



GUIDELINES FOR GREEN CERTIFICATION OF FRESHWATER ORNAMENTAL FISHES



The Marine Products Export Development Authority
(Ministry of Commerce & Industry, Government of India)

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THE MARINE PRODUCTS EXPORT DEVELOPMENT AUTHORITY

(Ministry of Commerce & Industry, Government of India)

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FOREWORD

Keeping colourful and fancy fishes known as ornamental fishes, aquarium fishes, or live jewels is one of the oldest and most popular hobbies in the world. The growing interest in aquarium fishes has resulted in steady increase in aquarium fish trade globally. The ornamental fish trade with a turnover of US \$ 6 Billion and an annual growth rate of 8 percent offers lot of scope for development. Unfortunately India's share in ornamental fish trade is estimated to be less than 1 % of the global trade. The major part of the export trade is based on wild collection. There is very good domestic market too, which is mainly based on domestically bred exotic species.

The earning potential of this industry and the relatively simple techniques involved in the growing of these fish has helped the aquarium industry to evolve and provide rural employment and subsequent economic upliftment in many countries including India. Ornamental fish trade has much more to offer than what is exploited now as far as India is concerned. As the trade expands, issues such as quality, environmental concerns, habitat protection and sustainability of the resource come to the fore simultaneously. For the trade to prosper, such issues have to be addressed giving due importance. The recent release of Global Guidelines for Aquaculture Certification in October 2010 by the Subcommittee on Aquaculture under the Committee on Fisheries of FAO, point out similar certification requirements in future in other sectors also. This could be considered as an indication of the future requirements the ornamental fish trade would require to comply with. We at MPEDA felt a similar effort covering all the concerns above would be beneficial for the ornamental fish production sector in India in gaining more market appreciation.

Green certification is the certification given to a product to ensure its environmental and socio-economic sustainability. It ensures product quality, safety and traceability. Keeping in line with these concepts, MPEDA, in association with UNCTAD and Project PIABA, Brazil organized an international workshop on Green certification of ornamental fishes in October 2008, which was the first of its kind in the sector. A national task force was constituted after the workshop to prepare the guidelines for green certification of freshwater ornamental fishes traded within and exported from India. The guidelines in the present form have been prepared through various deliberations and after incorporating the comments from organizations who have offered their valuable suggestions / comments on the draft.

I congratulate the Task Force members as well as all those who have put in their efforts to bring out this beautiful publication. I am also grateful the various organizations and experts for their constructive suggestions and comments to make this venture meaningful. I am sure that this will surely give an impetus to the growth and export of the ornamental fish sector of India.

LEENA NAIR
CHAIRMAN



ACKNOWLEDGEMENTS

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5. Mr. K.R. Pushpangadhan, Ornamental fish Exporter, Kerala
6. Mr. Kripan Sarkar, Ornamental fish breeder, West Bengal
7. Mr. Anilkumar P., Technical Officer, INFOFISH, Malaysia

Mr. G. Mohan Kumar, IAS, former Chairman, MPEDA was a source of inspiration and incessant support for organizing the international workshop on green certification as well as for the follow up activities during his tenure at MPEDA.

Thanks are also due to Mr. Kuruville Thomas, IFS, former Director (Marketing), MPEDA for the contributions he has made during his tenure at MPEDA for the successful culmination of the envisaged objectives.

We acknowledge the valuable comments and suggestions received from OFI (Ornamental Fish International), The Netherlands, WWF (World Wide Fund for nature), INFOFISH, Malaysia, CMFRI (Central Marine Fisheries Research Institute), Kochi, CIFA (Central Institute of Freshwater Aquaculture), Bhubaneswar and Assam Agricultural University, Assam.

The inputs from Dr.I.S. Bright Singh, Cochin University of Science and Technology, Dr. V.S. Basheer and Dr. T. Raja Swaminathan of National Bureau of Fish Genetic Resources (NBFGR), Cochin Unit for bringing out this guidelines are also duly acknowledged.



PREFACE

The potential for the development of ornamental fish trade in India is immense, though it is still in a nascent stage. The Government of India has identified this sector as one of the thrust areas for development to augment exports. The turn of the century has seen a spurt in the collection, culture and trade in freshwater ornamental fishes. Aqua-shows have now become an annual feature in some states as in Kerala where Government support for such an activity is in vogue. For the trade to prosper, the three pre requisites are quality, quantity and sustainability. The fish species diversity of the rivers and streams of the Western Ghats and North East India are well recognized with as many as 68 per cent of the 327 species listed from the former and over 50 per cent of the 350 or so listed from North East India being endemics. Of these, 40 to 50 per cent are ornamentals, some fetching very high prices in the international market. Ninety per cent of the freshwater ornamental fishes exported from India are wild caught indigenous species. The total marine products exported from India in 2009-2010 was about Rs.100485 million (US \$ @ 2132 million) of which ornamental fish formed only a minuscule of hardly Rs.55 million (US \$ @ 1.17 million).

We are today in an unenviable position, so that we could consider policies on environmental, and human management approaches to make the growing industry of freshwater ornamental fish trade sustainable, eco-friendly and at the same time monitor resilience of the resources. We have to create an awareness among local communities and stakeholders to desist from unlawful and illegal practices of catching ornamental fishes from the wild. The trade should also encourage protection of the habitat for an eco-friendly approach. Presently exotic species dominate our domestic aquarium trade, and some are being bred for export. Unregulated/illegal introduction of exotic species and control or elimination of invasive species pose problems and these issues have to be addressed.

It is in this context that the initiative taken by the Marine Products Export Development Authority (MPEDA) in organizing an “International Workshop on Green Certification of Ornamental Fish” in association with UNCTAD and PROJECT PIABA, Brazil assumes great importance. This workshop held at Cochin, India from 14 to 18 October 2008 was a milestone in this direction. It stressed the need for developing a value chain approach from collection/culture to export of ornamental freshwater fishes. Unfortunately, to date, we do not have any proper guidelines or code of practices for the freshwater ornamental fishes similar to marine ornamental fishes developed by Marine Stewardship Council (MSC) and the Marine Aquarium Council (MAC). Just as the Forest Stewardship Council (FSC) and the MSC, it is high time to develop a “Freshwater Stewardship Council (FSC)” as well as a “Freshwater Aquarium Council (FAC). In Brazil, it is the Forest Stewardship Council that handles certification of Cardinal tetra caught from the wild by traditional means and this has the approval of organizations such as the World Conservation Union, World Wild life Fund (WWF) and TRAFFIC.

Thus, the International Workshop at Cochin had opened up new vistas for developing modalities for Green Certification for Freshwater Ornamental fishes. Equally significant is the fact that in December 1999, the Indian Parliament passed the Geographical Indication of Goods (Registration and Protection) Act 1999 which seeks to provide for the Registration and Protection of Geographical Indications relating to goods in India. In the case of ornamental fish, Geographical Indication becomes imperative as it will indicate the natural distribution of a species and the location / country it belongs to. This will give legal protection to the concerned species and help in the event of any IPR / Patent issues, as the natural distribution of the species alone will have to be taken into



consideration and not the places / regions they have been introduced / transplanted through export or other man-made activities.

A major recommendation of the Cochin International Workshop which was attended by delegates from India and abroad was that under the auspices of MPEDA a “Task Force” be constituted to develop the Guidelines, Regulations and Code of Practices for Green Certification of Freshwater Ornamental Fishes and their Geographical Indications (GI). The animal health, community/ stakeholders’ welfare and the socio-economic sustainability are also matters of concern to be addressed. Accordingly, a seven member Task Force was constituted. The Task Force had nine sittings and went in depth into the various facets of details encompassing Green Certification of Freshwater Ornamental Fishes. The report of the Task Force was sent to various national and international organizations for comments and suggestions. The suggestions on the report received from OFI, WWF, INFOFISH, CIFA, CMFRI were analysed and relevant ones have been incorporated after a series of deliberations.

The following aspects such as collection from the wild, handling, transport, holding, breeding and culture facilities, conditioning for export, infrastructure and maintenance of records to conform to a value chain system for delivering healthy ornamental fishes to the trade and the hobbyist have been taken into consideration. The guidelines also addresses the Chain of Custody verification methods as proposed by the FAO to cover the tracking/ traceability of the product all along the collection, production, transportation, holding, breeding and marketing chain. This also encompasses traceability and transparency. The adoption of the Report and its implementation will go a long way to maintain the highest standards in the trade of freshwater ornamental fishes from India. The Certification should also assure enhanced economic returns, reduction in risks including mortality and reduction in the cost of production. Green Certification should not be considered as a threat, but as a facilitator for excellence in quality, standards and ethics.

Green Certification may be introduced on a voluntary basis in a phased manner once the implementing agencies are identified and training programmes organized for the stake holders and entrepreneurs for adopting the system. However, for wild caught native ornamental fishes, Green Certification may be made mandatory with a transition period of three years from the date of implementation of the guidelines.

E.G. SILAS
CHAIRMAN (Task Force)



VISION & MISSION

Vision

“Conservation and sustainable development of freshwater ornamental fish sector involving collection, farming and marketing through a value chain system enabling certification at all stages.”

Mission

- i) Create societal awareness about the significance of green certification in conserving and sustaining freshwater ornamental fish resources and their habitats.
- ii) Manage collection area according to the principles of ecosystem management ensuring ecosystem integrity and the sustainable use of the ornamental fish resources.
- iii) Gradually reduce the dependence on the wild stocks, to maintain the genetic diversity, by promoting captive breeding and farming practices.
- iv) Promote closed seasons, protected areas including sanctuaries and natural spawning grounds.
- v) Adopt eco-friendly practices of collection, farming, handling, transportation of freshwater ornamental fishes including eggs and larvae and marketing of freshwater ornamental fishes
- vi) Stop the release of farmed/alien species to the natural water bodies for safe guarding the genetic integrity and susceptibility to diseases of the native stocks.
- vii) Establish proper documentation which is mandatory at all stages (from collection/farming to marketing).
- viii) Establish Green Certification system to achieve sustainability and social security, reduce risk and cost, and to enhance income.



EXECUTIVE SUMMARY

India, blessed with the richness of its biodiversity and strategic geographical proximity and connectivity to the international markets can capitalize on these two factors to carve out a prominent place in the global trade of ornamental fishes. For achieving this ambitious target, efforts must be channeled to strengthen the infrastructure, knowledge base and marketing links with an eco friendly and sustainable approach ensuring socially acceptable and economically viable development of the sector.

The success of any product in the market is its consumer acceptance and assurance of certain standards to it by a certification system adds value to the product and enhances its consumer preference. In this context the concept of Green Certification assumes importance as it takes care of the environmental concerns as well as ensures a value chain system linking all segments of the sector from collector / producer to the consumer. In line with these objectives, the MPEDA, in collaboration with UNCTAD and Project PIABA, Brazil organized an international workshop on Green Certification of ornamental fishes from 14 to 18 October 2008 at Kochi, India. As per the recommendation of the Workshop, a seven member national level "Task Force" was constituted under the auspices of MPEDA to develop the guidelines, regulations and code of practices for Green Certification of freshwater ornamental fishes and their Geographical Indication (GI). The Task Force, after serious brainstorming sessions and deliberations has prepared the guidelines incorporating the following aspects such as collection from the wild, handling, transport, holding, breeding and culture facilities, conditioning for export, infrastructure and maintenance of records to conform to a value chain system for delivering healthy ornamental fishes to the trade and the hobbyist.

The gist of the various topics can be summarized as follows:

1. Guidelines for Collection of Ornamental fishes and invertebrates from natural water bodies:
 - ❖ This section covers the aspects such as nature & type of water body from which fish is collected, the methods for collection, handling and transportation.
2. Guidelines for Primary Holding Facility
 - ❖ The various aspects described include items such as site selection, water source, treatment of discharge water, and transport of the fishes.
3. Guidelines for Secondary Holding Facility
 - ❖ Major areas covered includes site selection, type of tanks to be used, Best Management Practices (BMP's), laboratory, acclimatization, packaging, transport, use of antibiotics, water treatment and disposal of dead fish.
4. Guidelines for Exporting Facility
 - ❖ This section addresses areas such as source of the fishes, quarantine measures, BMPs, Health certificates and buyer requirements.



5. Guidelines for Culture Facility

- ❖ The major aspects covered includes site selection, source of water, BMPs, use of organic manure, mandatory building/infrastructure facilities, requirements for ponds and tanks, supply and drainage system, water treatment, quarantine and health management, fish holding area, packing area, water and air supply requirements

6. Environmental Integrity

- ❖ This section addresses the significance of environmental concerns which have to be considered while evolving management strategies and protocols at various segments of the value chain. Major aspects mentioned include responsible use of various energy sources, feed, feed additives, chemicals, drugs and antibiotics.

7. Best Management Practices (BMP)

- ❖ The most ideal practices to be adopted at different facilities for achieving the overall objectives of green certification are described under this section. The areas covered includes live feed culture, feeding and feed preparation, use of chemicals for modifying the natural colour of the fishes, post mortem and disposal of dead fish, handling of fishes and use of tranquilizers / anesthetics.

8. Green Seal Labelling (Eco Labelling)

- ❖ Green Seal labelling procedure has to be adopted to indicate that the origin of the fish is from a certified operation and chain of custody (CoC) from buyer to consumer. Green seal certification requires that the ornamental fish in the CoC passes through the established processes and standards of fish catching, handling, culturing, conditioning, packing and marketing. The Green Seal is also concerned with environmentally responsible, socially acceptable and economically viable procedure of production and marketing of ornamentals

9. Documentation & Maintenance of Data

All the information has to be recorded and maintained at every facility/ section in the value chain so as to ensure the effective monitoring and surveillance of the system. This information is described in detail under this section. The format for log books and registers to be maintained at each section is given as annexures to this chapter.

10. Agencies for Accreditation and Verification

- ❖ Accreditation Agency and Verification Agency should be constituted by MPEDA which will be the Nodal Agency for implementation of Green Certification System in the country.

11. Programme implementation. The procedure for implementation of the programme is described under this section, which includes short term and long term plans.

12. Standards for assessment. The standards on which the assessment of the facilities is to be done is described here. Score cards for each facility has been prepared and is given as annexures.



13. Import of exotic Fishes

“Guidelines for the Import of Ornamental Fishes into India” issued by Ministry of Agriculture based on the recommendations of National Committee on Introduction of Exotic Aquatic Species into India must be followed for the import of exotic fishes to India. The relevant information on this topic is also included as annexure to this chapter.

14. Geographical Indication of species

- ❖ In December 1999, the Indian Parliament passed the Geographical Indication (GI) of Goods (Registration and Protection) Act 1999 which seeks to provide for the Registration and Protection of Geographical Indications relating to goods in India. In the case of ornamental fish, Geographical Indication becomes imperative as it will indicate the natural distribution of a species and the location / country it belongs to. The registration of a GI may act as a certification that the product possesses certain qualities, or enjoys a certain reputation, due to its geographical origin such as *Puntius denisonii* (Day), from the Western Ghats, India.

Training programmes will have to be organized for the stakeholders and the personnel of the implementing agencies by MPEDA to familiarize the guidelines and to create an awareness for the need to supply healthy ornamental fishes to the aquarium hobbyists, captured or cultured in an eco-friendly and sustainable manner. The stakeholders, breeders and exporters must be self-motivated to implement the green certification guidelines and the aquarium hobbyists may prefer buying the certified specimens, as the green certification process is aimed at producing quality fishes, reducing mortality at all stages, fetching far better prices, avoiding unethical practices and making all links of the chain sustainable and eco-friendly.



INTRODUCTION

Green certification is the certification given to a product to ensure its environmental and socio-economic sustainability. It is a procedure by which a third party gives written or equivalent assurance that the operation conforms to the relevant standard in relation to social issues, environmental impacts on animal (fish) welfare. It ensures product quality, safety and traceability. This is also aimed to enhance a fair value of a product along the chain of custody. The term bio-commerce includes the activities of production/collection, transformation and commercialization of goods and services derived from native biodiversity (genetic species, resources and ecosystems) that they are developed of sustainable form, in accordance with ambient, social and economic criteria (UNCTAD). There are many goods bearing green-labelling, such as, energy saving light bulbs, hybrid cars to reduced CO₂ emission, organic food, hand-netted reef fishes, managed wild-caught tuna and salmon. Another related term is 'Geographical Indication' (GI) - a name or sign used on certain products or which corresponds to a specific geographical location or origin (e.g., a town, region, or country). The use of a GI may act as a certification that the product possesses certain qualities, or enjoys a certain reputation, due to its geographical origin such as *Puntius denisonii* (Day), from the Western Ghats, India.

Global Facts

Ornamental fish is regarded today as a consumer based commodity and is the star product of the pet markets. It is a multi-million dollar industry that supports thousands of rural people in the developing countries. The global ornamental fish trade in retail level is worth more than US\$ 8 billion with an average annual growth of 9%, while the entire industry including plants, accessories, aquarium, feed, medications etc. is estimated to be worth more than US\$ 18-20 billion. The growing awareness of the need to respect the environment and, therefore, to know more about it, has helped popularize aquarium keeping with an education component. With the increasing popularity of household aquariums in many countries, ornamental fish play an important role in the international fish trade, providing employment opportunities to the rural population and considered as an earner of foreign exchange for many developing countries. As per FAO statistics the global estimates of exports of ornamental fish is around US\$ 337 million in 2008 representing an increase of more than 12 per cent over the previous year. Exports since 2000 showed recovery in buying patterns with most of the ornamental fish being sourced from the developing countries in the tropical and sub-tropical regions of the world. About 60-65% of ornamental fish were supplied from the developing countries.

There are more than 120 countries involved in ornamental fish trade. Altogether about 1,800 species of fish are traded, of which over 1200 are of freshwater origin. More and more species are being added to the list as a result of advancement in breeding, transport and aquarium technology. The global ornamental fish industry, although relies largely on captive-bred fishes of freshwater origin, significant numbers of fish and invertebrates from the wild are also included. The marine fish species constitute more than 15% of the market by value. About 98% of marine fish are collected from the wild while the rest are captive-bred. In general, the lower valued fish have greater demand than the high valued species. It has been estimated that about 30 freshwater species dominate the market such as guppies, platies, swordtails, mollies, neon tetra, angel fishes, gold fish, zebra danio, discus and barbs. The guppies and the neon tetra alone represent more than 25% of the global market in volume and fetches more than 14% in value. In the export market, the share of Singapore, the top exporting country in trade of ornamentals was 20% followed by Czech Republic (8%) Malaysia (7%), Israel (4%), Sri Lanka (3%) and China (1%). How-



ever, little is known about the scale of the international trade in many species, and there are concerns that trade in some species might not be sustainable, given factors such as their biology, distribution, conservation status and ability to survive in captivity.

The Indian scenario

The Western Ghats and the North-Eastern Region of India are considered to be two of the 34 'hotspot' areas of the world for biodiversity conservation with a variety of vegetation types, climatic zones and remarkable endemism. These regions are also endowed with a variety of brilliantly coloured ornamental fishes. With an abundance of these living jewels, India has a distinctive edge over other countries in trade potential. However, the Indian export of ornamental fish during 2009-10 was only US\$ 1.17 million (Rs.55 million) (source MPEDA) Exporters have put forward a number of reasons for the backwardness of India in the world trade including breeding, freight charges and lack of incentives. India has not made her presence felt in the international market for various reasons viz., inadequate transport facilities /high air freight, non-availability of breeding stock of exotic fishes, lack of professional training in nutrition, disease management, health care and breeding of exotic and indigenous fishes, lack of training in packing, handling and transportation, poor marketing strategies and restriction on the marketing of marine fishes and invertebrates. There are no definitive surveys on the domestic market size of ornamental fish also. As per the available data, the domestic ornamental fish market is worth around Rs.50 Crore and the demand is increasing at 20%. Economic surveys indicated that 16 million house holds (i.e. 8% of the 200 million house-holds) will require around 400 million fish per annum and can be optimistically assumed that the domestic market in India offers a huge untapped market in the coming decade. The MPEDA-UNCTAD funded survey conducted by Department of Industrial Fisheries, CUSAT in the five states, viz. West Bengal, Tamil Nadu, Kerala, Karnataka and Maharashtra estimates an annual production of 100 million fish from 1,703 units occupying an estimated area of 160 hectares. The productivity of ornamental fish sector in India is abysmally low when compared to the production of 132 million fish from 156 hectare in Singapore.

The abundance of both terrestrial and marine biodiversity in India has been both a blessing and a curse for the country. Unbridled exploitation of resources has crossed the sustainable levels and has also led to the decline of a number of species of plants and animals. The range of species caught and made available to the market often demands a continuous supply of "new fish species/varieties" and the hunt from the wild has tremendously increased in the global trade. As more and more 'beauties' from the rivers and coral reefs started attracting the world market, levels of exploitation kept going higher and higher which had led to adoption of destructive fishing practices. With other species of animals and plants currently in trade, new varieties have been produced by captive breeding, but with aquatic ornamentals, this is not yet the case. Human interference has disturbed the ecosystem of many water bodies also and only a few of them remain in pristine condition. In several parts of the world, there is growing awareness among the beneficiaries and user-agencies on the imperative need to conserve and manage various ecosystems. Official data on commercial exploitation from the wild have always been lacking, and resource monitoring has been poor. Therefore, the true extent and impacts of years of largely uncontrolled exploitation of natural ornamental fish resources have only recently started to be recognized. In 2000, the Global Marine Aquarium Database (GMAD) was established by UNEP-WCMC (United Nations Environment Programme- World Conservation Monitoring Centre), in collaboration with the Marine Aquarium Council (MAC) and with members of various aquarium trade associations. Many industry members (wholesale exporters and importers) provided data to enable monitoring of the trade in marine ornamentals, including information on the species in trade, volumes traded, and source and



destination countries. While this initiative provided an important step for the monitoring of this trade, it lacks an institutionalized, systematic reporting process and a regular source of funding to sustain it. In addition to GMAD, a number of mechanisms exist in many countries which aim to gather information concerning the trade in these organisms. These include customs and veterinary border controls, and sustainability-certification schemes. However, to date, certification and monitoring efforts have been focused on the marine component of the ornamental trade, with less emphasis on the freshwater sector. Although much of the freshwater trade involves captive-bred specimens, substantial volumes of wild-caught ornamental fish are also traded. Little is known about the scale, nature and sustainability of the trade of wild-caught freshwater ornamental species.

In order to address some of these issues, and to bring on board the various opinions of the different stakeholders, a workshop on sustainable harvest and green certification of wild caught indigenous and cultured ornamental fishery resources for export was conducted by the Marine Products Export Development Authority (MPEDA) in association with United Nations Conference on Trade and Development (UNCTAD) and Project PIABA, Brazil, at Kochi, India during 14 – 18 October, 2008.

The objectives of the workshop included

- ❖ promoting environmentally and socio-economically sustainable ornamental fish trade
- ❖ expanding & diversifying market through green certification
- ❖ creating geographic indication and brand image for the Indian fishes.
- ❖ Identifying significant freshwater ornamental fishes to be listed under GI from India.
- ❖ prepare guidelines for green certification standards for various stages in the supply chain.
- ❖ Formulating guidelines for green certification of ornamental fish species.

Task Force

The workshop recommended that a Task Force be constituted for formulating the guidelines for Green Certification for Wild caught and cultured ornamental fishes in the domestic and export trade with the following terms of reference:

- a) Formulate a Green Certification system for wild caught and cultured ornamental fish
- b) Prepare a road map for implementing the system.
- c) Submit the Green certification system developed for the approval of international organizations such as Food and Agriculture Organization of the United Nations (FAO), Ornamental Fish International (OFI), Ornamental Aquatic Trade Association (OATA) and World Wildlife Fund (WWF).

