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A REVIEW OF THE STATUS AND TRENDS OF EXPORTED ORNAMENTAL FISH RESOURCES AND THEIR HABITATS IN SRI LANKA

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PREFACE

This document discusses the history and the current status of marine and freshwater ornamental fish species in Sri Lanka, which are exported to some 25 countries in response to demand. It contains lists of marine and freshwater species, including endangered species, and information on their population, biology, ecology and distribution. It briefly discusses the impact of the export effort on resources, and the status of information relevant for resource and habitat management.

This document, and the activities undertaken between 1994 and 1999 in Sri Lanka to support conservation and management of ornamental fish species in the island, were supported by the Bay of Bengal Programme (BOBP) as part of its management-oriented Third Phase.

The BOBP is a multi-agency regional fisheries programme that covers seven countries around the Bay of Bengal – Bangladesh, India, Indonesia, Malaysia, Maldives, Sri Lanka, Thailand. The Programme plays a catalytic and consultative role in developing coastal fisheries management in the Bay of Bengal, thereby helping improve the conditions of small-scale fisherfolk in the member-countries.

The BOBP is sponsored by the Governments of Denmark and Japan. The executing agency is the FAO (Food and Agriculture Organization of the United Nations).

FOREWORD

The capture, breeding and export of ornamental fish is an important industry in Sri Lanka. It generates jobs, incomes and foreign exchange. But it also triggers concern. The collection of ornamental fish for export could have a detrimental impact on the rich but fragile ecosystems of the island, such as coral reefs, that teem with marine life.

During its management-oriented Third Phase (1994-1999), the BOBP was requested by the Government of Sri Lanka to help facilitate improved management of the ornamental fish sector.

Working with the Ministry of Fisheries and Aquatic Resources, the BOBP sought to promote consultation and negotiation among various stakeholders in ornamental fisheries. These included as many as 15 Ministries, various exporting firms, their suppliers, and the ornamental fish divers who collect and sell ornamental fish.) To aid the consultation process, two parallel streams of activities were organised. One aimed at strengthening knowledge about the ornamental fishery and about trends concerning resources and habitats, thereby giving stakeholders the best available scientific information. Another stream aimed at awareness-building on the needs, benefits and methods of management.

This report perhaps aids both streams by strengthening knowledge as well as awareness. The report has made an excellent review of the status and trends in the export trade of ornamental fish species. Key areas have been identified and prioritised for sustainable resource/habitat management. We hope the report is found useful as a source of information and reference by everyone concerned with ornamental fisheries, including planners, decision-makers, scientists and those engaged in the export trade in ornamental fish species.

Perhaps the most fruitful outcome of BOBP's work on ornamental fisheries in Sri Lanka is that many stakeholders are giving up past suspicions and antagonisms to discuss co-operation in strengthening the industry and its potential for enriching the country's economy.

We hope that this report will have the same effect, and lead to ideas and insights on conservation and management of Sri Lanka's ornamental fish industry.

Y.S. Yadava

6.12.2000 Interim IGO Coordinator

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(For easy reference, figures are numbered in relation to the Section in which they first appear)

Abbrevations Commonly Used in the Report

BOBP	Bay of Bengal Programme
CEA	Central Environmental Authority
CCD	Coast Conservation Department
FAO	Food and Agriculture Organization of the United Nations
MoF	Ministry of Fisheries and Aquatic Resources Development
NARA	National Aquatic Resources Research & Development Agency

ACKNOWLEDGEMENTS

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In Sri Lanka, I thank Mr H V C Fernando of the Ministry of Fisheries, not only for the work related to this report, but also for his dedicated commitment. With his keen interest to further Sri Lankan fisheries, I have found it a pleasure and a privilege to work with him.

I thank my patient assistants for helping me to finalise this report. To the various persons in the trade, whose knowledge and time were readily given to me, often confidentially, I owe a debt of gratitude. Many persons outside the trade, including a few students, have shared with me much time and aquatic-related knowledge over the years. Although they are too numerous to mention and I remain grateful to them, a few helpful friends such as the indefatigable Rohan Pethiyagoda, Vibu Perera, Samantha Goonesekera, Malik Fernando and Rex de Silva will not easily fade from memory. I sincerely thank colleagues and others who sent me supportive comments after the presentation of the draft of this report.

