VEMBANAD FISH COUNT REPORT 2009

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Ashoka Trust for Research in Ecology and the Environment.
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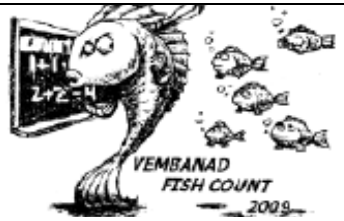

VEMBANAD FISH COUNT 2009

Report of the Participatory Fish Resources Survey of the Vembanad Lake , Kerala

May 2009

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VEMBANAD FISH COUNT 2009

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Kerala Biodiversity Board was also a coordinator of this programme. Nishanth (project fellow) participated in the event fully and the board has provided technical and financial supports. The Dean of Fisheries College, Panagad, Dr. Mohanakumaran Nair deserves special mention for rendering required supports. He was there to provide advises as a member of the Advisory committee constituted. An efficient team of students and faculty including Prof (Dr).Jayachandran facilitated the survey rendering their expert skill to identify each species of fish including the much complex crustaceans, caught from the lake.

The team from St Alberts College Ernakulam which actively participated in the Count and the advice and help of Dr. F.G. Bennopereira was usefuk for the smooth functioning of the program.

The Environment Department of MG University was also there, rendering all supports especially for monitoring the water quality of the lake in specified points. We are thankful to Dr. A.P. Thomas, HOD for rendering supports .

Other institutions which actively participated in the event includes School of Applied Life Sciences, Chuttipara Rajagiri College of Social Sciences, Kalamasseri, S.D College, Alapuzha, P.M.T College, Mavelikkara, Govt

We owe a lot to Sri. Venugopal IFS honorable collector of Alappuzha who inaugurated the valedictory function and shared his concerns to save the lake and its biota, Shri. C. K. Bhaskaran , President of the Muhamma Panchayth who presided over the preparatory workshop. A fleet of print and electronic media covered the function giving adequate publicity to reach out the un reached mass who are also concerned of such issues.Notable print media like The Hindu, Indian Express, Malayala Manorema, Mathrubhumi, Desabhimani, Kerala Kaumudi and video channels like Surya, Manorama news,etc , covered the events. Thanks to all

Finally we thank those who helped to develop this report. The list includes, Dr.Jayachandran ,College of Fisheries,Panangad, Shri.Rajeev Raghavan ,Conservation Research Group, St.Alberts College, Cochin and Krishna Kumar.K, Shijo Joseph of ATREE Team

Foreward

The health of the land is reflected in the health of its rivers, lakes and streams. And the health of the freshwater systems is mirrored in its biodiversity. Diverse fish implies a water body that is in good balance. Ask the fishermen of Vembanad and they will tell you what it takes to keep a lake healthy as their livelihoods depend on it. As I write the forward to the Report of the 2009 collective fish count of the Vembanad ecosystem I am reminded that its success was possible because of the enthusiastic participation of a wide cross-section of society. The varieties of fish that make Vembanad their home is a heritage that the citizens can be rightfully proud of. They must protect this heritage from any form of degradation or loss.

It is interesting to note that allowing tidal water to flow into the freshwater lake as is the natural cycle increased fish diversity. The presence of aggressive invasive fish needs to monitored closely and addressed as a possible risk that could threaten the native fish diversity.

It is heartening to note that the Kerala Biodiversity Board wants to expand such a fish count to the rivers of Kerala. I hope the Fish count becomes an annual `festival' celebrating the diversity of the Vembanad Lake. I wish that such community-based monitoring of biodiversity becomes popular for other taxa as well and spreads to other parts of the country. I congratulate the ATREE team and other members of the growing consortium for bringing out this informative report of a successful citizen-lead fish diversity count.

Dr. Gladwin Joseph

Director, ATREE

Preface

Conservation has changed its course from conserving a few species to conserving the greater diversity which include diversity of genes to habitats and the ecosystem functions. The experiences have taught us that our conventional conservation paradigms are largely top-down and ill suited to the current day conservation needs. The much celebrated participatory / joint conservation efforts failed to fetch the trust of the people because the decision making was largely top-down. Aiming at providing a more human face to conservation, ATREE is trying to apply deliberative democratic methods in conservation of natural resources. In deliberative democratic conservation, the conservation policies and prioritisation are done through consensus evolved through deliberations among various stakeholders. This will ensure the active participation of the communities in conservation decision making and cultivate ownership over the common resources.

Ashoka Trust for Research in Ecology and the Environment (ATREE) has set up Community Environmental Resource Centre (CERC, Alappuzha, Kerala), specifically to address the wetland related conservation and livelihood issues related to Vembanad backwaters, pursuing a deliberative democratic approach. ATREE tries to design conservation-oriented field interventions at Vembanad, to mitigate pressures from unsustainable use of resources, invasive species, and climate change. In this effort apart from various stakeholder groups, ATREE collaborates with several government and non- government organizations, private sector, policy makers, other civil society organisations and media to influence policy changes and create awareness. The state like Kerala, which is the pioneer in decentralized governance and peoples plan movement, is the right place to try out the unique deliberative democratic method for the conservation and management of natural resources.