Accordingly, a National level Task Force was constituted by the MPEDA as per order no : 5/2(B)/OFD/HO-2007 Vol 2-B dated 04.12.2008 under the Chairmanship of Dr E. G. Silas, Former Vice-Chancellor, Kerala Agricultural University with the following members in the Task Force:

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The report prepared by the Task Force was sent to various national and international bodies for comments and suggestions which were incorporated and finalized after a series of deliberations to the present form.

PROTOCOLS AND PROCEDURES

- 1. COLLECTION OF ORNAMENTAL FISHES AND INVERTEBRATES FROM THE NATURAL WATER BODIES**
 - 1.1. Source of water – do not collect from water bodies which are contaminated by pollutants, chemicals, fish poisons, explosives and locations where OIE listed pathogens occur.
 - 1.2. Do not use fish poisons and explosives for collecting fish
 - 1.3. Do not collect fish from sanctuaries, protected areas including sacred water bodies, fish breeding grounds and during breeding seasons. Sanctuaries, Protected areas and designated areas should be delineated. Commercial exploitation from reserve forests and forest areas should be strictly prohibited. Participatory support from the local communities will be essential for the implementation. Awareness programmes have to be developed for this purpose
 - 1.4. Identification of season for the best collection- State Fisheries Department has to notify the closed season, quota for fish catch and other regulatory measures to protect and manage the resource.
 - 1.5. The Central and State acts related to conservation measures to be strictly followed
 - 1.6. Method of collection
 - 1.6.1. Use encircling nets, small drag nets, bag nets, traps and dip nets of appropriate mesh size only which will allow escape of undersized fishes. However, by-catch, if any should be released back.
 - 1.6.2. Species specific eco-friendly gears only have to be used. Do not use cast nets, gill nets and knotted nets.
 - 1.6.3. Natural aquatic flora should not be destroyed during collection.
 - 1.6.4. Collection should be timed for early morning, evening or night
 - 1.6.5. The water from the collection site should be kept ready for transfer of fish with scoop net.
 - 1.6.6. Always keep the collection bags or containers with fish submerged and away from direct sunlight to prevent rise of temperature.
 - 1.6.7. Do not carry fish during collection
 - 1.7. Handling and transfer of fish
 - 1.7.1. Prevent overcrowding of fish in the bags/containers to avoid stress and mortalities
 - 1.7.2. Do not take the fish out of water while transferring to collection bags and avoid unnecessary handling.
 - 1.7.3. Use hand net/ scoop net made of soft cloth only, such as cotton/linen to avoid any injury while transferring fish.
 - 1.7.4. Once the collection is completed the fish should be immediately transferred to conditioning facility.
 - 1.7.5. Battery/generator powered aerators are advisable during handling and transportation of the fish.



2. PRIMARY HOLDING FACILITY (model lay out given in Annexure - 1)

- 2.1. It should be a fish collector's society/cooperative society/ Self Help Group (SHG)/individual registered with the authority concerned of the State and MPEDA.
- 2.2. First level certification can be availed only if the holder and holding facility complies with the guidelines stated in 1.6 and 1.7
- 2.3. Select the site for holding facility where clean and good quality natural water is available. In case of bore well water, quality has to be tested for compatibility and continuous monitoring is required.
- 2.4. If ground water is used it should be aerated for a minimum period of 24 hours
- 2.5. Where ever possible rainwater harvesting can be done. Before using the rain water the ionic content should be balanced and biosecurity ensured.
- 2.6. Freshly caught fish should be kept for a minimum of 48 hours during which no feed should be given
- 2.7. Minimum facility such as cement tanks /FRP/Glass and aeration facilities for holding the fish
- 2.8. Packaging and transport- at stable/ reduced temperature (should be in the oxygen filled bags during early morning/evening/night)
- 2.9. Transport of fish from Primary to Secondary facility should be in insulated containers.
- 2.10. The discharge water from the facility should be treated before release.

3. SECONDARY/ MAIN HOLDING FACILITY (model lay out given in Annexure-2)

- 3.1. Water storage facility is needed. For source and quality of water, adhere to the conditions stipulated at points 2.3, 2.4 and 2.5. Water quality should be tested by an approved laboratory every six months.
- 3.2. Site should be away from the areas that are prone to flooding
- 3.3. Use artificial tanks such as cement/ plastic/ fibre/ glass tanks only
- 3.4. Nets and other implements should be separate for each tank
- 3.5. Fish acclimatization area preferably in FRP/ plastic/ glass tank
- 3.6. Packaging and transport as per BMP
- 3.7. Permissible antibiotics and anesthetics may only be used (Annexure - 3)
- 3.8. While receiving the fish at the holding facility dip treatment with suitable disinfectants/chemicals may be given.
- 3.9. Drainage from the acclimatization facility should be separate and this water should be treated and it should not be released into natural water bodies. Discharge of the water should be carried out as per Pollution Control Board's guidelines.
- 3.10. The quantity of fish stored should not exceed the permissible holding capacity and there should be extra holding facility in reserve to meet exigencies.
- 3.11. Laboratory with minimum facility to assess the water quality (Nitrite: Ammonia, Oxygen,



Carbon dioxide, pH, Temperature and Hardness) and to check fish health (external clinical signs)

3.12. Dead fish should be disposed after post mortem following standard sanitary procedure.

4. EXPORTING FACILITY: (model lay out given in Annexure - 4)

4.1. Fish should be collected only from Green certified facility

4.2. Pre-shipment quarantine facility is essential for holding the fish for a minimum 7 to 45 days depending up on the species and size

4.3. Pre-shipment quarantine should be done in smaller glass tanks with independent inlet and outlets.

4.4. Better Management Practices for packing to be followed.

4.5. Health certification from the authority concerned be obtained before shipment

4.6. Import requirements of the buyers with respect to health and other standards have to be fulfilled.

4.7. For source and quality of water, adhere to the conditions stipulated at points 2.3, 2.4 and 2.5.

4.8. Adequate biosecurity measures must be in place to ensure pest and bird control, prevention of contamination and escape of fishes into natural water bodies.

5. CULTURE FACILITY (Model lay out given as Annexure - 5)

5.1. General Requirements

5.1.1. Adopt Hazard Analysis Critical Control Point (HACCP) principles – for evolving the general process control strategies.

5.1.2. All buildings, ponds and tanks complete with labels and dimensions must be shown in floor plans

5.1.3. Production area shall be at least 70% of total farm area

5.1.4. Master farm should have completely drainable ponds.

5.1.5. Organic manure, especially animal wastes (eg. slaughter wastes) should be avoided.

5.1.6. In case of water shortage, water recirculation system can be used with adequate filtration.

5.1.7. Pollution control board guidelines should be followed for treating water (<http://www.cpcb.nic.in/>)

5.1.8. The drains should be covered.

5.2. Mandatory building/facilities to be constructed

5.2.1. Fish ponds and tanks (cement/ Fibre Reinforced Plastic (FRP)/ glass tanks)

5.2.2. Reservoir tanks and overhead storage tanks

5.2.3. Quarantine cum conditioning area



- 5.2.4. Fish disease treatment area, lab and chemical store- (Fish Health Monitoring and Management Section).
- 5.2.5. Fish feed preparation/storage area.
- 5.2.6. Fish holding area
- 5.2.7. Packing area
- 5.2.8. Water and air supply
- 5.2.9. Electricity / Generator /Fuel store
- 5.2.10. Sedimentation pond
- 5.2.11. Effluent Water treatment plant
- 5.2.12. Office and Accommodation / Rest room
- 5.3. Site selection
 - 5.3.1. Designated wet lands such as mangrove areas / swamps and forest lands should not be selected for setting up of the unit.
 - 5.3.2. The site should be free of pollution, including seepage of pollutants.
 - 5.3.3. The site should not be in flood plains/saline soils.
 - 5.3.4. The site should be located in a place where key inputs such as sufficient good quality water (including bore well and harvested rain water) and electricity are available.
 - 5.3.5. The site should have good connectivity to markets and airports.
 - 5.3.6. Adequate precautions should be taken while extracting and discharging water to maintain good water quality and environment while operating the unit at all times.
 - 5.3.7. There should be adequate precautions to prevent the farmed fishes and alien species from escaping to the natural water bodies.
- 5.4. Source of Water
 - 5.4.1. Municipal water meant for drinking should not be used.
 - 5.4.2. River /pond/open well water needs to be filtered through filters such as bio-filter and sand filter. The sand filtered water may be ozonized or UV treated. No chemical should be used for treatment.
 - 5.4.3. Bore well water, after agitation should be treated to remove iron, Hydrogen Sulphide, hardness etc. as the case may be. Care should be taken to recharge the ground water with the treated discharge water.
 - 5.4.4. Where ever possible rainwater harvesting may be resorted to as an alternate means of water supply and to recharge the ground water.
 - 5.4.5. PVC pipes alone should be used for the distribution of water.
 - 5.4.6. Reservoir and overhead tanks of required size should be maintained to store and distribute water



5.5 Infrastructure Required - Ponds & Tanks (Ponds for brood stock maintenance and larval rearing).

5.5.1. Fish ponds:

- 5.5.1.1. Arrange in a manner to facilitate management and harvesting
- 5.5.1.2. Separate each other by 1m all around
- 5.5.1.3. Provision must be there for draining completely to dry
- 5.5.1.4. Inlet, outlet, gradient/slope should be provided for each pond
- 5.5.1.5. Recommended to have a pond size of 20 sq.m.
- 5.5.1.6. Anti predator netting and fencing should be used
- 5.5.1.7. Earthen ponds lined with Poly Urethane material provided with adequate bio-security measures may be used.
- 5.5.1.8. Scoop nets and harvesting nets should be hygienically treated before and after every use.
- 5.5.1.9. Nets and implements should be separate for each tank/ponds. The nets used for the ponds should be disinfected before use as per the procedure given in Annexure 6.
- 5.5.1.10. To avoid loss of fish, prevent contamination and predation screen and nets should be used.

5.5.2. Fish tanks

- 5.5.2.1. Should have a provision for inlet and outlet of water for each tank. The tanks should be constructed in modules for good management practice.
- 5.5.2.2. Aquaria and brood stock tanks should be in a proper building with adequate lighting arrangements.
- 5.5.2.3. All tanks should be provided with Biological filter. The biological filter should be 5-10% of the water volume. 10% of the biological filters should be maintained as reserve to meet any contingencies with proper power back up.
- 5.5.2.4. All tanks should be provided with proper aeration. Two air stones (having displacement of one liter per minute) per thousand liters of water be provided for aeration and filtration.
- 5.5.2.5. The cement tanks may preferably have plastic/epoxy/fiber coating.
- 5.5.2.6. Tanks shall be arranged back to back
- 5.5.2.7. Tank size should be as per species requirement.
- 5.5.2.8. A space of about 0.8m between each group of fish tank to facilitate worker's movements.
- 5.5.2.9. Should be connected to main drainage system which lead to sedimentation ponds
- 5.5.2.10. Anti predator netting should be used



- 5.5.2.11. Aeration & biofiltration system should be separately provided for each tank
- 5.5.2.12. Separate hand nets should be provided for each tank.
- 5.5.3. Reservoir tanks and overhead tanks (For Holding water for distribution to fish ponds/tanks & Receiving recycled water)
 - 5.5.3.1. To be located next to sedimentation pond
 - 5.5.3.2. Prior to discharge in reservoir ponds/tanks fish pond effluents must be discharged in sedimentation pond
 - 5.5.3.3. Reservoir tank capacity should suffice the supply of daily requirement of water.
 - 5.5.3.4. A storage tank having capacity of minimum 10% of the total requirement of water be provided. The storage tank should be covered properly.
 - 5.5.3.5. Recommended to have rain water harvesting & storage facility.
- 5.5.4. Supply & drainage system
 - 5.5.4.1. Direction of flow must be indicated on plans
 - 5.5.4.2. Connection between sedimentation pond and reservoir pond must be shown.
 - 5.5.4.3. Drainage for the surface system (with the exception of quarantine area and fish disease treatment area) shall be linked to reservoir pond/tank.
 - 5.5.4.4. The discharge water should be treated properly before release.
- 5.5.5. Quarantine cum conditioning area
 - 5.5.5.1. Location should be close to the road entrance
 - 5.5.5.2. Access to and from the quarantine area should be restricted so as to avoid cross contamination.
 - 5.5.5.3. Foot bath should be provided at the entry to the quarantine and holding area. Foot bath should cover the entire length of the entrance and it should be of at least 30 cm depth and 75 cm width. This footbath must be changed regularly to maintain its efficacy.
 - 5.5.5.4. Tanks should have adequate viewing facility to observe fishes for behaviour and signs of any distress or pathology
 - 5.5.5.5. Drainage system should not lead into culture/ sedimentation ponds.
 - 5.5.5.6. Separate water line connection should be provided to avoid any cross contamination with the holding facility. Disinfected water must be used in the quarantine area.
 - 5.5.5.7. Separate the quarantine area completely by a brick wall.
 - 5.5.5.8. Feed store, disease treatment area and hatchery/production area must not be in the same area as quarantine area.
 - 5.5.5.9. Floor should be made up of durable and graded tiles which are easy to clean.



- 5.5.5.10. Each tank should have separate siphoning or tank cleaning equipment and nets.
 - 5.5.5.11. Personnel working in the quarantine area should not work in other bio secured areas; eg. Holding area.
 - 5.5.5.12. Freshwater fishes entering quarantine should be given a saltwater dip on the way into the system and, if necessary, two more saltwater baths at 3- to 5-day intervals.
 - 5.5.5.13. Quarantine period should be 7 to 30 days depending on the species and the type of diseases they are susceptible to
 - 5.5.5.14. Temperature of the quarantine section to be maintained between 24 – 28 °C.
 - 5.5.5.15. Prophylactic treatments – Fishes should be examined for any clinical signs of diseases / stress and appropriate prophylactic treatments such as formalin/ Potassium Permanganate bath/ salt treatment, may be given.
 - 5.5.5.16. Before the disposal of dead fishes, post mortem examination should be conducted in a systematic sequence to identify the causative factor and records maintained.
 - 5.5.5.17. Proper documentation of the details of the fish received, transferred to holding tanks, treated, dead and disposed should be maintained.
 - 5.5.5.18. List of permitted antibiotics/chemicals – given in Annexure-3
- 5.5.6. Fish health monitoring and management section.
- 5.5.6.1. The fish health management section should be well isolated from the main unit, with an independent water supply and storage system.
 - 5.5.6.2. The area should be composed of tanks for maintaining the sick fish (hospital tanks) with sufficient aeration.
 - 5.5.6.3. A separate set of equipment (including nets) should be kept for each tank.
 - 5.5.6.4. The hospital tank need not have the conventional type of biological filtration.
 - 5.5.6.5. The hospital tanks should be properly labelled and should be with a lid to avoid aerosols.
 - 5.5.6.6. There must be a separate tank maintained for disinfecting nets on regular and continuous basis following an approved method of disinfection (Annexure 6).
 - 5.5.6.7. All dead fishes must be removed instantly from the tanks and placed in a plastic bag that is clearly identified with the tank number. These fishes could be subjected for either disease diagnosis or disposed off after post mortem (Annexure-6).
 - 5.5.6.8. When used for disease diagnosis they could be maintained at 4°C for a short span of 3 to 4 hours for the detection and isolation of bacterial or fungal pathogens or at -20°C if the assay is for viruses.
 - 5.5.6.9. The representatives of diseased samples should be sent to nearby authorised diagnostic laboratory for further analysis; transportation should always be at low temperature as stipulated in Annexure - 7.



- 5.5.6.10. Disposal should be in 10% formalin kept in a closed carboy (Annexure-6).
- 5.5.6.11. Records should be maintained for all treatments, indicating the dosage, nature of treatment (short bath, prolonged immersion, oral medication or injection). The results of treatment should also be indicated.
- 5.5.6.12. The effluent water from the hospital tank should be properly treated before disposal. (Annexure-6)
- 5.5.6.13. Fish Health Monitoring and Management Section should be equipped with a laboratory for primary observation of the clinical signs of diseases, refrigerator with a freezing cabinet, facility for water quality analysis and a store for prophylactics and therapeutants.
- 5.5.6.14. Laboratory for primary observation of clinical signs should have three sections which are compartmentalized with passage having door with automatic door closer. Part of the lab may be set apart for maintaining chemicals used for the preparation of reagents as well as for chemotherapeutants and probiotics as listed in Annexure-3.
 - 5.5.6.14.1. Diseased and moribund fish receiving and autopsy and biopsy section: The fishes after gross observation are subjected for autopsy and / or biopsy (Annexure-8). The external and internal organs are observed using a magnifying lens and samples are collected on slides for microscopic observation. This section should be equipped with the items listed in Annexure-9
 - 5.5.6.14.2. Microscopic observation section: This should be equipped with a binocular microscope (with oil immersion objective) and beakers with disinfectant for disposal of slides.
 - 5.5.6.14.3. Water quality analysis section should be equipped with the items listed in Annexure-10.
- 5.5.7. Fish feed preparation / storage area (as per the design and lay out provided in Annexure - 5).
 - 5.5.7.1. Live feed must be disease free and be produced and maintained hygienically in the farm itself.
 - 5.5.7.2. Dry feed must be stored properly to maintain quality.
 - 5.5.7.3. Feed quality standards – Fish feed additives such as growth promoting substances, fish colouring agents, antioxidants and veterinary drugs should contain only substances permitted by the authorities concerned. The records of feed ingredients used may be maintained.
- 5.5.8. Fish holding area (To hold the stock meant for export; comes after quarantine)
 - 5.5.8.1. Use artificial tanks such as cement/ plastic/ FRP/ glass tanks only
 - 5.5.8.2. Nets and other implements should be separate for each tank
 - 5.5.8.3. Drainage from the holding facility should be separate and this water should be treated and it should not be released into natural water bodies. Discharge of the water should be carried out as per Pollution Control Board's guidelines.



- 5.5.8.4. The quantity of fish stored should not exceed the permissible holding capacity and there should be extra holding facility in reserve to meet exigencies.
- 5.5.8.5. Dead fish should be disposed following standard sanitary procedure.
- 5.5.8.6. Feeding schedules must be strictly adhered to as per the requirements of the species.
- 5.5.8.7. Model layout of the holding area is provided in the Annexure -5
- 5.5.9. Packing area
 - 5.5.9.1. Packing water –good quality filtered water with good aeration should be provided
 - 5.5.9.2. Accessories- Styrofoam box, polythene bags, master cartons. Only new polythene bags to be used and packing materials to be stored hygienically.
 - 5.5.9.3. Packing machine
 - 5.5.9.4. Oxygen
 - 5.5.9.5. Temperature control – maintain between 20 - 23 °C
 - 5.5.9.6. Packed fish meant for export to be stored in a separate storage room with temperature control.
 - 5.5.9.7. Use new plastic bags
 - 5.5.9.8. Packing must be done one day prior to transportation, and repacked for dispatch.
 - 5.5.9.9. Never use formalin in packing water. In general, the ratio of water and air in bag is 1:2 (water:air)
- 5.5.10. Water and air supply equipments
 - 5.5.10.1. Blower & Compressor
 - 5.5.10.2. Motor & Pumps
 - 5.5.10.3. It is advisable to use more number of small capacity blowers than a single blower of big capacity. Adequate back up of these machineries to be provided as standby.
- 5.5.11. Electricity / Generator /Fuel store
 - 5.5.11.1. A standby generator should be provided.
 - 5.5.11.2. Non conventional energy sources (solar/ wind energy) may also be utilized.
 - 5.5.11.3. Fuel store must be closed at all times and prohibited to be near inflammable goods
 - 5.5.11.4. Designs and maintenance must comply with safety standards and regulations stipulated by relevant authorities.
- 5.5.12. Sedimentation pond (for settling of farm water)
 - 5.5.12.1. Located next to effluent treatment plant and minimum size is 10m²



5.5.12.2. Have walled partitions to direct water in a zig-zag or up-down manner to facilitate sedimentation of silt, detritus and de-sludging

5.5.12.3. Details must be reflected clearly on plans

5.5.12.4. Discharge must be channeled to fish ponds/reservoir ponds.

5.5.12.5. Excess discharge must be directed to effluent treatment ponds for final discharge.

5.5.13. Effluent water treatment plant - as per standards prescribed by State Pollution Control Board.

5.5.14. Office and Accommodation / Rest room

5.5.14.1. It should contain sufficient space to accommodate the following activities:

5.5.14.1.1. Administrative activities

5.5.14.1.2. Stores for chemicals, feed, equipments

5.5.14.1.3. Canteen/dining hall

5.5.14.1.4. Rest room for staff

5.5.14.1.5. Records maintenance

5.5.14.1.6. Library , computer / data processing centre

5.5.14.1.7. Guest rooms

6. ENVIRONMENTAL INTEGRITY

6.1. Farming should be planned and practiced in an environmentally responsible manner in accordance with appropriate state, national and international rules and regulations.

6.2. Breeding and farming of ornamental fish can impact on the environment in various ways such as biodiversity, habitats and ecosystems; genetic diversity including Genetically Modified Organisms (GMO); endangered species, exotic species, alien and migratory species; natural fish stocks and species; and water, soil and air quality. Farmers should ensure that these impacts are identified, managed or mitigated including the production and marketing of GMOs.

6.3. Routine monitoring of the farm environmental quality such as water quality parameters and disease combined with good record keeping is a pre requisite for all the units.

6.4. Hatchery produced seed may be used for culture rather than collecting the seeds from wild. Breeding farms must be able to demonstrate that the brood stock is obtained legally

6.5. Responsible use of feeds, feed additives, manure and fertilizer that improves net energy conversion and economic viability should be practiced.

6.6. Chemicals, veterinary drugs and antibacterial products may be used in a judicious manner.

6.7. Energy may be used responsibly to reduce any negative environmental impacts.

6.8. Farm bred ornamental fishes should not be released to natural water bodies



6.9. Alien species should not be released to the natural water bodies.

7. BEST MANAGEMENT PRACTICES (BMP)

7.1. Live food has to be cultured within the premises to avoid cross contamination and infection.

7.2. Good quality, permissible ingredients only should be used for the prepared food.

7.3. Indiscriminate use of chemicals for modifying the natural colour of the fishes should be avoided.

7.4. Dead and diseased fishes should be disposed in a sanitary way.

7.5. Feed should be given in feeding trays and not thrown directly into the water.

7.6. The fish should be handled with minimum stress. The fish should not be exposed to air (not be taken out of water) while transferring to another tank. Nets made of Soft clothing and of appropriate size should be used. Separate nets should be used for each tank. While handling, small sized fish a plastic cup like container should be used for scooping the fish.

7.7. Packaging and transport fish as per the BMP.

7.8. Permissible antibiotics and anaesthetics/tranquilizers only be used (Annexure-3)

7.9. Overcrowding of the fish should be avoided.

7.10. A laboratory to assess the water quality and fish health should be maintained as described under section 5.4.4.

7.11. The green certified farms should procure fish only from green certified units.

8. GREEN SEAL LABELLING : Green Seal labelling procedure has to be adopted to indicate that the origin of the fish is from a certified operation and chain of custody to buyer and consumer. Hence Green certification is proposed as an independent certification and verification programme for sustainable harvest, production and marketing of ornamental freshwater fish from India. The Green certification provides a guarantee that the certificate holder has procedures in place which ensures fishes supplied as green certified are authentic and any associated claims are truthful and correct.

