

Review of Aquarium Fishery of the Maldives – 2003



Mariyam R. Saleem
&
M. Shiham Adam

MARINE RESEARCH CENTRE
Ministry of Fisheries, Agriculture and Marine Resources
Malé, Republic of Maldives



December 2004

The authors wish to thank Ms. Zaha Waheed of Marine Research Centre who played a lead role in coordinating with Maldives Customs Services and Ministry of Trade and Industries in data collection and compilation. Thanks are also due to Ms. Aminath Sheron for data entry. We also thank staff of Maldives Customs Services for their cooperation and assistance in data compilation and verification. Finally we thank all the fish exporters for their cooperation given to us during our visits.

For bibliographic purposes the report should be as follows:
Saleem, M.R. and M.S. Adam. (2004). *Review of Aquarium Fishery of the Maldives – 2003*. Marine Research Centre, Male', Maldives, pp 33.

Table of Contents

Executive Summary.....	3
1. Introduction.....	5
2. Methodology	6
3. Organization of Aquarium Trade	7
3.1. Initial process – client order.....	7
3.2 Collection.....	7
3.3. Holding facilities.....	8
3.4. Packaging and export	9
4. Status of the Trade.....	11
4.1. Species based quota system	11
4.2. Licensing scheme	12
4.3. Collection areas	13
4.4. Trends in the trade.....	15
5. Management Initiatives: Monitoring and Regulation of the Trade	22
5.1. Collection methods.....	22
5.2. Conflicts arising from the aquarium fishery	23
5.3. Awareness initiatives	23
5.4. Licensing and data analysis	23
5.5. International management initiatives	24
6. Recommendations	25
7. References	26
Appendix	28

List of Figures

Figure 1: Large semi-circular hand net used for collecting aquarium fish... 8
Figure 2: Fish are kept in tanks, or separately in holed plastic bottles or containers. The latter two are to avoid fighting between individuals..... 9
Figure 3: Plastic bags of different sizes are used to pack fish..... 9
Figure 4: Cups used to measure the amount of water (left) and bag tied at the mouth after filling with fish, water and oxygen..... 10
Figure 5: Bags are packed in styrofoam boxes for long haul journeys 10
Figure 6: Map of the Maldives showing areas of collection in 2000 and 2004 (filled in blue)..... 15
Figure 7: Export of aquarium fish (nos.) and their export value (MRf), 1980-2003. Source: ERSS/ MoFAMR and MCS. 16
Figure 8: Export of aquarium fish (nos.) and their export value (MRf) for Sri Lanka and Europe from 1995 – 2003. Source: ERSS/MoFAMR and Customs. 16

List of Tables

Table 1: Quantity of aquarium fish (nos.) exported from the Maldives by country from 1995-2003. Source: ERSS/MoFAMR and MCS. 18
Table 2: Value of aquarium fish (in '000s of MRf) exported from the Maldives by country from 1995 – 2003. Source: ERSS/MoFAMR, MCS. 19
Table 3: Average unit prices for aquarium fish offered for major destinations (prices in Rf) Source: ERSS/MoFAMR, MCS. 20
Table 4: Twenty two most commonly exported species and their estimates of quantity exported in 2003. Also given are the quotas set for species (for category B) in 2003. Source: MRC, ERSS/MoFAMR, MCS. 21

List of Abbreviations and Acronyms

ERSS – Economic Research and Statistics Services

FRA – Fishery Replenishment Area

GMAD – Global Marine Aquarium Database

HMF – HMF Maldives Pvt. Ltd.

MAC – Marine Aquarium Council

MCS – Maldives Customs Services

MoFAMR – Ministry of Fisheries, Agriculture and Marine Resources

MRC – Marine Research Centre

MTI – Ministry of Trade and Industries

SCUBA – Self Contained Underwater Breathing Apparatus

STEP – Sub Tropical Exotic Paragon Pvt. Ltd.