The Vembanad Nature Club and Kayal Samrakshana Samithys (Lake Protection forums) are ATREE's important partners in our interventions in the fisheries sector. With the initiative of Kayal Samrakshana Samithys, based on the community's knowledge and expertise, several Fish Sanctuaries (Matsyathavalam) have been established in the Vembanad Lake. An independent technical evaluation of the performance of the sanctuaries by the fisheries experts of the St. Alberts College Ernakulam testifies "The establishment of fish sanctuaries helps greatly in sustaining the fishery of the lake."

Traditionally, conservation and management of the lake resources, especially fishery resources were vested in the hands of the local fishing communities. The reduced extent of the lake, the declining water quality, and other sorts of increasing human pressure on the lake have been detrimental on the fishery resources and livelihood of the traditional fishermen. With the intention of regaining the participatory methods in lake management and to enhance cooperation between various stakeholders, Govt. departments, NGOs and academic institutions and to create awareness about the state of the lake and its fishery resources , Ashoka Trust for Research in Ecology and the Environment (ATREE) has initiated the annual **Vembanad Fishcount** in May 2008. The second episode of the fishcount, theVembanad Fishcount- 2009 was conducted on 26th and 27th May 2009. The Kerala State Biodiversity Board, Regional Agricultural Research Station (RARS) of the Kerala Agricultural University, Vembanad Nature Club and various Lake Protection Forums of the fisher-folk were the co-organizers of the event. The Fisheries College, Panangad, St Albert's College (Ernakulam) and Environment Science department of the Mahatma Gandhi University have provided the necessary technical support for the event. ATREE's wetland Conservation team acknowledges all participant institutions and volunteers and has great pleasure in presenting this report of the Vembanad Fishcount 2009.

Priyadarsanan Dharma Rajan, Ph.D.

CERC Convenor and Principal Investigator

Editors' note

The Vembanad estuarine system, the largest wetland on the west coast of India is known to be abundantly enriched biodiversity with include diverse fishery resources, providing feeding, spawning and rearing areas for a very large proportion of commercial fish and shellfish. However, ecosystem health of the Vembanad wetlands is alarmingly declined due to a variety of reasons viz., Thannermukkom Bund, obstruction of river courses, sand mining & habitat destruction, loss of riparian canopy cover, encroachment, pollution and unethical fishing practices. Reduced summer flow due to drying up of rivers and pollution hazards from agro-chemicals and sewage also lead to mass mortality of fishes. As a result of human intervention the lake tainted its name to 'inland fish basket' to an 'Inland wastebasket', driving the fisher folks, the primary stakeholder of the lake to a livelihood and health crisis.

One of the hopes of backwater conservation lies in the 'active involvement of the dependent communities'. This can be made possible only by institutionalizing community rights over protection and harvest of the natural resources. To ensure the participation of the communities in conservation, it is necessary to cultivate the ownership feeling among people and they should realize nature conservation as essential for their own existence. In this backdrop Ashoka Trust for Research in Ecology and the Environment (ATREE) is trying to suggest a deliberative democratic conservation strategy for the Vembanad wetland. In the process of deliberative democratic conservation the conservation policies and prioritization are done through consensus evolved through deliberations among various stakeholders and transfer of responsibilities over its harvest and management to them.

With the intention of regaining the participatory methods in lake management and to enhance cooperation between various stakeholders, Govt. departments, NGOs and academic institutions and to create awareness about the state of fishery resources of the lake ATREE in collaboration with the Regional Agricultural Research Station (RARS), Kumarakom, and the Kerala State Biodiversity Board attempted to conduct a participatory fish census as the "Vembanad Fish Count-2008 a participatory fishery resource inventory and monitoring of the Lake, on 30th May 2008, involving scientists, naturalists, students, fishermen, and interested people. Besides inventorisation, it also aimed to create mass awareness

among the general public on conservation of Vembanad Lake through more sensible management.

65 species of finfish representing and 14 species of shell fish were recorded during this Fish count. The sites around Pathiramanal Island were observed the richest sector surveyed which recorded 50 fish species.

This fish count received wider attentions from all walks of life. This report is a summary of our findings and it paves way for future course of action as it is our dream to make this an annual event, involving more and more interested agencies and people.

Dr. Latha Bhaskar, Project
Coordinator, CERC,ATREE

25th May 2010

Alappuzha

Introduction

Extensive water and land remodeling efforts in Vembanad Lake has drastically changed the lake's water and landscapes, altering natural habitats of many terrestrial and aquatic fauna and flora. The major anthropogenic intervention in Vembanad region was focused to escalate the agricultural production in the reclaimed areas of Kuttanad. Thottappally spillway constructed in 1955 was intended for flood control but regrettably, the spillway channel was not constructed to the required size, resulting in only partial evacuation of the floods. Thaneermukhom Bund (1.441 km long) constructed during 1976 to avert salt water incursion on to the paddy fields of Kuttanad, was another major human intrusion in Vembanad Lake. Decline in primary productivity and fishery resources, growth of aquatic weeds and degradation in water quality are well documented consequences of this intervention. Thirty three species of commercially important fishes reported from Kuttanad, have declined drastically. Large scale fish mortalities have also been observed on several occasions (Azis & Nair, 1981). Seventy species of fishes were recorded from the region lying to the south of Thannermukkom bund in 1983 as part of Kuttanad Water Balance study. The tidal flushing action prevalent in the entire lower Kuttanad region has ceased and a drop in water level in the upstream region has been observed. Catches of prawn and other economically important crustaceans have also dwindled considerably. In addition, the unprecedented growth and spread of noxious aquatic weeds like *Salvinia and Eichornia* has created an alarming situation in the area. This has created problems for paddy cultivation, navigation and fishing. The lime shell industry has also suffered severe setbacks since the area south of Thaneermukhom bund maintains an oligohaline condition.