8.1. The two aspects of chain of custody (CoC) are formal interfaces between CoC operations and defined procedures for fish tracking within each chain of custody operation.

8.2. Green certification is required for any operation buying certified fishes that are used in the CoC and sold to a client that wants to promote those fishes as certified or make a certification claim about their origin.

8.3. Green seal certification requires that the ornamental fish in the CoC passes through the established processes and standards of fish catching, handling, culturing, conditioning, packing and marketing. The certification also requires that the capture, culture and marketing operations be improved to reduce mortality of fish, disturbances of ecosystem and sustaining the resources in its natural habitat. The Green Seal is also concerned with environmentally responsible, socially acceptable and economically viable procedure of production and marketing of ornamentals.





Green Certification Logo

9. DOCUMENTATION & MAINTENANCE OF DATA –

It is mandatory to have proper documentation of all events and activities as well as maintenance of the data for retrieval and verification for a unit to be accredited as a Green Certified unit. Annexures – 11, and 11A to 11E.

10. AGENCY FOR ACCREDITATION

MPEDA will be the Nodal Accreditation Agency for implementation of Green Certification System for freshwater ornamental fish in the country.

11. PROGRAMME IMPLEMENTATION

11.1. Short Term Plans

11.1.1. Verification Committee

It is proposed that Verification Committees (VC) shall be constituted at regional levels by MPEDA for verification of the chain of custody for compliance to the prescribed guidelines and to recommend certification by MPEDA. The Committee shall comprise of a convenor (from MPEDA) and three expert members, from the following organisations:

- (i) Central / State Universities
- (ii) ICAR Fisheries Research Institute
- (iii) State Fisheries Department

When a unit applies for Green Certification, verification committee will undertake two visits to the chain of custody, first for verification of required infrastructure and the second for verification of system implementation. The time period between two visits shall not be more than 6 months. Based on the 1st visit, a provisional certification for Green Certification will be granted to the unit, and final certification will be granted subject to recommendation by the VC on compliance to the system implementation

Certification will be valid for a period of 1 year and shall be renewed.

11.1.2. Awareness programmes

Awareness/Training programmes with time lines to be arranged by MPEDA to the verification committee members and all the stakeholders.

11.1.3. Identification of units to introduce Green Certification on a voluntary basis (Demo project)

MPEDA may identify some leading ornamental fish collection, breeding and exporting units to introduce Green Certification on a voluntary basis and to collect the required information to streamline the system.

11.1.4. To develop a monitoring and surveillance plan.

11.1.5. Periodical review of the guidelines and its implementation.

11.2. Long Term Plans

Enhance the research programmes on ecology and biology of native ornamental fish species, their abundance and availability, mapping of geographical distribution, stock specific rehabilitation, conservation and management of the resources.

12. STANDARDS FOR ASSESSMENT

12.1. Ecosystem and fishery management

Ecosystem and fishery management standards have to be evolved based on regular feedback and stake holder consultations for sustainable utilization of the freshwater ornamental fishes.

The Marine Products Export Development Authority (MPEDA) will be the nodal agency to coordinate and constitute appropriate committees to address the ecosystem and



sustainable resource management aspects in consultation with respective State administration. The recommendations by the committees may be implemented by the State Governments concerned. The concerned authorities have to study the status of the wild fish stocks on a continuous basis and maintain a database. Studies on fixing up Minimum Legal Sizes (MLS) and exploitable stock in each region also shall be organized. The MPEDA shall be the repository as well as the disseminating agency of the data.

12.2. Chain of custody management

The authority concerned identified by the MPEDA has to verify that the chain of custody activities (including collection, holding, culture, transport and marketing) conforms to the ecosystem integrity of the collection area, sustainable use of the fishery resource and good health of the harvested fish. The detailed guidelines addressing these issues are contained in this document.

12.3. Score cards for assessment

Performance evaluation in the format of score cards have been evolved for the various facets of the value chain of Green Certification. The details of these are given in Annexures -12A to 12E. The unit which scores more than 75% when assessed shall qualify for Green Certification. For a fish to be designated as Green certified, it should pass through the entire green certified chain of custody.

13. IMPORT OF EXOTIC FISHES

Guidelines for the Import of Ornamental Fishes into India” issued by Ministry of Agriculture based on the recommendations of National Committee on Introduction of Exotic Aquatic Species into India must be followed (Annexure- 13).

14. GEOGRAPHICAL INDICATION OF SPECIES

Geographical Indications (GI): The article 22 of the Trade Related Aspect of Intellectual Property Rights (TRIPS) agreement of India defines, Geographical Indications (GI) as “indications which identify goods as originating in the territory of a member, or region or locality in that territory, where a given quality, reputation or other characteristic of the good essentially attributable to its geographical origin”. It is assigned to give consumers confidence that product they buy come from specific place with repute and it has certain characteristics that are due to that place of production. They are important for product of plant varieties or animal breeds that have gained favorable reputation because of their geographical association. As obligations under the WTO regime and other international agreements, India has taken suitable steps and enacted several acts, including the Geographical Indications of Good (Registration and protection) Act, 1999 that has come into force since 2001 in harmony with the TRIPS provisions. The Act seeks to provide for the registration and protection of goods related with geographical indications in India. “Indication” includes any name, geographical or figurative representation or any combination of them conveying or suggesting the geographical origin of goods to which it applies. “Goods” means any agricultural, natural or manufactured goods or any goods of handicraft or of industry and includes food stuff” originating or manufactured in a region or locality of a territory, where a given quality, reputation or other characteristics of such goods can essentially be attributed to (Section 2; The Fourth Schedule). An applicant under section 17 can be a producer, any association of persons, users, organization or authority established under the law (Section2) and must represent the interest of the producers or authorized user in respect of a reorganized geographical indication (Chapter III). The producer has been defined as the person(s) who produces the goods, or if such goods are natural



goods, exploits the goods. The authorized users can exercise the exclusive right to use the geographical indication in promotion of the goods.

India is endowed with rich agro-climatic diversity associated with equally rich cultural heritage belonging to one of the oldest civilizations of the world. Every region in India has its claim to fame with some or the other agricultural products or practices with unique features that can be a source of trade advantage. Specific Geographical indication should be able to help protect a product produced by a number of different producers (concept similar to community, tribes, and ethnic group), based on traditional practices or processes, which are passed on from one generation to the other. It also relates to products, which normally have a relationship with the land, local resources and the environment. Traditional knowledge is linked to a specific process related with a place or zone, which confers the products with specific characteristics or reputation primarily because of its geographical origin or association. Agro-biodiversity from specific areas such as high mountains of Himalayas, the Gangetic plains, arid regions of Rajasthan, tropical wet Northeast region and the Western Ghats, have a number of bio-resources/products associated with specific ecologies. There are many examples of traded agricultural products related with taste and quality attributes, associated to specific geographical region. Such products get trade advantage, only because they are cited along with their place of production. For example, 'Banarasi Pan', 'Melihabadi Mango', 'Allahabadi Amrood', 'Nagpur Santra', 'Goan Feni', 'Kannauj Rose perfume', etc. in case of plants, and Murra Buffalo from Haryana and Western Uttar Pradesh with higher milching Bellary sheep from Andhra Pradesh and Tamil Nadu with quality wool and meat, Chokla sheep from Rajasthan with white wool, Marwari goat from Rajasthan with quality meat, Aseel chicken with dark flesh from Madhya Pradesh and Chattisgarh, Kathiawari horse from Madhya Pradesh, Kutchi camel from Gujarat etc. among animals.

There is an urgent need to build proper strategy and infrastructure to claim protection for as many biodiversity derived freshwater ornamental fishes as possible. Registering them under GI Act can help build a better platform for development of products of importance from trade point of view and check bio-piracy of our nation's genetic wealth. The major problem of enforcing GI protection stems from the fact the GIs are, in a way, a collective mark. They are collectively held by many small producers that do not have the resources to engage in expensive litigation and register their names in all member countries of the WTO. Therefore, there is a need –

1. for developing awareness about GI Act and the provision available in it for protection of product and process associated with specific regions,
2. Popularization and motivation of local producers or users to join hands to form a strong association and maintain specific quality related to the reputation of the product to harness trade and economical benefits.
3. In case of crop varieties and animal/fish breeds it may require some special efforts for application of principles of maintenance breeding by which the specific quality of the product is maintained. This may need participatory approach involving relevant scientists and stakeholders.
4. Formulation of association or cooperatives or motivating civil societies and non-governmental organizations seeking registration of products and promoting market research and marketing so that they become beneficial meeting the aspiration of local communities and are promoted.

Organizations such as MPEDA and ICAR may take lead for protection of fish genetic resources geographically associated with some region for their specific characteristics, using GI Act. This would require concerted efforts to undertake the following activities.

1. Identification of such genetic resources and their categorization as per fourth schedule of classification of goods for the GI Act 1999
2. Geographical map of the territory of the country or region or locality in the country in which the



- goods are produced or originate or manufactured, describing physical characteristics of the associated region in terms of-
- a. Habitat characteristics
 - b. Temperature and relative humidity regimes at the harvest/production time
 - c. Annual seasonal precipitation
 - d. Agro-climate or production system
3. Characterization and validation of characteristics through appropriate indicators or parameters for establishment of geographical association:
 - a. Identification of standard benchmark
 - b. Identification of mechanism and components of unique characteristics
 - c. Range and mean of these components on a quantitative scale
 - d. Identification of contribution of these components to associated unique characteristics
 - e. Level of stability/variability
 4. How the geographical indication serves in respect of specific quality, which can be exclusively or essentially attributed to geographical environment with its inherent natural or human factors.
 5. Commercial value/potential
 6. Listing of producers/artisan (tribe or ethnic group) related with product
- On confirmation the relevant products can be registered with requisite supportive/validated data and/or documented information by producer(s), users or association their off following the procedure. This may need formation of farmers' consortiums and licensing for getting the trade benefits.

Proposed native freshwater ornamental fish species of India listed for GI:

Sl. No.	Scientific name	Trade name	Geographical area
1.	<i>Puntius denisonii</i> (Day)*	Redline torpedo	Southern Western Ghats between 8° and 16° N. Lat.
2.	<i>Puntius chalakkudiensis</i> Menon, Rema Devi & Thobias*	Redline torpedo	Western Ghats-Kerala (Thrissur, Ernakulam & Idukki Districts)
3.	<i>Puntius exclamatio</i> Pethiyagoda & Kottelat*	3 spot barb	Western Ghats-Kerala (Quilon District)
4.	<i>Puntius filamentosus</i> (Valenciennes)*	Indian tiger barb	Western Ghats
5.	<i>Puntius rohani</i> Rema Devi <i>et al.</i>	Kanya barb	Kanyakumari, Western Ghats
6.	<i>Puntius manipurensis</i> Menon, Rema Devi & Vishwanath*	Manipur barb	North East India
7.	<i>Puntius fasciatus</i> (Jerdon)*	Melon barb	Western Ghats
8.	<i>Puntius sahyadriensis</i> Silas*	Khavli barb	Western Ghats- Maharashtra region
9.	<i>Puntius pookodensis</i> Anna Mercy & Eapen Jacob*	Pookode barb	Western Ghats – Wayanad District
10.	<i>Puntius ornatus</i> Vishwanath & Juliana	Ornate barb	North East India
11.	<i>Puntius bizonatus</i> Vishwanath & Laisram		North East India, Manipur
12.	<i>Puntius narayani</i> (Hora)*	Narayani barb	Western Ghats - Karnataka, Maharashtra, Goa.



13.	<i>Puntius jerdoni</i> (Day)*	Jerdon barb	Western Ghats - Kerala, Karnataka
14.	<i>Puntius ophicephalus</i> (Raj)*	Elongate barb	Western Ghats – Kerala
15.	<i>Puntius tambraparniei</i> Silas*	Silas Barb	Western Ghats - Tamil Nadu (Tirunelveli Dt.)
16.	<i>Puntius arulius</i> (Jerdon)*	Aruli barb	Western Ghats Kerala, South Karnataka.
17.	<i>Puntius melanostigma</i> (Day)*	Wayanaad barb	Western Ghats - Wayanad
18.	<i>Puntius sarana subnasutus</i> (Valenciennes)*	Olive barb	Western Ghats- Karnataka, Kerala, Tamil Nadu
19.	<i>Gonoproktopterus curmuca</i> (Hamilton)*	Curmuca barb	Western Ghats- Kerala, Karnataka
20.	<i>Gonoproktopterus thomassi</i> (Day)*	Nilgiri shark	Western Ghats- Kerala, Karnataka
21.	<i>Labeo nigriscens</i> Day*	Black labeo	Western Ghats- Kerala, Karnataka
22.	<i>Labeo potail</i> (Sykes) *	Deccan labeo	Western Ghats- Maharashtra, Karnataka
23.	<i>Horadandia attukorali brittani</i> (Menon)	Glow light carp let	Kerala
24.	<i>Tor malabaricus</i> (Jerdon) *	Malabar mahseer	Western Ghats- Kerala, Tamil Nadu
25.	<i>Rasbora ornatus</i> Vishwanath & Laisram		North East India, Manipur
26.	<i>Garra stenorhynchus</i> (Jerdon)*	Nilgiri gara	Western Ghats- Kerala, Karnataka
27.	<i>Garra hughi</i> Silas*	Cardamom gara	Western Ghats- Kerala
28.	<i>Garra surendranathanii</i> Shaji, Arun & Easa*	Elongate garra	Western Ghats- Kerala
29.	<i>Devario malabaricus</i> (Jerdon) *	Malabar danio/ Blue danio	Western Ghats- Kerala, Karnataka, Tamil Nadu
30.	<i>Devario neilgherriensis</i> (Day) *	Nilgiri danio	Western Ghats- Tamil Nadu
31.	<i>Betadevario ramachandrani</i> Pramod et al.*	Broad-band Danio	Western Ghats – Shimoga, Karnataka
32.	<i>Brachydanio jaintianensis</i> Nibedita Sen*	Red-line Danio	North East India - Meghalaya
33.	<i>Barilius bakeri</i> Day*	Malabar baril	Western Ghats-Kerala, Tamil Nadu, Karnataka
34.	<i>Barilius barna</i> (Hamilton)		North East India, Yamuna River
35.	<i>Barilius canarensis</i> (Jerdon) *	Jerdon's baril	Western Ghats- Kerala, Karnataka
36.	<i>Barilius dogarsinghi</i> Hora	Manipur Baril	North East India - Manipur
37.	<i>Salmostoma horai</i> (Silas)*	Hora razor-belly minnow	Western Ghats-Karnataka
38.	<i>Laubuca fasciata</i> (Silas)*	Malabar hatchet chela	Western Ghats-Kerala, Tamil Nadu
39.	<i>Laubuca dadyburjori</i> (Menon) *	Dadio	Western Ghats-Kerala, Karnataka, Maharashtra
40.	<i>Osteochilichthys nashii</i> (Day) *	Nash's barb; Malabar Osteobrama	Western Ghats-Kerala, Karnataka
41.	<i>Osteobrama bakeri</i> (Day) *	Malabar Osteobrama; Gurda Bakerova	Western Ghats-Kerala



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42.	<i>Lepidopygopsis typus</i> Raj*	Peninsular hill trout; Ostrozub travancorský, Brahmana kenda,	Western Ghats- Kerala
43.	<i>Homaloptera montana</i> Herre	Anamalai loach	Western Ghats- Tamil Nadu
44.	<i>Travancoria elongata</i> Pethiyagoda & Kottelat*	Lizard loach	Western Ghats-Kerala
45.	<i>Travancoria jonesi</i> Hora*	Travancore loach; Balitora Jonesova (Czech)	Western Ghats-Kerala
46.	<i>Mesonemachilus triangularis</i> (Day)*	Zodiac loach	Western Ghats, South
47.	<i>Mesonemachilus guentheri</i> (Day) *	Guenther's loach; M?enka Güntherova (Czech)	Western Ghats- South
48.	<i>Longischistura striata</i> (Day) *	Striped loach	Western Ghats- South
49.	<i>Schistura nilgiriensis</i> (Menon) *	Crimson loach	Western Ghats-Kerala, Karnataka
50.	<i>Schistura denisoni denisoni</i> (Day) *	Denison's loach; Nemacheilus, loach	Western Ghats-Kerala, Karnataka
51.	<i>Schistura semiarmatus</i> (Day) *	Armatus loach	Western Ghats-Kerala, Tamil Nadu; Karnataka
52.	<i>Schistura prashadi</i> (Hora)		North East India, Manipur
53.	<i>Physoschistura elongata</i> Sen & Nalbant	Elongate loach	North East India, Shillong
54.	<i>Aborichthys garoensis</i> Hora	Aborie garonská (Czech)	North East India, Meghalaya
55.	<i>Syncrossus berdmorei</i> (Blyth)	Firetail Botia; Blyth's Loach; Tiger Botia; Berdmore's Loach	North East India, Maniour
56.	<i>Acanthocobitis moreh</i> (Sykes) *	Moreh loach; Nemacheilus loach; Kannada name : Murangi, malli; hunase	Western Ghats-Kerala, Tamil Nadu
57.	<i>Nemacheilus anguilla</i> Annandale	Eel loach; Black lined loach	Western Ghats-Maharashtra
58.	<i>Nemacheilus monilis</i> Hora	Monliform loach	Western Ghats-Kerala, Tamil Nadu
59.	<i>Oreonectes evezardi</i> (Day)	Evezardi loach	Western Ghats-Kerala, Karnataka
60.	<i>Indoreonectes keralensis</i> (Rita & Nalbant)	Kerala loach	Western Ghats-Kerala
61.	<i>Lepidocephalichthys manipurensis</i> Arunkumar	Ngakrijou macha; Nganap arangbi	North East India.
62.	<i>Botia almorhae</i> Grey	Almorhae loach; Yoyo loach	Himalaya, India
63.	<i>Botia dario</i> Hamilton	Bengal loach; Necktie loach	North East India.
64.	<i>Botia rostrata</i> Guenther	Gangetic loach; Emperor loach; Sekavka gan•ská (Czech)	India
65.	<i>Botia striata</i> Rao*	Tiger loach; Zebra loach	Western Ghats - Maharashtra
66.	<i>Psilorhynchus sucatio</i> (Hamilton)	River stone carp Darjeeling	North East India, Assam,



67.	<i>Psilorhynchus balitora</i> (Hamilton)	Balitora, Ngop-nogi	North East India, Assam, Darjeeling
68.	<i>Chaca chaca</i> (Hamilton) *	Frogmouth catfish; Square head catfish; Indian chaca	India
69.	<i>Horabagrus brachysoma</i> (Guenther) *	Yellow catfish	Western Ghats-Kerala, Karnataka
70.	<i>Horabagrus nigricollaris</i> Pethiyagoda & Kottelat*	White collared imperial catfish	Western Ghats-Kerala
71.	<i>Glyptothorax anamalaiensis</i> Silas*	Striped sucker catfish	Western Ghats-Kerala
72.	<i>Glyptothorax madraspatanam</i> (Day)*	Brown sucker catfish	Western Ghats-Kerala
73.	<i>Horaglanis krishnai</i> Menon	Indian Blind catfish	Kerala
74.	<i>Horaglanis alikunhii</i> Subhash Babu & Nayar*	Blind catfish	Kerala
75.	<i>Akysis manipurensis</i> (Arunkumar)		North East India, Manipur
76.	<i>Akysis prashadi</i> Hora	Indawgyi stream catfish; Seeprajokimonna	North East India, Manipur
77.	<i>Erethistes hara</i> (Hamilton) *	Butterfly catfish; Kosi hara	India
78.	<i>Erethistes serratus</i> Vishwanath & Kosygin	Butterfly catfish	North East India, Manipur
79.	<i>Conta pectinata</i> Ng	Conta catfish	North East India, Manipur, Assam & Meghalaya
80.	<i>Microphis cuncalus</i> (Hamilton) *	Crocodile-tooth pipefish	India
81.	<i>Microphis deocata</i> (Hamilton)	Deocata pipefish	North Bengal, Assam
82.	<i>Tetraodon travancoricus</i> Hora & Nair*	Red green dwarf puffer; Malabar Pufferfish	Western Ghats-Kerala
83.	<i>Carinotetraodon imitator</i> Britz & Kottelat*	Golden puffer; Matkijapallokala; Pothal	Western Ghats-Kerala
84.	<i>Tetraodon cutcutia</i> Hamilton*	Figure eight puffer; Ostindisk Kuglefisk; Intianpallokala; Ocellated pufferfish	India
85.	<i>Badis badis</i> (Hamilton)*	Indisk bladfish	India
86.	<i>Badis assamensis</i> Ahl	Assam badis	North East India, Manipur, Assam
87.	<i>Badis tuivaiei</i> Vishwanath & Shanta		North East India, Manipur
88.	<i>Polycanthus lalius</i> (Hamilton)	Dwarf gouramy	North East India
89.	<i>Polycanthus fasciatus</i> (Bloch & Schneider)		India
90.	<i>Polycanthus sota</i> (Hamilton)		North East India
91.	<i>Dario dario</i> (Hamilton)	Scarlet badis; Scharlakansbadis	India
92.	<i>Channa bleheri</i> Vierke*	Rainbow snakehead	North East India-Endemic to the Brahmaputra River basin, Assam, India

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93.	<i>Channa barca</i> (Hamilton) *	Barca snakehead	North East India
94.	<i>Channa aurantimaculata</i> Musikasinthorn*	Orange spotted snake head	North East India Endemic to the Brahmaputra River basin, Assam, India
95.	<i>Channa diplogramme</i> (Day) *	Malabar snakehead; Indian giant snakehead	Western Ghats-Kerala
96.	<i>Etroplus maculatus</i> (Bloch) *	Orange chromide; Gul cichlid	Kerala
97.	<i>Etroplus canarensis</i> Day*	Canara pearl spot; Elimeenu	South Karnataka
98.	<i>Macrogathus guentheri</i> (Day) *	Malabar Spiny eel	Kerala
99.	<i>Pristolepis marginata</i> Jerdon*	Malabar catopra/Sun fish; Indian leaffish; Malabar-bladfish	Western Ghats-Kerala
100.	<i>Pristolepis fasciata</i> (Bleeker) *	Sun fish.	Western Ghats-Kerala
101.	<i>Nandus andrewi</i> Ng & Jaafar*		North Bengal, Assam
102.	<i>Horaichthys setnai</i> Kulkani	Anu; Thready Top- Minnow; Malabar Ricefish	West Coast of India (from Kutch to Trivandrum, brackish)
103.	<i>Pseudosphromenus dayi</i> (Kohler)*	Spike-tailed paradise fish	Western Ghats - Kerala

* Photographs of fishes appended in Annexure - 16

For ornamental fish GI here is defined here as the place of origin / first description of the concerned species and its quality, reputation and other characteristics. GI registration of the above species will expand the market for indigenous ornamental fish.



