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Discussions

Interactive comment on "Freshwater fish fauna of rivers in the southern Western Ghats, India" *by* Anbu Aravazhi Arunkumar and Arunachalam Manimekalan

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Reviewer Comments and Responses

Comment 1: The Pangaea link works very well. The authors basically repeat the tables from the manuscript as data files in the Pangaea archive. Because the Pangaea landing page correctly identifies the four data tables (tables 1, 3, 5 and 6) as tab-delimited files, the names of the files in the dataset folder should carry this designation. E.g. Arunkumar-etal_2015-T3.tsv rather than Arunkumar-etal_2015- T3.tab. R, Excel and other spreadsheets can easily ingest a .tsv file but those software packages will not recognize a .tab file. Once I renamed them I had no problem to open all the .tsv files.

Response 1: As per the reviewer comment the .tab file has been converted to .tsv file and attached separately. The ".tab" file format is already tsv-compatible, if you remove the "metadata header" from them (between the "/*" and "*/" tokens). For completeness of metadata and data when downloading it, we have to add the metadata to the files. In case you don't need them or your tool cannot process them, you may strip them away with a simple "sed"/"awk"/... command. There are also packages available to use PANGAEA data with several tools (Pan2Applic for ODV, PangaeaR for R, possibly also for Matlab) that will take care for you, while maintaining correct citation of the metadata.

Lines 13, 14. This sentence at the start of the abstract, about studying the freshwater fish from 2010 to 2013 can give a wrong impression. Some readers will assume that you studied these rivers in repetitive years, e.g. in 2010, again in 2011, out to 2013. In fact this study reports the outcome of a collection and identification process that covered 31 separate sampling sites that required 4 years (2010 to 2013) to complete. Nowhere in the documentation do we read about any repeat sampling. You should make very clear that you conducted one comprehensive sampling and assessment of each site in a process that required 4 years, 2010 to 2013.

Response 2: Yes the corrections has been incorporated in the manuscript as per the reviewer comment.

Comment 3: Lines 16, 17. These lines, about 64 species, some many orders, families, etc. repeat information from line 14. Remove the sentence in line 14? We do not need to see this information twice, so close together.

Response 3: The sentence has been removed.

Comment 4: Line 18. Plural of 'genus' should appear as 'genera' (as in line 17 above)?

Response 4: Yes the necessary corrections has been incorporated in the manuscript as per the reviewer comment.

Comment 5: Lines 23 to 26. The collection and identification of some fish species considered endangered or critically endangered probably represents an import contribution of this study. These fragmented and confused statements do not provide an adequate summary. The manuscript that follows probably needs an explicit section on endangered species and the significance of finding them in the Western Ghats. This abstract implies a "concise discussion" but that discussion never appears in the subsequent manuscript?

Response 5: Reviewer comment on concise discussion has been elaborated in the discussion part of the manuscript (Line no: 206 to 329).

Comment 6: Line 45, 46. The "Satpura" hypothesis? Specific to Indian or South Asian ecosystems or something more general. How and why did that hypothesis stimulate discussion on, for example, "endemism". Does this discussion have relevance to this paper?

Response 6: Comment on Satpura hypotheis by reviewer and its explanation has been discussed in the subsequent paragraph and reframed according to reviewer comment.

Comment 7: Lines 48 to 62, this paragraph about new species discoveries has relevance to the larger point about the Western Ghats as a location and source of unique biodiversity? We need to know the reason for this list of species names.

Response 7: The lines 48 to 62 describes about the species diversity of the southern Western Ghats. The list of species gives full views about the biodiversity status.

Comment 8: Line 65, 66. This combination of various types of nets has some minimum capture size? Larger organisms could avoid the nets? Please give users a sense of the size range captured by your sampling. What happens to any invertebrates? Discarded, recorded, ignored, or not captured?

Response 8: The mesh size of the fishing nets has been included in the manuscript. The other species were not disturbed.

