GENERAL OUTLOOK OF FISH DISEASE IN SRI LANKA (*A REVIEW*)

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ABSTRACT: In recent years, inland fishery and aquaculture have resulted in the introduction of 19 fish species into Sri Lanka. Along with these, fish parasites have been introduced. The cestode *Bothriocephalus gowkongensis* Yeh probably came in with the grass carp *Ctenopharyngdon idella* (Cuvier and Valenciennes) from China. Carps also harbour *Dactylogyrus* and the crustacean parasite *Sybergasilus major* (Markevich) 1940 in the gills. The crustacean parasite *Lernaea* has also been observed. Ornamental fish have also been imported without any quarantine and have brought in protozoan fish parasites like *Ichthyophthirius* sp. and *Trichodina* sp. Epizootic ulcerate syndrome (EUS), possibly caused by a rabdo virus, is found in Southeast Asian countries and threatens to invade Sri Lanka. A well organized fish quarantine programme is necessary to prevent further outbreak of fish disease.

Fisheries in Sri Lanka called for an increase in percapita consumption from a level of around 15 kg/ year to 21 - 22 kg/ year by 1989. To meet this goal, it was estimated that the total fish production must increase from 210,000 tons/year in 1982 to 330,000 tons/year by the year 1986 (Anon 1986a). The maximum sustainable yield (MSY) of the continental shelf fishery of Sri Lanka is approximately 250,000 tons/year. The additional production required from other contributions must be reached via deep sea and off-shore fisheries or from inland fisheries (fresh water fisheries). The cost involved in improving off-shore fisheries and deep sea fisheries is high and requires foreign assistance, both technical and scientific. There has been a significant increase and improvement in existing inland fisheries. Since the 1970s, the government of Sri Lanka has laid particular emphasis towards boosting inland fisheries but this has now stopped in 1990's. The total fish production in 1985 was estimated at 186,536 tons, the contribution from culture-based reservoir fisheries being 19.3%; that is around 35,983 tons (Anon 1985).

The inland fishery of the island is based on extensive stocking in seasonal tanks and man made reservoirs. Further, 120,000 lagoons and brackish water estuarine resources are also stocked. In addition, considerable land suitable for pond construction may also be found mostly in the country's wet zone which has an annual rain-fall of more than 190 mm (Anon 1979).

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To meet the projected production of freshwater fisheries, the Sri Lankan government has embarked upon an immense aquaculture programme in collaboration with various aid agencies, such as the Food and Agriculture Organization (FAO), the United Nations Development Programme (UNDP), the International Development Research Centre (IDRC) and the Asian Development Bank (ADB), involving millions of dollars. Experience has shown that intensification of aquaculture creates management problems, including out-breaks of disease. Aquaculture is in its infancy and health checks on imported fish are often neglected as yield is the primary consideration. At present, disease control measures are minimal or absent and it is most unfortunate that no fisheries development plans lay any emphasis on disease prevention and fish health. The current status of fish disease in Sri Lanka is reviewed by Balasuria (1987).

The proposed and ongoing aquaculture and fisheries development programmes seem likely to introduce new species of fishes into the island, and consequently some new parasitic organisms can be expected to be introduced which may transfer into suitable indigenous fish hosts. According to Chandrasoma (1983), 19 species of food fish have been introduced to Sri Lanka. Later, based on the recommendation of De Silva (1984), African culepids (*Limnothrissa* species and *Stolothrissa* species) were introduced into Sri Lanka. Tippets-Abbot McCarty Stratton (1980) suggested that the introduction of *Tilapia sparmani* (A.) Smith and *Sarotherodon galilaeus* (L.) would be desirable. At the time of the introduction of these new exotic species into the country neither serious quarantine measures nor disease screening had taken place. Fernando and Furtado (1963) reported that the occurrence of the cestode *Bothriocephalus gowkongensis* Yeh 1955 (Table I) in indigenous fish in Sri Lanka was probably a result of importing grass carp, *Ctenopharyngodon idella* (Cuvier and Valenciennes), from China. This is considered to be a highly pathogenic parasite of carp causing severe problems in carp culture in Europe. Carps harbour the monogeans *Dactylogyrus* spp in the gills (Table I) which cause serious disease out-breaks and mortality at the fry and fingerling stages. Balasuriya (1983) reported that the highly host specific crustacean parasite, *Sybergasilus major* (Markevich) 1940, which severely affects the gills of grass carp, was detected in 1976, just one year after the introduction of grass carp to Sri Lanka. It is also suspected that the crustacean parasite, *Lernaea*, was introduced into Sri Lanka with exotic fish species. The significance of the pathogenicity of introduced fish diseases to local water bodies within Sri Lanka has still to be fully researched.