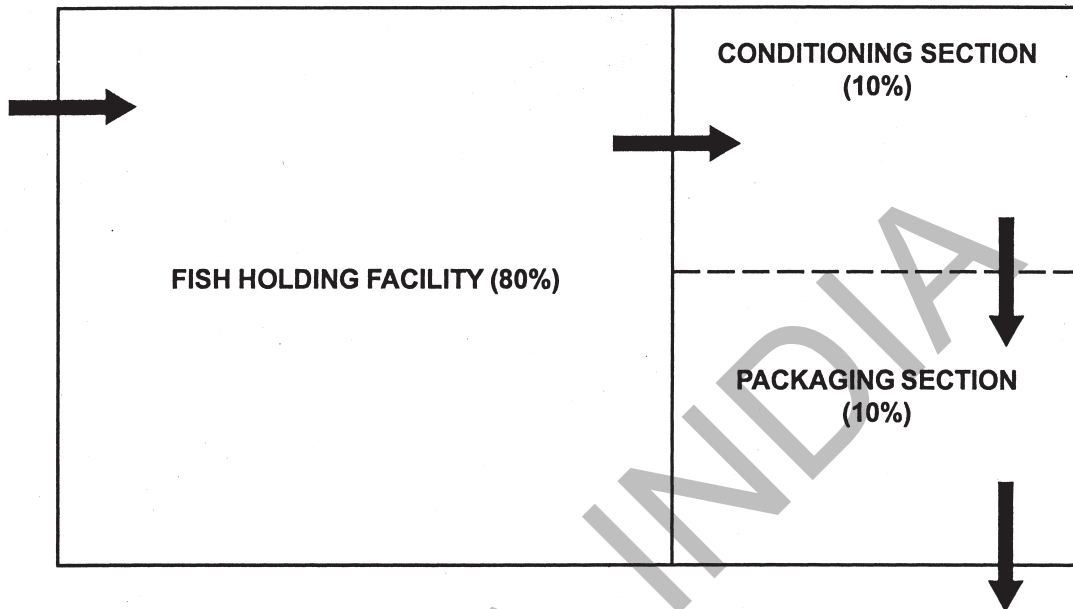
14. CONCLUSION

Green Certification for the sustainable development is an emerging concept in the case of fresh water ornamental fish. The International workshop organized by the Marine Products Export Development Authority (MPEDA) in association with United Nations Conference on Trade and Development (UNCTAD) and Project PIABA, Brazil, at Kochi, India from 14 – 18 October, 2008 is the first of its kind in the world. Consequently the National level Task Force constituted for preparing the Guidelines for Green Certification of ornamental fishes has come out with the Guidelines and Geographical Indication of selected species after a series of brainstorming sessions and deliberations. The findings of the Task Force can be briefly summarized as follows:

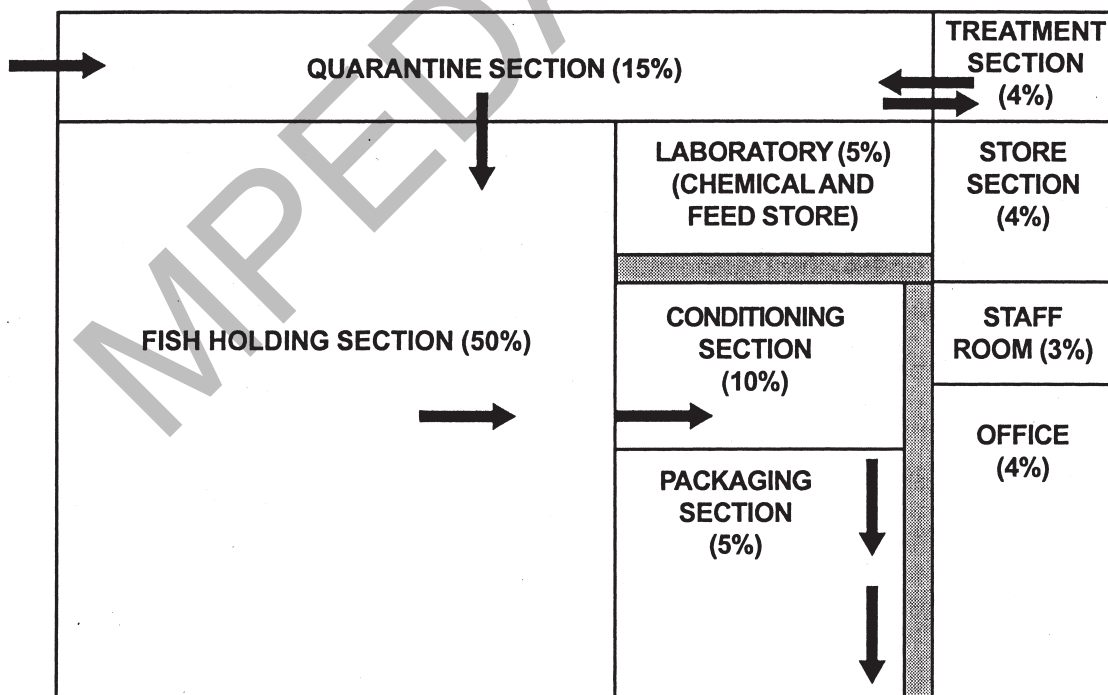
- ❖ The ornamental fish sector is being operated in an unorganized manner at present with minimum scientific inputs and national policy involvements. This could be improved once the green certification system is introduced for an effective value chain system.
- ❖ The increasing stringent export standards of the buyers call for a systematic and efficient mechanism for monitoring and surveillance of the chain of custody in order to issue the necessary certificates by the authorities concerned. The Green certification and Green Seal Labelling would assure an eco-friendly healthy fish to the buyer.
- ❖ The importance of maintenance of log books and records at all stages of the value chain is emphasized and the necessary proforma have been appended to the report.
- ❖ The floor plans for different facilities to maintain high standards in the handling and care of the fish are appended.
- ❖ These guidelines may be implemented to encourage voluntary participation of all stakeholders.
- ❖ Standards for assessment and necessary score cards for evaluation for the award of Green Certification have been developed.
- ❖ A list of endemic freshwater ornamental fishes have been identified, as these have potential for registration under GI Act, 1999 (Govt. of India). Trader consortiums/associations can utilize this opportunity for exploring better market avenues and value addition.

The MPEDA as the nodal agency may take appropriate action to implement Green Certification and Green Seal Labelling for Freshwater Ornamental Fish of the country.

ANNEXURE - 1
MODEL DESIGN FOR ORNAMENTAL FISH PRIMARY HOLDING FACILITY



ANNEXURE - 2
MODEL DESIGN FOR ORNAMENTAL FISH SECONDARY HOLDING FACILITY



ANNEXURE 3
List of permissible Medicines / Antibiotics/ Anaesthetics
for treating diseases

Antibacterial agents	Worm removers
Oxytetracycline	Fenbendazole
Oxolinic acid	Mebendazole
Nifurpirinol	Levamisole
Kanamycin	
Ciprofloxacin	
Antifungal agents	Crustacean eliminators
Acriflavine	Nuvan (dichlorvos)
Formalin	Trichlorfon
Malachite green (zinc free)	Diflurobenzuron
Methylene blue	
Anti-protozoan	Anaesthetics*
Leteux – Meyer mix	MS222 (Tricaine methanesulfonate - Tricaine-S /Finquel)
Copper sulphate	Clove oil
Metronidazole	Aqui-S (50% Isoeugenol and 50% Polysorbate 80)
	CO ₂
	Metomidate
	Benzocaine

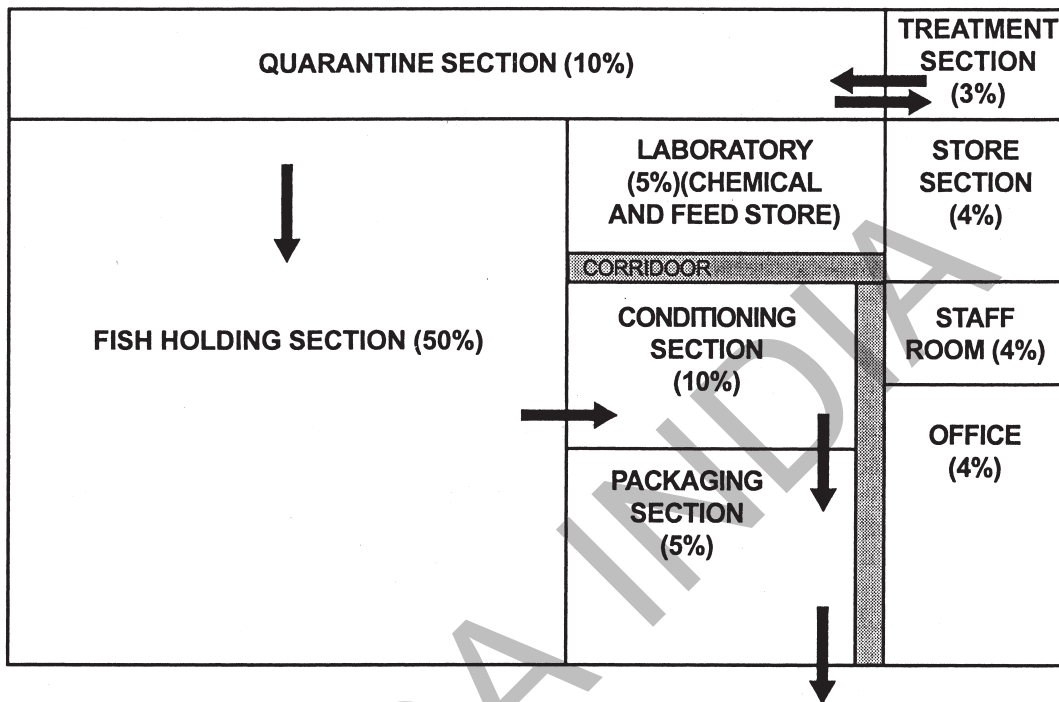
* The buyers generally prefer not to use anaesthetics during transport. The appropriate dosage of anaesthetics may be standardized for ornamental fishes.

Reference

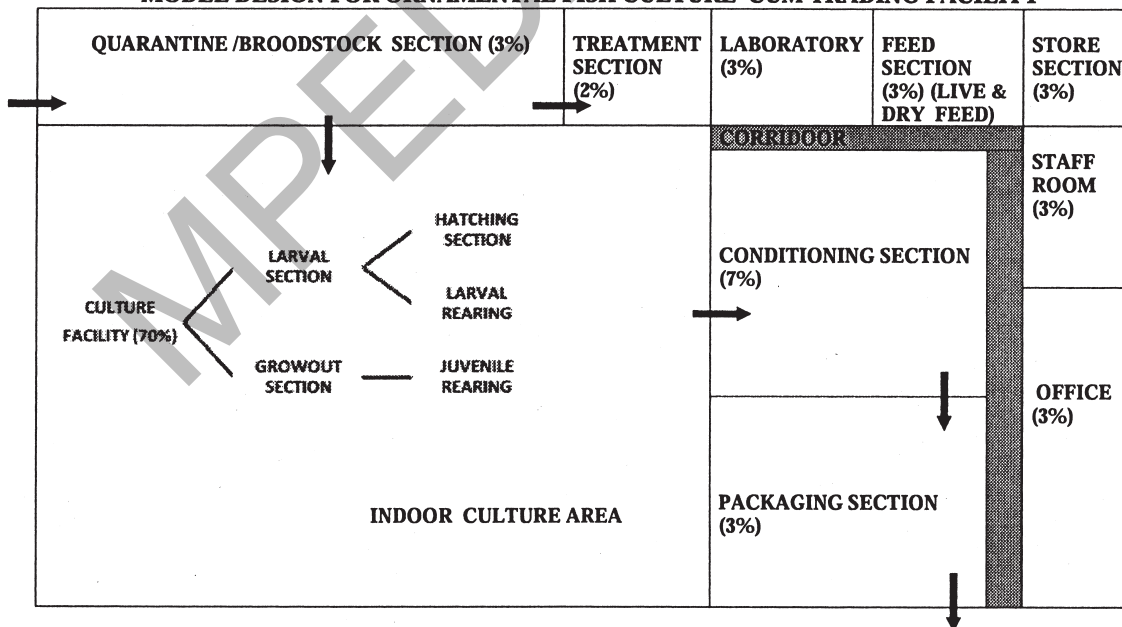
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ANNEXURE - 4 MODEL DESIGN FOR ORNAMENTAL FISH EXPORT FACILITY



ANNEXURE- 5 MODEL DESIGN FOR ORNAMENTAL FISH CULTURE CUM TRADING FACILITY



ANNEXURE 6

Disinfection & Disposal Methods

Disinfectants are compounds that reduce pathogenic organisms on biological surfaces by rather non-specific actions. Ideal characteristics of a disinfectant include a broad spectrum, fast action and low toxicity. For these reasons, as well as the lack of regulatory control, disinfectant has gained wide-spread use in aquaculture facilities. Types of disinfecting agents that might be used during an outbreak of disease in aquatic animals include the following: i) oxidising agents; ii) pH modifiers (alkalis and acids); iii) aldehydes; iv) biguanides; v) quaternary ammonium compounds (QACs); vi) ultraviolet (UV) irradiation; vii) heat; viii) drying; and ix) high temperatures.

Disinfectant applications for equipments and premises with recommended doses (as per Australian Aquatic Veterinary Emergency Plan, 2008).

Disinfecting agent	Application	Pathogens	Recommended dose	Comments
Hypochlorite solutions (calcium hypochlorite or sodium hypochlorite)	Treatment of clean, hard surfaces	All pathogens	Minimum 30 mg/L available chlorine	Use as a general disinfecting solution
	Treatment of water (assuming low organic loading)	All pathogens	Minimum 30 mg/L available chlorine Maintain a minimum of 5 mg/L of residual chlorine.	Hold for a minimum of 24 hours to inactivate. Test chlorine level before discharge or neutralise with thiosulphate. Less active in the presence of high levels of organic matter; Re-dose if necessary
	Treatment of net pens	All pathogens	Initial dose of 1000 mg/L available Chlorine; Maintain a minimum of 5 mg/L of residual chlorine	Thoroughly mix to ensure even distribution Immerse for a minimum of 6 hours.
	Dip treatment of absorbent material such as dip nets, clothing, ropes or absorbent surfaces.	All pathogens	Solution of >200 mg/L available chlorine	Allow time to completely saturate plus a further 2 minutes (minimum); Rinse items in fresh water or neutralise with thiosulphate.
	Treatment of tanks, floors and walls in culture facilities	All pathogens	Spray with a solution >1500 mg/L available chlorine	Leave solution for 2 hours, then rinse to free any remaining soils; Tanks should be filled with freshwater and dosed with 200 mg/L available chlorine; Leave for 24 hours in the case of whirling disease.
Chloramine-T	Treatment of water	Bacteria, viruses, fungi	20 mg/L of chloramine-T (or as per manufacturer's instructions)	Hold for a minimum of 24 hours; Test chlorine level before discharge or neutralise with thiosulphate; Concentrations and doses vary between products.



	Treatment of previously cleaned hard surfaces	Bacteria, viruses, fungi	20 g/L of chloramine-T (or as per manufacturer's instructions)	Leave to dry on suitable surfaces, or for a minimum of 30 minutes before rinsing ;Concentrations and doses vary between products.
	Footbaths	Bacteria, viruses, fungi	50 g/L of chloramine-T (or as per manufacturer's instructions).	Brush boots clean before immersion Leave to dry on boots; Concentrations and doses vary between products.
	Treatment of hard surfaces	All pathogens	1% solution for >60 minutes (or as per manufacturer's instructions).	Concentrations and doses vary between products.
Peracetic acid	Treatment of porous surfaces	All pathogens	2% solution for >60 minutes (or as per manufacturer's instructions).	Concentrations and doses vary between products
	Treatment of waste slurries (high organic matter).	All pathogens	40 L concentrate solution per 1000 L Contact time >1 hour	May cause excessive foaming and tank overflow in presence of high levels of protein.
Monosulfate compounds	Treatment of hard surfaces	All pathogens	10 g/L (or as per manufacturer's instructions)	Application rate of 400 mL/m2 for >10 minutes; Doses and concentrations vary between products.
	Treatment of porous surfaces	All pathogens	20 g/L (or as per manufacturer's instructions)	Application rate of 400 mL/m2 for >10 minutes; Doses and Concentrations vary between products
	Footbaths	All pathogens	50 g/L (or as per manufacturer's instructions)	Remove all organic matter on footwear before immersion; Immersion time >1 minute Replace solution daily in areas of heavy use; every 4 days in areas of light use; doses and concentrations vary between products.
Chlorine dioxide	Treatment of hard and porous surfaces; Treatment of water	All pathogens	As per manufacturer's instructions	Can produce volatile fumes when first activated
Iodophores	Treatment of hard surfaces	Bacteria, fungi, viruses	>200 mg/L available iodine	Apply to surface 1–Iodophors 2 minutes.
	Spray disinfection of equipment	Bacteria, fungi, viruses	100 ppm available iodine	Apply to previously cleaned and dried equipment.
	Footbaths	Bacteria, fungi, viruses	>200 mg/L available iodine	Clean boots before disinfection; Replace daily in high-use areas, or when solution has lost colour.



	Use as a hand or skin wash, or on angling or other delicate equipment.	Bacteria, fungi, viruses	> 200 mg/L available iodine	Povidone-iodine solution only, do not use acidified iodine solutions.
	Treatment of water	Bacteria, fungi, viruses	30 mg/L available iodine, left for 12 hours	Treat with thiosulphate before release.
Calcium oxide	Earthen-based ponds	All pathogens	0.5 kg/m ² for 1 month	Repeat dose on at least two occasions in wet areas or in event of flooding.
Sodium hydroxide	Treatment of concrete or cracked surfaces of appropriate materials	All pathogens	Applied as a mixture with CaOH and Teepol	NaOH generally sold as pellets. Repeat dose on at least two occasions in wet areas or in event of flooding. May also be used as a 0.2% solution as a cleaning agent for equipment. Teepol (wetting agent) enhances penetration through soil and into concrete.
	Treatment of appropriate surfaces where high organic loading may be a problem	Viral pathogens on suitable surfaces	Applied as a solution of 20 g/L NaOH for >10 minutes	
	Treatment of waste water	All pathogens	At a rate to achieve pH >12 for 24 hours.	
	Treatment of waste slurries (high organic matter).	All pathogens	50% (wt/vol) solution at a rate of 30 L/1000 L of slurry	
Calcium hydroxide	Treatment of waste slurries (high organic matter)	All pathogens	40% (wt/vol) solution at a rate of 60 L/1000 L of slurry	Dose should achieve a pH of >12. Treat for > 4 days.
Glutaraldehyde	Treatment of small items or those subject to corrosion.	All pathogens	2% (wt/vol) for 30 minutes.	Available as concentrate solution
Formalin solution	Treatment of hard or porous surfaces, Foot baths.	All pathogens	8% (vol/vol) for 30 minutes	Available as 40% solution Dilute 1:12 for use. Use only in well-ventilated areas.
	Treatment of waste slurries (high organic matter).	All pathogens	40 L formalin solution per 1000 L (40%)	Must be distributed evenly
	Treatment of pipelines or sewage channels (<i>in situ</i>)	All pathogens	300 mL of commercial grade formalin solution per 10 L of water	Completely fill pipeline with disinfecting solution and leave for 24 hours



Quaternary ammonium compounds	Use on skin or delicate items	Some bacteria, some viruses	1 mg/L for >1 minute	Limited range of efficacy
	Use on hard surfaces	Some bacteria, some viruses	2 mg/L for >15 minutes	Limited range of efficacy
Heat	Treatment of waste water	Most pathogens Category A viruses and some bacteria may be resistant	60°C for 10 minutes; 70°C for 6 minutes; 75°C for 5 minutes; 80°C for 4 minutes.	
	Treatment of hard surfaces and equipment	Most pathogens Category A viruses and some bacteria may be resistant	Steam cleaning at 115– 130°C for 5 minutes	Difficult to regulate, best used as an adjunct to other disinfection methods Especially suitable for treatment of transport tanks.
Desiccation and light	Earthen tanks	Most pathogens	Dry for >3 months at an average temperature of >18°C	Drying period can be reduced if combined with an appropriate chemical disinfectant. Use drying and sunlight as a general adjunct to all disinfection if possible
UV light	Treatment of waste water	Viruses, bacteria, fungi	>25 mJ/cm ²	Requires pre-treatment with chemical precipitation or filtration.
	Treatment of water.	<i>Myxosporidean</i> species spores.	>35 mJ/cm ²	
Ozone	Water treatment	All pathogens	1 mg/L for >1 minute	

Disinfection of effluent water

Chlorination is the safest method of disinfection of water, rearing tanks and implements as the chlorine gas gets volatilized sooner or later.

Prior to chlorination the water should be passed through a filter capable of removing suspended organic material. Following is the protocol recommended for chlorination:

- ❖ Add 1.6 ml of Sodium hypochlorite (12.5% available chlorine) per litre of water collected in a vessel.
- ❖ Before the treatment commences, the chlorinated effluent should be brought to pH between 5.0 and 7.0.
- ❖ Subsequent to the addition of hypochlorite, waste water must be agitated for 10 min to ensure thorough mixing of hypochlorite and retained for a period of 1h.
- ❖ After the retention period, the chlorine in the waste water is neutralized by adding sodium thiosulphate at a rate of 1.25g (2.5 ml of 50% sodium thiosulphate solution) per litre of treated waste water.
- ❖ Agitated for 10 min before discharge.

Chlorinated water should not be discharged directly into adjacent waterways with out de-chlorination.

Disposal of dead fishes

All dead animals or eggs should be kept in a solution of 10% formalin for a minimum of 5 days before disposing off. The ratio of the volume of dead fish or fish eggs to solution should not be less than 1:5.



Reference

- Anonymous, 2008. Department of Agriculture, Fisheries and Forestry - Operational Procedures Manual — Decontamination (Version 1.0). In: Australian Aquatic Veterinary Emergency Plan (AQUAVETPLAN), Australian Government Department of Agriculture, Fisheries and Forestry, Canberra, ACT. <http://www.daff.gov.au/aquavetplan>.
- Burka, J F., Hammell, K. L., Horsberg, T. E., Johnsons, G. R., Rainnie, D. J. and Spears, D. J. 1997. Drugs in salmonids aquaculture – A review. *Journal of Veterinary Pharmacology and Therapeutics*. 20: 333-349.

ANNEXURE 7

Dispatch of sick fishes and representative samples for further examination

- * Lightner (1996). A Handbook of Pathology and Diagnostic Procedures for Diseases of Penaeid Shrimp, World Aquaculture Society, Chapter 2

The sick fish can be transported to the diagnostic laboratory by following ways:

Live fish: The fish should be packed in double plastic bags, filled with water to one third of their capacity with the remaining 2/3 volume filled with air/oxygen. The bags should be tightly sealed and packed inside a Styrofoam box or cardboard box lined with Styrofoam.

Whole dead fish, iced: Sick fishes or the ones that have just died should be placed each in separate plastic bag and sealed. They are transported on crushed ice in a cooler or styrofoam lined shipping box and should reach the laboratory within 24 hours. This could be the most suitable sample for pathogen isolation and identification.

Whole dead fish for post mortem analysis: Sick or recently dead fish can be frozen and transported for post mortem analysis. Place each fish in an individual plastic bag, freeze (-20), place in a shipping Styrofoam container, fill the bag with crushed ice and tightly seal air tight and transport. Samples shall be collected from such samples for detecting viral pathogens.

Fishes for histopathology: Fishes to be used for histopathology should be sacrificed by either immersing in crushed ice (small fishes) or by giving a hard blow on head in the case of larger fishes. Small fishes should be ventrally split open and immersed in Davidson's Fixative (Lightner, 1996)* having the following composition in a ratio of 10:1 (Fixative to fish).

