

10.11609/jott.2021.13.14.20143-20310 www.threatenedtaxa.org

26 December 2021 (Online & Print) Vol. 13 | No. 14 | Pages: 20143–20310

> 955N 0974-7907 (Ouline) 955N 0974-7893 (Print)





Publisher

Wildlife Information Liaison Development Society www.wild.zooreach.org Host Zoo Outreach Organization www.zooreach.org

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Caption: Large Indian Civet Viverra zibetha, Tricoloured Munia Lonchura malacca and Hoya wightii (Medium-pencil crayon on watercolour paper) © Supriya Samanta.

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Journal of Threatened Taxa | www.threatenedtaxa.org | 26 December 2021 | 13(14): 20309-20310

ISSN 0974-7907 (Online) | ISSN 0974-7893 (Print) https://doi.org/10.11609/jott.7804.13.14.20309-20310 #7804 | Received 17 December 2021



BOOK REVIEW

Freshwater fishes of the Arabian Peninsula

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The Arabian Peninsula covering an area of >3 million km², though considered to be mostly dry and arid, has several interesting freshwater systems such as the wadis (a valley or stream bed that is dry except during the rains). However, compared to other parts of the world, very little ichthyological research has been undertaken in this region, and the freshwater system here, are known to harbour comparatively few freshwater fish species than the rest of Asia. Since the publication of the IUCN report on 'Status and distribution of freshwater fishes of the Arabian Peninsula' in 2015, in which the conservation status of 21 species occurring in the Arabian Peninsula was documented, there has been a significant improvement in the knowledge on taxonomy and distribution of fishes of this region – necessitating a need for an updated compilation. This is what the 272-page book on Freshwater Fishes of the Arabian Peninsula offers - the most authoritative account of Arabian ichthyofauna, published till this day. As William Darwall, Head of the IUCN's Freshwater Biodiversity Program aptly writes in his foreword, this book is a tremendous recognition of the hard work and effort of the authors who make sure that it is not only a book for today, but also a valuable contribution for informing the future conservation of Arabia's native fish species.

The Arabian Killfish, Aphanius stoliczkanus adorns the cover of Freshwater Fishes of the Arabian Peninsula, a book that undoubtedly fits the anatomy and definition of a 'field guide' to perfection, not only in its contents, but also in its compactness (one can very easily carry it in the field!). The book essentially follows a style and pattern that has been previously used in Handbook of European Freshwater Fishes, an extremely popular and highly cited ichthyology masterpiece!

Freshwater Fishes of the Arabian Peninsula is organized into four sections. The first section discussing 'field methods' is an excellent source of information, and a must-read, for early career ichthyologists and taxonomists. The authors have covered fundamental aspects of a range

ISBN: 978 1 86063 511 3

Authors: Jörg Freyhof, Johannes Els, Gary R. Feulner, Nashat A. Hamidan and Friedhelm Krupp Publisher: Motivate Media Group Pages: 272pp, Price AED 80.00

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Date of publication: 26 December 2021 (online & print)

Citation: Raghavan, R. (2021). Freshwater fishes of the Arabian Peninsula. Journal of Threatened Taxa 13(14): 20309–20310. https://doi.org/10.11609/ jott.7804.13.14.20309-20310

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Book Review

of subjects, from 'organizing field work' to 'sampling techniques', 'photography', 'preservation' and most importantly 'methods and techniques for morphometrics and meristics'. It has been often argued that inadequate resources for fish taxonomy including limited literature on standard taxonomic methods and techniques is a major impediment to the progress of ichthyology, particularly in the biodiversity-rich tropical countries. In this context, the first section of Freshwater Fishes of the Arabian Peninsula will certainly help bridge this resource-gap, not just for ichthyologists of the Arabian Peninsula, but also elsewhere in the tropics. The second section of the book deals with essential concepts in taxonomy and biogeography and includes general topics such as 'species and populations', 'species concepts', 'nomenclature', and an account of the geological history and biogeography of the Arabian Peninsula. The information on geology and historical biogeography of the region from Oligocene to the present day, which has been discussed in the context of aquatic taxa, will be of immense use to researchers working on questions related to systematics and biogeography, both in Asia and Europe.