WCMC – World Conservation Monitoring Centre

Executive Summary

1. The marine aquarium trade started around 1979 and is exclusively export based. Whereas in the early years majority of exports were to Sri Lanka the fishery has expanded more recently, with Europe becoming the major market.
2. Although the contribution of the marine aquarium trade to the total value of marine exports is minimal, there is a potential for conflict of interest between the fishery and tourism, the major source of foreign exchange earnings. Due to such matters, along with concern of potential ecological and environmental impacts arising from the fishery, the Government of Maldives have closely monitored the trade since its inception
3. The trade process is comprised of 4 stages. It is generally triggered by an order list by the client. Fish are collected according to the list and kept in holding facilities for conditioning before being packed and exported.
4. In 2003 there were 5 licensed companies in the aquarium trade. However, 95% of the exports were by 2 companies with only one of them exporting 70% of the total exports and earning 80.5% of the total revenue.
5. At present, a species-based quota system is in effect, which has strengthened monitoring of the trade and facilitated management of the fishery. It is based on export data from the Maldives Customs Services and on general demographic information of species such as rarity in the natural environment, as well as tolerance of species to captivity.
6. The responsibility of issuing export licenses to the aquarium fish exporting companies lies with the Ministry of Trade and Industries and the license is based on the export value, which is determined by the exporter. A major problem with such a licensing system is under-quoting of prices of fish by exporting companies in an attempt to maximize the number of fish exported per license.
7. There are no designated areas for collection of aquarium fish. In the beginning, collection was concentrated around Male', although over the years it has spread to atolls further north and south.
8. The fishery has fluctuated since its inception and still appears to be evolving. In 2003, majority of the exports were to Europe followed closely by Sri Lanka, with smaller percentages to the Far East, USA and other countries. The highest earnings were derived from exports to Europe followed by Sri Lanka.
9. The highest unit price per fish was offered by the United States followed by countries in the Far East in 2003. The value gained from exports to the Sri Lankan market is low compared to the exported

quantity, as the average unit price per fish offered is inferior, relative to other destinations.

10. 70% of the exports of fish were made up of 22 species. Among the invertebrates traded were starfishes, sea anemones, and nudibranchs and the red starfish (unidentified species) was one of the most exported species in 2003.
11. Apart from a study carried out in 1994, no stock assessment studies have been undertaken for species targeted by the aquarium fishery. Such a study needs to be carried out to complement the export data.
12. All destructive methods of fish collection in the aquarium fishery have been banned by the government.
13. A guide to aquarium fish identification was prepared by MRC in 1996 to aid those involved in the fishery, including Customs officials, fish collectors and managerial staff. Workshops were held for exporters and Customs officials to increase awareness of the fishery and to provide information on strengthening data collection and monitoring.
14. An important component of monitoring and regulating the trade is to carry out regular reviews of the data, to assess trends and to assess whether existing levels of exploitation are sustainable.
15. It is important to affiliate with regional and international organizations working towards ensuring the sustainability of the marine aquarium trade such as the Marine Aquarium Council. Codes of conduct need to be developed for collectors along with internationally acceptable standards for packaging and holding facilities.

1. Introduction

The marine aquarium trade of Maldives is believed to have started around 1979 (Adam, 1996). During the early years most exports were to Sri Lanka (Edwards and Shepherd, 1992), and over the years the fishery has expanded, Europe becoming the major destination. In 2003 there were 5 registered companies, trading a total of about 120 species of fish and 6 species of invertebrates. Export of corals is banned in the Maldives and thus the trade does not include coral species. The only exception to this ban is the export of organ pipe coral (*Tubipora musica*), a species which is not traded in the aquarium fishery but nonetheless exported for pharmaceutical purposes, mainly to India.

Only a few species in the aquarium trade are directly exploited for other purposes, and aquarium species are probably the highest value-added product that is collected from coral reefs (Wabnitz *et al.*, 2003). In 2003, 209,758 fish and invertebrates were exported from the Maldives, earning a total of Rf 7,020,000.39 (US\$ 546,303.53) and making up 0.72% of total value of marine exports. Although the numbers of fish taken are relatively small, there is a potential for conflict of interest between the fishery and tourism, the major source of foreign exchange earnings. Tourism in the Maldives is essentially marine based and therefore heavily dependent on the rich diversity of this environment. The species that are collected by the aquarium trade are also an important attraction for tourists who visit the Maldives. As collection of fish is allowed on many of the tourist dive sites, there is the possibility of the two activities occurring simultaneously, thus increasing the conflict. Until recently, a few minor bait species were collected for the aquarium trade. Live baitfish is required by the pole and line tuna fishery, the primary fishery of Maldives. Juveniles of some species of edible reef fish such as *Variola louti* (Lunar tailed grouper) and *Cephalopholis miniata* (Vermillion rock cod) which are eaten locally or targets of the live food fish trade are also collected by the aquarium fishery. However, the quantity exported through this trade is insignificant compared to the amount landed at the fish market or exported as live food fish. For example, 23 juveniles of *C. miniata* and none of *V. louti* were exported in the aquarium trade between May and September of 2003. During the same

period, 11,888 individuals of *C. miniata* and 12,992 of *V. louti* were exported in the live food fish trade (MRC unpublished data, 2003).