Past economic, agricultural and industrial development has overlooked the importance and necessity of resource

conservation and management. It was generally thought to be a luxury, to be concerned with such matters in the face of prevalent poverty and hunger and the more pressing need to meet the basic needs of a rapidly amplifying population.

Traditionally, conservation and management of the resources of Vembanad, especially fishery resources were vested with the local fishing communities. These community-based management systems evolved at the local or grassroots level, and were actively involved in the management of the resources they relied on for sustenance and livelihood security. There were several customs and traditional practices which were directly or indirectly protecting the fishery resources. Such functions, responsibilities and authority, however, slowly changed hands and are now vested with state government departments. People lost the feeling of ownership and to cope with the increasing living expenses, changed lifestyles and scarcity of resources, they adopted many destructive fishing practices which have accelerated the decline of fishery resources in the lake. In spite of the existence of several rules and regulations for the conservation and management of fishery resources and regulating the use of destructive gears, effective control mechanisms could not be exercised as the fishermen were not convinced of the same.

Vembanad Fish Count (VFC)

Ashoka Trust for Research in Ecology and the Environment (ATREE) initiated the "Vembanad Fish count" in this backdrop as an annual participatory fish assessment during May 2008 and repeating it in 2009. Several institutions and agencies like Kerala State Biodiversity Board, Regional Agricultural Research Station (RARS), Kumarakam, and the Fisheries College, Panangad, supported the event and several other colleges like St Albert's College (Ernakulam), Environment Science department of the Mahatma Gandhi University have actively participated. VFC is a participatory

approach paradigm in research and development which completely differs from the conventional top-down approaches. It is a stakeholder-focused program where the targeted group participates in the entire process, learning about the situation, identifying problems, discussing alternatives, seeking solutions, designing and implementing activities, evaluating and disseminating results. In these processes, target groups share their traditional knowledge to identify problems and solutions, ensuring that the poor and uninformed will not be excluded from decision making and development opportunities.

Researchers, students, fishermen, local self governments, schools, media persons, NGO's and environmentalists in the area became a part of the annual event and were very curious to learn about the status of fishery resources of the lake. This event has helped to consolidate views on the issues and convinced the need for immediate interventions in this sector, especially through participation of the stakeholders. This report acknowledges the efforts of each and every participant of this mega event and appeals all concerned to initiate adequate measures to safeguard the lake and its biodiversity.

Launching participatory approach to Small Scale Fishery Management

Coastal backwaters and inland water bodies are economically efficient systems, now fast declining due to lack of care, improper management, over exploitation and lack of awareness. One of the hopes of backwater conservation lies in the 'active involvement of the dependent communities in the management of the natural resources. This can be made possible only by institutionalizing community rights over protection and harvest of the natural resources. In the last few years, Ashoka Trust for Research in Ecology and the Environment (ATREE) has been trying to address some of the conservation issues faced by Vembanad Lake (Kerala) through a deliberative democratic process

(www.vembanad.org). ATREE aims to increase coordination between stakeholders and strengthen their capacity to address the various issues related to Vembanad backwaters and build multisectoral and multistakeholder partnerships at the local level to influence decision making.

As part of its efforts, ATREE, with the intention of regaining participatory methods in lake management and to enhance cooperation between various stakeholders, Govt. departments, NGO's and academic institutions and to create awareness about the state of fishery resources of the lake, initiated the Vembanad Fish Count, an annual community fishery resource assessment in 2008 (Report of Vembanad Fish Count, 2008). The second episode of the fish count, the Vembanad Fish count- 2009 was conducted on 26th and 27th May 2009. The Kerala State Biodiversity Board, Regional Agricultural Research Station (RARS) of the Kerala Agricultural University, Kumarakam, Vembanad Nature Club and various Lake Protection Forums of the fisher folk were the co -organizers of the event. The Fisheries College, Panangad, St Albert's College (Ernakulam) and Environment Science department of the Mahatma Gandhi University have provided the necessary technical support for the event. Several researchers, NGO's, environmentalists and media persons from all over South India and students, fishermen, local self governments, schools, from around the lake have participated in this annual event and were very curious to learn about the status of fishery resources of the lake. This event has helped to consolidate views on the issue and convinced the need for immediate interventions in this sector, especially through participation of the stakeholders.

27th May 2009 REPORT OF THE VEMBANAD FISH COUNT 2009

Objective

The main objective of this participatory assessment was 'to bring attention to the declining status of inland fisheries in the Vembanad Lake and to create a common platform to consolidate attention of all concerned, including the policy makers to discuss conservation issues.