I owe a lasting debt of gratitude to my country for fostering in me a love and dedication for the rich natural resources that we possess, for it is indeed unparalleled and it behoves on Us the obligation to hold it in trust for the benefit and enjoyment of our future generations.

SUMMARY

The ornamental fish trade in Sri Lanka has come a long way over the last 75 years of its existence to develop into a valuable foreign exchange earner for Sri Lanka. Ornamental fish are exported to over 25 countries, mostly "developed". These include USA, Japan, United Kingdom, Holland, Germany, Singapore and Hong Kong. The consignments that reach Singapore, Hong Kong and Holland are mostly re-exported to other "western" countries. Exports have shown an increasing trend over the last two to three years, particularly since prices have become more competitive. Over 25 major exporters are now involved in the trade.

The base material for this trade is the rich tropical biological diversity that Sri Lanka enjoys, which seems to be imperilled by aquarium-trade related activities and other ill-planned short-term developmental activities. The trade now seems receptive to evolving strategies for the sustainable management of the aquarium fishery.

The freshwater aquarium trade obtains specimens for export both from wild-caught and captive-bred/hatchery-reared stocks, whereas the marine trade relies solely on the natural or wild habitat to procure specimens for export, collections being done by persons employed specifically for this purpose. Collection, especially in the marine waters, involves some degree of habitat destruction and stress to the collected organism. It is therefore necessary to develop and popularise eco-friendly collecting methods. Other mortality and stress-inducing practices occur during the holding phase (until collection by the exporter) and the transport phase. Methods for mortality reduction have to be developed/popularised. Hatchery breeding that has been developed by exporters for some species of freshwater fish (such as *Puntius nigrofasciatus* and *Puntius titteya)* seems the ideal answer to the ecosystem disruptions that trade practices cause, since natural mortality as well as habitat destruction are thereby avoided.

In the freshwater ecosystems, we have some 80 species of indigenous fish of which 27 are endemic, meaning that they are found nowhere else on our planet. 59 species of these freshwater fish are presently recorded as being collected from wild populations and exported in the aquarium trade; 53 of them being regularly exported. From among the 27 endemic freshwater fish species, up to 20 species are presently being used regularly in the aquarium export trade. Among the most sought after species for exports are the endemic *Rasbora vaterifloris, Puntius nigrofasciatus* and *Puntius titteya* with *Puntius cumingii* and *Belontia signata* being among the other popularly exported endemics. *Monodactylus argenteus* is the single most heavily fished non-endemic species

Recent trends in the marine trade have witnessed its expansion for exports to include more species (139 species in 1985 to over 200 species at present) and to export increased numbers of fish (from about 200,000 individuals in 1985 to almost 1,000,000 individuals at present). There is also an increasing trend to import fish from other countries for value-added transhipment.

In both the marine and freshwater exports, supply from the wild seems to be coming down. This trend is sending collectors to areas which were not previously used for collections (in the case of freshwater habitats) or to deeper and further offshore areas using SCUBA gear (in the marine habitat). Although no studies have been completed "to prove that there is a reduction in gene pools, colour varieties, etc." (NARA, 1998), collections appear to have impacted on gene pools and population characteristics of available stocks, since available sizes have changed and the desirable attractive colour varieties of freshwater species are no longer readily available. NARA (1998), however, is of the view that changes in the quality of food available for these species should not be discounted as a reason for these changes in the colours in fish. There are signs that over-collection of some species as well as over-collection of some sizes of certain species have already occurred, even though corroborating scientific studies have not been conducted.

The effects of selective over-collection are exacerbated by the habitat degradation that is taking place independently of aquarium-trade activities, but which would inevitably affect the sustainability of the aquarium industry.