Due to such matters, along with concern of potential ecological and environmental impacts arising from the fishery, the Government of Maldives have closely monitored the trade since its inception (Adam, 1996). In 1988, a blanket quota of 100,000 was set for maximum total number of exports of all species of fishes by Maldives Customs Services in consultation with the Marine Research Section (Presently Marine Research Centre) (Edwards, 1988). While such a quota system is simple and could be easily enforced, it could also lead to overexploitation of sought after species even when total exports are below the blanket-quota level, especially since about 20 species makes up about 70% of the trade (Edwards and Shepherd, 1992). Thus, a provisional species-based quota system was adopted for 22 species (Edwards and Shepherd, 1992) but enforcement was lacking. More recently a species-based quota system for the majority of the species traded has been implemented. This has strengthened monitoring of the trade and aided management of the fishery.

2. Methodology

The data for this report was obtained from export information collected by Maldives Customs Services (MCS). The quantity of fish exported and the revenue derived each year is compiled by MCS. The trend in exported quantity and value of exports was obtained using the MCS information. The data for Sri Lanka and United States were treated individually while the countries of 'Europe', 'Far East' and 'Others' were grouped together. The unit price for the regions was obtained using the weighted average method. The unit price per country or region was multiplied by the number of consignments to that country or region and summed. This total was then divided by the sum of consignments to obtain the final unit price. For individual countries the unit price was calculated by dividing the total price by the total number of fish exported for the year for the respective country. The unit price includes fish and invertebrates as data for these two groups were not available separately. The species-wise data was compiled from 364 proforma sheets filled out by the exporters and collected by MCS. This data set was not complete but gave quite a clear representation of the total

exports. The 20 most commonly exported species for 2003 was obtained using this data.

Interviews were carried out with managerial staff of the two major exporting companies to investigate the processes involved in the trade, management issues and to identify difficulties with data collection. Information on the process of fish and invertebrate collection was gathered during a field visit to the aquarium of the largest exporting company, Sub Tropical Exotic Paragon (STEP) in 2000 and subsequently in 2004. Fish collectors and staff of the aquarium were interviewed during these visits.

3. Organization of Aquarium Trade

3.1. Initial process – client order

The trade process is triggered by an order list by the client. This order is derived from the price list of the exporting company which contains species name, common names, species code and the unit price per fish. Once the order is received, it is “decoded” for the collectors. The names used by the collectors are different from those used on the price list and thus they need to be translated into a form they can understand.

3.2 Collection

Collectors are either directly employed on a monthly salary by the exporting companies or paid a percentage of their catch. STEP employs about 40 collectors and they are paid between Rf 5000 to Rf 10,000 per month depending on whether they are skin divers or licensed SCUBA divers. Fish are collected using semi-circular hand nets (Figure 1) with a mouth diameter of 10 cm (small net) and 50 cm (large net) (Adam, 1996). The smallest mesh size is 5 mm.

Each diver carries a small and a large hand net, using the most appropriate net for the size of the fish they are catching. The fish are driven into them and transferred to a plastic bag secured at the waist. These divers can go down to depths of 35-40 m. Snorkellers use the same hand nets and one collects the fish while another is responsible for looking after a large plastic container where fish caught by snorkelling is kept. This container is holed for

water circulation and a tyre is attached around it for stability and to keep it afloat. The collected fish are transported by boat to the holding facilities. At the holding facilities they are kept in tanks with automatic circulation systems or in holed and floating plastic containers, with frequent exchange of water.



Figure 1: Large semi-circular hand net used for collecting aquarium fish.

Destructive methods of collection are not used in the Maldives. Moxy nets were used until October 1997 when its use was banned due the detrimental effects of this

method. Moxy nets are small cast nets draped over coral heads and fish are scared out of their refuge by banging the corals with sticks, breaking them. Fish caught using this technique are highly stressed and often die within a few days (Adam, 1996). Another highly damaging method is the use of poisons such as cyanide or quinaldine to stun the fish, making them easier to catch (Wabnitz *et al.*, 2003). Poisons are not used in the Maldivian aquarium trade although its use has been reported in the live food fish trade (Wabnitz *et al.*, 2003).

3.3. Holding facilities

Holding facilities are located in the vicinity of the international airport in Male' Atoll. The largest exporting company STEP has its holding facility on Male' Atoll Gaagandu, about half an hour by boat from the airport. HMF Maldives Pvt. Ltd (HMF) has two bases, one on Male' Atoll Gulhi and the other on Vaavu Fulidhoo. The collected fish are kept in aerated concrete or glass tanks for about 3 days for conditioning before export. Some species are kept separately in holed plastic bottles or containers (Figure 2). They are starved during this period to make sure that they do not foul the water in the bags, which is common practice worldwide (Wabnitz *et al.*, 2003). The largest exporting company has an open system where water in the tanks is

taken from the surrounding sea and the used water is directly pumped back out to sea.