For larger fish, the full length of the body cavity should be split open and the viscera and swim bladder gently displaced to permit incision of each major organ, at least once, to allow maximum penetration of the fixative. Ideally, the organ, or any lesions under investigation, should be removed, cut into blocks and placed in a volume of fixative at least 10 times the volume of the tissue.

For skin preparation, it will be best to cut out several large pieces with a scalpel, briefly soaked in the fixative cut into smaller sections about 1.0 cm wide and return the pieces quickly to fixative for 24 hrs.

For samples from lesions, it is advisable to cut out a sample which includes healthy tissue



surrounding the lesion to allow for comparison between healthy and affected tissues, with a width of no more than 1.0 cm and immediately placed in the fixative for 24 hrs.

The container with the fixative and tissue must be tightly sealed. Use plastic containers. The sealed container should be placed in a shipping container filled with Styrofoam pellets or other packing material.

Davidson's fixative – Composition

(for 100 ml)

Ingredients	Quantity (ml)
95% Ethyl alcohol	33.0
100% Formalin	22.0
Glacial acetic acid	11.5
Distilled water	33.5

Store in a cool place (<25°C)

ANNEXURE 8

Biopsy techniques

(Source : Noga, E.J., 2000., Fish Disease: Diagnosis and Treatment. Iowa University Press. pp. 17-26)

Steps involved in biopsy

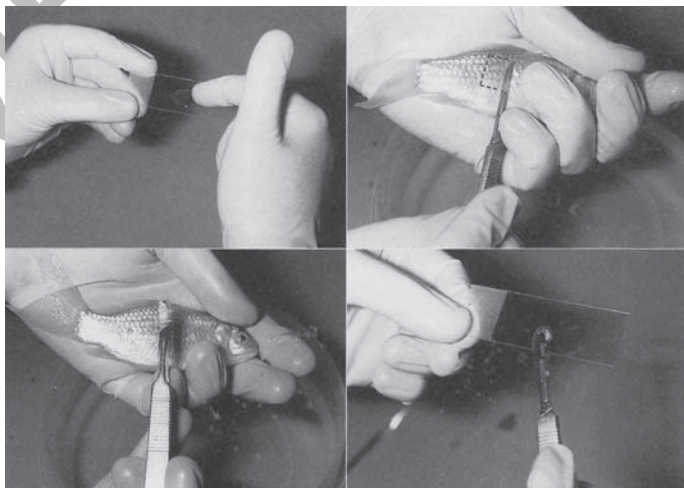
- ❖ Clean a bench or suitable working surface and, set up microscope ensuring all components of it are working correctly.
- ❖ Place a smooth, non-absorbent surface such as laminated wood or plastic onto the bench and clean it using an antibacterial cleaner.
- ❖ Onto this place a moistened paper towel long enough for the fish to be placed on.
- ❖ Get a new clean slide and cover slip to hand
- ❖ A bath must be prepared to hold the fish before the actual sample is taken.
- ❖ To prepare a bath, take a vessel suitable for the fish's size, and place enough pond/aquarium water into it so that the fish will be comfortable.
- ❖ Use plastic gloves to protect the fish during handling.
- ❖ If only one fish is showing disease signs, remove it from the population using a soft mesh giving minimal amount of stress possible.
- ❖ On the other hand, if a population of individuals is affected, select the most affected fish or that with the most obvious clinical signs.
- ❖ They are placed in tubs with sufficient quantity of water and anaesthetized.
- ❖ Meanwhile fresh water is kept in another tub aerated for recovery of the fishes after the collection of samples for observation.



Anaesthetizing fishes using clove oil. Clove oil is diluted with ethanol at a ratio of 1:9 (clove oil: ethanol) to yield a working stock solution of 100 mg/ml since each ml of clove oil contains approximately 1 gram of drug. Keep this solution in a dark bottle, preferably also in the dark. Concentrations between 40 and 120 mg/liter are effective in freshwater fishes.

Skin biopsy

- ❖ Two methods are employed: skin scraping and fin clipping.
- ❖ Wear plastic gloves, gently lift the fish out of the water, and place it onto the wet towel.
- ❖ Skin scraping is performed using a scalpel blade gently scraping along the side of the body or fins.
- ❖ Do not scrape too heavily, as it may damage the fish. Return the fish to the holding bath.
- ❖ Once the smear is on the slide, a drop of filtered fresh water in the case of fresh water fishes, brackish water in the case of brackish water fishes or sea water in the case of marine fishes is added to the smear, and a cover slip placed over.
- ❖ Tap water should not be used as the chlorine will kill the parasites before they may have been observed.
- ❖ For placing correctly the cover slip, hold it by the sides at 45 ° angle, support it with a dissection needle and lower it over the smear.
- ❖ By this way trapping of air bubble with in the cover slip can be avoided.
- ❖ Wipe out the overflowing fluid from the slide with paper towel without disturbing the cover slip, and then place it on the stage of the microscope.
- ❖ The preparation should be examined immediately as the fish parasites may not live long on the slide, and the smear may get dried shortly.
- ❖ However, the slide can be stored for short periods in a humidified container to prevent it from drying out.
- ❖ To make a humidified container simply place some wet paper towel into a sealable plastic food container.



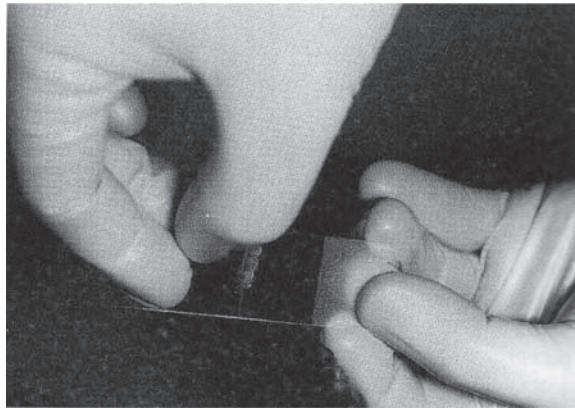


Fig 1: Steps involved in skin scraping

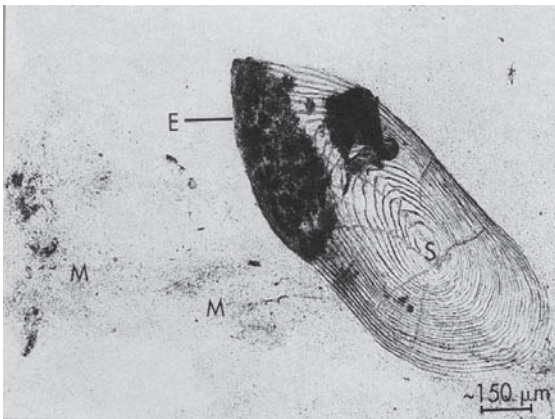


Fig 2: Wet mount of skin scraping

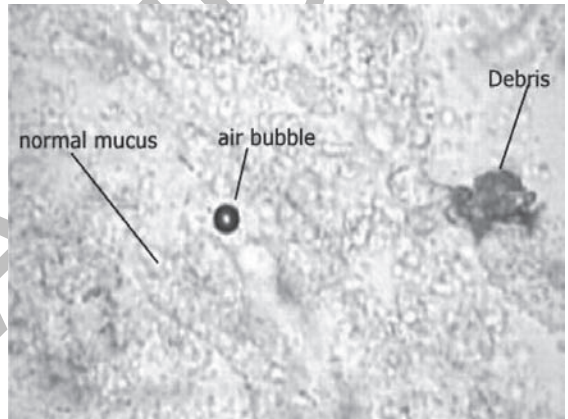


Fig 3: Wet mount of normal mucus

In fin biopsy, the fin is spread and a scissor is used to cut a triangular wedge of fin tissue from between the fin rays.

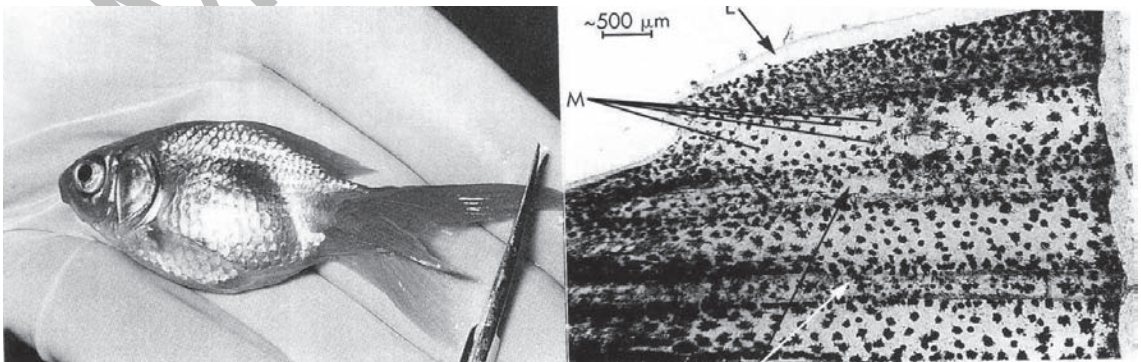


Fig 4: Fin clipping and wet mount

Gill biopsy

- ❖ Immediately before biopsy, the gills should be examined grossly.
- ❖ Healthy gills are bright red. Pale pink gills indicate anemia, while brown gills suggest methemoglobin formation.
- ❖ Gills quickly become pale pink soon after death because of the drainage of blood from the gills.
- ❖ Gill biopsy is performed by inserting the tip of a pair of fine scissors into the gill chamber.
- ❖ The scissors are then gently opened, lifting the operculum until the gill arches can be seen.
- ❖ The tips of several primary lamellae are then cut and transferred to a slide; cover slip is then applied.

Only the tips of the lamellae should be cut; bleeding should be minimal.

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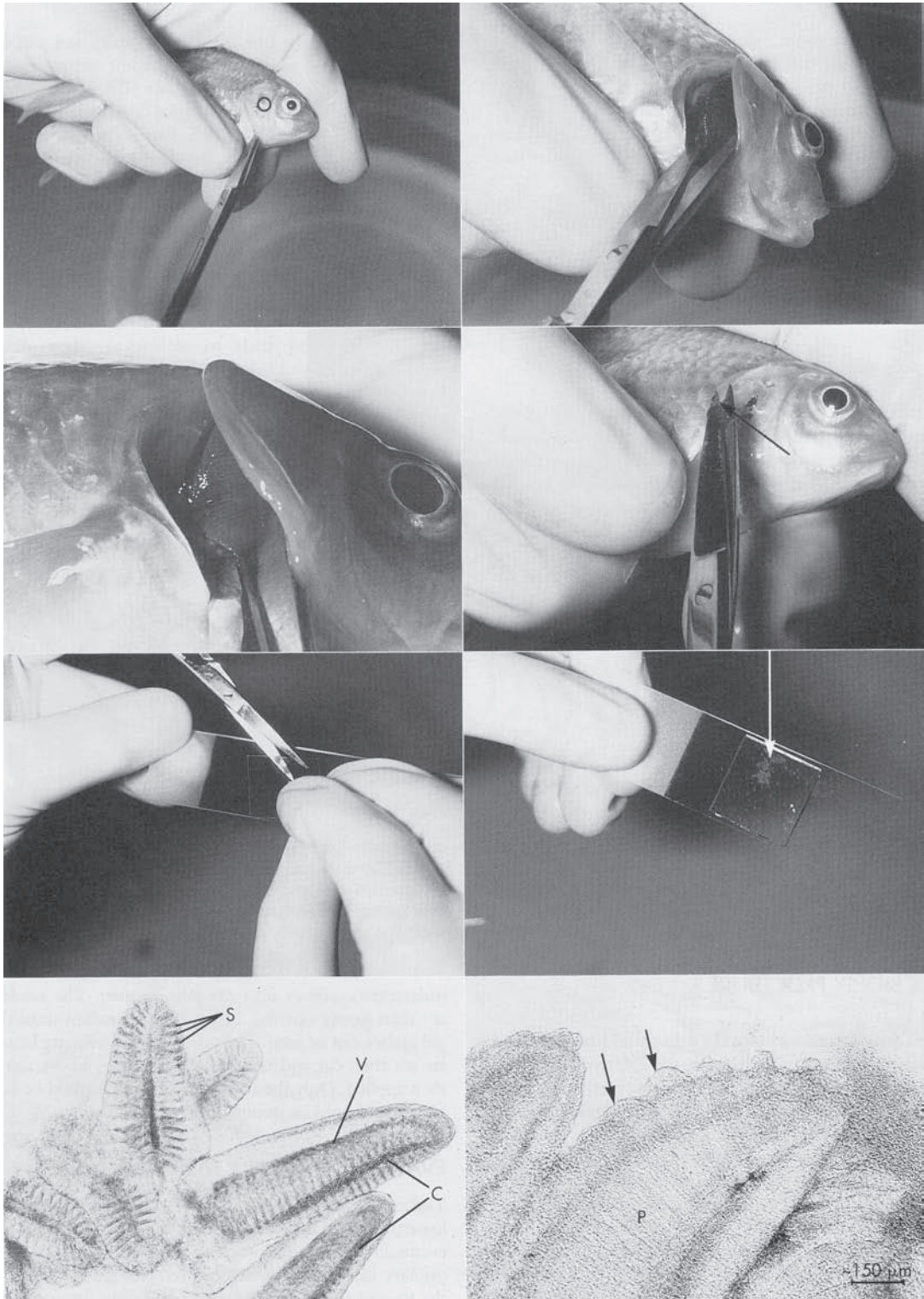


Fig 5: Steps involved in gill biopsy

ANNEXURE - 9

REQUIREMENTS IN AUTOPSY & BIOPSY SECTION

- ❖ Dissection set
- ❖ Magnifying lens
- ❖ Tissue paper
- ❖ Microscopic slides and cover slips
- ❖ Trays
- ❖ Data entry register
- ❖ Carboy with 10% formalin for disposal of fishes
- ❖ Sufficient plastic covers, rubber bands and label slips
- ❖ Refrigerator with freezer chest
- ❖ Weighing balance
- ❖ Containers for holding fish
- ❖ Anaesthetics
- ❖ Gloves

ANNEXURE-10

REQUIREMENTS IN WATER QUALITY ANALYSIS SECTION

- ❖ Colorimeter
- ❖ Burettes with burette stand
- ❖ Pipettes
- ❖ Conical flasks
- ❖ Measuring cylinders
- ❖ Beakers
- ❖ Pipette bulbs
- ❖ Plastic and enamel trays
- ❖ Pipette stand
- ❖ Sink
- ❖ Water still
- ❖ Distilled water containers
- ❖ Wash bottles
- ❖ Reagent bottles
- ❖ Refrigerator for storage of reagents



ANNEXURE 11

Documentation and maintenance of data

Documents should be maintained at each facility to record the following information:

a. Collection / procurement (Log book format – Annexure 11 A)

- i. Name of the water body, location, site, date and time of fish collected/purchased
- ii. Physical observation of the water quality
- iii. Fishing methods adopted for collection
- iv. Species, Size, sex (if discernable)
- v. Associated species caught and released
- vi. Quantity/number (Catch Per Unit Effort- the gear operated, no of times it is operated and the catch per operation)
- vii. Quota/restriction, if any

b. Handling and transportation

- i. Physical observation of the health status
- ii. Type of packaging materials used, type of packing used
- iii. Details of aeration/oxygenation,
- iv. Packing density/ tranquilizers used if any
- v. Mode, time and duration of transportation.
- vi. Temperature at which the fish is transported and the method adopted for regulating the same.

c. Primary Holding (Log book format – Annexure 11 B)

- i. Green Certification Number of the supplier/society
- ii. Mortality rate at the time of arrival
- iii. Species, number, size received and sold
- iv. Health status (weak/active/injured), packing water quality (turbid/clear/frothy; smell of the packing water)
- v. Method of release- treatments used
- vi. Details of holding facility, source and quality of water used
- vii. Details of the chemicals used in the holding facility, if any.
- viii. Duration of holding/ feed given, if any
- ix. Mortality in the holding facility
- x. Date of receiving and dispatch.
- xi. Manner of disposal of dead fish



- xii. Occurrence of disease out break if any and the details of treatment.
- xiii. Disposal of used water and treatment if any.

d. Secondary Holding (Log book format – Annexure 11 C)

- i. Green Certification Number of the supplier/society
- ii. Name of the water body, location, site, date and time of fish collected/purchased
- iii. Mortality rate at the time of arrival
- iv. Health status (weak/active/injured), packing water quality (turbid/clear/frothy; smell of the packing water)
- v. Method of release, acclimatization and treatments used
- vi. Details of holding facility, source and type of water used
- vii. Species, number, size received and sold
- viii. Details of the chemicals used in the holding facility, if any.
- ix. Duration of holding/ feed given
- x. Date of receiving and dispatch.
- xi. water quality (temperature, colour and odour, Nitrite, Oxygen, Hardness)
- xii. Mortality in the holding facility
- xiii. Manner of disposal of dead fish
- xiv. Nets and other implements used.
- xv. Occurrence of disease out break, if any and the details of treatment.
- xvi. Disposal of used water and treatment if any
- xvii. Method of packaging and transportation used.
- xviii. Packing density, chemicals used.

e. Exporter's facility (Log book format – Annexure 11 D)

- i. Green Certification Number of the supplier (primary and secondary holding facility)
- ii. Name of the water body, location, site, date and time of fish collected/purchased
- iii. Fishing methods adopted for collection
- iv. Mortality rate at the time of arrival
- v. Method, duration, treatment and water quality of quarantine.
- vi. Health status (weak/active/injured), packing water quality (turbid/clear/frothy; smell of the packing water)
- vii. Method of release, acclimatization and treatments used
- viii. Details of facility including quarantine, source and type of water used
- ix. Species, number, size received and sold



- x. Details of the chemicals used in the holding facility, if any.
- xi. Duration of holding/ feed given
- xii. Date of receiving and dispatch.
- xiii. water quality (temperature, colour and odour, Nitrite, Oxygen, Hardness)
- xiv. Mortality in the holding facility
- xv. Manner of disposal of dead fish
- xvi. Nets and other implements used.
- xvii. Occurrence of disease out break if any and the details of treatment.
- xviii. Disposal of used water and treatment if any
- xix. Method of packaging and transportation used.
- xx. Packing density, chemicals used,
- xxi. Details of health certificate obtained for the consignment.
- xxii. Requirements of the buyer including health and other standards stipulated.

f. Breeding and Culture facility (Log book format – Annexure 11 E)

- i. Site, location & address of the facility
- ii. Green Certification Number of the unit
- iii. Source of brood stock/fish - Name of the water body, location, site, date and time of collection/purchase, species wise number of fishes collected/purchased.
- iv. Fishing methods adopted for collection, if from wild.
- v. Mortality rate at the time of arrival.
- vi. Health status (weak/active/injured), packing water quality (turbid/clear/frothy; smell of the packing water).
- vii. Method of release, acclimatization and treatments used.
- viii. Details of holding facility - source and type of water used, Number and type of ponds/tanks, capacity.
- ix. Species, number, size received and sold.
- x. Details of the chemicals used in the facility, if any (Name, dosage, time & frequency of usage).
- xi. Daily stock of brood stock/fishes available in the unit.
 - 1. Species wise, variety wise and sex wise number of brood stock maintained.
 - 2. Details of hormones used – type, dosage, frequency and mode of administration.
 - 3. Details of chemicals used for sanitation/ disinfection purpose – type, dosage, frequency and mode of administration.
 - 4. Spawning schedule - species wise.

5. Hatching details (Species wise & variety wise hatching and survival rates).
6. Sex reversal techniques used, if any – hormones/chemicals- type, dosage, frequency and mode of administration.
7. Water quality parameters – in hatching, nursery and rearing tanks/ponds.
8. Species wise survival in hatching, nursery and rearing tanks/ponds.
9. Details of feeds used in hatching, nursery and rearing stages – quantity & feeding schedule.
- xii. water quality in the culture facilities (temperature, colour and odour, Nitrite, Oxygen, Hardness, ammonia).
- xiii. Stocking density in the culture system- species & variety wise.
- xiv. Feeds & feeding schedules - species & variety wise.
- xv. Duration rearing & harvesting details.
- xvi. Mortality in the culture system.
- xvii. Manner of disposal of dead fish.
- xviii. Nets and other implements used.
- xix. Occurrence of disease out break, if any and the details of treatment.
- xx. Disposal of used water and treatment.
- xxi. Method of handling, packaging and transportation adopted.
- xxii. Packing density, chemicals used.

**ANNEXURE 11 A
LOG BOOK FORMAT**

I. Collection/procurement

1. Date & time :
2. Location (address):

3. Water quality :	Clear	Transluscent	Turbid
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4. Fishing method :	Drag net	Cast net	Dip net	Others(Specify)
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5. Fish caught :

Sl no	Species	Number	Size	Sex

6. Associated species caught and released:

7. Quantity of the catch (No.s):

8. No of times the gear operated:

9. CPUE (Catch per unit effort):

10. Quota restriction, if any:

II. Handling & Transportation

1. Health status :	Healthy	Weak	Moribund	Dead
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2. Packaging material used:	Polythene bags	Water tanks	Others (specify)



3. Aeration provided : Yes / No

4. Packing density (Nos/litre)

5. Transportation details:

Mode : Road / Rail / Others (specify)

Time : Morning / Noon / Evening / Night

Duration (In Hrs):

6. Temperature at which fish is transported:

7. Method adopted for regulating temperature:

Name :

Signature:

Designation:

**ANNEXURE 11 B
LOG BOOK FORMAT**

Primary Holding facility

1. Date & time :

2. Green certification number of the supplier/society:

3. Mortality at arrival (% of the total) :

4. Details of receipt and sale of fishes:

Sl no	Species	No.	Size	Sex	Sold (Nos.)



5. Health status : Active / Weak / Injured / Dead
6. Packing water quality : Clear / turbid / frothy / foul smelling / No smell
7. Source of water: Open well / bore well / river / others (specify)
8. Quality of water : Temp: pH:
9. Holding facility
 - a) Chemicals used if any:
 - b) Duration of holding
 - c) Feed given if any
 - d) Mortality rate:
10. Date of dispatch:
11. Disease out break if any:
(Name of the disease)
12. Treatments given :
13. Disposal of used water: After treatment / without treatment / to open areas / drainage channels
14. Details of treatment :

Name :

Signature:

Designation:



ANNEXURE 11 C LOG BOOK FORMAT

Secondary Holding facility

1. Date & time :
2. Green certification number of the supplier/society:
3. Mortality at arrival (% of the total) :
4. Details of receipt and sale of fishes:

Sl no	Species	No.	Size	Sex	Sold (Nos.)