The transportation of ornamental fish is exclusively carried out by the private sector, without any supervision or quarantine procedures. This route by which fish diseases are introduced is often neglected, since the ornamental fish trade contributes less towards aquaculture (Subasinghe and Balasuria 1987). However, this means of introduction must also be monitored to prevent the introduction of disease. Most protozoan fish parasites such as *Ichthyophthirius* sp.

and *Trichodina* (Table l) are transported with the fish. These parasites have a wide range of host specificity, a high reproductive rate and cause damage to fish in tropical conditions. Therefore the ornamental fish trade may contribute more towards the fish disease problem whilst contributing less to aquaculture. It is thus important to have a well organised fish quarantine programme to prevent further outbreak of fiish disease in the future.

A recent survey sponsored by the FAO and Overseas Development Administration (ODA) of the United Kingdom has found that epizootic ulcerative syndrome (EUS), possibly caused by a rabdo virus, may be causing severe epizootics in cultured and wild freshwater fishes in South east Asian countries (Anon 1986b). So far this has not been diagnosed in Sri Lanka (Subasinghe and Balasuria 1987). Confirmation of the existence of the EUS causative rabdo virus needs very advanced studies in the field at the site of the outbreak as there is still confusion as to whether the onset of the disease is predominantly related to the use of fertilizers, pesticides, herbicides, pollutants or effluents entering water bodies. The FAO has set up a team to investigate ulcerative disease syndrome (UDS) including Nicholas Frerichs from the University of Stirling who visited Sri Lanka in 1987, to study the possible existence of the disease in some Southern rivers. The findings of this research have yet to be published.

Isopod parasites (Table l) have become important in some perennial water bodies. They have caused mortalities of *Orechoromis mossambicus* and *O. niloticus* adults in two reservoirs in the Pambala area, namely Katupotha (200 ha) and Siyambalankotuwa (300 ha) (Balasuriya 1987). Bacterial diseases are mainly found in grass carp reared in fisheries stations. Enteritis of grass carp caused by *Aeromonas punctata* (See Anon 1980) causes severe losses in adult fish in mud ponds mainly when the organic content of the pond bottom rises (Balasuriya 1987).

There is no regulation governing the export/import and quarantine of fishes. However, the Ministry of Animal Production and Health requires that the importer provides a satisfactory health certificate from the country of origin, certifying that the fish are free of disease. Upon arrival, the fish are released to the importer. No holding facilities or screening procedures are undertaken at present. The setting up of a fish disease unit will allow the formation of quarantine and certification procedures (Shariff 1987).

Current regulations governing fish quarantine and certification are still rather vague, resulting in poor implementation. There are a number of causes for the ineffectiveness of the implementation of quarantine and certification procedures (Sharrif 1987):

1. Lack of personnel qualified to inspect fish consignments for imports/exports and to conduct diagnostic procedures.
2. Insufficient base line research and lack of detailed knowledge on the causative agents of diseases.
3. Limited funds for the establishment of quarantine stations, the purchase of equipment, training of personnel, and for research.
4. Lack of implementation of standardized systematic procedures for the examination and certification of fish.
5. Lack of public awareness of the knowledge of the effect of fish mortalities and disease along with the movement of fish stock from one place to another.

Table 1. Parasites of Sri Lankan inland fish species.