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Comment 9: Line 67. Five specimens from each species. This means you did some species identification in the field? Did you have a statistical basis for this sampling strategy? Or a valid logistical constraint? By focusing on repeatable numbers of species present, you have minimised the presence-absence question? The issue of absence of expected species does not arise in this manuscript, despite earlier mention of disturbance and invasives? Perhaps this discussion belongs in a subsequent research paper but those future researchers will need to know how to understand your data. Absence means zero specimens of a given species collected or fewer than 5 specimens collected?

Response 9: Minimized sampling is done to reduce the disturbance done to the diversity of species. Further species identification was done at the field level. Further the morphometric and meristic character analysis, a minimal no of specimens (5 no's) were transported to the laboratory. Further for I acknowledge that zero means that no specimens were recorded at that particular sampling sites.

Comment 10: Line 81, water samples collected "post-monsoon". We should have actual dates for all collection episodes, fish and water? Perhaps these exist in your database but they do not appear in any of the data shared here.

Response 10: The correction has been carried out in the manuscript. Comment 11: Lines 98, 99. Confusion here for the reader about primary sources of uncertainty. One source, identified here, involves conversion of information from "elementary" or "original" data sheets? Which feeds which? Which represents inputs to the database? Errors frequent or rare in these data translation processes? We need more clarification here. Later, in the summary, you should list for users all the known sources of uncertainty.

Response 11: The lines 98 and 99 has been removed.

Comment 12: Line 104. Present collection sites based on prior literature reports? Shouldn't we have this information, along with discussion of impact on reliability and

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repeatability, earlier, in the methods section? If true, this opens the possibility of comparison of abundance, species presence- absence, etc., with earlier collections? We need to know if, where, and to what degree the present collections enable these historical comparisons. We do not need the comparisons themselves - those perhaps belong in a separate research paper - but we do need to know if the current collections enable such comparisons with prior collections. If not, why not?

Response 12: The present data expresses a vast variation in diversity to the earlier reports which has been elaborated in the discussion part in the manuscript.

Comment 13: Lines 104 to 112. This description of geomorphology and biodiversity of the Western Ghats belongs in the introduction?

Response 13: This description of geomorphology and biodiversity of the Western Ghats has been included in the introduction.

Comment 14: Line 114. We need a much better presentation of the sampling sites. Figure 1 shows only 16 out of 31 sites. If the authors want to show locations on a map, we need a better, more complete map. In Table 1 we get very useful information of sites by river system with elevation and lat lon for each site. But in Table 5 and 6 we lose that information. Those tables should still make clear the association of sites with rivers; you do not want us as users making mistakes in our assignment of site to river system. Table 1 does not seem to sort the site by elevation; somewhere we need that information. In the .tsv data file for table 1 I could sort by river system and then elevation (or forest type); better the authors should do this for all readers?

Response 14: Regarding the map, table 1, 5 & 6 the necessary corrections has been incorporated in the manuscript.

Comment 15: Line 119. Discussion of diversity, abundance and distribution by site, but not by river system, elevation, drainage area, proximity to human influence, presence or absence of hydroelectric dams, etc. Later in this results section the authors mention

elevation, water temperature, water quality, lakes, etc. But here we don't get any sense of those factors for all sites or for each river system; we only see site-by-site lists.

Response 15: Based on the reviewer comments, the entire data has been organized.

Comment 16: Line 128. Species similarity was very 'low' rather than very "less"? The authors only hint at all the factors that might impact similarity, e.g. as plotted in Figure 6. Again we would need to see those sites according to their river systems rather than independently? Or, do the authors imply that site-to-site diïňÃerences exceed river-to-river diïňÃerences? We do not get a clear treatment of river vs site data and diïňÃerences that would allow us to assess the validity of such similarities or diïňÃerences. A clearer presentation of sites by river system, and of summary statistics of river vs river, or of the absence of significant diïňÃerences, would help!

Response 16: The entire data has been organized based on the reviewer comments.

Comment 17: Line 138. IS: 10500 Permissible limits. This represents an India-wide water quality standard? We need a reference to it?