5. Health status : Active / Weak / Injured / Dead
6. Packing water quality : Clear / turbid / frothy / foul smelling / No smell
7. Method of release, acclimatization & treatments:
 - a) Release:
 - b) Acclimatization
 - c) Treatments:
8. Source of water: Open well / bore well / river / others (specify)
9. Water quality :
 - a) Temperature:
 - b) Colour :
 - c) Odour :
 - d) Nitrite :
 - e) Hardness :
 - f) Oxygen :
 - g) Ammonia :



10. Holding facility
 - a) Chemicals used if any:
 - b) Duration of holding:
 - c) Feed given if any:
 - d) Mortality rate:
11. Date of dispatch:
12. Disease outbreak if any:
(Name of the disease)
13. Treatments given :
14. Disposal of used water: After treatment / without treatment / to open areas / drainage channels
15. Details of treatment :
16. Nets and other implements used:
17. Disposal of dead fish : Incinerated / buried / others (specify)
18. Packaging method
19. Packing density (Nos/litre)
20. Chemicals used in the packing water:

Name :

Signature:

Designation:



**ANNEXURE 11 D
LOG BOOK FORMAT**

Exporting facility (Green certification No:)

1. Date & time :
2. Green certification number of :
 - a. Primary holding facility:
 - b. Secondary holding facility:
3. Source of the fish
 - a. Name of water body, location & site
 - b. Date & time of fish collected /purchased:
 - c. Fishing methods adopted for collection:
4. Mortality at arrival (% of the total) :
5. Quarantine details:
 - a. Method:
 - b. Duration (Days / hrs)
 - c. Treatments given
 - d. Water quality:

Temperature	pH	Hardness	Oxygen	Nitrite

6. Health status : Active / Weak / Injured / Dead
7. Packing water quality : Clear / turbid / frothy / foul smelling / No smell



8. Method of release, acclimatization & treatments:

a) Release:

b) Acclimatization

c) Treatments:

9. Source of water: Open well / bore well / river / others (specify)

10. Water quality :

a) Temperature:

b) Colour :

c) Odour :

d) Nitrite :

e) Hardness :

f) Oxygen :

g) Ammonia :

11. Holding facility

a) Chemicals used if any:

b) Duration of holding:

c) Feed given if any:

d) Mortality rate:

12. Receipt and sale of fishes:

Sl no	Species	No.	Size	Sex	Sold/exported (Nos.)

13. Date of dispatch:



14. Disease out break if any:
(Name of the disease)
15. Treatments given:
16. Disposal of used water: After treatment / without treatment / to open areas / drainage channels
17. Details of treatment :
18. Nets and other implements used:
19. Disposal of dead fish : Incinerated / buried / others (specify)
20. Packaging method
21. Packing density (Nos/litre)
22. Chemicals used in the packing water:
23. Details of health certificate obtained

SI no	Certificate No and date	Issued by (Name of the competent authority)	Country of destination
1			
2			
3			
4			
5			

24. Requirements of the buyer:

Name :

Signature:

Designation:



ANNEXURE 11 E LOG BOOK FORMAT

Breeding & culture facility (Green certification No:)

1. Location and address :
2. Source of brood stock
 - a. Name of water body, location & site
 - b. Date & time of fish collected /purchased:
 - c. Fishing methods adopted for collection if from wild:
3. Fish collected / purchased:

Sl. No	Name of species	Nos.

4. Mortality at arrival (% of the total):
5. Health status: Active / Weak / Injured / Dead
6. Packing water quality: Clear / turbid / frothy / foul smelling / No smell
7. Method of release, acclimatization & treatments:
 - a) Release:
 - b) Acclimatization
 - c) Treatments:



8. Holding facility

a) Source of water: Open well / bore well / river / others (specify)

b) Ponds & tanks

Item	Numbers present	Type				
		Earthen	Cement	Glass	FRP	Others (specify)
PONDS						
TANKS						

9. Receipt and sale of fishes:

Sl no	Species	No.	Size	Sex	Sold/exported (Nos.)

10. Chemicals used in the tanks/farm

SL no	Name of the chemical	Dosage	Time of application	Frequency of application



11. Daily stock of brood stock & other fishes: - IN STOCK REGISTER

STOCK REGISTER FOR FISHES / BROOD STOCK (FORMAT)

Date	Name of the fishes	Variety	Sex	No. remaining

12. Hormones used

SL no	Name of the hormone	Dosage	Mode of application	Frequency of application

13. Chemicals used for Disinfection/ sanitation

SL no	Name of the hormone	Dosage	Mode of application	Frequency of application

14. Spawning schedule

SL no	Name of the Fish	Variety	Date/Time of spawning



15. Hatching details

SL no	Name of the fish	Variety	Approx.no of larvae	Survival rate at juvenile stage

16. Sex reversal techniques, if any

SL no	Name of the hormones/chemicals	Type	Dosage	Frequency	Mode of administration

17. Water quality:

Section	Temperature	pH	Hardness	Oxygen	Nitrite	Ammonia
Hatching tanks						
Nursery tanks						
Rearing tanks						

18. Feeds & feeding schedules

a) Section wise

Section	Quantity	Feeding schedule
Hatching tanks		
Nursery tanks		
Rearing tanks		



b) Species wise

Name of species	Variety	Quantity	Feeding schedule

19. Rearing & harvesting details:

Name of species	Rearing period	Harvesting details		
		Method	Time	No

20. Mortality in the culture system:

Section	Mortality (%)	Reason
Hatching tanks		
Nursery tanks		
Rearing tanks		

21. Disease out break if any:
(Name of the disease)

22. Treatments given:

23. Disposal of used water: After treatment / without treatment / to open areas / drainage channels



24. Details of treatment of the water :
25. Nets and other implements used:
26. Disposal of dead fish: Incinerated / buried / others (specify)
27. Packaging method:
28. Transportation method : Road / rail / air / others
29. Packing density (No/litre)
30. Chemicals used in the packing water:

Name :

Signature:

Designation:



ANNEXURE 12 A

SCORE CARD FOR COLLECTION SITE

Sl.no	Major attribute	Assessment criteria	Score	Attributes	Score obtained
1	Environmental integrity (10)	Excellent	10	a) Sustainable collection – 3marks b) Eco-friendly gear & methods-3marks c) Collection from permitted waters-2marks d) Pollution free environment-1mark e) Time of collection-1mark	
		Very good	8		
		Good	6		
		Fair	4		
		Poor	2		
2	Social integrity	Excellent	5	a) Harmony with local community – 2marks b) Proper water treatment before discharge-2mark c) Proper disposal of dead fish-1 mark	
		Very good	4		
		Good	3		
		Fair	2		
		Poor	1		
3	Infrastructure	Excellent	30	a) Oxygen cylinder – 5 b) Packing bag – 5marks c) Good quality water- 5marks d) Holding facility -10marks e) Appropriate handling & transportation-5 marks	



		Very good	25		
		Good	20		
		Fair	10		
		Poor	5		
4	Documentation	Excellent	10	a) log book (as per annexure 11A) - 5 b) Sales register-3 c) Stock register-2	
		Very good	8		
		Good	6		
		Fair	4		
		Poor	2		
5	Water quality	Excellent	15	a) Oxygen > 5ppm –5marks b) Ammonia < 0.02 ppm-5marks c) Clear water-3marks d) Odourless -2marks	
		Very good	12		
		Good	8		
		Fair	3		
		Poor	2		
6	Human re-sources	Excellent	10	a) Collection/fishing skill - 5marks b) Handling skill-2marks c) Packing skill-2marks d) Transportation skill-1mark	
		Very good	8		
		Good	6		
		Fair	4		
		Poor	2		

Guidelines for Green Certification of Freshwater Ornamental Fish

7	Handling & transportation	Excellent	10	<ul style="list-style-type: none"> a) Handling with appropriate gadgets – 2marks b) Mortality rate less than 10% - 2 marks c) Appropriate packing density -2 marks d) Use of aerators -2marks e) Stress free transportation – 2 marks 	
		Very good	8		
		Good	6		
		Fair	4		
		Poor	2		
8	Biosecurity	Excellent	10	<ul style="list-style-type: none"> a) Hygienic fishing operations -3marks b) Pollution & disease free collection site - 3marks c) Hygienic collection & handling gadgets-2marks d) Absence of clinical symptoms of disease- 2marks 	
		Very good	8		
		Good	6		
		Fair	4		
		Poor	2		



ANNEXURE 12 B

SCORE CARD - 2 (PRIMARY HOLDING FACILITY)

Sl.no	Major attribute	Assessment criteria	Score	Attributes	Score obtained
1	Environmental integrity (10)	Excellent	10	a) Fish purchase from Green certified supplier/collector – 5marks b) Proper discharge of effluent water-3marks c) Proximity to the collection site- 2marks	
		Very good	8		
		Good	6		
		Fair	4		
		Poor	2		
2	Social integrity	Excellent	5	a) Harmony with local community – 2marks b) Proper water treatment before discharge-2mark c) Proper disposal of dead fish-1 mark	
		Very good	4		
		Good	3		
		Fair	2		
		Poor	1		
3	Infrastructure	Excellent	30	a) Adequate number of cement/FRP/Glass tanks - 10 b) Aeration & filtration facility - 5 marks c) Adequate number of oxygen cylinders – 10 marks d) Sufficient number of packing & handling materials - 5marks	



		Very good	25		
		Good	20		
		Fair	10		
		Poor	5		
4	Documentation	Excellent	10	a) log book (as per annexure 11B) - 5 marks b) Purchase records -2marks c) Sales register-2 marks c) Stock register-1 marks	
		Very good	8		
		Good	6		
		Fair	4		
		Poor	2		
5	Water quality	Excellent	15	a) Oxygen > 5ppm –5marks b) Ammonia < 0.02 ppm-5marks c) Clear water-3marks d) Odourless -2marks	
		Very good	12		
		Good	8		
		Fair	3		
		Poor	2		
6	Human resources	Excellent	10	a) Fish maintenance skill – 5 marks b) Handling skill-2marks c) Packing skill-2marks d) Transportation skill-1mark	
		Very good	8		
		Good	6		
		Fair	4		
		Poor	2		

7	Handling & transportation	Excellent	10	<ul style="list-style-type: none"> a) Handling with appropriate gadgets – 2 marks b) Mortality rate less than 10% - 2 marks c) Appropriate packing density - 2 marks d) Use of aerators - 2 marks e) Stress free transportation – 2 marks 	
		Very good	8		
		Good	6		
		Fair	4		
		Poor	2		
8	Biosecurity	Excellent	10	<ul style="list-style-type: none"> a) Hygienic fish handling and proper handling gadgets- 3marks b) Contamination, parasite & disease free stock - 2 marks c) Absence of clinical symptoms of disease- 2marks d) Treatment kits – 1 mark e) Proper disposal of dead fishes – 1 mark f) Bird / insect control - 1 mark 	
		Very good	8		
		Good	6		
		Fair	4		
		Poor	2		

ANNEXURE 12 C

SCORE CARD FOR SECONDARY HOLDING FACILITY

1	Major attribute	Assessment criteria	Score	Attributes	Score obtained
	Environmental integrity (10)	Excellent	10	a) Fish purchase from Green certified supplier/collector – 5marks b) Proper discharge of effluent water-3marks c) Flood safe site- 2marks	
		Very good	8		
		Good	6		
		Fair	4		
		Poor	2		
2	Social integrity	Excellent	5	a) Harmony with local community – 2 marks b) Proper water treatment before discharge-2mark c) Proper disposal of dead fish-1 mark	
		Very good	4		
		Good	3		
		Fair	2		
		Poor	1		
3	Infrastructure	Excellent	30	a) Lay out and design complies to requirements as per Annexure 2 - 5 marks b) Aeration & filtration facility - 3 marks c) Adequate number of oxygen cylinders – 3 marks d) Sufficient number of packing & handling materials - 4 marks e) Laboratory facility – 3 marks	



				<ul style="list-style-type: none"> f) Acclimatization & quarantine facility -5 marks g) Disease treatment facility - 5 marks h) Power backup facility – 2 marks 	
		Very good	25		
		Good	20		
		Fair	10		
		Poor	5		
4	Documentation	Excellent	10	<ul style="list-style-type: none"> a) log book (as per Annexure 11C) – 5 marks b) Purchase records -1 mark c) Sales register-1 mark c)Stock register (consumable and permanent) -1 mark d) Document of daily sanitation – 1 mark e) Document of daily maintenance - 1 mark 	
		Very good	8		
		Good	6		
		Fair	4		
		Poor	2		
5	Water quality	Excellent	15	<ul style="list-style-type: none"> a) Oxygen > 5ppm – 3 marks b) Ammonia < 0.02 ppm- 3 marks c) Nitrite <0.02 ppm-3 marks d) Nitrate 50 mg/L – 2 marks e) pH 6-8 – 1 mark f) Odourless -1mark g) Hardness as required for the species - 1 mark h) Ambient temperature – 1 mark 	
		Very good	12		

		Good	8		
		Fair	3		
		Poor	2		
6	Human re- sources	Excellent	10	<ul style="list-style-type: none"> a) Presence of qualified technician – 3 marks b) Adequate number of skilled staff – 2 marks c) Handling skill-2marks d) Packing skill-2marks e) Transportation skill-1mark 	
		Very good	8		
		Good	6		
		Fair	4		
		Poor	2		
7	Holding, Handling & transportation	Excellent	10	<ul style="list-style-type: none"> a) Standard feeding protocol – 2 marks b) Mortality rate less than 10% - 4 marks c) Appropriate life support systems - 2 marks d) Use of temperature controlled vehicle for transportation -2marks e) Proper conditioning and transportation – 2 marks 	
		Very good	8		
		Good	6		
		Fair	4		
		Poor	2		
8	Biosecurity	Excellent	10	<ul style="list-style-type: none"> a) Quarantine measures - 3marks b) Contamination, parasite & disease free stock - 2 marks c) Absence of clinical symp- 	

				toms of disease- 2marks d) Treatment kits – 1 mark e) Proper disposal of dead fishes – 1 mark f) Bird / insect control - 1 mark	
		Very good	8		
		Good	6		
		Fair	4		
		Poor	2		

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ANNEXURE 12 D

SCORE CARD FOR BREEDING & CULTURE FACILITY

Sl.no	Major attribute	Assessment criteria	Score	Attributes	Score obtained
1	Environmental integrity (15)	Excellent	15	a) Flood safe site- 3marks b) Biological inputs(such as brood stock, larvae, live feed and aquatic plants) sourced from Green certified supplier/collector – 5marks c) Absence of Genetically Modified Organisms-1 marks d) Compatible species in the culture system-1 mark e) Good waste water treatment system-2 marks f) Rain water harvesting system-1 mark g) Recirculating system-1 mark f) Use of non conventional energy sources (such as solar energy, wind energy and biogas)-1	
		Very good	12		
		Good	9		
		Fair	6		
		Poor	3		
2	Social integrity	Excellent	5	a) Harmony with local community – 2 marks b) Non utilization of drinking water from public distribution system-2marks c) Proper disposal of dead fish-1 mark	
		Very good	4		
		Good	3		



		Fair	2		
		Poor	1		
3	Infrastructure	Excellent	30	<ul style="list-style-type: none"> a) Lay out and design complies to requirements as per Annexure 5 -5 marks b) Acclimatization & quarantine facility -3 marks c) Live feed/Fish feed preparation & storage area-2marks d) Aeration & filtration facility - 3 marks e) Adequate life support systems such as oxygen cylinders, aerators, blowers & filters – 3 marks f) Laboratory facility – 3 marks g) Disease Treatment facility - 3 marks h) Power backup facility – 2 marks i) Pre shipment conditioning facility - 2 marks j) Office & accommodation/ rest room –4marks 	
		Very good	25		
		Good	20		
		Fair	10		
		Poor	5		
4	Documentation	Excellent	10	<ul style="list-style-type: none"> a) log book (as per Annexure 11E) – 5 marks b) Purchase records -1 mark c) Sales register-1 mark c) Stock register (consumable and permanent) -1 mark d) Document of daily sanitation & premises cleaning - 1 mark e) Equipments maintenance register -1mark 	
		Very good	8		



		Good	6		
		Fair	4		
		Poor	2		
5	Water quality	Excellent	10	<ul style="list-style-type: none"> a) Oxygen > 5ppm – 2 marks b) Ammonia < 0.02 ppm- 2 marks c) Nitrite <0.02 ppm-2 marks d) Nitrate < 50 mg/L – 1 marks e) Optimum pH as required for the species – 1 mark f) Hardness as required for the species - 1 mark g) Temperature control at packing facility 22°C ± 2 – 1 mark 	
		Very good	8		
		Good	6		
		Fair	4		
		Poor	2		
6	Human re-sources	Excellent	10	<ul style="list-style-type: none"> a) Presence of qualified technician/s – 5 marks b) Trained manpower for brood stock & breeding section – 3 marks c) Trained manpower for farm management -2marks 	
		Very good	8		
		Good	6		
		Fair	4		
		Poor	2		
7	Holding, Handling & transportation (Operations)	Excellent	10	<ul style="list-style-type: none"> a) Standard feeding protocol – 2 marks b) Mortality rate less than 10% - 2 marks 	



				<ul style="list-style-type: none"> c) Proper signage and labels - 2 d) Operation schedules (cleaning, water quality checking & feeding) - 2 marks d) Use of temperature controlled vehicle for transportation -2marks 	
		Very good	8		
		Good	6		
		Fair	4		
		Poor	2		
8	Biosecurity	Excellent	10	<ul style="list-style-type: none"> a) Quarantine measures - 3marks b) Parasite & disease free stock - 1 mark c) Absence of clinical symptoms of disease- 1mark d) Treatment kits – 1 mark e) Proper disposal of dead fishes – 2 mark f) Proper pre shipment conditioning packing & stacking - 2 mark 	
		Very good	8		
		Good	6		
		Fair	4		
		Poor	2		

ANNEXURE 12 E

SCORE CARD FOR EXPORT UNIT

Sl.no	Major attribute	Assessment criteria	Score	Attributes	Score obtained
1	Environmental integrity (15)	Excellent	15	a) Flood safe site- 2marks b) Biological inputs(such as brood stock, larvae, live feed and aquatic plants) sourced from Green certified supplier/collector – 5marks c) Absence of Genetically Modified Organisms-1 marks d) Good waste water treatment system-2 marks e) Rain water harvesting system-1 mark f) Recirculation system-1 mark g) Use of non conventional energy sources (such as solar energy, wind energy and biogas)-1mark h) Use of eco friendly materials and green buildings -2mark	
		Very good	12		
		Good	9		
		Fair	6		
		Poor	3		
2	Social integrity (5)	Excellent	5	a) Harmony with local community – 2 marks b) Non utilization of drinking water from public distribution system-2marks c) Proper disposal of dead fish-1 mark	
		Very good	4		
		Good	3		



		Fair	2		
		Poor	1		
3	Infrastructure (30)	Excellent	30	<ul style="list-style-type: none"> a) Lay out and design complies to requirements as per Annexure 4 -5 marks b) Acclimatization & quarantine facility -3 marks c) Live feed/Fish feed preparation & storage area-2marks d) Aeration & filtration facility -3 marks e) Adequate life support systems such as oxygen cylinders, aerators, blowers & filters – 3 marks f) Laboratory facility – 3 marks g) Disease Treatment facility - 3 marks h) Power backup facility – 2 marks i) Pre shipment conditioning facility - 2 marks j) Office & accommodation/ rest room –4marks 	
		Very good	25		
		Good	20		
		Fair	10		
		Poor	5		
4	Documentation (10)	Excellent	10	<ul style="list-style-type: none"> a) Log book (as per Annexure 11D) – 4 marks b) Purchase records -1 mark c) Sales register-1 mark c) Stock register (consumable and permanent) -1 mark d) Document of daily sanitation & premises cleaning - 1 mark e) Equipments maintenance register -1mark f) Documents to prove rejection free export for the preceding 1 year-1mark 	



		Very good	8		
		Good	6		
		Fair	4		
		Poor	2		
5	Water quality (10)	Excellent	10 8 6 4 2	a) Oxygen > 5ppm – 2 marks b) Ammonia < 0.02 ppm- 2 marks c) Nitrite <0.02 ppm-2 marks d) Nitrate < 50 mg/L – 1 marks e) Optimum pH as required for the species – 1 mark f) Hardness as required for the species - 1 mark g) Temperature control at packing facility 22°C ± 2 – 1 mark	
		Very good	10		
		Good			
		Fair			
		Poor			
6	Human re-sources	Excellent	8	a) Presence of qualified technician/s – 5 marks b) Trained manpower at all sections - 3 c) Qualified managerial personnel for export market-ing-2marks	
		Very good	6		
		Good	4		
		Fair	2		
		Poor			
7	Holding, Handling & transportation (Operations)	Excellent	10	a) Standard feeding protocol – 2 marks b) Mortality rate less than 10% - 2 marks	

				<ul style="list-style-type: none"> c) Proper signage and labels - 2 d) Operation schedules (cleaning, water quality checking & feeding) - 2 marks d) Use of temperature controlled vehicle for transportation -2marks 	
		Very good	8		
		Good	6		
		Fair	4		
		Poor	2		
8	Biosecurity	Excellent	10	<ul style="list-style-type: none"> a) Quarantine measures - 3marks b) Parasite & disease free stock - 1 mark c) Absence of clinical symptoms of disease- 1mark d) Treatment kits – 1 mark e) Proper disposal of dead fishes – 2 mark f) Proper pre shipment conditioning packing & stacking - 2 mark 	
		Very good	8		
		Good	6		
		Fair	4		
		Poor	2		

ANNEXURE – 13

Guidelines for the import of ornamental fishes to India

The information furnished here are excerpts from the NBFGR Documents on Aquatic Exotics and Quarantine Guidelines & National Strategic Plan. The readers are advised to refer to the original document for more details.

Citation:

Ponniah, A. G. Unnithan, V. K. & Sood, N. (2002) National Strategic Plan for Aquatic Exotics and Quarantine. NBFGR Special Publication No. 3, xiii + 119p. National Bureau of Fish Genetic Resources, Lucknow, U.P., India.

Ponniah, A. G. & Sood, N. (2002) Aquatic exotics and quarantine guidelines. NBFGR Special Publication No. 4, xii + 97p. National Bureau of Fish Genetic Resources, Lucknow, U.P., India.

