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Unique fish wealth in terms of endemism and crypticism of Western Ghats, India

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Abstract

The Western Ghats, India having the most biological diversity in the world and in terms of the freshwater fish the endemism also higher here. Over 300 freshwater fishes present in the Western Ghats and more than 50% of those are endemic. Very few places in the earth having extraordinary biodiversity and the intensity of endemism in respect of freshwater fishes as Western Ghats, India showed. Eighteen genera are endemic in Western Ghats regions. Some fishes having cryptic nature with their congeneric sister species. Proper identification, conservation and incorporating the cultivable endemic species for development of aquaculture is now demand of time.

Keywords: Western ghats, endemic, cryptic species

1. Introduction

This paper addresses the unique fish wealth of Western Ghats. The freshwater fishes of Western Ghats having the endemism and some fishes have cryptic nature, also. Ichthyofauna of Western Ghats is defined as the 'Linnean shortfall' (knowledge deficit of exact number of species present) and 'Wallacean shortfall' (knowledge gap on the distribution of species) by Raghavan *et al.* (2011) [1]. Western Ghats, is a mountain range that covers an area of 140,000 km² and travel through the States of Karnataka, Kerala, Tamil Nadu, Goa, Maharashtra and Gujarat. Moreover, Western Ghats is 1,600 km parallel to the western coast of the Indian peninsula. This is one of the eight "hot-spots" of ichthyofaunal diversity in the earth and it is announced as a UNESCO World Heritage Site (Myers *et al.*, 2000) [2]. The Great Escarpment of India is another name of the Western Ghats, India (Migon, 2010) [3]. This region harbors 27 west-flowing and 38 east-flowing rivers. The major rivers and streams are Godavari, Krishna, Cauvery, Periyar, Bharathappuzha, Mandovi, Netravati, Kumaradhara, Phalguni, Sharavathi, Sitanadi, Swarna, Chandragiri, etc. The west flowing streams originating from this region possesses a unique fish wealth. "Very few sites in the world showing exceptional biodiversity and a high degree of endemism with respect to freshwater fishes as Western Ghats, India showed" (Kottelat and Whitten, 1996) [4].

2. Endemic fish status

The endemic fish can be defined as the species of fish which are native only in a particular country or waterbodies (Shaji *et al.*, 2000) [5]. Out of the total freshwater fish species of India, about 298 species were found in the Western Ghats; 52% of them are endemic to the Western Ghats and nearly one-third of the Western Ghats fish species are threatened (Daniels, 2001) [6]. Four species of *Barilius*, eleven species of *Puntius*, ten species of *Hypselobarbus*, twelve species of *Noemacheilus* genera are found exclusively in the Western Ghats region. Eighteen genera is endemic in Western Ghats regions e.g.- *Eechathalakenda*, *Cyprinion*, *Schismatorhynchus*, *Crossocheilus*, *Garra*, *Horalabiosa*, *Parapsilorhynchus*, *Noemacheilus*, *Homaloptera*, *Balitora*, *Bhavana*, *Travancoria*, *Pseudobagrus*, *Gagata*, *Glyptothorax*, *Horaglanis*, *Horaichthys* and *Parambassis* according to Daniels (2001) [6]. In another study, Dahanukar *et al.* (2004) [7] found this region of India is home of 288 known species belonging to 109 genera, 41 families and 12 orders with 118 endemic species (40.97%). Raghavan (2019) [8] stated that the Western Ghats mountain ranges have unique freshwater fish fauna, the reason is over 300 species, of which ~65% are endemic and the endemism is in family, genera and species level.

3. Cryptic fishes in the Western Ghats

The numbers of scientific publication are huge on the endemic ichthyofaunal diversity of Western Ghats (Day 1875-78^[9]; Pillay 1929^[10]; Hora 1942^[11]; Jayaram, 1981^[12]; Talwar and Jhingran, 1991^[13]. Some of the endemic fishes having ambiguities in identity; fourteen species position are cryptic in terms of taxonomy (Knight, 2013; Basavaraja, 2014; Arunachalam, 2016; Shaji *et al.*, 2000^[5])^[14, 15, 16, 5].

In all through life following fish species showed complexity: *Hypselobarbus jerdoni*, *H. dobsoni*, *H. pulchellus* complex (Gopalakrishnan and Basheer, 2000)^[17]; *Hypselobarbus thomassi*, *H. lithopidos*, *H. jerdoni* species conflicts; *Hypselobarbus kolus*, *H. curmuca*, *H. kurali* complex (Menon and Remadevi, 1995)^[18] etc. To establish the validity of certain species under crypticism in the Western Ghats—thoroughly studies need to be performed by the help of truss network technique and genetic markers (Nasren *et al.*, 2019)^[19]; (Gopalakrishnan and Basheer, 2000)^[17].

4. Prospects of Western Ghats Fishes

Gopalakrishnan and Ponniah (2000)^[20] stated the complete list of cultivable, acquirium, food and sport fishes endemic to Western Ghats. The cultivable fishes need to be prioritized and trial in local aquaculture (Gopalakrishnan and Ponniah, 2000)^[20]. Moreover, in different stages of life, the fish show different colours and which lead to misidentification. The boundaries between the cultivable potentially species (e.g *H. dobsoni*, *H. pulchellus*, *H. jerdoni*) need to be resolved. The captive breeding and cultural technique is the prerequisite to contribute these species in species diversification in aquaculture (Reid, 1990)^[21]. The artificial breeding is a procedure broadly used in the world-wide for preserve the endangered fishes (Keshavanath *et al.*, 2006)^[22]. A rare diversity of endemic fishes in Western Ghats, which can be conserve from different stressors-over exploitation by harvesting for food or aquarium fish trades (Raghavan *et al.*, 2018a)^[23]. There are tremendous scopes of the study of cryptic taxonomy, status of endemic species and propagations can lead to implement the conservation action plans in Western Ghats (Raghavan *et al.*, 2018b)^[24].

5. Conclusion

Proper identification of cryptic species and in situ conservation of endemic species are mandatory for Western Ghats fish. Many of cryptic species grows more than 5 kilograms and having the potentiality of aquaculture. The crypticism of these fish needs to be solved and further biological and propagation research needs to be carried out. The overall fish endemism is the pride of the Western Ghats, which demand attention.

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