Characteristic Features of Lake Vembanad

Vembanad Lake (9° 34' 60 N, 76° 25' 0 E) is a transitional ecotone between sea and land having a length of 96 km and a surface area of 1512 km^2. The rich biodiversity and socio economic importance, of Vembanad lake along with adjacent kole lands led to the declaration of the lake as a Ramsar site; a wetland of international importance. Seven rivers which originate from the Western Ghats Biodiversity Hotspot drain to the lake and eventually join the Arabian Sea. The mangrove patches and islands in the lake like *Pathiramanal* also provide habitat for resident and seasonal migratory water fowl, otters, fish, clams, shrimps, crabs, aquatic insects and other aquatic organisms. The lake is also famous for its tourism potential, live clam resources and sub-fossil deposits, as a habitat for the vulnerable spot billed pelican *Pelicanus philippensis*, large populations of water fowls, besides a high species diversity of finfish and shellfish (WWF 2002). One hundred and fifty species of fish belonging to 100 genera and 56 families are known to occur in Vembanad Lake (Kurup and Samuel 1985). The lake has a salt water barrier at Thaneermukhom which divides the lake into two parts - one half with perennial brackish water and the other with freshwater fed by the rivers draining into the lake. The freshwater region of the lake is facing ecological problems due to the rampant propagation of water hyacinth and eutrophication. Vembanad wetlands have long been acclaimed as the 'Inland fish basket' of Kerala State. But due to habitat alteration, eutrophication and other anthropogenic activities it tainted its name to 'Inland waste basket'.

Methodology

Wide media publicity was given about the 'Vembanad Fish Count 2009, inviting participation of interested persons. Institutions like Fisheries college, Environmental department of local Universities, Kerala State Biodiversity Board, Regional Agricultural Research Station, Schools and

colleges in Vembanad region, Cochin University of Science and Technology, Kerala State Pollution Control Board and Non Governmental Organizations etc. were contacted, inviting attention to participate.

Responding to the call, 150 volunteers from various colleges, Universities, research institutes and Non Governmental Agencies assembled at the St George Parish Hall at Muhamma on 25th May 2009. Participants were oriented on the methodology and were provided with a field guide with pictures of the fishes of Vembanad. The entire team was then divided into three sub-groups: the Kumarakam Cruise, Kuttanad Cruise and Pathiramanal Cruise with 40 -50 members in each team.

Each cruise team was further subdivided to assign responsibilities for 1) experimental fishing, 2) collecting data from landing centres, 3) collecting data from fishermen in the lake and 4) water quality monitoring. One week before the event, a scoping survey was conducted along the southern sector of Vembanad Lake to identify the key landing centers around the lake. The landing centre team left out to stay near the landing centres, to collect data from early morning hours of the fishcount day.

Experimental fishing was carried out from 15 geocoded sampling sites in the southern sector of Vembanad Lake using various gears such as gill net, cast net, seine net and scoop net, from 0600h - 1200h. Gill nets of two different mesh size (35mm and 50mm) was deployed at appropriate sites for one hour in the sampling sites, cast net and scoop net was operated 3 times (3 efforts) at respective sampling points. The abundance and occurrence of individual fish species was also noted.

Collection of catch data from fishermen were also done during the cruise, by the designated team. They examined the day's catch as well as the fishing gear and methods

Landing centre data from all the major landing centres around the sampling sites were collected to assess the species diversity of the catches on that day and were recorded. The type of gear used and fish composition was also documented.

Water quality parameters tested included dissolved oxygen, temperature, pH and transparency of the sampling sites.

Outcome

Vembanad Fish Count 2009 could identify 65 species of finfish and 14 species of shell fish, as detailed in the Table 1 below

Table. 1. **List of Fish Species: VEMBANAD FISH COUNT 2009**

Scientific Name	Common Name	Vernacular Name
1. Ambassis ambassis	Commerson's glassy	Aranghil
2. Parambassis ranga	Indian glassy fish	Aranghil
3. Parambassis dayi	Day's glassy perchlet	Aranghil
4. Parambassis thomassi	Western Ghat glassy perchlet	Aranghil
5. Amblypharyngodon melettinus	Attentive Carplet	Vayampu
6. A. mola	Mola Carplet	Vayampu

7. A. microlepis	Indian carplet	Vayampu
8. Laubuca dadiburjori	Dadio	*Mathiparal*
9. Labeo dussumieri	Common Labeo	Thooli
10. Puntius sarana	Olive barb	*Kuruva Paral*
11 Puntius filamentosus	Blackspot barb	*Poovali Paral*
12. Puntius vittatus	Greenstripe barb	*Kaipa Paral*
13. Puntius amphibious	Scarlet-banded barb	*Urulan paral*
14. Puntius melanostigma*	Wyanad Barb	*Paral*
15. Puntius ticto	Ticto barb	*Kadunghali paral*
16. P. sarana subnasutus	Olive barb	*Kuruva paral*
17. Rasbora daniconius	Common Rasbora	*Kaniyan paral*

18. Anabas testudineus	Climbing Pearch	*Kalle mutti*
19. Aplocheilus panchax	Blue panchax	*Manathu kanii*
20. Aplocheilus lineatus	Striped panchax	*Manathu kanni*
21. Aplocheilus blockii	Green panchax	*Manathu kanni*
22. Arius maculates	Spotted catfish	*Yeta koori*
23. Arius subrostratus	Shovelnose sea catfish	*Yeta koori*
24. Glossogobius giuris	Tank Goby	*Poolan*
25. Channa striata	Snakehead murrel	*Nadan viral*
26. C. marulius	Great snakehead	*Vaka viral*
27. C. orientalis*	Walking snakehead	*Vattan*
28. Chanos chanos	Milk Fish	*Poomeen*