Habitat destruction as well as habitat change are taking place in both freshwater and marine habitats. Clearing of shade along wet zone streams affects many endemic species, since many endemics are shade-loving species that live in shallow streams. Increased siltation, sediment load, pollution and reduction in water quantity are also disturbing trends. Another alarming trend bringing about change in our freshwaters, and which would affect the future of the aquarium trade, relates to the increase of many imported exotic and invasive aquatic species (including snails such as the Golden Apple snail, *Pomacea sp.,* and piscivorous fish, such as the Clown Knife fish, *Notopterous chitala)* in our freshwaters (Bambaradeniya et al, 1988) in our freshwaters. Such freshwater fish introductions would effectively reduce the carrying capacity of Sri Lanka's fresh waters to her indigenous fish species and may well lead to their being competitively eliminated, impacting gravely on our biological diversity and seriously narrowing the biological options that remain open for future development and expansion of our export aquarium industry.

The marine habitat is also seriously impacted by increased sediment load, pollution and habitat destruction. The unprecedented coral bleaching that has been recently experienced would bring about changes in the reef and coastal ecosystems, the destabilising nature of which we are as yet unable to predict.

Some of the freshwater endemic species require urgent measures for their protection and sustainable management. This is because their collection imposes further stresses, often severe, on their already strained populations. The stress-inducing factors include their small population, heavy collection pressure, the intense targeted collection of attractively-coloured individuals or specific size groups, (Gundekera, 1995, 1998), and population declines (due to unknown factors including environmental degradation). The species meriting such concern are *Rasbora vaterifloris, Puntius nigrofasciatus, Puntius titteya, Puntius cumingii, Puntius bimaculatus, Daniopathirana, Aplocheilus werneri, Sicyopus jonklaasi* and *Belontia signata.* Among marine species, extreme care should be exercised in exploiting species that are present in low numbers (such as clown fish) and species that form key linkages (such as cleaner fish) or perform key ecological functions (such as territorial damsels, algal feeding/coral cropping parrot fish and zooplanktivores).

Most endemic and sensitive species are restricted to very narrow specific habitats. Their survival, affected by physical over-exploitation for the aquarium trade, may be further hit by habitat alteration. No comprehensive studies have been carried out on the requirements of these endemic or sensitive exported species. In the absence of suitable impact studies, it is not possible to predict what impact habitat alteration will have on these species. Exporters target the more colourful varieties and since their ecological significance has not been studied, what long-term effect such selective exploitation will have on genetic diversity cannot yet be detailed.

Some species are more susceptible to poor handling and transport conditions. Exporters simply harvest larger numbers to offset attendant mortalities of such species. Inadequate space and water volume, poor oxygenation during export and excessive pre-export starvation and stress increase the mortality of exported numbers of some species.

Apart from legislation that can be effectively implemented, eco-physiological and population studies of a quantitative nature are urgently needed to advise on collection, maintenance and transport conditions that need to be followed by exporters to safeguard collected stocks from unnecessary mortality. Exporters are eager to learn and would be receptive to receiving appropriate, scientifically formulated, well-meaning practical advice. Studies should be targeted towards this end, since it seems unlikely that the export trade can at present be voluntarily modulated on the basis of conservation requirements. Such a strategy could only become feasible after an adequately robust ecological data base has been compiled, which would necessarily require time.

An effective management strategy needs to address not only aquarium-trade related matters, but also policy and other matters in an integrated approach if we are to be hopeful of sustaining the aquarium industry in the long-term.

Indonesia	9,100,000
Philippines	8,600,000
Hong Kong	7,400,000
Colombia	3,000,000
Brazil	1,800,000
Japan	*1,750,000*
Malaysia	1,600,000
Sri Lanka	1,200,000
Others	ca 42,550,000
Total imports:	US$ 100,000,000

Table 3.3 Countries competing to export tropical fish to the EEC as indicated by import figures (freshwater & marine, 1992; Bassleer, 1994)

(in US$)

Country of Origin	*Freshwaterfish*	*Marine fish*
Singapore	35,000,000	1,800,000
Netherlands	5,800,000	1,650,000
USA	5,350,000	1,100,000
Israel	5,300,000	1,300
Japan	4,800,000	
Czechoslovakia	4,700,000	
Indonesia	1,800,000	2,100,000
Brazil	2,850,000	
Thailand	2,200,000	
Philippines	75,000	1,300,000
Germany	2,000,000	
Colombia	1,700,000	
Sri Lanka	400,000	1,200,000
Others	10,025,000	1,850,000
Total	**ca** 82,000,000	**ca 11,000,000**
Total imports	**ca US$** 93,000,000	