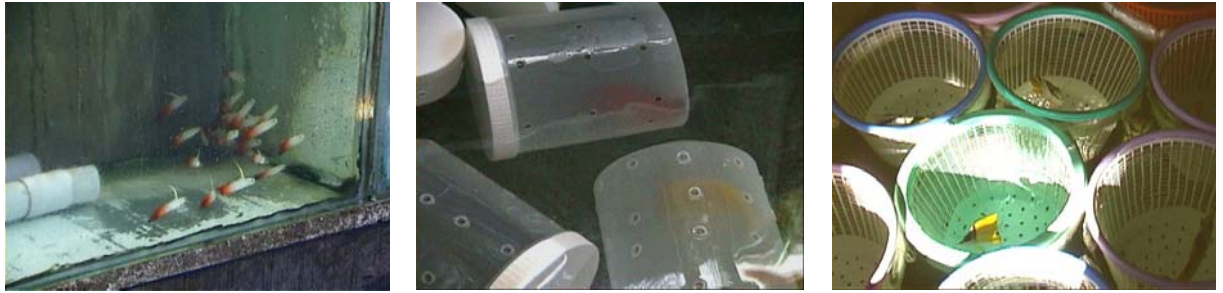


Figure 2: Fish are kept in tanks, or separately in holed plastic bottles or containers. The latter two are to avoid fighting between individuals.

3.4. Packaging and export

After the fish are conditioned, they are packed in heavy duty plastic bags a few hours before they are taken to the airport for dispatching. The plastic bags range from about 10 cm to 25 cm width and two to three bags are used for packing each fish (Figure 3).



Figure 3: Plastic bags of different sizes are used to pack fish

Newspaper is placed between two bags when packing territorial fish to avoid aggressive behaviour. Different sized cups are used to measure the amount of water that is put in the bags (Figure 4). After the fish is placed in the bag of water, it is packed with oxygen in equal volume to the water (Figure 4). The bags are then tightly tied at the mouth and packed in cardboard boxes if they are destined for Sri Lanka, or in styrofoam boxes to other destinations (Figure 5). For long haul journeys, some ice may be added to the box to avoid thermal stress during the flight. STEP stated that there was zero mortality of fish throughout this process while 10-20 % mortality was reported by HMF.

Information derived from the invoices of the largest exporting company showed that the average packaging cost was US\$10/ box for all countries and a handling of US\$100 for each consignment. Another company quoted the same amount for packaging but lower handling charges of US\$50-75 per consignment. Packaging cost appears to have increased recently. Edwards and Shepherd (1992) quoted an average packaging cost of US\$3.40 per box to Sri Lanka and US\$6.43 per box to Europe and USA, and Adam (1996) gave similar figures of US\$4.63 per box to Sri Lanka and US\$5.91 per box for those destined to Europe. At the time a large import duty of 25-100 % was levied on aquarium-trade articles (Edwards and Shepherd, 1992) and recently this duty has been waived and packaging material can now be imported duty free.



Figure 4: Cups used to measure the amount of water (left) and bag tied at the mouth after filling with fish, water and oxygen



Figure 5: Bags are packed in styrofoam boxes for long haul journeys

4. Status of the Trade

In 2003 there were 5 licensed companies in the aquarium trade. However, 95% of the exports were by 2 companies with STEP exporting 70% of the total exports, earning 80.5% of the total revenue. Approximately 90 people were employed in the trade of which 6 were expatriates working in the managerial and administrative positions. This is in contrast to the mid-90s when majority of the work force were Sri Lankans working essentially as divers (Adam, 1996). This transformation was probably due to enforcement of Clause 14 of the Fisheries Law (Law No. 5/87) which states that only Maldivians have the right to carry out fishing activities in the fishing grounds most commonly used by Maldivian fishermen, which represents an area within 75 miles of the outer atoll rim. This was triggered as a consequence of the increasing use of moxy nets, which was introduced to the fishery by the Sri Lankan divers (Adam, 1996).

4.1. Species based quota system

The species-based quota system that is in effect at present was based on MCS export data and on general information of species such as rarity in the natural environment, as well as tolerance of species to captivity. Such a selective quota system is difficult to establish, as information on population characteristics such as abundance and boundaries of habitats in collection areas and species densities is required to understand maximum sustainable yields, and to identify those species that are susceptible to overexploitation.

There are 3 categories adopted in this system. Category A includes 13 species that are banned from export, Category B includes 66 species that are subject to quota and Category C which consist of 65 species that can be freely exported up to a maximum total number of 300,000 (Tables 1, 2, and 3, Appendix). Category A includes species that do not survive well in captivity such as *Chaetodon meyeri*, *C. trifasciatus* and *C. triangulum* (Wood, 1985) and those that are locally rare like the Armitage's angelfish (*Apolemichthys armitagei*). In addition to Category A listed species, it is an offence to export any species of parrot fishes, puffer fishes, porcupine fishes, eels or giant clams. There is also a ban on exporting any species utilized as livebait in the pole and line tuna fishery. In compliance with this

regulation, the most traded species globally, *Chromis viridis* (Blue-green damselfish) (Wabnitz *et al.*, 2003), is not exported from Maldives.