29. Dayella malabarica	Day's round herring	*Paral*
30. Etroplus suratensis	Pearl Spot	*Karimeen*
31. Etroplus maculates	Orange Chromide	*Pallathi*
32. Gerres setifer	Small Bengal silver-biddy	*Pranghil*
33. G. filamentosus	Whipfin silverbiddy	*Pranghil*
34. Horabagrus brachysoma	Yellow catfish	*Manjha koori*
35. Eubleekeria splendens	Splendid ponyfish	*Mullan*
36. Photopectoralis bindus	Orangefin ponyfish	*Mullan*
37. Liza tade	Mullet	*Kanampu*
38. Mugil cephalus	Gray Mullet	*Kanampu*
39. Heteropneustes fossilis	Stinging Catfish	*Kari*

40. Alepes djedaba	Shrimp scad	*Vatta*
41. Carangoides malabaricus	Malabar trevally	*Vatta*
42. Mystus gulio	Long whiskers catfish	*Chattithalayan Koori*
43. Mystus armatus	Kerala mystus	*Chillan koori*
44. Mystus vittatus	Striped Catfish	*Varayan koori*
45. Pangasious suchi	Fresh water Shark	*Malasian vala*
46. Mastacembelus armatus	Peacock eel	*Aarakan*
47. Pseudosphromenus cupanus	Paradise fish	*Karinkanna*
48. Pseudosphromenus cupanus dayi	Spiketail paradisefish	*Karinkanna*
49. Stolephorus indicus	Indian anchovy	*Attu Choodan*
50. Ompok malabaricus	Butter catfish	*Dharman*

51. Wallago attu	Helicopter catfish	*Attu vala*
52. Nandus nandus	Leaf Fish	*Urakkam Thoonghi*
53. Carinotetraodon travancoricus	Malabar Puffer Fish	*Thavala pottu*
54. C. imitator	Dwarf Indian Puffers	*Thaval pottu*
55. Xenentodon cancilla	Full beak	*Kolan*
56. Scatophagus argus	Scat	*Nachara*
57. Brachirus orientalis	Oriental sole	*Pulli manthal*
58. Cynoglossus sp.	Sole Fish	*Nanghu*
59. Hyporamphus xanthopterus	Half Beak	*Morashu*
60. Chelodon patoca	Milk Spotted puffer	*Kadal Makri*
61. Balistes capriscus	Grey triggerfish	*Klathi*

62. Pterygoplichthys multiradiatus	Sucker Catfish	*Sucker*
63. Johnius dussumieri	Sin Croaker	*Kuttan*
64. Siganus javus	Rabbit Fish	*Muyal malsyam*
65. Lates calcarifer	Asian Seabass	*Kalanchi*
Shell Fish		
1. Metapenaeus dobsonii	Kadal shrimp	Poovalan chemeen
2.M. monoceros	Speckled shrimp	Choodan
3. Penaeus monodon	Gaint Tiger Prawn	Kara
4. Fenneropenaeus indicus	Indian white shrimp	Naran
5. Macrobrachium rosenbergii	Giant freshwater Prawn	*Kalan konchu*

6. M.idella	Sunset Shrimp	Koonan Konchu
7. Leptocarpus potamiscus	Bombay Prawn	
8. Caradina naderjoni		
9. C. pseudo-gracilirostris		
10.Scylla serrata	Mud Crab	Kayal Ghandu
11.S. tranquebarica	Purple Mud crab	Kayal Ghandu
12.Villorita cyprinoides	Black clam	Kakka
13 Lamelliden marginalis	Pearl mussel	Kakka
14 Pila globosa	Apple snail	Nattakka

* Taxonomic Ambiguity

Sector Wise Analysis

Three cruises covered the southern portion of the lake spread, as per the route map attached.

Table. 2**. Sector wise analysis**

Fish species	***Kumarakam Cruise***	***Muhamma Cruise***	***Kuttanad Cruise***
1. Ambassis ambassis	√	√	
2. Parambassis ranga	√		√
3. Parambassis dayi	√	√	
4. Parambassis thomassi	√	√	√
5. Amblypharyngodon melettinus	√		√
6. A. mola		√	
7. A. microlepis			√
8. Chela dadyburjori		√	

9. Labeo dussumieri	√	√	√
10. Puntius sarana	√	√	√
11 Puntius filamentosus	√	√	√
12. Puntius vittatus	√	√	√
13. Puntius amphibius		√	√
14. Puntius melanostigma			√
15. Puntius ticto		√	
16. P. sarana subnastus		√	√
17. Rasbora daniconius	√		√
18. Anabas testudineus	√	√	√
19. Aplocheilus panchax	√		

20. Aplocheilus lineatus		√	√
21. Aplocheilus blockii		√	
22. Arius maculates		√	
23. Arius subrostratus	√	√	
24. Glossogobius giuris	√	√	√
25. Channa striata	√	√	√
26. C. marulius			√
27. C. orientalis			√
28. Chanos chanos		√	
29. Dayella malabarica	√	√	
30. Etroplus suratensis	√	√	√