Towards the end of the second section, we are introduced to the grim fact that almost half (47%) of the native freshwater fish species of the Arabian Peninsula is threatened – thanks to a range of stressors including water extraction and dams, habitat loss and degradation, pollution, alien species and climate change. This is certainly bad news as almost 75% of the region's ichthyofauna is endemic, and further declines in the quantity and quality of habitats will only push these species towards an imminent extinction. Of particular concern are three species listed as Critically Endangered on the IUCN Red List, the Arabian Bream (Acanthobrama hadiyahensis) (endemic and restricted to two locations in Saudi Arabia), Andhur Garra (Garra sindhae) and Hasik Garra (Garra smartae) (both endemic to Oman). While the authors mention that legal protection for fish species are in place in most areas, they do not provide further details, except about an ex-situ conservation breeding program for three threatened species (one of which is G. smartae) taking place at Sharjah, UAE. An interesting discussion on the eradication of alien tilapias (p93) could be useful information for biodiversity and fisheries managers throughout the Asia-Pacific, where tilapias are becoming a major threat to native fish diversity.

The core of *Freshwater Fishes of the Arabian Peninsula* is certainly the section that covers species accounts of all of the 31 native freshwater fishes occurring in the Arabian Peninsula. From pages 106 to 219, this section features concise text that will aid the field-level identification,

excellent colour images depicting every species (many for the first time), and accurate distribution maps. Species accounts are presented family-wise (7 families) where the authors begin by introducing the family, and providing basic information on the diversity, distribution, ecology and biology of the members of the family, besides a key to the species that occur in the Arabian Peninsula. Detailed species accounts follow, including high quality images depicting every species (and in some case males and females, and in others juveniles and adults), a diagnosis, information on distribution (both within the Arabian Peninsula and beyond), habitat, biology, threats and conservation status. The authors have also provided a catchment-scale distribution map, as well as images of typical habitat/s of the species. The book ends with a similar section featuring 10 alien fish species (three species of tilapia, two species of catfishes, and five species of poeciliids) that have now established populations in the Arabian Peninsula. The bibliography is extensive, and lists all relevant literature on the freshwater fishes of the region, updated until 2020.

As a freshwater ichthyologist, I consider Freshwater Fishes of the Arabian Peninsula as an impressive piece of work, and therefore have little criticisms and suggestions. I was of course, concerned by the large amount of text that has been reproduced verbatim from Handbook of European Freshwater Fishes. For example, the entire text that forms the basis of Sections 1 and 2 in pages 22-28, 48-53, 55-63, 71-72, and information provided in boxes on pages 57, 68 and 69 in Freshwater Fishes of the Arabian Peninsula, are all reproduced verbatim from the introduction chapter of Handbook of European Freshwater Fishes. While the authors admit this fact in their acknowledgments, I think it would certainly have been better to include modified (and additional) text in many cases. For suggestions, I would have loved to see a map depicting the current distribution of the 10 alien species in the Arabian Peninsula (especially since there are other maps depicting distribution of endemic and threatened fish species), and a separate map that shows overlaps in the distribution of endemic/threatened, and alien fish species. These could have added more value to the conservation element of the book.

Freshwater Fishes of the Arabian Peninsula would definitely have been a challenging project to accomplish, but I am sure the authors are immensely satisfied with the final product – a standard reference that is an invaluable for anyone interested in understanding the fishes of Arabian Peninsula, or for that matter anyone interested in 'freshwater fish'! I strongly recommend this book.



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ISSN 0974-7907 (Online) | ISSN 0974-7893 (Print)

December 2021 | Vol. 13 | No. 14 | Pages: 20143-20310 Date of Publication: 26 December 2021 (Online & Print) DOI: 10.11609/jott.2021.13.14.20143-20310

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Updated distribution of seven Trichosanthes L. (Cucurbitales: Cucurbitaceae) taxa in India, along with taxonomic notes Kanakasabapathi Pradheep, Soyimchiten, Ganjalagatta Dasaiah Harish,

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