The current system appears to be quite effective, although there are still some difficulties in monitoring the trade. The system was administered through the use of proforma aquarium fish export forms as recommended by Edwards and Shepherd (1992). The form lists scientific and common names of the species that are commonly exported in the trade. It also allocates a code name to each species and the exporters fill out one proforma sheet per consignment. The problem with this system lies in effectively monitoring the quotas as there are different agencies involved in the process. While the Marine Research Centre (MRC) sets the quotas, Ministry of Trade and Industries (MTI) issues export licenses and MCS collects the proforma sheets filled out by the exporting companies. MCS compiles data summaries such as quantity of fish and revenue from each consignment as well as the destination and dates. Copies of these sheets are forwarded to MRC where the species wise data is compiled. Thus clarity of responsibilities with regards to monitoring quota balances is lacking. As a result, every year a few species in Category B are exported in excess of the quotas set for these species. Although infrequent, a few individuals in Category A are also exported occasionally.

Another problem is the use of a wide variety of common names to identify the different species. It is not clear how reliable the data collected from the proforma export forms is. One of the exporting companies reported that they were not very familiar with the species names and therefore were not very confident when filling out the proforma sheets.

Nonetheless, the species based quota system appears to work and provides reliable estimates of the trade including numbers of fish exported, revenue derived from the trade, destinations, species wise data and unit prices.

4.2. Licensing scheme

The mandate to regulate the export trade lies within the Ministry of Trade and Industries. They are responsible for issuing export licenses to the aquarium fish exporting companies and this license is based on the export value, which is determined by the exporter. The minimum value is Rf 100 and there is no upper limit for the maximum value. For every Rf 1,000 of

exports, Rf 1 is paid in the form of revenue stamps. The quota for Category B species is determined by MRC for the year and is divided up, and a part is given out under the license. The license is valid until the last day of the year it was issued. As the license is based on the value of the exports, once the license value is reached, it has to be renewed even though some export quota is remaining under that particular license. If a species has been exported up to the quota issued with the license, the quota is renewed provided that the overall yearly quota set for that species by MRC is still remaining.

A major problem with a value based licensing system can be under-quoting of prices of fish by exporting companies in an attempt to maximize the number of fish exported per licence. This would have consequences on the assessments of the annual revenue from the fishery as well as average unit prices. Thus the present system of licensing should be eliminated and a quota based system put in its place. For this to be achieved, all species traded in the industry need to be given a yearly quota including those in Category C.

4.3. Collection areas

Aquarium fish collection can be carried out on any reef except resort house reefs and the 25 protected dive sites which were established in 1995 and 1999. In the beginning, collection areas were concentrated around Male' due to the dependence of the trade on an international airport, with direct flights to Europe and other destinations (Edwards and Shepherd, 1992). With the establishment of regional airports in the northern and southern atolls, collection has spread to other atolls including Haa Dhaalu and Baa in the north and Vaavu, Laamu and Thaa in the south (Figure 6). The collected fish are brought by domestic planes to the holding facilities in Male' atoll and conditioned before sending them abroad. HMF and Star Maldives Pvt. Ltd. collect their specimens from Male', Baa and Vaavu atolls, where they have their bases. A maximum of 50 litres of fuel is spent per day on the boat to get to collection sites and return to base. This suggests that collection is carried out in an estimated area that can be reached within a one hour boat ride.

It should be noted that there are changes in collection areas over time. In 2000, collection was carried out in Haa Dhaalu, Male', Laamu and Thaa

atolls while the collection areas are in Baa, Male' and Vaavu atolls at present. This pattern of resource use may act as indirect time area closures and aid in the replenishment of fish stocks.

At present there are no designated areas for collection of aquarium specimens. From a scientific point of view it is very important to have designated areas for collecting aquarium fish. Edwards and Shepherd (1988) recommends a fishing area of 20% and the remaining 80% closed to fishing, thus acting as marine reserves. Such a system would ensure that a recruiting stock is available to replenish the fished areas, minimizing overexploitation (Palumbi, 2003) and extinction of sought after species. In the past few decades, marine reserves have been advocated as a tool to replenish overexploited stocks of species targeted by food fisheries (Russ and Alcala, 1996; MacClanahan and Mangi, 2000; Roberts *et al.*, 2001). A study carried out in Hawaii on aquarium fish collection and marine reserves found that aquarium fish increased in newly established Fishery Replenishment Areas (FRAs) while there was a significant decrease in those areas open to collection (Tissot *et al.* 2002). These two sets of sites were compared to control sites for evaluation of effectiveness of FRAs in management of the aquarium fishery.