31. Etroplus maculates	√	√	√
32. Gerres setifer		√	
33. G. filamentosus	√		
34. Horabagrus brachysoma	√	√	√
35. Eubleekeria splendens	√	√	
36. Photopectoralis bindus			√
37. Liza tade		√	
38. Mugil cephalus	√	√	
39. Heteropneustes fossilis	√	√	√
40. Alepes djedaba		√	
41. Carangoides malabaricus	√	√	√

42. Mystus gulio	√	√	
43. Mystus armatus			√
44. Mystus vittatus		√	
45. Pangasious suchi			√
46. Mastacembelus armatus		√	√
47. Pseudosphromenus cupanus	√	√	√
48. Pseudosphromenus cupanus dayi			√
49. Stolephorus indicus	√	√	
50. Ompok malabaricus		√	
51. Wallago attu			√
52. Nandus nandus		√	√

53. Carinotetraodon travancoricus	√	√	√
54. C. imitator		√	
55. Xenentodon cancilla	√	√	
56. Scatophagus argus		√	
57. Brachirus orientalis	√	√	
58. Cynoglossus sp.		√	
59. Hyporamphus xanthopterus	√	√	√
60. Chelodon patoca		√	
61. Balistes capriscus		√	
62. Pterygoplichthys multiradiatus			√
63. Johnius dussumieri	√	√	

64. Siganus javus		√	
65. Lates calcarifer		√	
Shell fish			
1. Metapenaeus dobsonii		√	
2.M. monoceros		√	
3. Penaeus monodon	√		
4. Fenneropenaeus indicus		√	
5. Macrobrachium rosenbergii		√	√
6. M.idella		√	√
7. Leptocarpus potamiscus		√	√
8. Caridina naderjoni		√	√

9. C. pseudo-gracilirostris	√	
10.Scylla serrata	√	
11.S. tranquebarica	√	
12.Villorita cyprinoides		√
13 Lamelliden marginalis		√
14 Pila globosa	√	

Kumarakam cruise , which covered Nazrath(Kumarakam), Thannermukkom and R block, recorded 32 species of fin fish and 1 crustacean. The salinity of these sites varied from 0.9 ppt to 3ppt. Experimental fishing carried out by this team led to the collection of 6 species of fin fish and one crustacean from Thannermukkom, 5 species of fin fish and one crustacean from Kumarakam and 9 species of finfish from R block. The landing centre group of this cruise covered the landing centres in Thannermukkom, Kumarakam, Vechoor and Pallom and recorded 29 species of finfish and 1 crustacean. Detailed water quality analysis result is provided in table 3.

Table. 3. **Vembanad Fish Count-2009 (Kumarakam Cruise): Water Quality Results**

Parameters	Nazrath	Thanneermukkom	R- Block
pH	7	7	8
Transparency(cm)	136.5	174.5	181
Rainfall	0	0	0
Tidal Phase	Low Tide	Low Tide	Low Tide
Dissolved Oxygen (ppm)	7.6	6.8	7.6
Salinity (ppt)	2	3	0.9
Temperature (Water)	27	27	28
Temperature (Air)	28	29	29

Muhamma cruise explored sites like Muhamma, Kaipuram, Pathiramanal and Aryad and recorded the maximum number of species i.e. 50 species of fin fish and 10 species of shell fish. Salinity of the site varied from 0-3ppt. The experimental fishing team in this area collected 18 species of fin fish and 2 species of shell fish from Kaipuram, 16

species of fin fish and 4 crustaceans from Pathiramanal and 14 species of fin fish and 4 crustaceans from Aryad. The landing centre groups recorded 23 species of fin fish and 1 crustacean.

Water quality analysis of selected sites was also carried out and the results were furnished in table 4 below.

Table .4. **Vembanad Fish Count-2009 (Muhamma Cruise): Water Quality Results**

Parameters	Pathiramanal	Kaipuarm	Aryad	Muhamma
pH	7.5	7.5	8	8
Transparency(cm)	153	167	173.5	197
Rainfall	0	0	0	0
Tidal Phase	Low Tide	Low Tide	Low Tide	Low Tide
Dissolved Oxygen (ppm)	7.2	7,5	7.3	4
Salinity (ppt)	2	2	3	2
Temperature (Water)	28	27	28	29
Temperature (Air)	29	28	29	30

Kuttanad cruise, covering the sites Kuppapuram, Kainakary and Pallathuruthy recorded 34 species of fin fish and 6 species of crustaceans , which included two exotics viz. Sucker catfish (*Pterogoplichthys multiradiatus*), and Freshwater shark (*Pangasius hypophthalmus*). Salinity of the site varied from 0 to 3ppt. Experimental fishing conducted by the team recorded 12 species of fin fish and 2 species of shellfish from Kuppapuram, 12 species of fin fish and 4 crustaceans from Kainakary as well as 9 species of fin fish and 4 crustaceans from Pallathuruthy. The landing centre group of this cruise covered the landing centre in Alappuzha and Punnamada and have recorded 24 species of fin fish and 1 crustacean. Detailed water quality analysis result is provided in table 5.