Proforma for submitting proposals for introduction of live aquatic organisms

- 1 **Name of the applicant** :
- 2 **Status of the applicant** :
- 2.1 Central Govt. Department/
State Govt./ Private :
- 2.2 Govt. Research Institute/ Academic
Institution/ private research laboratory :
- 2.3 Designation :
- 2.4 Full Address :

- Telephone
- Fax
- E-mail

- 3.1 **Brief field experience of the applicant with activities related to species being introduced** :
- 4.1 **Name of the aquatic organism proposed to be introduced in Indian waters** :
- 4.2 Type of organism
Plant/ mollusc/ crustacean/ fish/ others
(please specify) :
- 4.3 Scientific name (s) :
- 4.4 Common names used in the country from
where it is imported :
- 4.5 Source of origin (Wild/cultured) :
- 5 **Purpose of introduction** :
- 5.1 Research/Aquaculture/Aquarium trade :
- 5.2 Any additional or specific information on scope
and extent of activities with the organism
proposed to be imported :
- 5.3 Any technical knowhow that will be transferred
from the importing country along with the
organism :
- 6 **Import details** :
- 6.1 Life stages
Unfertilized eggs/ cryopreserved milt develop-
ing eggs/ larvae/ juveniles/ immature adult/
brood stocks :



6.2	Quantity/ size of import	:
6.2.1	Number	:
6.2.2	Average weight (g)	:
6.2.3	Average length (cm)	:
7	Biological profile of original species as recorded from wild	:
7.1	Maximum size (cm) with likely age	:
7.2	Maximum weight (g) with likely age	:
7.3	Adult habitat	:
7.3.1	Freshwater/ brackish water/ marine	:
7.3.2	Anadromous/ Catadromous	:
7.3.3	Flowing/ stagnant	:
7.3.4	Usually found in bottom/ column/ surface of water	:
7.3.5	Littoral/ deeper waters	:
7.4	Temperature requirement for different stages	:
7.4.1	Yolk sac larvae	:
7.4.2	Post larvae	:
7.4.3	Fry	:
7.4.4	Fingerlings	:
7.4.5	Adults	:
7.5	If migratory in nature	:
7.5.1	Feeding/ breeding migration	:
7.5.2	Life stages undergoing migration (broodstock/ juvenile/ larval).	:
7.6	Breeding	:
7.6.1	Bisexual/ hermaphrodite/ clonal	:
7.6.2	Oviparous/ viviparous	:
7.6.3	Age at maturity	:
7.6.4	Period/ time of breeding	:
7.6.5	Fecundity	:
7.6.6	Temperature requirements	:
7.6.7	Salinity requirements	:
7.6.8	Other requirements	:
7.6.9	Feeding habits (herbivorous/ carnivorous/ omnivorous)	:
7.6.10	Natural food item of	:
	- Larval stages	:
	- Juvenile	:
	- Adult	:
8	In its natural habitat with which species it is known to compete for	:
8.1	Food	:
8.2	Breeding grounds	:
8.3	Same ecological niche	:
9	Genetic profile	:
9.1	Wild/ captive/ domesticated/ developed	:
9.1.1	If wild, area of collection	:
9.1.2	If captive - Number of generation held in hatchery	:
9.1.3	If domesticated - Number of generations undergone domestication	:
9.1.4	If developed - Originals/ stocks used for development	:
9.1.5	Genetic mechanism used for developing (Selection/ hybridization/ chromosome engineering/ genetic engineering/ combined (please specify)	:
9.1.6	Strain	:
	No./ Name	:



- 9.1.7 Genetic stability of characters developed :
 10 **Quarantine profile** :
 10.1 Parasites and other diseases recorded, if any, :
 in wild :
 10.2 Parasites and other disease, recorded in :
 farmed stocks :
 10.3 a). Has any OIE/ NACA or list of diseases of :
 concern to India been reported from exporting :
 country (Annexure 14 & 15) :
 b). If yes, from which species. :
 10.4 Has it been reported from candidate species :
 from exporting country. :
 10.5 a). Has there been any disease outbreak in :
 the farm from where import is proposed. :
 b). If yes so, give details. :
 10.6 a). Is there any active surveillance in the :
 exporting country. :
 b). Does the particular hatchery/ farm from :
 where the species is imported is covered by a :
 national aquatic health surveillance system. :
 c). Has this particular hatchery or farm been :
 declared free of any disease (if yes, specify :
 disease(s) :
 10.7 Name and designation of the officer who :
 would sign pre movement certificate :
 11 **Details of earlier export of the same** :
species from the farm/ hatchery from :
where import is planned :
 11.1 The date and details (listed in item 5, 6) with :
 address of organization to which earlier :
 exports have been sent :
 11.2 Any evaluation done in the importing countries :
 on ecological and quarantine angle before :
 import. If so, address of agency and copy of :
 report :
 11.3 Is pre-shipment quarantine possible from :
 exporting country? If so, type of quarantine :
 and certification :
 11.4 Route, packaging and shipment details :
 11.5 Any facility with the importer for maintaining :
 imported stock in isolation for a minimum of 30 :
 days. :
 12 **Recommendations of the State Govern-** :
ment in case of Private Company :
 13 **Other relevant information concerning the** :
proposed project :
 13.1 Proposed period of import :
 13.2 Experimental area :
 - Hatchery/ farm location where brood stock :
 developed from import will be maintained :
 - Address :
 - Names of nearby stream, canals, rivers, :
 lakes and distance from the farm :
 13.3 Operational areas :
 Progeny produced from brood stock will be :
 sold as live/ killed :
 For export/ only within India :
 If within India which States :
 13.4 Liaison with State/ Central Govt. :
 13.5 Liaison with any research organization which :
 could oversee import :



- 14 **Information regarding farm where imported aquatic organisms will be maintained** :
- 14.1 What is the distance in kilometres from the nearest water body? :
- 14.2 What is the height of the farm from sea level? :
- 14.3 Has the farm been flooded over the last 10 years? If yes, state the year of flooding. :
- 14.4 Whether the water supply is independent? :
- 14.5 Whether there is a provision for preventing backflow? :
- 14.6 Whether the discharge is going to the natural water bodies or not? If yes does it have a system of filters? :
- 14.7 Whether the farm is fenced? :
- 14.8 Whether nets cover the pond? :
- 14.9 Whether the farm will be used only for exotic aquatic organisms or other aquatic organisms as well? :
- 14.10 Whether the capacity for emergency harvest or destroying the whole stock is there? :
- 14.11 Experience in aquaculture sector (in years) :
- 14.12 Other related activities in aquaculture sector :

Date

Signature

Seal

Essential enclosures :

1. Photos of organisms to be imported
2. Layout of hatchery/ farm (item 13.2)
3. Scientific literature/ documents for items 7, 8, 9, 10 (except those marked in boxes *)
4. Documents/ letter for items 11 and 12.4, 12.5

Instructions for filling proforma

1. For each species separate proforma may be used.
2. No column should be left blank. If information is not available, indicate by N.A. and if item is not relevant by N.R.
3. Effort may be made to supply relevant information supported by scientific literature/ documents. This would facilitate rapid evaluation from exotic and quarantine angles. Due to inadequate information on items other than enclosed in boxes request for import can be rejected since evaluation of risks will not be possible.



Proforma for evaluating ecological risks of fresh introductions of ornamental fish, which have already been introduced in India

- 1.1 **Name of the ornamental fish introduced in Indian waters** :
- 1.2 Scientific name (s) :
- 1.3.1 Name of countries where the species has been introduced earlier
- 1.3.2 Name of country from which the species is proposed to be introduced :
- 1.3.3 Source of origin (wild /cultured) :
- 1.4 Common names used in the country from where it is imported, and in India, (if any) :
- 2 Will the species be used for any purpose other than aquarium trade :
- 3 **Import details** :
- 3.1 Life stages
Juveniles/ immature adult/ brood stocks :
- 3.2 Quantity/ size of import :
- 3.2.1 Number :
- 3.2.2 Average weight (g) :
- 3.2.3 Average length (cm) :
- 4 **Biological profile of original species as recorded from wild** :
- 4.1 Maximum size (cm) with likely age :
- 4.2 Maximum weight (g) with likely age :
- 4.3 Adult habitat :
- 4.3.1 Freshwater/ brackish water/ marine :
- 4.3.2 Anadromous/ catadromous :
- 4.3.3 Flowing/ stagnant :
- 4.3.4 Usually found in bottom/ column/ surface of water :
- 4.3.5 Littoral/ deeper waters :
- 4.4 Temperature requirement for different stages :
- 4.4.1 Yolk sac larvae - :
- 4.4.2 Post larval :
- 4.4.3 Fry :



- 4.4.4 Fingerling/ juvenile :
- 4.4.5 Adult :
- 4.5 If migratory in nature :
- 4.5.1 Feeding/ breeding migration :
- 4.5.2 Life stages undergoing migration (/ juvenile/ larvae/ broodstock /). :
- 4.6 Breeding :
- 4.6.1 Bisexual/ hermaphrodite/ clonal :
- 4.6.2 Oviparous/ viviparous :
- 4.6.3 Age at maturity :
- 4.6.4 Period/ time of breeding :
- 4.6.5 Fecundity :
- 4.6.6 Temperature requirements :
- 4.6.7 Salinity requirements :
- 4.6.8 Other requirements :
- 4.6.9 Generation interval :
- 4.7 Feeding habits (herbivorous/ carnivorous/ omnivorous)
- 4.7.1 Natural food items of
- Larvae :
 - Juvenile
 - Adult
- 4.7.2 Artificial feeds accepted/ not accepted (If accepted, what are the feeds?) :
- :
- :
- :
- :
5. In its natural habitat with which species it is known to compete for :
- 5.1 Food
- 5.2 Breeding grounds :



Guidelines for Green Certification of Freshwater Ornamental Fish _____

5.3 The same ecological niche :

6. Genetic profile

6.1 If developed - Originals/ stocks used for development :

6.2 Genetic mechanism used for developing (selection/ hybridization/ chromosome engineering/ genetic engineering/ combined (please specify) :

6.3 Genetic stability of characters developed :

6.4 Morphological characters of parent strains in terms of body shape, colour and fin shape :

6.5 Morphological changes in body shape, colour and fin shape in the present strain :

Strain	No./Name	Body shape	Coloration	Fin shape
1				
2				
3				
4				
5				

* A separate photograph for each strain to be enclosed

7 Earlier import

7.1 Year of first import and total number imported, if available :

7.2 Documentary evidence for 1st import :

7.3 Name and address of the firm which imported it for the first time :

7.4 Area where introduced for the first time :

7.5 Were the imported ornamental fish

a) Confined to large secure farms :

b) Distributed to backyard hatcheries or hatcheries without secure facilities :

8 New introductions

8.1 a) Will the ornamental fish be confined to large secure farm :



- b) Will the ornamental fish be distributed to backyard hatcheries or hatcheries without secure facilities :
- 8.2 Are the ornamental fish meant for
- a) Export :
- b) Internal market :
- 8.3 Whether the new introduction of ornamental fish will be maintained by
- a) One hatchery* :
- b) Many hatcheries* :

Date

Signature

Seal

Essential enclosures:

1. Photos of organisms imported
2. *Address of Hatchery/ Farm

Instructions for filling proforma

1. For each species use a separate proforma.
2. No column should be left blank. If information is not available fill N.A. and if item is not relevant, N.R.



Proforma for ecological risk evaluation (Part 1-4) and disease risk evaluation (Part 5)

[Answer Yes (Y)/ No (N) with details; if no data indicate unknown (U)]

Part – 1 : Justification for import

Sl. No.	Parameters	Y/N/U	Details	Ref. Code No.	Data Quality code
1.	Purpose of the introduction				
2.	Whether the proposed objective can be met by native species				
3.	If not, kindly indicate; a). Native species don't have capability b). Technology is not available for its culture				

Part – 2 : Species Summary (taxonomic and general habitat)

Sl. No.	Parameters	Y/N/U	Details	Ref. Code No.	Data Quality code
1.	Scientific name				
2.	Common name(s)				
3.	Classification: Family Order				
3.a)	Taxonomic reference				
4.	Is the species difficult to distinguish from any other species? If yes, what species.				
5	In the species to be introduced, a developed strain of the original species or domesticated farm stock. If it is a strain a) Indicate strain development method (selection, hybridization, cross breeding chromosome manipulation). b) Give details of founder stocks and number of generation from founder stock. c) Can the species to be introduced produce all male/ female/ sterile population? (If so specify details).				
6	Natural distribution [country of origin]				
7	Climate of source region. (e.g. tropical, subtropical, temperate, etc.)				
8	The specie's main ecosystem marine, estuarine, warm freshwater, cold freshwater.				
8.a)	Other ecosystems found				
9	Main habitat type – River, lake/ reservoir, estuary, wetlands, reef, inter tidal, mangroves				
9.a)	Other habitats				

Part - 3 : Species assessment to judge if it is under prohibited category or for prohibited area

Sl. No.	Parameters	Y/N/U	Details	Ref. Code No.	Data Quality code
1.	Is the species already present in India? 1.a) If yes, specify where available. 1.b) Can it meet present demand? 1.c) If no to 1.b, the reason.				
2.	If not available in India, what is the source of the fish to be introduced? Wild/ hatchery stock Country and fish farm address				
3.	What is the population status of the species in its native range as classified by IUCN or the threatened list of the country.				
4.	Would approval of this application further endanger the species in its native range?				
5.	Does the species have potentially harmful characteristics? If yes, provide details on venomous spines, poisonous flesh/ toxins, special defence mechanisms, etc.				
6.	Is the species known to be a host of any parasite or pathogen of public health significance? Specify the parasites or pathogens that have been identified.				
7.	Do these pathogens already exist in India? If yes, specify.				
8.	Would the present introduction have potential to introduce disease harmful to human beings in India?				
9.	Can the species play a role in the spread or transmission of diseases or parasites that affect aquatic or terrestrial domestic, native or feral animals? Specify which parasite or disease.				
10.	Does the geographic area where introduction is proposed come under prohibited area?				

Part – 4: Ecological assessment

4.1

Sl. No.	Parameters	Y/N/U	Details	Ref. Code No.	Data Quality code
1.	What are the main predators of the species throughout the life cycle in its country of origin?				
2.	Do similar predators occur in India?				
3.	What are the ranges of the following physical parameters in the natural habitat of the species? Temperature - Upper / lower				



Guidelines for Green Certification of Freshwater Ornamental Fish

	pH - Upper / lower Salinity - Upper / lower Oxygen - Upper / lower				
4.	Does this combination or range of parameter characteristics exist in the areas of India where the organism is likely to be introduced? Specify.				
5.	Does the species possess any accessory breathing organs? If yes, specify.				
6.	Does the species possess any other characteristics or behaviour that would enhance its ability to survive drought, e.g. aestivation, hibernation? If yes specify.				
7.	Does the species have any unusual habitat requirements? If yes, specify.				

4.2

Sl. No.	Parameters	Y/N/U	Details	Ref. Code No.	Data Quality code
1.	Are the sexes of the species readily distinguishable?				
2.	If yes, at what size are they first distinguishable? Male Female				
3.	What is the size of maturity? Does the species exhibit plasticity with this character. If so details.				
4.	What is the maximum length and weight the species attains? Male Female				
5.	Has the species been bred in captivity? Specify condition/ situation- pool/ pond aquarium others (specify)				
6.	Does the species breed readily in captivity without any inducing agent? Specify conditions-				
7.	What type of breeder is the species? Live bearer, pelagic spawner, mouth brooder, carrier of attached eggs, layer of adhesive eggs, substrate spawner which guards the site, substrate spawner which abandons the site, parasitic (cuckoo) breeder. Others (specify)				
8.	Does the species have particular requirements for breeding sites? If so which of these: Bedrock, boulders, gravel, sand, unknown, fine sediments, aquatic plants (specify species), timber-snags. Others (specify)/ unknown				



9.	Does the habitat condition in the area where the species is to be introduced meet the species requirements for nest/breeding sites? Specify.				
10.	Does the species utilize nest or shelter sites similar to those used by Indian native species?				
11.	What breeding characteristics does the species possess? Obligate, opportunistic, serial (batch/ complete) Other (Specify)				
12.	What is the fecundity of the species?				
13.	What are the triggers for breeding? Day length, feed availability, water level (increase/ decrease), temperature rise/ fall, first rainfall, . change in water conductivity, social factors Other (specify)/ unknown				
14.	Does the species exhibit a) Schooling b) Territoriality				

4.3

SI. No.	Parameters	Y/N/U	Details	Ref. Code No.	Data Quality code
1.	Is the species known to hybridize? a) In its' natural habitat. b) In aquaria/hatchery without inducing agent. c) Only after inducement.				
2.	If the species has hybridized, what crosses are known?				
3.	Are the F1 progeny fertile?				
4.	With which Indian species there is a possibility to hybridize and the reason.				

4.4

SI. No.	Parameters	Y/N/U	Details	Ref. Code No.	Data Quality code
1.	How do you characterize the species with regard to its feeding habit? Carnivore/ piscivore, omnivore, herbivore, detritus feeder Specialist (scale, blood, slime, eggs, larval stage, etc.) specify				
2.	Describe the range of food types of the species. Does it show plasticity/ capacity to switch diet.				
3.	Name the Indian native species having similar diet to the exotic species. Give details.				



4.	With which Indian species there is possibility of competition for food. Give reasons.				
5.	Is the species aggressive in its behaviour to own kind? Specify.				
6.	Is the species aggressive in its behaviour to other species? Specify.				
7.	Does the species cause any physical disturbance to the aquatic environment such as disturbance of the bottom, uprooting of flora, increasing turbidity, etc.				
8.	If yes, what would be the expected nature and degree of such disturbance?				
9.	Is the species able to utilize/adapt to disturbed habitats? Specify.				

4.5

SI. No.	Parameters	Y/N/U	Details	Ref. Code No.	Data Quality code
1.	List all introductions (country, year, purpose)				
2.	Has the species established/ failed to establish feral populations in areas where introduced? Specify countries.				
3.	In the country (ies) it has established feral population				
a)	What is its present distribution? widespread/ limited?				
b)	Ecosystem and habitats feral population found (see part: 6, 7)				
c)	Rate of spread rapid/ slow but steadily expanding/ not expanding				
4.	What are the impacts (genetic, environmental, economic and social in countries where feral population have established.)				
5.	Please provide any other information you feel is relevant to the report.				

Part – 5 : Disease risk assessment

SI. No.	Parameters	Y/N/U	Details	Ref. Code No.	Data Quality code
1.	The parasites/ pathogens the exotic species is known to harbour. List species name, taxonomic position, country and year of report.				
2.	Which of the above cause disease and the morbidity and mortality rate reported.				
3.	Which of the above is listed under OIE, NACA or national list of diseases of concern (Refer Annexure 13 & 14).				



4.	Which of the items under 3 are exotic to India or so far not reported from India.				
5.	What is the mode of transmission of disease vertical, horizontal or both.				
6.	Does each of the disease under 4 exhibit difference in pathogenicity depending on a) Life stage b) Season c) Particular culture conditions.				
7.	What is the documented spread of diseases in other countries identified under item 4.				
8.	Which are the natural hosts of this pathogen.				
9.	Has experimental infection been proven.				
10.	In which species the pathogen exists as a) Latent infection b) Vector				
11.	Are any of the hosts (other than candidate species to be imported) listed in 8, 9, and 10 found in the country from where import is proposed?				

Data quality

Reviewer has to indicate data quality as per details given below.

Code

Conditions

1. Definite documented evidence from particular species.
2. Definite documented evidence from species belonging to same genera.
3. Definite documented evidence from species belonging to same family.
4. Studies to indicate that potential exists but are not conclusive.
5. In the absence of studies, based on overall assessment reviewer to indicate yes or no.

Reviewer’s Judgement:

- ❖ Can the species breed in Indian conditions? If yes, list such agro climatic zones/ coastal regimes and what are the criteria for making judgement?
- ❖ Whether the candidate species can establish and spread?
- ❖ State the risk category based on risks?
- ❖ Under which secure system (high, medium, low secure or open system as defined in Guidelines) does the farm fall?

Reference

- All references to be listed separately and the code for reference to be indicated for each item.



QUARANTINE

Though FAO/ NACA guidelines have extensively dealt with quarantine, some of the items were not covered in detail. These have been identified and information available from Australian Quarantine Inspection Service has been presented below with some modifications covering.

- 1) Standards for transporting aquatic animal to India.
- 2) Guidelines for quarantine facilities for live aquatic animal.
- 3) Quarantine procedures to be adopted on arrival
- 4) Quarantine procedures to be adopted on arrival into India and at the quarantine facility.
- 5) Approved disinfection procedure.

STANDARDS FOR TRANSPORTING AQUATIC ANIMALS TO INDIA

1. All aquatic animals in the consignment must be packaged in leak-proof bags, each bag containing only one species. The bag must be colourless and sufficiently transparent to enable proper inspection and identification of the aquatic animals and must not contain any extraneous matter, unapproved plant material, pests or unauthorized species. The use of outer bags of opaque materials or half-black bags to provide a dark shipping environment is acceptable, provided the contents can be inspected to the satisfaction of competent authority.
2. The inclusion of inert material such as zeolite, activated carbon, shredded plastic or dried terrestrial plants is permitted provided the contents of the bag can be properly inspected to the satisfaction of competent authority and the material is disinfected or destroyed as directed by competent authority.
3. Each bag must be of a size and weight which will allow inspection to the satisfaction of competent authority.
4. Each bag must be placed within polystyrene boxes or cartons fitted with a plastic lining. Each box or carton must be clearly identified as part of a shipment/ consignment and be individually identified.
5. The consignment must be accompanied by documents which include the identification number of each box or carton, and the scientific name and number of the contained aquatic animals. It is recommended that the common names of the aquatic animals also be included in the papers.
6. The aquatic animals in each bag must be stocked at a density that will facilitate inspection and hence must not be overcrowded. When packed for export, aquatic animals must be placed in clean water. The use of pH indicator in the water is permissible, provided it does not interfere with inspection.
7. Each consignment of aquatic animals must be accompanied by a health certificate issued by the Competent Authority of the exporting country, signed by an official with appropriate knowledge of the health of the animals and the export premises.

2 Guidelines for quarantine facilities for live aquatic animals

It is the responsibility of the person setting up quarantine facilities to be aware of and to ensure compliance with the requirements of all State and local government regulatory organizations.



The requirements for quarantine premises to hold live aquatic animals are:

Criteria for selecting location:

- i) The location of the approved quarantine premises must be such that designated officers can make arrangements for inspection to the satisfaction of competent authority.
- ii) The quarantine premises should not be located in an area classified by the appropriate State or local authority
 - (a) as a flood prone area,
 - (b) area adjacent to a aquatic farming/ hatchery operation.
- iii) The facility is not used for any purpose other than as a place for the performance of quarantine. The facility may share a building with other areas which are used for purposes other than any activity connected with live aquatic organisms like storage of feed but must not be used as an access-way to other parts of the building.
- iv) The quarantine facility must have a quarantine sign prominently displayed on the entrance to the satisfaction of competent authority. The sign must be on pattern of the internationally accepted quarantine sign.
- v) Approval of quarantine premises will be for a period of 12 months after which approval will have to be renewed. The premises must be inspected by competent authority prior to approval to ensure that standards stipulated are met. Approved quarantine premises may be inspected at other times to determine whether standards are being maintained. In addition to those requirements identified above, competent authority may stipulate other measures for the effective running of approved quarantine premises. Approval may be cancelled or suspended if the standards are not maintained.

Setting up Quarantine Facility:

- i. The quarantine facility shall be in a walled or fenced area. The facility must be away from other aquaculture establishments and natural water bodies. The distance will be decided by AQIU. The wall or fence must be a minimum of 2 meters in height. There shall be no water used in common by quarantined aquatic animals and any other operation involving eggs or aquatic animals.
- ii. The quarantine facility must be fully enclosed and the walls and floor must be impervious and sufficiently smooth to enable adequate cleaning and disinfection. Windows may be installed in the facility, but must be either sealed or, if capable of opening, must be adequately screened to prevent entry of insects. The door must have a self-closer to ensure that it remains shut after entry.
- iii. The facility must be secured with locked access and only authorized persons will be allowed entry.
- iv. The floor must be able to retain all spill water, and should have sufficient slope to allow good drainage into an approved septic tank system as followed by Australian Quarantine Authority. The drainage outlet should be supplied with a plug or other means of closing the outlet. Overseas water (water brought with consignment) and other wastewater must be disinfected



prior to discharge, provided this does not provide direct entry to natural waterways.

- v. Lighting in the facility must be of sufficient intensity to permit adequate inspection of all aquatic animals.
- vi. The quarantine facility should have a covered enclosed area that can be used as a laboratory for preparing samples and undertaking microscopic examination. Sterilized containers and reagents should be available to collect samples for despatch to other laboratories for further examination, if required.
- vii. Intake water should be disinfected/ sterilized. Spring, ground, artesian and well waters, which have no flora or fauna in them prior to entry into quarantine facility, are best and require no further treatment. If surface waters are used, there is a risk that native pathogens and pests may cause disease outbreaks in the unit causing consequent difficulties in deciding whether the pathogen is native to the water supply or was imported with the introduction.
- viii. The facility should have tanks, ponds, pools and other containers of appropriate size and volume as appropriate. They must provide good visibility of contained aquatic organisms.
- ix. The premises should have a designated refrigerator used solely for the storage of clinical materials before sending the same to laboratory. It should be located within the quarantine facility.
- x. There should be footbaths at the entrance of the quarantine facility for the disinfection of the footwear.