Response 17: The reference has been included in the manuscript as per reviewer comments.

Comment 18: Lines 137 to 154. This water quality discussion occurs almost entirely by site, not by river system. Why? Here and in Table 6, I feel surprised to see salinity. Conductivity I expect, and perhaps resistivity, but what do these very low values of 'salinity' represent and report? Do we have a definition of the salts involved? Not the typical seawater salts, presumably, so we must have a diïňÃerent freshwater definition of salinity? In other ESSD papers reporting mountain stream water quality, they typically do not report salinity. Because all these values lie below 0.5 ppt (one commonly-accepted definition of freshwater) we should consider them all to have negligible amounts of salts? If the authors do not make explicit use of the salinity data, we do not need them?

Response 18: As per the reviewer comments, the entire data on salinity has been removed.

Comment 19: Lines 156 to 210. After the water quality paragraph the authors provide four paragraphs on species appearance, diversity, abundance, etc. without clear conclusion and particularly without confirmation of Western Ghats as a biodiversity hotspot or as a 'refuge' for endangered species. Either we need less of species lists or we need more synthesis and assessment of the fundamental question: will these data allow and support discussion and conclusion about regional biodiversity and biological refuges or not - even if those discussions occur in other research papers or in other conservation fora. Readers need to get from the authors a sense of confidence on how to use these data! Unfortunately, from this somewhat confused and random discussion of physical and biological influences on habitats and species presence or abundance, we fail to get a clear understanding of the authors' confidence in their own data. We also learn that the Periyar river flows westward when earlier we read that this study focused on eastward-flowing rivers and about the existence of Periyar Lake. Certainly the map in Figure 1 and none of the text so far gave us any hints of lakes. Response 19: Yes the necessary corrections has been incorporated in the manuscript as per the reviewer comment.

Comment 20: Line 188: "moolavaigae"? Presumably this refers to a high-elevation location of Moolavaigae?

Response 20: Yes, moolavaigae refers to one of the high-elevation location among the Western Ghats where the Periyar River system originates its flow line no. 236- 238.

Comment 21: Line 212, 213, Summary. I do not understand the point of the first sentence about morphological variation related to micro- or macro-habitat?

Response 21: The morphological-based fish taxonomy is more inconclusive methods that explains the micro and macro habitat which may create much impact on the phenotypical variations among the fishes.

Comment 22: Lines 220 to 222. Again by individual sites, with no reference to river systems.

Response 22: Yes the necessary corrections has been elaborated in the manuscript in line no. 377- 396.

Comment 23: Line 223: The present study failed to convince this reader that altitude had any consistent eïňÃect. Probably more related to a weakness in the presentation rather than a weakness in the data, but in either case the paper has not shown us convincing data relating biodiversity to elevation. Response 23: As stated by the reviewer the changes has been carried out in the manuscript. Comment 24: Lines 224 to 232: Perhaps valid statements toward a positive "ecological spirit", but in fact from these data the authors have not guided us to conclusions about "sharp decline" (line 227) or about social pressures. Response 24: Yes the following changes has been carried out in the manuscript.

Comment 25: A good conclusion should briefly summarise the data, explicitly caution users about uncertainties and limitations of the data, and then outline both the present impacts (for conservation management) and need or intention for future monitoring or data gathering.

Response 25: Yes the necessary corrections has been elaborated in the manuscript in line no. 377- 396.

Comment 26: Table 1. 'Forest Type': these terms come from FAO or GBIF definitions or from an India Forest Classification scheme? Readers need to know how to relate this terminology to other data from other regions. 'Stream Order': hydrologists will understand this general mechanism to indicate stream branching but the authors should specify whether these represent standard Strahler stream order numbers or some other India-specific index of stream branching? 'Area' presumably represent catchment area above (upstream) of the sampling location. The authors should inform readers how they calculated this or from what source they extracted this