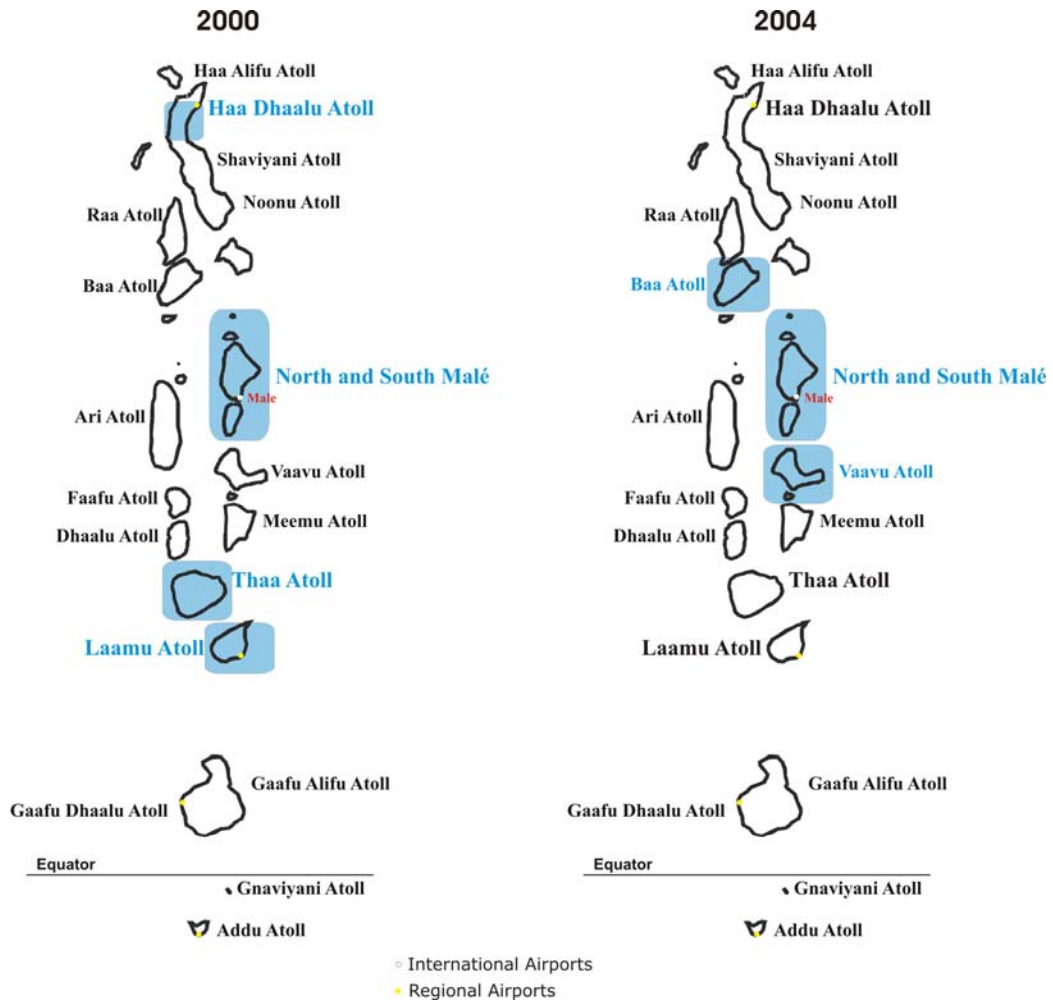


Figure 6: Map of the Maldives showing areas of collection in 2000 and 2004 (filled in blue)

4.4. Trends in the trade

The fishery has fluctuated since its inception and still appears to be evolving (Figure 7). There was a gradual increase in fish exports until the mid-1990s, with a slight decline during the late 1980s. This decline could be attributed to the civil unrest in Sri Lanka, a major destination at the time (Edwards and Shepherd, 1992; Adam, 1996). The highest exports were in 1994 after which it decreased slightly and then rose again. The trend in fish exports declined since 1997 and this could be attributed to the lower number of companies involved in the trade. Until 1997, several Sri Lankan divers were involved in fish collection when Clause 14 of Law 5/87 was re-enforced, prohibiting expatriates to be directly involved in fishing activities within the Coastal Zone of Maldives.