Table. 5. **Vembanad Fish Count-2009 (Kuttanad Cruise): Water Quality Results**

Parameters	Kuppapuram	Kainakary Vattkayal	Pallathuruthi
pH	**7.5**	**7.5**	**7.5**
Transparency(cm)	**145**	**188**	**173**
Rainfall	**0**	**0**	**Little**
Tidal Phase	**Low Tide**	**Low Tide**	**Low Tide**

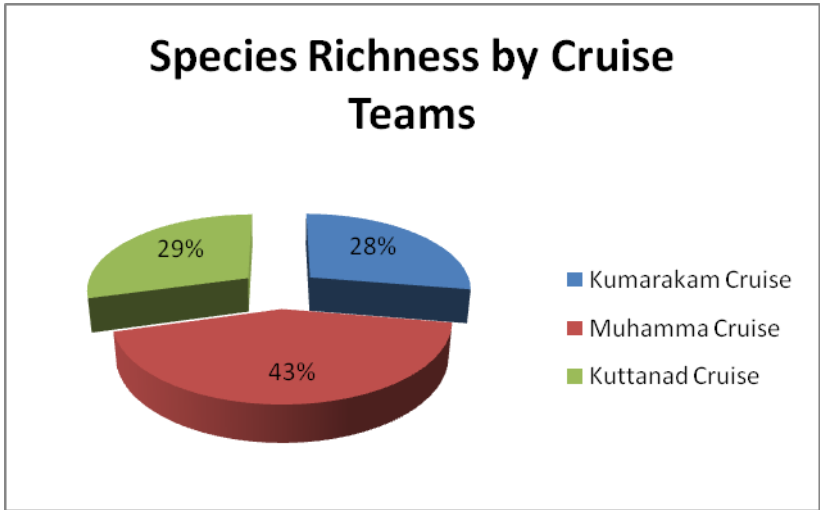
Dissolved Oxygen (ppm)	**5.9**	**6**	**8.6**
Salinity (ppt)	**2**	**3**	**0**
Temperature (Water)	**29**	**27**	**27**
Temperature (Air)	**32**	**27**	**28**

Observations

A total of 65 fin fish species were recorded from the lake in 2009 where as only 51 species were recorded in 2008. The number of shell fish has also increased substantially from 11 species in 2008 to 14 in 2009. Two non native species viz. *Catla catla* and *Oreochromis mossmbicus* reported in 2008 was absent in the 2009 survey. In total the survey added 13 more native fish species and 3 shell fish species to the fish fauna of the lake. The survey also recorded two exotic species (Sucker catfish and Sutchi catfish) from the lake, for the first time. Among the newly recorded species, 8 were estuarine species which proliferated in the lake due to timely opening of the Thannermukkom Salt water barrier. *Anguilla bicolar* (Eel), *Anguilla bengalensis and Clarias dussumieri* (Walking Catfish) which was available in plenty a few years back is found to have disappeared from the lake. The reason for vanishing eels from the southern sector of the lake is caused by stake net operation in the

northern part of the lake and dams as both these obstruct the migratory pathway of eels. The other 5 species were typical riverine species dominated by cyprinids which occurred mainly as a result of summer rains during the time of assessment. Around 17 species of fish were observed in all three cruises which included many commercially important varieties such as Channa, Carangids and Pearl spot. Silver belly (*Gerrus filamentosus) was* recorded only from Kumarakam cruise.19 species of fishes including marine fishes like Puffers, File fish, Rabbit fish and Sea bass was recorded exclusively by Muhamma cruise. 10 species of fishes mainly riverine fishes were recorded only by Kuttanad Cruise. Species richness by the three cruise teams are provided in figure 1

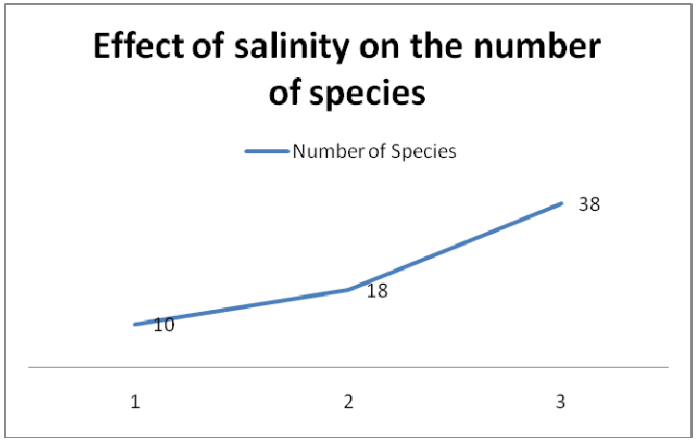
Figure 1



A good number of species recorded by the three teams were from the landing centre inventory conducted at the major landing centres adjoining the lake. The salinity intrusion in the lake has led to an increase in species richness, and the diversity of fish species is more in the brackish water zones of the lake compared to others. The

change in species richness with regard to salinity levels is shown in Figure 2. The increase in species richness in fish count 2009 as compared to the fish count in 2008 was mainly as a result of early opening of Thaneermukhom salt water barrier which allowed saline water to flush in and clean the lake, facilitating the occurrence of euryhaline brackish water species like Carangids, Puffers, and Trigger fishes to enter the southern part of the lake.

Figure 2.