Parasite	Host
Protozoa	
Cryptobia sp.	*Lebeo rohita, Cirrhinus mirrigala, Ctenopharyngodon idella*
Trichodina sp.	*L. rohita, C. mirigala, Cyprinus carpio, Catala catala, Labeo dussumieri*
Ichyphthirius sp.	*C. idella, L. rohita C. mirigala*
Scyphidia sp.	*L. rohita, C. mirigala, C. carpio*
Myxobolos sp.	*L. rohita, C. mirigala, C. carpio*
Monogenea	
Dactylogyrus curiosus	*Rasobora danisonius*
Dactylogyrus daniconii	*R. daniconius*
Dactylogyrus sarangea	*Puntus sarana*
Dactylogyus aequipinnoti	*Danio aelpninnatus*
Dactylogyrus dorsalis	*Puntuis dorsalis*
Dactylogyrus fernandoi	*P. dorsalis*
Dactylogyroides macracanthus	*Puntius filamentosus*
Dactylogyroides vittati	*Puntus vittatus*
Dactylogyrodes bimaculati	*Puntius bimaculatus*
Conudiscoides(=Ancylodicoides) jaini	*Macrones keletius*
Bifurcohaptor lanki	*M. keletius*
Ancryocephalus esomi	*Esomus dandrica*

Ancryocephalus rasborae	*R. daniconius*
Ancryocephalus heteranchoris	*R. daniconius*
Ancryocephalus daniconii	*R. daniconius*
Ancryocephalus aqualis	*R. daniconius*
Ancryocephalus kirtisinghei	*R. daniconius*
Ancryocephalus tripathii	*R. daniconius*
Ancryocephalus etropli	*Etroplus suratensis, Etroplus maculatus.*
Ceylontrema globidiscus	*E. suratensis*
Enterogyrus globidiscus	*E. suratensis*
Entrogyrus papernai	*E. suratensis*
Dactylogyrus sp.	*L. rohita, C. mirigala, C. catla, C. carpio, C. idella, L. dussumieri, Aristichthys nobilis.*
Gyrodactylus sp.	*L. rohita, C. mirigala*

Digenea

Transversotrema patialense	*Macropodus cupanus*
Digenean metacercaria	*L. rohita, C. mirigala, C. idella, A. nobilis, H. molitrix*

Cestoda

Bothriocephalus gowkongensis	*Puntius sarana*
Senga lucknowensis	*Mastacembleus armatus*
Gangesia bengalensis	*Wallago attu*
Lingula sp.	*L. rohita*

Acanthocephala

Zeylanechinorhynchus sp.	*Macrones vittatus*
Pallisentis nagpurensis	*Ophiocephalus striatus*

Nematoda

Camallanus ceylonsis	*W. attu*
Zeylanema arabantis	*Anabus testudineus, P. filamentosus, R. daniconius*
Zeylanema pearsei	*P. daniconius*
Zeylanema kulasiri	*Ophiocephalus punctatus, A. testudineus*
Zeylanema fernandoi	*O. striatus, O. punctatus*
Zeylanema sweeti	*R. daniconius, Clarias teysmani, O. punctatus*
Procamallanus planoratus	*C. teysmani, O. striatus, O. punctatus*

Procamallanus confusus	*Heteropneustus fossilis*
Procamallanus sp.	*W. attu*
Spinitectus corti	*Ophiocephalus gachua kelaarti*
Hedruris sp. (larva)	*W. attu, O. bimaculatus, Glossgobius giuris*
Eustrongylides sp. (larva)	*H. fossilis, O. bimaculatus, W. attu*
Annelida	
Placobdella undulata	*E. suratensis*
Crustacea	
Ergasilus ceylonsis	*P. sarana, P. dorsalis*
Ergasilus mendisi	*O. bimaculatus*
Paraergasilus brevidigitus	among zooplankton
Sinergasilus major	*C. idella*
Lamproglena chinensis sprostoni	*C. idella*
Lernaea cyprinacea chakoensis	*C. carpio, O. sphronemus goramy, H. fossilis, G. giuris*
Lernaea sp.	*C. carpio, L. rohita, C. mirigala, L. dussumieri, A. nobilis*
Argulus foliaceus	*C. carpio*
Alitropus typus	*R. daniconius, W. attu*
Isopod gen sp.[1]	*Orechoromis mossamicus*

1. This parasite was observed at a freshwater reservior under the jurisdiction of Pambala Brackish Water Fisheries station.

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