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A geographical analysis of various factors responsible for deterioration of inland fisheries in Kuttanad Basin, Kerala

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Abstract
Kerala is a land affluent with numerous inland water resources such as rivers, tanks, ponds, reservoirs, brackish water lakes, backwaters and estuaries. These serve as a natural habitat for different verity fish species. Recently, these water resources confronts irreparable damage to aquatic life due to over-fishing, use of banned fishing gear, practices like water-poisoning, use of explosives and electrocution, erection of water barriers and the resultant degeneration of the ecosystem, water pollution due to discharge of household and industrial waste, and accumulation of pesticide and fertilizer residue in water bodies. Some wild fish species endured extinction and few others are on the verge of extinction.

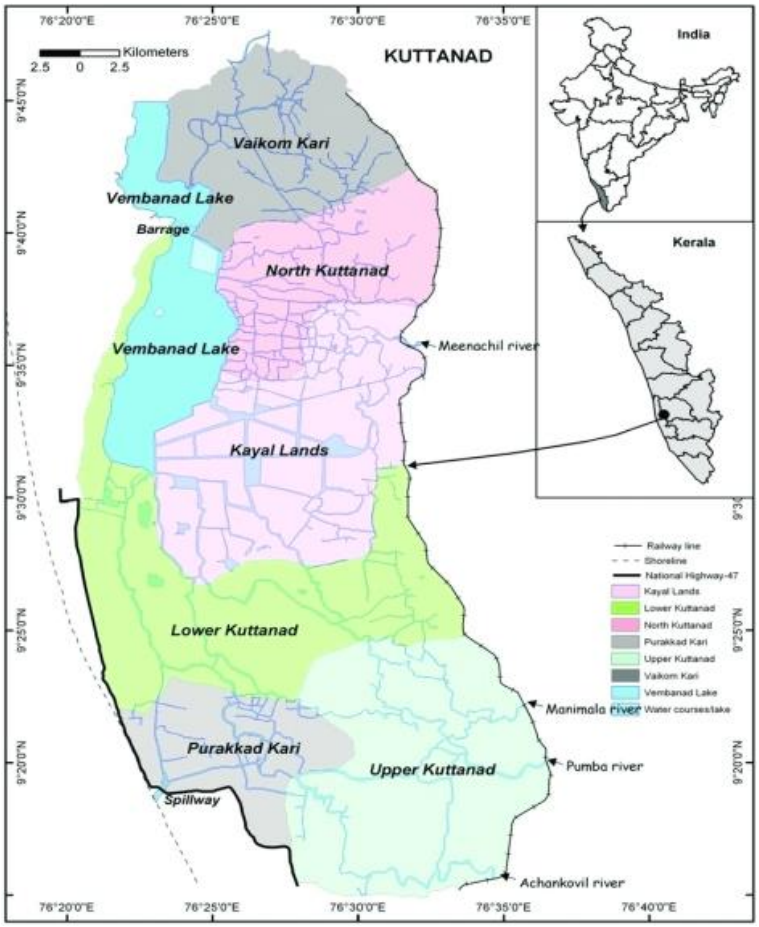
Keywords: backwater, water poisoning, inland fishing

Introduction
Inland fishing economy has a significant role in the financial management of Kerala. Inland water bodies such as backwater, river, pond and paddy fields are the major inland fishing grounds in Kerala. The present paper is an attempt to address the inland fishing predicaments and challenges with special reference to Kuttanad region in Alappuzha, Kottayam district in Kerala.

Study Area
Meenachil, Pamba, Manimala, Muvattupuzha and Achencovil, the five river systems located in the fertile low-lying areas of Vembanad Lake (Fig.1: Six Division of Kuttanad) contributed to the deltaic formation of Kuttanad. Traversing Alappuzha, Kottayam and Pathanamthitta districts of Kerala, Kuttanad forms an integral part of the Vembanad-Kole Ramsar site. This region lies between 9^0 17'–9^0 40'N & 76^0 19'–76^0 33'E. This area remains sodden almost throughout the year and is prone to continued flood ingression during the season of monsoon and saline water intrusion during the season of summer as this region lies 0.6 to 2.2 m below mean sea level. Kuttanad is rightly called the 'rice bowl of Kerala', contributing nearly 20% of the total state rice production. It enshrouds 53,639 hectares of land distributed among 1086 units where rice is cultivated. Before the initiation of the cultivating season, water has to be pumped out to the canal systems and backwaters as these fields are drenched during the non crop season. According to the characteristics of geomorphology and salinity intrusion of the soil, Kuttanad is further subdivided into six agro-ecological zones that is (i) Upper Kuttanad (ii) Kayal lands (iii) Vaikom Kari (iv) Lower Kuttanad (v) North Kuttanad and (vi) Purakkad Kari (Indo-Dutch Mission 1989). Vembanad estuary, the biggest in the southwest coat of India is located in Kuttanad wetland. Across the year the place witnesses extensively uniform temperature ranging from 21–36 ^{0} C. also covering humidity is observe in every circle of the climate change. The average annual rainfall received is around 3000mm of which about 83% is received during south west monsoon period.