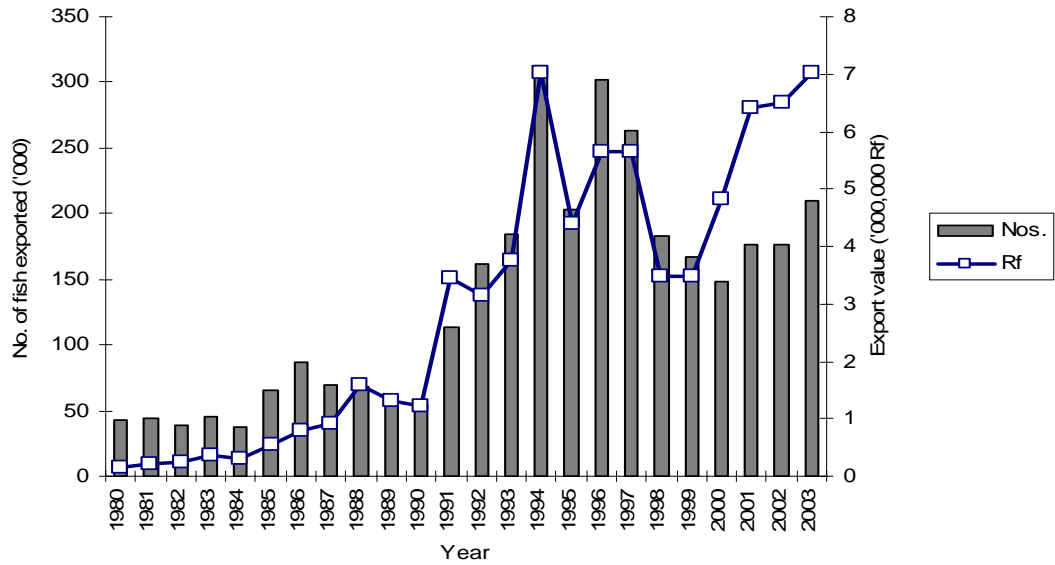


Figure 7: Export of aquarium fish (nos.) and their export value (MRf), 1980-2003. Source: ERSS/ MoFAMR and MCS.

At the time there were few Maldivians with a diving license and aquarium fish collection relied heavily on expatriates for SCUBA diving. Thus the number of licensed companies fell from 17 in 1996 to 4 in 2000 (Saleem and Naeem, 2000). Since 1997 the number of fish exported has stabilized although the relative earnings have increased significantly. This is possibly due to the larger percentage of exports to Europe fetching higher prices compared with Sri Lanka (Figure 8).

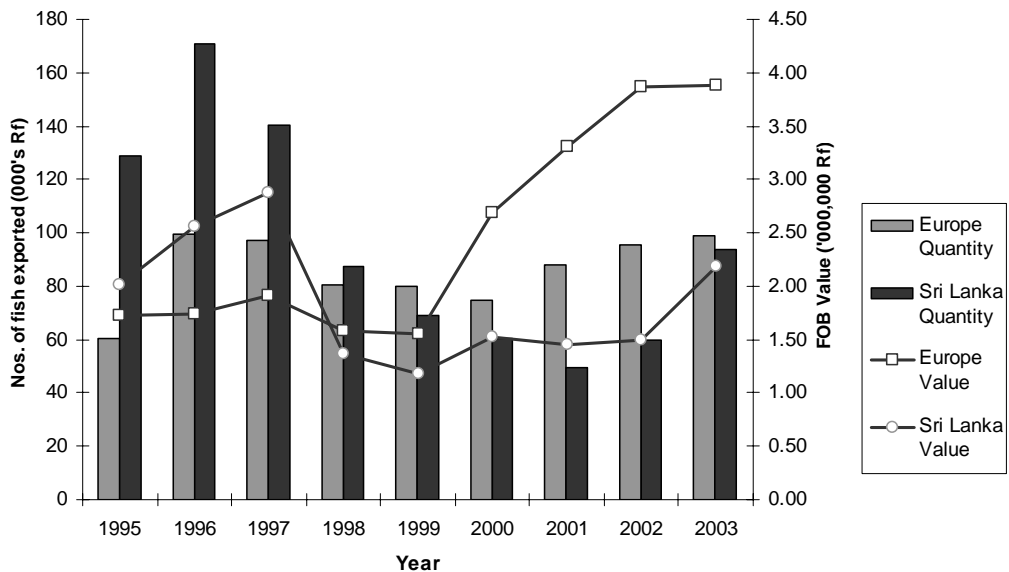


Figure 8: Export of aquarium fish (nos.) and their export value (MRf) for Sri Lanka and Europe from 1995 – 2003. Source: ERSS/MoFAMR and Customs.