Disinfection facilities:

- i. Facilities must be available for proper disinfection of
 - a. Water brought with consignment
 - b. Equipment that come into contact with water or aquatic animals under quarantine.
- ii. Provision must be made for staff and inspectors to wash their hands prior to leaving quarantine facility
- iii. There should be provision for disinfection of all effluents from the quarantine facility in an approved manner.
- iv. The quarantine facility must have a chlorination system to chlorinate all effluents. The chlorination system except the stock chlorine solution tank shall be enclosed within a walled and roofed building. The stock chlorine solution tank shall be separately enclosed to prevent solution leakage. The chlorination system shall include an alarm, which is activated when the amount of residual chlorine falls below 5 ppm. At that stage, discharge of effluents from the facility will not be permitted.

3. Quarantine procedures to be adopted on arrival

- i. Each consignment of aquatic animals entering India (including packaging) will be examined on entry by inspectors of the competent authority who will evaluate their health, check that all documentation is in order, that only approved species are included and that no material of quarantine concern is present. Any prohibited species or materials of must be re-exported,



destroyed or treated to the satisfaction of competent authority, all at the importer's expense. After inspection, all the animals will be ordered into quarantine at a place approved by the competent authority as aquatic animals quarantine facility (AAQF). On arrival at the premises, the aquatic animals will be transferred using a net to new water in the facility.

- ii. All bags, polystyrene boxes and cartons used for importing exotic aquatic organisms must be either incinerated or effectively disinfected by methods approved by competent authority prior to disposal
- iii. All water imported with the consignment must be disinfected to the standards of competent authority prior to disposal.

4. Operation of Quarantine Facilities

- i) All aquatic animals must be kept in units *i.e.* tanks or other approved containers. Units must be kept clean at all times. They must be free of gravel, sand, plants, soil or shell grit and only sterilisable materials (*e.g.* polypropylene) may be contained in the unit. Tanks must be fitted with covers (or approved equivalent) to prevent the aquatic animals from jumping out of the tanks and to minimize splash contamination. Each unit must contain only a single species of aquatic animals.
- ii) Where separate consignment of animals share a water recirculation system, the animals may only be approved for release from quarantine when the last consignment to enter the system has satisfactorily completed its quarantine requirements. All aquatic animals sharing the system may be subject to quarantine risk management measures (*e.g.* destruction, treatment or detention beyond the normal quarantine period) if any aquatic animals in the system is suspected to carry disease agents or pests of quarantine concern. In deciding on the need for measures to be applied to all aquatic animals sharing a recirculation system, competent authority will take into account the presence of water sterilization systems (*e.g.* ozonation or ultraviolet irradiation).
- iii) The quality of water used in the quarantine unit should be monitored at regular intervals to ensure that any mortality in the quarantine population is not due to environmental conditions but to disease agents.
- iv) Only authorized persons should be allowed entry in the quarantine facility. Entrance to the quarantine facility is restricted to the importer, his nominated employees and officials of the competent authority, or other persons approved by the competent authority. Once a person has entered a quarantine facility, such person will not on the same day enter any other place where live aquatic organisms are kept.
- v) Any unusual levels of mortality or unusual signs of disease/ pests (levels of mortality or illness above that normally observed in imported aquatic animals) must be reported to the competent authority immediately. If the quarantine unit suffers a disease outbreak that cannot be controlled, the diseased stocks must be destroyed and disposed off after sterilization in an approved manner, but not before notification to the appropriate government authority. The quarantine unit or the particular module and associated items must be disinfected prior to its reuse
- vi) The importer must ensure that no aquatic animals leave the quarantine facility under any circumstances without the approval of the competent authority, excepting dead aquatic animals moved to a nearby refrigerator or freezer. Aquatic animals may not be released from



quarantine until completion of the following quarantine detention periods and fulfilment of all the requirements to the satisfaction of the competent authority:

- vii) Approval of requests for prophylactic or therapeutic treatments will be considered by the competent authority, taking into account the need to ensure that exotic disease agents are not inadvertently released from quarantine. Any treatment may result in the extension of quarantine detention period or other measures as deemed necessary by the competent authority.
- viii) Where the competent authority has reason to believe at the end of the quarantine detention period that the aquatic animals still present an unacceptable risk of introduction of disease or pest, they may be kept in quarantine detention for further investigation, observation, treatment, testing or for any other purpose appropriate to the circumstances. If the risk cannot be effectively managed, destruction of the aquatic animals will be ordered. The costs associated with these measures will be borne by the importer.
- ix) Permission may be granted by competent authority for healthy aquatic animals to be held in the quarantine facility after release from quarantine provided that all the requirements are met during the time that the aquatic animals remain in the quarantine facility. On completion of quarantine, aquatic animals are to be transferred by a suitable net into clean water prior to removal from the facility.

Records:

- i) A standard record sheet of the competent authority must be maintained for each unit. A template of a unit record sheet may be obtained from competent authority. Unit record sheets must be legible and available for inspection by the officials of the competent authority during the quarantine period and for 12 months thereafter.
- ii) A record should be maintained for all water treatments.
- iii) All drug/ chemical treatment of aquatic animals must have approval of the competent authority and be recorded on unit record sheets.

Disinfection:

- i) All nets and equipment shared between units must be disinfected in the quarantine facility by a method approved by competent authority before being used for other consignments of aquatic animals or prior to removal from the quarantine facility.
- ii) All equipment must be disinfected prior to their removal from the quarantine facility. All material for filtering water must be disinfected prior to removal of water from the quarantine facility or disposed off by incineration.
- iii) Staff and visitors must leave their street footwear outside the quarantine facility, and use separate waterproof footwear within the facility. The footwear used in the quarantine facility must remain inside the facility. Alternately, footwear may be removed from quarantine facility after being cleaned and disinfected to the standards of the competent authority.
- iv) Staff and visitors who make contact with aquatic animals or water within the quarantine facility must wash their hands with soap and water prior to exiting the facility.
- v) All the effluents from the quarantine facility should be regarded as potentially infectious and must be disinfected in an approved manner before releasing to the wastewater.



5. Disinfection procedures

Water sterilization and disinfection of equipment should be effective against the more resistant aquatic animals disease agents or pests. Disinfection/ sterilization protocols should reduce pathogen titres to levels below that likely to cause infection when exposed to a susceptible host. The following disinfection/ sterilization protocols provide an indication of the level of disinfection and/ or sterilization required. Alternate methods which provide equal or greater level of quarantine security may also be used. But it needs the advance approval of competent authority.

Sterilization of wastewater (including overseas water): Chlorine is very toxic. Hence hypochlorite powders and concentrated hypochlorite solutions should be kept in sealed containers in well-ventilated area outside the quarantine facility. This is to prevent volatilization of chlorine gas into the air with risk to staff, and to reduce the possibility of chlorine dissolving in aquarium water, with risk of toxicity to aquatic animals.

- i. All the water to be treated must pass through a filter capable of removing suspended organic material prior to hypochlorite treatment.
- ii. The water to be treated must pass to a retention vessel where sufficient hypochlorite must be added to achieve a final concentration of 200 ppm. Sodium hypochlorite (bleach) should be used at 1.6 milliliters of hypochlorite solution (12.5% available chlorine) per litre of water, while calcium hypochlorite powder (65-70% available chlorine) should be used at 0.3 g of powder per litre of water.
- iii. Following addition of hypochlorite, wastewater must be agitated for a period not less than 10 minutes to ensure thorough mixing of hypochlorite and retained for a period not less than 1 hour.
- iv. After the one-hour retention period, the chlorine in the wastewater may be neutralized by adding sodium thiosulphate (hypo) at a rate of 1.25 g (2.5 ml of 50% sodium thiosulphate solution) per litre of treated wastewater, then agitated for not less than 10 minutes before discharge.

Disinfection of equipment, hands, footwear and dead aquatic organisms:

- i. Units and unit equipment to be disinfected must be thoroughly cleaned and treated with hypochlorite solution at 200ppm concentration for 5 minutes or with an iodophore solution containing 0.5% available iodine for 5 minutes or by other approved disinfection methods.
- ii. Hands of the personnel should be thoroughly washed with soap and water to remove any contaminant material, prior to exiting the quarantine facility.
- iii. If footwear is to be removed from the quarantine facility, it should be clean and the soles and lower portion of the footwear must be disinfected by immersion of the exterior surface in an approved disinfectant such as a 5% solution of Betadine.
- iv. All dead aquatic animals or eggs can be kept in a solution of 10% formalin for a minimum of 5 days before disposing off. The ratio of dead fish or fish eggs volume to solution volume shall not be less than 1:5.



SURVEILLANCE AND REPORTING

Surveillance means a systematic series of investigations of a given population of aquatic animals to detect the occurrence of disease for control purposes, and which may involve testing samples of the population. It helps in early detection of exotic pathogens, thereby preventing spread of the same to the aquatic organisms in the country. Surveillance will assist in evolving zoning concept for diseases of concern and also in contingency planning.

The existing disease reporting system has to be strengthened with clear understanding of flow of information through different channels. To bring uniformity in the diagnosis report, aquatic disease diagnosis laboratory form is enclosed.

For surveillance, the active participation of State Fisheries Departments is essential. Measures need to be developed for linking State Fisheries Departments with Network of Diagnostic Laboratories to strengthen surveillance and reporting.

Disease Outbreak Report Form

Date reported: / /	Date problem first noticed: / /
--------------------------	---------------------------------------

Reported by:

Name:	Phone/ Fax/Email:
Address:	

Location of problem:

Contact name:	Phone/ Fax/Email:
Address:	

Tick one box only for each affected species:

Species affected	++++	+++	+	Appearance of affected and dead animals

++++: Mass mortalities; +++: moderate numbers of deaths; + few deaths

Current situation (Tick one or more boxes):

Problem now over
Problem is continuing
Problem occurring elsewhere

Suspected cause (s):

Signature: _____

Place: _____ Date: _____



Annexure 14

OIE LISTED DISEASES

DISEASES OF CRUSTACEANS

Crayfish plague (*Aphanomyces astaci*)
Infectious hypodermal and haematopoietic necrosis
Infectious myonecrosis
Taura syndrome
White spot disease
White tail disease
Yellow head disease

DISEASES OF FISH

Epizootic haematopoietic necrosis
Epizootic ulcerative syndrome
Gyrodactylosis (*Gyrodactylus salaris*)
Infectious haematopoietic necrosis
Infectious salmon anaemia
Koi herpesvirus disease
Red sea bream iridoviral disease
Spring viraemia of carp
Viral haemorrhagic septicaemia

DISEASES OF MOLLUSCS

Infection with *Bonamia exitiosa*
Infection with *Bonamia ostreae*
Infection with *Marteilia refringens*
Infection with *Perkinsus marinus*
Infection with *Perkinsus olseni*
Infection with *Xenohalotis californiensis*

ANNEXURE 15

NACA LIST OF DISEASES IN ASIA-PACIFIC

Diseases prevalent in some parts of the region	
Finfish diseases :	Epizootic haematopoietic necrosis* Infectious haematopoietic necrosis* Oncorhynchus masou virus disease* Infectious pancreatic necrosis** Viral encephalopathy and retinopathy** Epizootic ulcerative syndrome (EUS)** Bacterial kidney disease**
Mollusc diseases:	Bonamiosis (<i>Bonamia</i> sp., <i>B. ostreae</i>)* Marteliosis (<i>Marteilia refringens</i> , <i>M. sydneyi</i>)* Microcytosis (<i>Mikrocytos mackini</i> , <i>M. roughleyi</i>)* Perkinsosis (<i>Perkinsus marinus</i> , <i>P. olsenii</i>)*
Crustacean disease:	Yellow head disease* Infectious hypodermal and haematopoietic necrosis (IHHN)** White spot disease* Baculoviral midgut gland necrosis** Gill associated virus (GAV)*** Spawner mortality syndrome ('Midcrop mortality syndrome')**
Diseases presumed exotic to the region, but reportable to OIE	
Finfish diseases:	Spring viremia of carp* Viral haemorrhagic septicaemia*
Mollusc diseases:	Haplosporidiosis (<i>Haplosporidium costale</i> , <i>H. nelsoni</i>)*
Other diseases of importance: These include the following diseases so far presumed, but not proven, to be exotic to this region:	
Finfish diseases:	Channel catfish virus disease** Infectious salmon anaemia** Piscirickettsiosis** Gyrodactylosis (<i>Gyrodactylus salaris</i>)** Enteric septicaemia of catfish**
Mollusc diseases:	Iridovirus (Oyster velar disease)
Crustacean disease:	Nuclear polyhedrosis baculovirosis (<i>Baculovirus penaei</i>)** Crayfish plague (<i>Aphanomyces astaci</i>)** Taura syndrome* Necrotising hepatopancreatitis***

- OIE notifiable diseases
- ** OIE other significant diseases
- *** Diseases other than OIE-listed diseases.



ANNEXURE 16
IMAGES OF SOME FRESHWATER ORNAMENTAL FISHES
SUGGESTED FOR GI



Puntius denisonii (Day)



Puntius chalakkudiensis Menon, Rema Devi & Thobias



Puntius exclamatio Pethiyagoda & Kottelat



Puntius filamentosus (Valenciennes)



Puntius manipurensis Menon, Rema Devi & Vishwanath



Puntius fasciatus (Jerdon)



Puntius sahyadriensis Silas



Puntius pookodensis Anna Mercy & Eapen Jacob



Puntius narayani (Hora)



Puntius jerdoni (Day)





Puntius tamaraparnici Silas



Puntius arulius (Jerdon)



Puntius ophicephatus (Raj)



Puntius melanostigma (Day)



Puntius sarana subnasutus (Valenciennes)



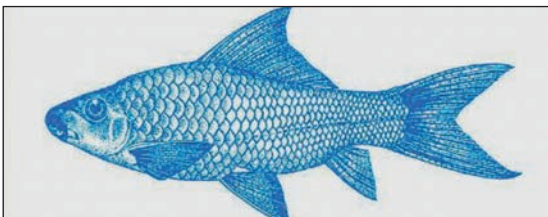
Labeo nigriscens Day



Gonoproktopterus curmuca (Hamilton)



Gonoproktopterus thomassi (Day)



Labeo potail (Sykes)



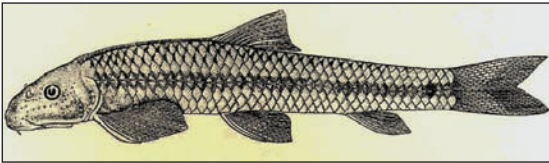
Tor malabaricus (Jerdon)



Ledidopygopsis typus Raj



Garra stenorhynchus (Jerdon)



Garra hughii Silas



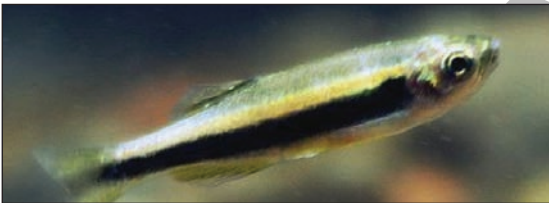
Garra surendranathanii Shaji, Arun & Easa



Devario malabaricus (Jerdon)



Devario neilgherriensis (Day)



Betadevario ramachandrani Pramod et al.



Barilius bakeri Day



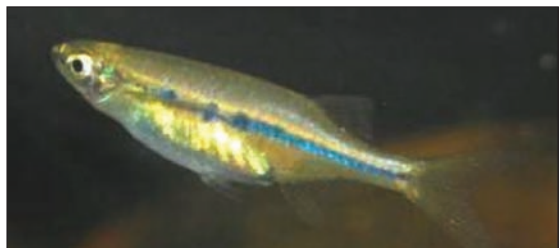
Barilius canarensis (Jerdon)



Salmostoma horai (Silas)



Laubuca fasciata (Silas)



Laubuca dadyburjori (Menon)



Osteobrama bakeri (Day)



Osteochilichthys nashii (Day)



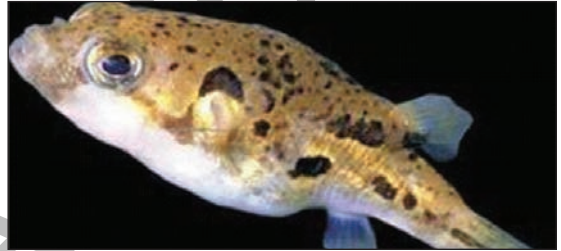
Brachydanio jaintianensis Nibedita Sen



Tetraodon cutcutia Hamilton



Tetraodon travancoricus Hora & Nair



Carinotetraodon imitator Britz & Kottelat



Dario dario (Hamilton)



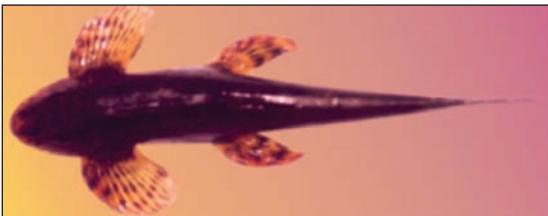
Badis badis (Hamilton)



Travancoria elongata Pethiyagoda & Kottelat



Schistura semiarmatus (Day)



Travancoria jonesi Hora



Mesoneemacheilus triangularis (Day)



Schistura denisoni denisoni (Day)



Schistura nilgiriensis (Menon)



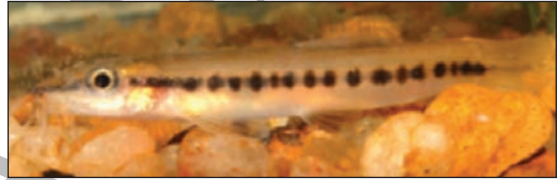
Botia striata Rao



Acanthocobitis moreh (Sykes)



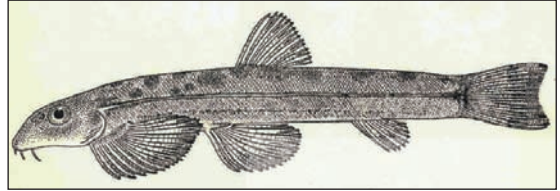
Mesonemacheilus guentheri (Day)



Nemacheilus monilis Hora



Oreonectes evezardi (Day)



Homaloptera montana Herre



Longischistura striatus (Day)



Indoreonectes keralensis (Rita & Nalbant)



Channa barca (Hamilton)



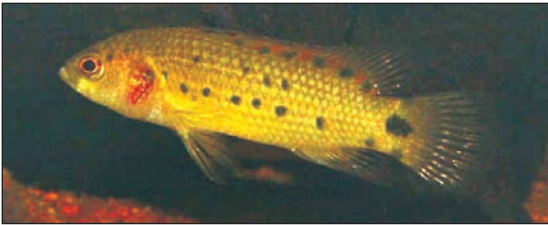
Channa bleheri Vierke



Channa diplogramme (Day)



Channa aurantimaculata Musikasinthorn



Badis assamensis Ahl



Chaca chaca (Hamilton)



Horabagrus nigricollaris Pethiyagoda & Kottelat



Horabagrus brachysoma (Guenther)



Etroplus canarensis Day



Etroplus maculatus (Bloch)



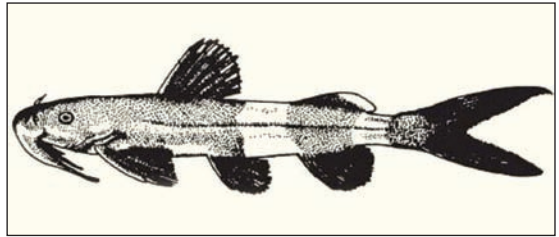
Pristolepis marginata Jerdon



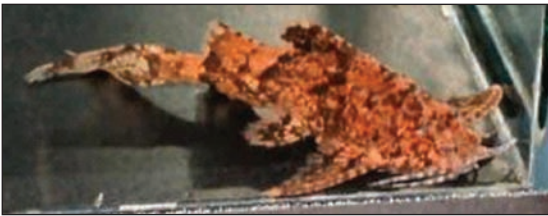
Pristolepis fasciata (Bleeker)



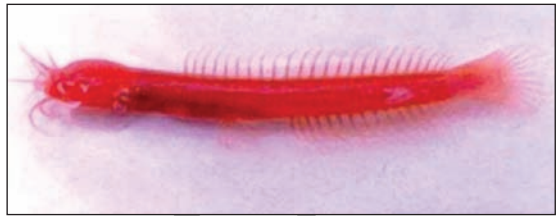
Glyptothorax madraspatanam (Day)



Glyptothorax anamalaiensis Silas



Erethistes hara (Hamilton)



Horaglanis alikunhii Subash Babu & Nayar



Microphis cuncalus (Hamilton)



Macrognathus guentheri (Day)



Pseudosphromenus dayi (Kohler)



Nandus andrewi Ng & Jaafar

Source:

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GLOSSARY

1. Acclimatization area- Area where the fish is acclimatized to the captive conditions in the holding facility. In this facility, the fish is held till it accepts the feed.
2. Accreditation- means a procedure by which an authoritative body gives formal recognition that a body or person is competent to carry out specific tasks.
3. BMP: Best Management Practices.
4. CBD – Convention on Biodiveristy.
5. Certification – means the procedure by which a third party gives written assurance (certificate of conformity) that a product, process or service conforms to requirements specified.
6. Certifier or certification organization- a third party independent organization that assesses, on a commercial basis, other organizations or individuals for their compliance to the Green Certification standards.
7. Chain of custody- the sequence of commercial operations or people responsible for the collection, culture and trade in freshwater ornamental fishes. This begins with the collectors and extends to the retailer – sale and to the end buyer. For the retailer to be able to offer green certified ornamental fishes, all components of the chain of custody handling the organisms must be certified.
8. CIFA: Central Institute of Freshwater Aquaculture, Bhubaneswar, Odisha, India.
9. CITES: Convention on International Trade of Endangered Species.
10. CMFRI: Central Marine Fisheries Research Institute, Kochi, Kerala, India.
11. DAA- Dead After Arrival- ie, from acclimatization through the holding period until the organism is packed for onward shipping.
12. Declared shipping time – the maximum period of time the organism can maintain optimal health in a closed container for shipping.
13. DOA – Dead on Arrival- upon receipt and opening of the shipping container at the beginning of the acclimatization period.
14. Documentation system- the collection of written policy statements, procedures, work instructions and records that make up formal objective evidence to show that an organization or individual complies with the requirements of the Green Certification standards.
15. Export facility: The area where the fishes are held and conditioned before dispatching for export. It should have the prescribed facilities. Some times the secondary holding facility in itself can be export facility if it satisfies all the requirements of an export facility.
16. ICAR: Indian Council of Agricultural Research.
17. INFOFISH: Intergovernmental Organisation for Marketing Information & Technical Advisory Service for Fishery Products in the Asia Pacific Region.
18. MPEDA: The Marine Products Export Development Authority, Kochi, Kerala, India.
19. NACA. Network of Aquaculture Centres in Asia.
20. NBFGR: National Bureau of Fish Genetic Resources, Lucknow, India.
21. OFI: Ornamental Fish International.
22. OIE: Office International des Epizooties (World Organisation for Animal Health), Paris, France.
23. Primary Holding facility: The area where the fish collected from the wild is initially held for a short period of time with minimum infrastructure facilities.
Secondary holding facility: The area where the fishes from primary holding facility are held for a longer period of time than the former.
24. UNCTAD: United Nations Conference on Trade and Development.
25. WWF: World Wildlife Fund.



MPEDA INDIA





THE MARINE PRODUCTS EXPORT DEVELOPMENT AUTHORITY

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