Methodology and Data Base
The present study is based on the secondary data on the topic fish production and distribution statics published by the department of fisheries Government of Kerala. By conducting direct interview sections with the dwellers, inhabitants and local fishermen of the sampling area data is collected, organized, scrutinized and scientifically represented. The limitations of data collection it supplemented with the data collected during the study on the subject matter of the fish production and distribution statistics carried out by the Department of Fisheries, Government of Kerala.

Results and Discussion



Source: S. prasanth Narayan, Ornithofauna and its conservation in the Kuttanad wetlands, southern portion of Vembanad-Kole Ramsar site, India

Fig 1: Six Divisions of Kuttanad

Table 1: Fish production of India

Fish Production Of India (In Lakh Tones)		
YEAR	MARINE	INLAND
2014-2015	36.27	67.08
2015-2016	36.30	71.65
2016-2017	36.30	77.79
2017-2018	36.88	89.17
2018-2019	36.91	90.03
2019-2020	36.95	91.25

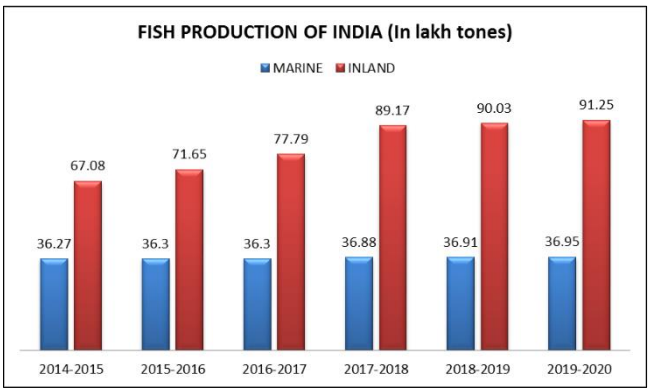


Fig 2: Graphical representation Fish production of India

By discerning the catalogue we can assume that in 2014-15 the marine fish production in India is about 36.27 lakh tones. Simultaneously the recorded inland fish production is about 67.08 lakh tones. After 5 years the development in marine fish production is a slow and intermittent one but the inland fish production is a sudden progressive on. As these fraudulent exploitation methods imposes grate pressure in Kuttanad aquatic ecosystem, the fauna witnesses gradual extinction of specious.

Table 2: Inland profile Kerala

Inland Profile Kerala		
	NO.	**Areas (ha)**
RIVERS	44	85000
RESERVOIRS	47	34205
POND/TANKS	47216	27625
BRAKISH WATER AREA	-	65213
BACK WATERS	53	46129
PRAWN FILTRATION FIELDS	234	12873
MANGROVES	-	1924

In Kerala there are total 44 rivers, 3 of them flowing toward east direction, and the others towards west. There are 47 reservoirs and 47216 ponds.