information. Likewise for 'Volume', this presumably represents annual mean volume measured at some exit or drainage point of each stream and river? Again, readers need to know where this information comes from. In this table, 'Mean Velocity' represents a code referenced in a footnote, and not an absolute value? The authors could reduce confusion by using the actual codes 'slow', 'moderate', 'very fast', etc? Response 26: The classification of the Forest Types were given based on the India Forest Classification scheme. The link about the classification are attached. http://www.sikkimforest.gov.in/docs/Forestry/Vegetation%20Types.pdf http://www.biologydiscussion.com/forest/5-types-of-forests-found-in-india-explained/6940 The rest of the corrections regarding the stream order, area, volume, mean velocity has been corrected in the manuscript. The following article gives the detail information regarding the parameters followed. Armantrout, N.B. 1990. Aquatic habitat inventory. Bureau of Land Management, Eugene District, U.S.A. pp. 32.

Comment 27: Table 2. Comprehensive species list but the IUCN codes in column 4 do NOT match the descriptions in the footnote. For example, the footnote does not define LC as it appears in the Table while 'LRnt' from the footnote never appears in the Table. Response 27: Yes the necessary corrections has been incorporated in the manuscript as per the reviewer comment.

Comment 28: Table 3. We need these data explicitly organized by river system and perhaps sorted in order of elevation within each river system. With eïňǍort a user can establish these distinctions and filter by elevation by using the .tsv file but the authors need these improvements in Table 3 in order to support their discussion about, for example, biodiversity and altitude? Response 28: Yes the necessary corrections has been incorporated in the manuscript as per the reviewer comment.

Comment 29: Table 5. Species by generic number code vs. site by similar generic number code. Inclusion of actual species names (as genus.sp) and clearer organization by river system would greatly increase the utility and information content of this

Table!

Response 29: Yes the necessary corrections has been incorporated in the manuscript as per the reviewer comment. Comment 30: Table 6. Again, organize this by river system and sort by elevation?

Response 30: The table has been organized based on river systems and the elevation has been detailed in table 1 & 3.

Comment 31: Figure 1. The authors should cite their source for the base map? Not particularly useful as presented because it includes only about half of all sampling sites, gives no highlight of selected river systems, shows no lakes or dams, etc. Presumably a DEM exists for this region but perhaps not at the resolution needed? Many conservation organizations have better maps? Even on a lower resolution map the authors could label their sampling sites while also emphasizing the biodiversity importance of this region? Response 31: Yes, the map has been plotted using the base map provided by the gramin gps instrument. Comment 32: Figure 2. Not sure what this figure shows us? Would it oïňǍer a basis for comparison to another region in India or to another mountainous biodiverse region elsewhere?

Response 32: Regarding the figure 2 the author explains about the six different orders collected from Western Ghats of which the order Cypriniformes are dominant.

Comment 33: Figures 3, 4 and 5. All these figures need indication of the sampling sites within their respective river system and - if the authors want to focus on elevation - sort within each river by altitude? Response 33: The sampling sites within the river system were differentiated and the elevation details were incorporated in the table 3. Comment 34: Figure 6. We need more information about the numerical basis for similarity-dissimilarity. A user doesn't gain much useful information from this without designation of the rivers? Or perhaps of elevation? Response 34: Yes, the reviewer has commented on the Figure 6, in regard to that the author has plotted a cluster dendogram using all the water quality, diversity parameters and habitat characters of

the six river systems to find out the dissimilarity among the sampling sites to prove that the habitat characters plays a vital role in the diversity of species among the six river systems.

Comment 35: Figure 7. Do these pictures come from this collection or from other sources? I suspect ESSD cannot publish them without attribution. Do individual pictures associate with appropriate species in the database? Response 35: Yes, these pictures are original taken by the authors from the streams and rivers of Western Ghats. Further the pictures in figure 7 and the species list in table 2 is available in the database.

Please also note the supplement to this comment:
https://www.earth-syst-sci-data-discuss.net/essd-2017-118/essd-2017-118-AC2-supplement.pdf

Interactive comment on Earth Syst. Sci. Data Discuss., https://doi.org/10.5194/essd-2017-118, 2017.