Diversity in fished taxa along the Indian coast during 2012

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The marine fish landings in 2012 was estimated at 3.94 million tonnes and the contribution from different maritime states and union territories are shown in table-1. From the National Marine Fisheries Data Centre information on individual species wise estimates of marine fish landings and presence/ absence data of all the species landed along the Indian coast during 2012 were used for testing species diversity in the fished taxa among different maritime states and union territories. An All India species data base was created consisting of all the species caught during 2012, with details of Genus, Family, Order, Class and Phylum for each species.

It is preferable to use biodiversity measures capturing alternatives to simple taxon richness, in the form of relatedness amongst observed taxa, for a given number of species. Such measures not only allow an exactly similar comparison to that for richness, but also permit valid biodiversity comparisons between different regions with varying sample sizes. The average taxonomic distinctness (DELTA+) and the variation in taxonomic distinctness (LAMBDA+) are two such measures, widely applied to presence/absence data, which have the unbiasedness property and are not a function of the sample size or the total species richness. These measures have been used to compare different regional faunas, and decline in DELTA+ has been suggested as a measure of stress in a system. Also, DELTA+ is the measure of mean path length through the taxonomic tree connecting every pair of species and LAMBDA+ is the variance of these pairwise path lengths which reflects the unevenness of the taxonomic tree. Primer software Version 5.2.9 was used for computing DELTA+ and LAMBDA+ and for preparing funnel plots.

Among 667 species landed in the country in 2012 only 16 species were landed in all states/UTs and 248 species landed in only one of the states/UTs during 2012 (Fig-1). Tamil Nadu is at the top with

Table 1. Marine fish landings, percentage, number of species, coastal length, FTD, DELTA+ and LAMBDA+ for different maritime states and union territories for 2012.

State / Union territory	Landings (Lakh tonnes)	%	No of species	Coastal length	FTD**	DELTA+	LAMBDA+
West Bengal	1.6	3.9	105	158	0.7	73.6	527.8
Odissa	2.5	6.3	196	480	0.4	72.4	491.9
Andhra Pradesh	3.1	7.7	250	974	0.3	72.2	467.5
Tamil Nadu	6.5	16.4	404	1076	0.4	72.6	458.8
Puducherry	0.6	1.4	110			71.1	538.0
Kerala	8.4	21.3	366	590	0.6	75.5	462.2
Karnataka	4.8	12.1	158	300	0.5	73.5	498.7
Goa	0.7	1.8	69	104	0.7	72.3	541.3
Maharashtra	3.2	8.0	247	720	0.3	75.5	503.2
Gujarat (*)	7.6	19.2	188	1600	0.1	77.1	527.8
Daman & Diu	0.8	1.9	120			75.8	525.3
All India (*)	39.4		667	6068	0.1		

(*) Provisional estimate

(**)FTD- Fished taxa diversity in terms of number of species per kilometer

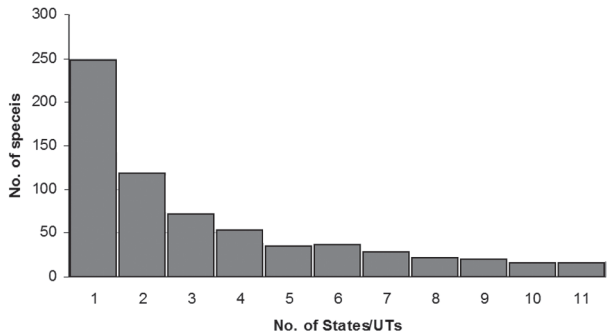

Fig 1. Bar chart showing the distribution of 667 species landed along the Indian coast during 2012 according to the number of states/UTs in which they were found landed

landings of 404 species followed by Kerala with 366 species. The least number of species landed was 69 in Goa. The Fished Taxa Diversity in terms of the number of species per kilometer coast is high for West Bengal and Goa and is the lowest for Gujarat. The average taxonomic distinctness DELTA+ was found maximum for Gujarat and minimum for Puducherry. Based on DELTA+ values we can classify the maritime states and union territories into different groups namely Gujarat having the highest value as the first group, Damen & Diu, Kerala and Maharashtra as the second group, West Bengal and Karnataka as the third group, Tamil Nadu, Odisha, Goa and Andhra Pradesh as the fourth group and Puducherry the last group. From the funnel plot of DELTA+ against number of species (Fig-2) this classification is visible and only Gujarat falls outside the funnel. This indicates that compared to other states/UTs the species that are landed in Gujarat are not closely related as may be the case with Tamil Nadu having maximum number of species landed but low DELTA+. When we examine the variation in taxonomic distinctness LAMBDA+ it can be seen that Gujarat has high LAMBDA+ value than that of Tamil Nadu which supports the above observation.

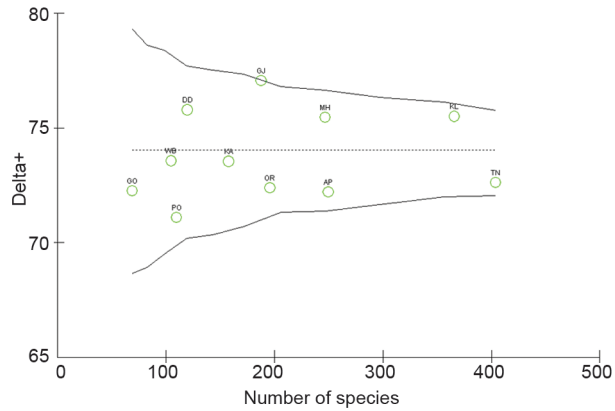

Fig 2. Funnel plot showing the taxonomic distinctness of different maritime states/UTs in India based on fished taxa in 2012 (WB: West Bengal, OR: Odisha, AP: Andhra Pradesh, TN: Tamil Nadu, PO: Puducherry, KL: Kerala, KA: Karnataka, GO: Goa, MH: Maharashtra, GJ: Gujarat and DD: Damen & Diu)