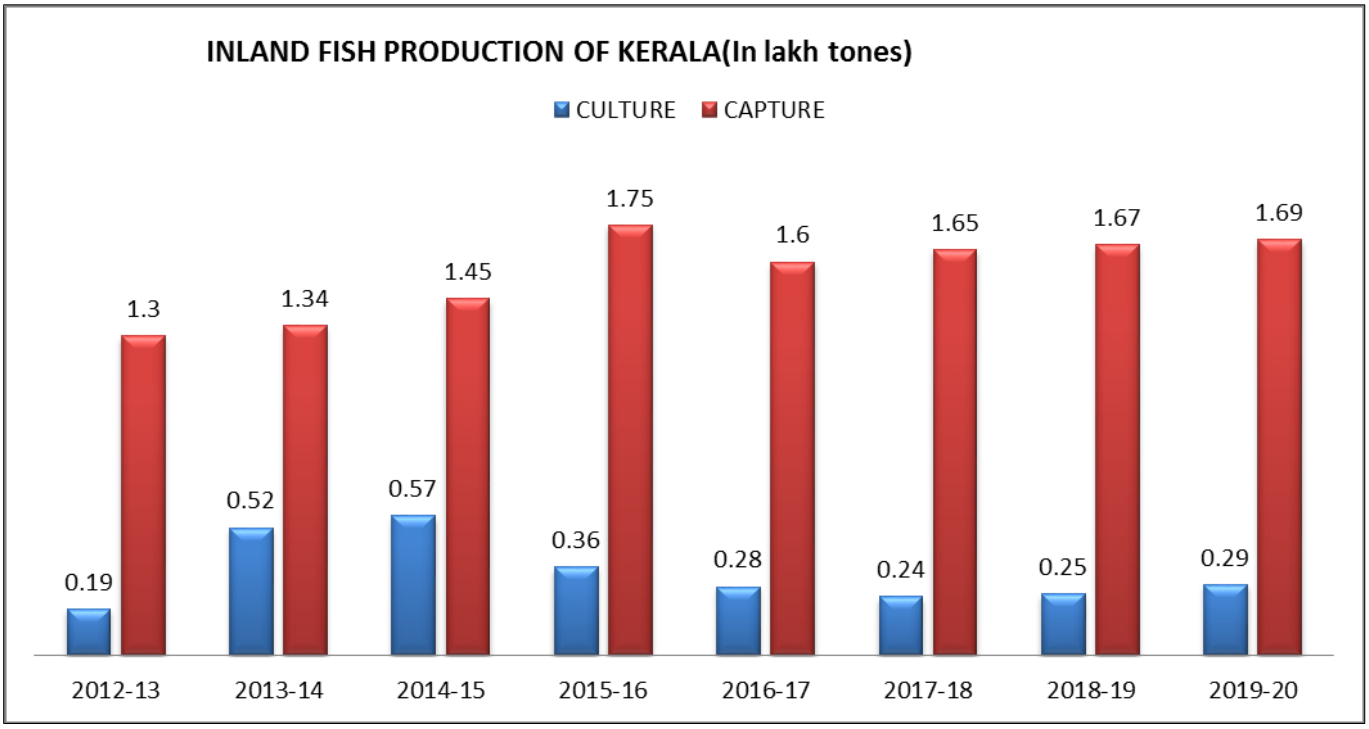


Fig 3: Graphical representation Inland Fish production of Kerala

This figure shows the difference in rate of aquaculture and inland fish capture. In the past three years the aquaculture is indirectly proportional to inland fish capture. This proclivity induces an abrupt disparity in the inland fishing ecosystem.

