

Project title	Assessing the impact of fisheries on the biodiversity of marine fish resources of Southwest coast of India
Period	2005 - 2008
Principal investigator	K.S. Mohamed
Other investigators	P.U. Zacharia, P.K. Krishnakumar, T.V. Sathianandan and P.K. Asokan

The final report of the AP Cess Fund project on 'Assessing the impact of fisheries on the biodiversity of marine fish resources of Southwest coast of India' was submitted to the ICAR during the year. The salient findings are:

1. Using data archaeology, 2 databases were created – one, a complete fished taxa catch and effort database for Kerala and Karnataka for 1970 to 2005, and another historical records for the Indian oil sardine and mackerel with regard to catch (from 1926-2005: 80 years) and length frequencies (oil sardine: 1934-2005: 70 years).
2. Catches of the both oil sardine and mackerel were not having any significant relationships with sunspot activity, ENSO or rainfall. The recruitment success of oil sardine whose spawning and recruitment cycle is overlapping with the upwelling season is depending upon an Optimum Environmental Window.
3. The spatial comparison of the data on Average Taxonomic Distinctness (AvTD; Delta+) and Variation Taxonomic Distinctness (VarTD; Lambda+) shows that K1 and K2 zones in Kerala (off Thiruvananthapuram District) and K14 zone (off Bhatkal) in Karnataka are stressed habitats with respect to biodiversity, and this may be due to impacts of fishing. Coincidentally, these fishing zones in Kerala also had comparatively poor alpha and beta diversity values. Therefore parts of these fishing zones (K1, K2 and KN14) are identified as MPAs.
4. Predictions for Karnataka derived from the Markov Chain analysis indicate that Oil sardine and Mackerel are likely to continue and dominate the catches in future also, although oil sardine has higher probability to be at Rank 1 position. The Markov Chain analysis for Kerala reveals that only three resources/ species are predicted to improve their landings – sharks (from 50th rank to between 21 and 25), *P. stylifera* (from 13 to between 1 and 5) and *Stolephorus* (from 11 to 4).
5. Four species in Karnataka and 17 species in Kerala were classified as extremely rare or extinct as they have not been recorded in the fishery for the past 20 years. A new criterion for classification of fish stocks as depleted, collapsed and extinct based on percentage of maximum catch was applied, and accordingly, 1 fish stock in Kerala and 2 stocks in Karnataka are considered as depleted. Catfish is a depleted stock common to both states.

Identification of MPA in Kerala and Karnataka based on biodiversity stress in fishing zones

Identified MPA	Landmarks	Part of LME?	Taxonomic Diversity	Trophic Level	Remarks
KERALA Parts of Fishing Zone – K1 & K2	From Kollamgode in the south to Kappil in the north	Arabian Sea, could also be a transition zone between Indian Ocean and Arabian Sea	Very poor Delta+ values indicating low taxonomic diversity Poor alpha and beta diversity	Comparatively high trophic level	A predator driven oceanic ecosystem which needs conservation on account of biodiversity stress
KARNATAKA Parts of Fishing Zone – KN14	From Bhatkal in the south to Murudeswara in the north	Arabian Sea LME and part of Malabar Upwelling Zone	Poor Delta+ values indicating low taxonomic diversity Poor alpha and beta diversity	Not studied	A habitat with many small rocky islands and submerged coral reefs which needs protection and conservation on account of biodiversity stress

Recent average catch during 2003-2005 of different species as percentage of the historical maximum catch (baseline catch) during 1970-2002 in Kerala

Species/ Stock	Historical maximum catch (t)	Recent 3-year average catch (t)	% of maximum catch	Stock status
<i>Scomberomorus commerson</i>	8126	8167	100.50	Abundant
<i>Sardinella longiceps</i>	241411	235958	97.74	Abundant
<i>Saurida</i> sp.	14126	10841	76.75	Abundant
<i>Cynoglossus</i> sp.	27301	18759	68.71	Less abundant
<i>Auxis</i> spp.	9601	5670	59.05	Less abundant
<i>Nemipterus</i> sp.	55078	31396	57.00	Less abundant
<i>Sphyraena</i> sp.	9781	4335	44.32	Declining
<i>Trichiurus</i> sp.	31775	13242	41.67	Declining
<i>Euthynnus affinis</i>	25082	10053	40.08	Declining
<i>Stolephorus</i> sp.	55042	21217	38.55	Declining
<i>Rastrelliger kanagartha</i>	128411	46512	36.22	Declining
<i>Chirocentrus dorab</i>	1685	587	34.84	Declining
<i>Hemiramphus</i> sp.	3574	1152	32.22	Declining
<i>Leiognathus</i> sp.	18392	5014	27.26	Declining
<i>Carcharhinus</i> sp.	10338	2447	23.67	Declining
<i>Lactarius lactarius</i>	6663	481	7.22	Depleted
<i>Pampus argenteus</i>	2305	122	5.31	Depleted
<i>Arius</i> sp.	33526	234	0.70	Collapsed