriptive statistics was prepared and processed by the help of PALSTAT software.

RESULTS

The results are presented in table 1 and table 2. A total of 17 species of molluscs, prawns and crabs, belonging to 9 families were identified during the present study. Molluscs were the most abundant group with 6 families. Molluscs (47.04%), prawns (29.38%) and crabs (23.5%) were contributed to the total shell fish population in the present study. *Villorita cyprinoides* was collected as common species during the entire study period. As per family wise analysis, Portunidae and Penaediae were considered as the dominant families (Table 2). The present study revealed that *V. cyprinoides* under the family Corbiculidae was the most dominant shell fish species, which was common during all collections.

Most of the shell fish species in the present study were categorized under the not evaluated category specified by IUCN. Habitat specificity analysis revealed the specific categorization of the shell fish habitat as resident, marine and freshwater. Most of the species recorded during the present study were emigrants from sea, which include the prawn family Penaediae and swimming crab family Portunidae. Freshwater species *M. rosenbergii*, mangrove species *T. telescopium*, resident

species *S. serrata*, *V. cyprinoides* and *P. malabarica*, brackish water species *M. metacalfei*, *M. meretrix*, *P. perna*, *B. tentaculatus* and invasive species *M. tuberculata* were collected during the study (Table 2).

Table 1: Shell Fish Diversity of Veli Lake

Sl. No.	Family	Scientific names
Molluscs		
1	Mytilidae	<i>Perna perna</i>
		<i>Modiolus metacalfei</i>
2	Veneridae	<i>Meretrix meretrix</i>
		<i>Paphia malabarica</i>
3	Thiaridae	<i>Melanoides tuberculata</i>
4	Bithyniidae	<i>Bulimus tentaculatus</i>
5	Corbiculidae	<i>Villorita cyprinoides</i>
6	Potamididae	<i>Telescopium telescopium</i>
Prawns		
7	Penaediae	<i>Fenneropenaeus indicus</i>
		<i>Metapenaeus affinis</i>
		<i>Metapenaeus dobsoni</i>
		<i>Penaeus monodon</i>
8	Palaemonidae	<i>Macrobrachium rosenbergii</i>
Crabs		
9	Portunidae	<i>Scylla serrata</i>
		<i>Portunus sanguinolentus</i>
		<i>Portunus pelagicus</i>
		<i>Charybdis cruciata</i>

Table 2: Family Wise Percentage of Shell Fishes From Veli Lake

Sl. No.	Family	Percentage of family	Total percentage
Molluscs			
1	Mytilidae	11.76	47.04
2	Veneridae	11.76	
3	Thiaridae	5.88	
4	Bithyniidae	5.88	
5	Corbiculidae	5.88	
6	Potamididae	5.88	
Prawns			
7	Penaediae	23.5	29.38
8	Palaemonidae	5.88	
Crabs			
9	Portunidae	23.5	23.5

The pollution resistant invasive species, *M. tuberculata* was collected during the study. Freshwater species *M. rosenbergii*, mangrove species *T. telescopium*,

resident species *S. serrata*, *V. cyprinoides* and *P. malabarica*, brackish water species *M. metacalfei*, *M. meretrix*, *P. perna*, *B. tentaculatus* and invasive species *M. tuberculata* were collected from the lake during the study. As per IUCN red list status (<http://www.iucnredlist.org>), the shell fish species *V. cyprinoides*, *M. tuberculata*, *T. telescopium* and *M. rosenbergii* were categorized under the least concern category and the remaining species were placed under the not evaluated category.

Diversity and species richness were maximum in monsoon. The mangrove dependent species *T. telescopium* and *M. rosenbergii* were showed comparatively less in number than the other fauna during the period of study. Exotic weeds such as *Eichhornia crassipes* and *Salvinia* spp. prevailed in Veli Lake. Low diversity and lower species richness indicates stressed condition of the Lake. In fact, the lake is being polluted heavily; the place is becoming the point of waste disposal from hotels, hospitals and industries

DISCUSSION

Deliberate hunt for *M. rosenbergii* owing to their handsome economic value may subsequently lead to their population reduction in Veli Lake. Exotic weeds such as *Eichhornia crassipes* and *Salvinia* spp. prevailed in Veli Lake, decomposing of these weeds increases the eutrophication rate as suggested by Harikrishnan (2011). Sand mining prevails in Veli Lake, which damages the natural habitat and adversely affects the growth and survival of shell fishes due to the habitat destruction and similar situations were reported by Nandan (2008). Illegal fishing characterized with unfriendly fishing practices had contributed to declining abundance of shell fish species (Gamito; 2008).

Organic pollution due to intensive coir retting process and the disposal of municipal sewage can very well be the reasons of decline of shell fishes in Veli Lake, as suggested by Nandan (2008). Now a day the mangrove vegetation in Veli Lake facing acute depletion and that also may be a reason of lesser shell fish diversity since mangroves are considered to be the nursery ground for many shellfish species. Degradation in the water quality, habitat alteration and reclamation practices in the lake may disturbs the shell fish community structure and modify its functioning (May and Spears; 2012). Industrial pollution contributed from the nearby factories, pesticide and fertilizer pollution, domestic pollution and eutrophication contributed the diversity reduction of shellfishery fauna in

Veli Lake. Now the indigenous fauna of the lake replaced gradually by pollution and stress resistant species such as *V. cyprinoides* and *M. tuberculata*.

Distribution pattern of fishes even may be disturbed as a result of stressful polluted environment in Veli Lake (May and Spears; 2012). The rising demand for commercial shell fishes resulted in overfishing, which may be attributed to the decline of the species (Lotze; 2010). An integrated management plan has to be formulated for the conservation of Veli Lake, which should reflect the carrying capacity of the lake for anthropogenic activities and should optimize the sustainable use of existing natural resources.

CONCLUSION

The environmental integrity of Veli Lake is in a steady state of decline due to the environmental and climatic disturbances, uncontrolled resource use such as over exploitation of shell fishes mainly for commercial purposes, pollution and eutrophication, mangrove destruction, sand mining, exotic species invasion, habitat loss due to the Lake reclamation along with illegal conversion and encroachment of the Lake.

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