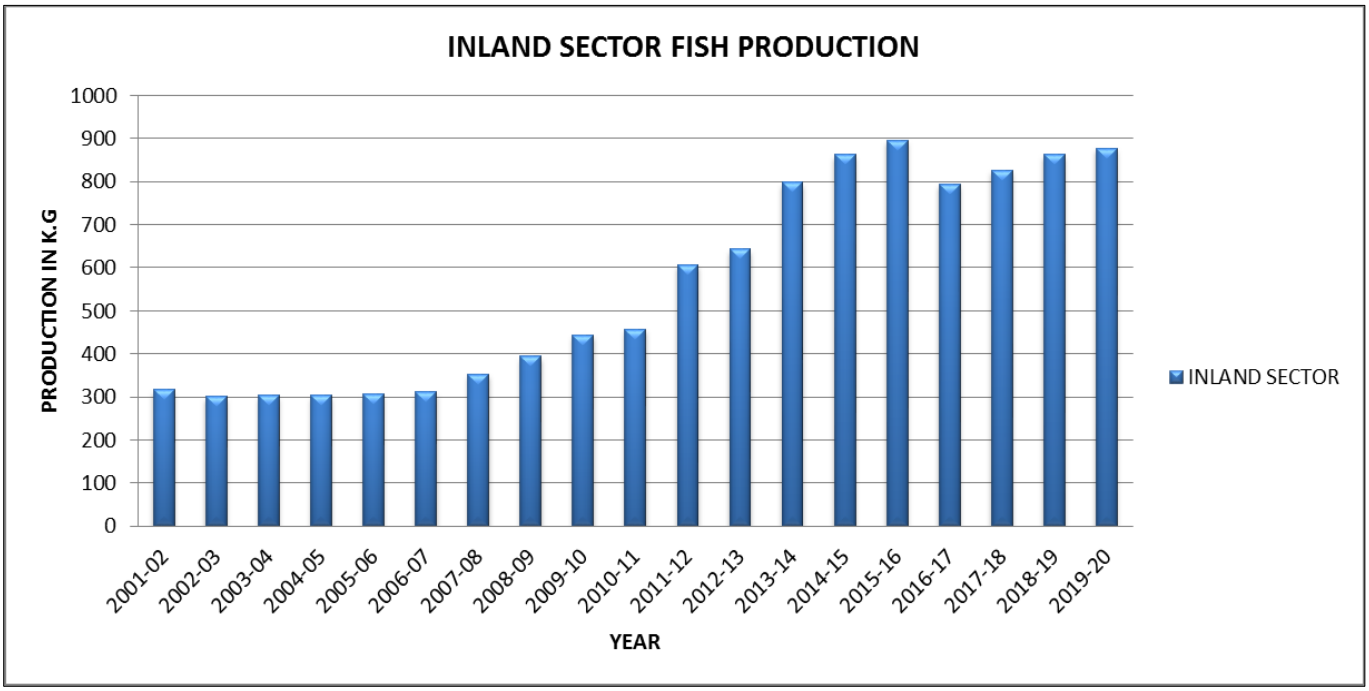


Fig 4: Graphical representation Inland Fish production

According to the hand book on fisheries statistics, published by government of India in 2009, The total inland water bodies in the state constitute 7.38% and the brackish water bodies constitute 19.36% of the country. The contribution of inland fisheries to total fish production of the state is 27.81% (in quantity) while its share in terms of value is 40.66%. It indicates that inland fish in the state fetches higher price. The relative share of Kerala's fisheries output from the span of 2000-2001compared to 2019-2020 shows a decline. In 2000-2001 the relative share of inland fish production was 3% of the country while it has declined to 2.42% in 2019-2020. The relative share of total fish production of the state had declined from 11.53% to 5.93% during the period

Table 3: Common fresh water fishes of Kuttanad

Common Fresh Water Fishes Of Kuttanad		
No	**Name**	**Scientific name**
1	Stinging Catfish	*Heteropneustes fossilis*
2	Walking Catfish	*Clarias batrachus*
3	Yellow Catfish	*Horabagrus brachysoma*
4	Longwhiskered Catfish	*Mystus gulio*
5	Boal	*Wallago attu*
6	Giant Danio	*Danio malabaricus*
7	Karnataka Barbe	*Puntius carnaticus*
8	Peninsular Olive Barb	*Puntius sarana*
9	Tiger Panchax	*Aplocheilus lineatus*
10	Orange chromide	*Etroplus maculates*
11	Mullet	*Mugil cephalus*
12	Freshwater Garfish	*Xenentodon cancila*
13	Malabar leaf fish, Common catopra	*Pristolepis marginata*
14	Tire track eel	*Mastacembelus armatus*
15	Indian mottled eel	*Anguilla bengalensis*
16	Cobra Snakehead	*Channa marulius*
17	Tank goby	*Glossogobius giuris*
18	Ceylon Snake head	*Channa orientalis*

The food security and rural livelihood is dependent upon the availability of capture fisheries in the rivers, lakes, channels, flood plain water bodies, tanks and ponds. It is vital to adapt a sustainable use of small indigenous species in both capture and culture fisheries system as they are the only source of nutrition for the rural poor. This method will also maintain biodiversity. There are many studies based on estuarine, reservoir fisheries conducted; but researches and studies about this specified area is limited. The data collection and sampling on reverine fishing is a difficult task as the modes operandi is not systematized and methodical. A few investigations on this area unveiled abundance of Tilapia, a species of cichlid fish population, replacing the native fish fauna. The alien invasive species are the major threat to biodiversity conservation and second major cause of extinction of native and endemic species around the world. The fishes of Kuttanad river system are subjected to severe overfishing leading to killing of spawned fish population. Over exploitation of fishery resources due to its extra ordinary economic value has been a causative factor exacerbating the vulnerability of the population in different ecosystems. Owing to ever increasing demand of fish as food, the aquatic ecosystems are under constant pressure which leads to the depletion fish fauna.