The Vembanad Fish Count 2009 points to a new threat to fishes of Vembanad Lake – Invasive Alien Species (IAS). The survey reported the occurrence of the exotic Sucker catfish. *Pterogoplichthys multiradiatus*, an armoured catfish native to the South American drainages, is a popular aquarium pet worldwide and is known commonly as 'algae eater'. Species under the genus *Pterygoplichthys* have been introduced worldwide as a result of the ornamental fish trade. In the Philippines, where they are known as janitor fish, two species have established feral populations in Marikana River and Laguna de Bay, and are considered a threat to the native freshwater fishes. *P. multiradiatus* is also known to have established in natural waters of countries as widespread as Puerto Rico, United States of America and Taiwan. They are omnivores, attaining large sizes (up to 500 mm) and exhibiting territorial behavior. Further, they are capable of tolerating pollution because of their air-breathing ability and are also known to create serious

negative impacts on periphyton feeding and bottom spawning fishes. Similar situations may be replicated in water bodies like Vembanad, where economically valuable bottom spawners such as *Etroplus suratensis* occur. Grazing on benthic algae and detritus by sucker mouth catfish is also known to alter and reduce food, and physical cover available for various aquatic insects, thereby affecting the tropic chain. Around twelve ornamental varieties are reported from various water bodies of Kerala and the reports of their adverse environmental effect is widely known, but still governmental organizations has not yet done anything to prevent similar instances . Even though Kerala has many native ornamental fishes with high market potential, instead of promoting the culture of native varieties the government promotes ornamental fish culture with exotic varieties and undertakes import of exotic ornamental fishes, without proper risk assessment. Aquarium fish species also escape from tanks while draining water, due to splintering, or they may be released for various other reasons such as when they have grown too large to be kept in an aquaria, the owners are tired caring for the fish, or throw away heavily infected fish, or through escape from the culture ponds during floods. There exist high risks to the freshwater environment from the commercial aquarium trade and one aspect of prevention could include only allowing trade in species that do not survive in the wild. Exotic ornamental fish farms and hatcheries should not be allowed to function close to natural water bodies like lakes and rivers. Also the import of aquarium species to Kerala should be done only after proper risk assessments.

The survey also reported occurrence of *Pangasianodon hypophthalmus* (Suchi Catfish) from Punnamada. As the aquaculture of Pangassius is not regulated, there are many culture systems persisting adjacent to wetlands like

Vembanad Lake. Detailed studies should be conducted to determine the impacts and methods best to capture and control this dangerous species. The development of management plans should aim at minimizing probable impacts of this invasive species. The strategy must include increasing the consciousness of scientists, farmers, fishers, legislators and general public about these exotic fishes, along with rigorous application of existing laws. Studies must be done in order to determine the existing aquaculture systems adjacent to all the major wetlands culturing Pangassid catfish. Being a highly aggressive and voracious feeder that eats a very wide spectrum of aquatic organisms, the presence of the Pangasid Catfish in Vembanad Lake and its associated rivers is sure to spell doom for the rich and endemic fish fauna of this region. As an alternative to this species it is strongly recommended to propagate the culture of our indigenous species. Among the native fishes more than ten fishes including Pearl spot, Yellow catfish, Snakeheads, Freshwater Shark and Stinging catfish having high market demand has been reported to be suitable for culture. Another most important and urgent necessity is to ban the production and marketing of seeds of the exotic Pangassius in Kerala and neighboring states.

Recommendations

1) In addition to the support offered through central and state welfare schemes to fishing communities and other subsidies for purchasing boats, net and marketing, the state Government should also put efforts to sustain the fisheries sector through a holistic approach which includes habitat protection, enforcement of regulations and adoption of co-management strategies. This will lead to improving the livelihoods of fishers and avoiding further degradation and deterioration of habitat quality of the lake ecosystem.

2) Assistance of fisheries institutes and other research organizations should be sought for large scale seed production and ranching programs of commercially important indigenous fish species instead of ranching transplanted and exotic varieties.

3) Ranching and other management measures should be implemented with participation from fishing communities.

4) Existing natural habitats and native vegetation like those surrounding Pathiramanal islands, the reclaimed portions of lake at Chithira and Rani Block of kayals should be declared as ***No take Zones.***

5) Strict enforcement of existing fishing laws should be carried out by Fisheries Department agencies.

6) Evolving a participatory-management system should be a top priority for fisheries planners in the Vembanad. This should be based on a bottom-up strategy rather than the conventional top-down schemes which have been a failure.

7) Long term monitoring mechanism on population dynamics of various fish species which are thought to be declining and study the effect of Thanneermukkom Bundh on migratory fishes of Vembanad .should be taken up through collaborative projects involving various research organizations

8) Collaborations between various central and state government organizations, research institutes, universities, colleges, non-governmental organizations and cooperatives with due participation of local stake holders should be made and efficient programs for protecting the lake, its

resources and the livelihoods of the fishers depending on the ecosystem should be adapted.

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Appendix

A Fisherman's Perspective to VFC – 2009

Participating Institutions and Organizations

College of Fisheries, Panangad
Kayal Samrakshana Samithy around Vembanad
Kerala State Biodiversity Board
Regional Agricultural Research Station
School of Applied life Sciences, Chuttipara, Pattanamthitta
School of Environmental Sciences, Mahatma Gandhi Univniversity
St Albert's College, Ernakulam
Vembanad Nature Club, Muhamma

Community Environment Resource Centre,
Ashoka Trust for Research in Ecology and the Environment.
Ammankovil Street, Alappuzha.