Conclusion and Recommendation

The aquatic biodiversity of the world is getting depleted alarmingly as a result of various factors like habitat loss, pollution, and introduction of exotic species, overexploitation and other anthropogenic activities. The loss is severe in freshwater ecosystem and accounts for 0.1% of hydrosphere, but harbor 40% of the fish species so far recorded. The diversity of fish in Kuttanad river system is excellent indicators of water quality. In order to maintain a healthy biodiversity and abundance of fish certain recommendations on conservation measures are put in place. Harvesting during the spawning period must be avoided. Harvesting juveniles should be prohibited. Introduction of invasive species like tilapia, mosquito fish and guppies into the river should be controlled at any cost. Aware local inhabitants about the life cycles of freshwater fish and the negative impact of pollution with sewage, fertilizers, pesticides and other chemicals as Anthropogenic activities have led to the degradation of Kuttanad at a faster pace. Formulate and implement a comprehensive inland fisheries policy. Strictly enforce the existing rules and regulations regarding the use of nets and other fishing gear, and the prohibition of destructive devices. Prevent further encroachment on existing fishable land bodies. While designing any further development projects in the Kuttanad region give due importance to the inland fishing sector and implement only those projects that are environment-friendly. Reassess the usefulness of Thanneermukkam Bund and Thottappally Spillway in the light of the serious environmental problems caused by them. Take appropriate steps to mitigate water pollution discharge of household and industrial waste. Persuade rice farmers to use only the optimum quantities of pesticides and chemical fertilizers; and restrict dredging activities in Kuttanad region. Rejuvenate the 'Fish Disease Monitoring Cell' set up under the State Fisheries Department in 1991 to deal with problems related to inland fish diseases.

Reference

1. Chandy M. Study on the avifauna of rice fields in and around Vembanad Lake. Ph.D. Dissertation, Mahatma Gandhi University, Kottayam, Kerala, 2003.
2. FAO. Rehabilitation of rivers for fish. Food and Agricultural Organization of the United Nations, Fiishing News Books, London, 1998.
3. Gopalakrishnan A, Basheer VS. Occurrence of *Labeo rohita* and *Cirrhinus mrigala* in Mennachil, Manimala and Pampa rivers, Kerala. In: Ponniah, A. G., Gopalakrishnan A. (Eds.), Endemic fish diversity of Western Ghats, NBFGRNATP, National Bureau of Fish Genetic Resources, Lucknow, U. P., India, 2000, 167-168.
4. Maltby ER. Waterlogged Wealth: Why Waste the World's Wet Places?. Earth scan, London, UK, 1986, 132
5. Prasanth Narayanan S, Thomas A.P, Sreekumar B. Ornithofauna and its conservation in the Kuttanad wetlands, southern portion of Vembanad-Kole Ramsar site, India; Journal of Threatened Texa,3(4):1663-1676.
6. Radhakrishnan MV, Sugumaran E. Fish diversity as a cue to the fisheries potential of veeranam lake, Tamilnadu, India. Paul VI (ed.) In Biodiversity: Issues Impacts, remediation and Significances. VL Media Solutions Publishers, new Delhi, 2012, 162-166.
7. Shari PV, Chitra KP. Kuttanadinte charithravum bhoomisastravum (History and geography of Kuttanad), 2005, 9-18. In: Joseph, M.J. (ed.). Kuttanattile jala punarujjeevana prayoga sadhyathakal (Water reclaiming in Kuttanad; Possible chances). Planet Kerala, Trivandrum, 131pp. (In Malayalam).
8. Sinha M, Mukhopadhyay MK, Hajra A. Inland fisheries development: achievements and destinations for twenty first century. In: Sinha, M., Mukhopadhyay, M. K. and Hajra, A. (Eds.), Souvenir: the National Seminar on Ecofriendly Management of Resources for Doubling of Fish Production-Strategies for 21st Century. Inland Fisheries Society of India, CIFRI, Barrackpore, India, 1999, 25-35.
9. Sreejith KA. Human impact on Kuttanad wetland ecosystem-An overview; International journal of science, environment technology,2013:2(4):679-690

10. Sudhikumar AV, Sebastian PA. Diversity of spiders in Kuttanad rice agro-ecosystem, Kerala. Journal of the Bombay Natural History Society,2005:102(1):66-68.
11. Venkataraman K. Natural Aquatic ecosystems of India, Thematic biodiversity strategy and action plan. Zoological Survey of India, Chennai, 2003, 217-224.
12. Vijayasree TS, Radha Krishnan MV. Fish diversity of Kuttanad's river system, Kerala state, india, International Journal of Fisheries and Aquatic studies,2014:1(6):55-58.
13. Zacharias VJ, Gaston AJ. Survey of Kerala wetlands, India. OBC Bulletin,2003:37:15.