During the early years of the trade, majority of the exports were to Sri Lanka. From 1983-1986 approximately 83% of the fish was destined to Sri Lanka followed by Europe (13.3%) (Edwards and Shepherd, 1992). Between 1989 and 1992 the situation had reversed, resulting in Europe being the major destination (Adam, 1996). However, exports to Sri Lanka increased again compared to Europe until 1998, and since then Europe has dominated the market (Figure 8). At present, the most important markets are United Kingdom, Germany, Sri Lanka, Hong Kong and Japan (Tables 1 and 2). In 2003, about 47% of the exports were to Europe followed closely by Sri Lanka (44%), with small percentages to the Far East (4.8%), USA (3.12%) and others (0.17%). The highest earnings were derived from exports to Europe (55.32%) followed by Sri Lanka (31.07%). Exports to Sri Lanka are normally re-exported to Europe, US or other destinations. In the mid-80s, Wood (1985) suggested that about 20% of Sri Lanka's exports may originate from the Maldives, but in a more recent study it was found that this percentage had decreased to 7% (Wilhelmsson *et al.*, 2002). The recent rise in exports to Europe relative to Sri Lanka is probably due to an increasing number of direct flights to European destinations, which has allowed faster and more efficient transportation of the goods.

In 2003, the highest unit price per fish was offered by the United States (Rf 65.12 per fish on average) followed by countries in the Far East averaging about Rf 50.52 per fish and subsequently Europe paying approximately Rf 43.38 per fish (Table 3). The value gained from exports to the Sri Lankan market is low compared to the exported quantity, as the average unit price per fish offered is lower, relative to other destinations. However, this price has increased from less than Rf 15 per fish in the early 1990s (Adam, 1996) to Rf 23.24 at present.

Table 1: Quantity of aquarium fish (nos.) exported from the Maldives by country from 1995-2003. Source: ERSS/MoFAMR and MCS.

Country	1995	1996	1997	1998	1999	2000	2001	2002	2003
EUROPE									
UK	27515	49655	47277	38637	36169	36222	56082	51977	63234
Italy	2303	0	927	6351	4633	8516	4255	8126	6019
Germany	4747	21113	27882	22257	28816	22573	30020	21562	20096
Austria	462	0	0	63	0	0	0	0	0
Switzerland	379	691	287	0	0	0	0	0	125
France	2970	781	1730	1173	2944	3152	1590	4293	6622
Netherlands	21264	27513	19161	11892	7310	2846	11480	6713	2122
Spain	41	0	0	294	0	0	0	0	0
Belgium	300	0	0	0	0	1377	766	2589	583
Denmark	311	0	0	0	0	0	0	0	0
Israel	0	0	0	0	0	0	0	105	0
Sub total	60292	99753	97264	80667	79872	74686	104193	95365	98801
Sri Lanka	128860	171003	140327	87503	68818	60630.00	56639	59959	93889
FAR EAST									
Thailand	163	1231	294	0	0	0	0	0	0
Hong Kong	347	7580	5678	3133	4152	2184	3623	5306	2626
Singapore	138	2085	559	0	999	598	0	0	0
Japan	10459	14723	4480	2946	3922	2884	6824	6573	7396
Malaysia	0	20	0	0	0	0	3	0	0
China	0	0	0	0	1855	0	0	0	0
Taiwan	0	1047	269	0	0	0	0	228	0
Sub total	11107	26686	11280	6079	10928	5666	10450	12107	10022
OTHER									
Bahrain	0	138	0	0	0	0	0	0	0
U.A.E	0	22	0	0	0	0	0	1804	357
South Africa	215	0	0	17	0	0	0	189	0
Sub total	215	160	0	17	0	0	0	1993	357
U.S.A	3147	4793	13770	8650	7839	7018	5259	6454	6689
GRAND TOTAL	203621	302395	262641	182916	167457	148000	176541	175878	209758

Table 2: Value of aquarium fish (in '000s of MRF) exported from the Maldives by country from 1995 – 2003. Source: ERSS/MoFAMR, MCS.

Country	1995	1996	1997	1998	1999	2000	2001	2002	2003
EUROPE									
UK	694.3	889.5	804.0	446.7	634.1	1103.5	2021.4	1988.4	2307.9
Italy	92.1	0.0	39.5	156.6	71.6	349.2	294.5	420.1	326.9
Germany	173.4	442.0	650.7	613.6	608.8	897.8	1282.1	949.1	805.8
Austria	28.2	0.0	0.0	1.4	0.0	0.0	0.0	0.0	0.0
Switzerland	3.3	20.7	21.7	0.0	0.0	0.0	0.0	0.0	9.7
France	85.4	38.4	60.1	48.5	55.4	157.5	90.3	248.2	363.5
Netherlands	626.3	356.0	336.1	309.6	180.8	64.3	209.6	115.4	37.1
Spain	1.4	0.0	0.0	4.2	0.0	0.0	0.0	0.0	0.0
Belgium	14.8	0.0	0.0	0.0	0.0	119.5	38.7	134.8	32.7
Denmark	6.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Israel	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.2	0.0
Sub total	1725.8	1746.7	1912.1	1580.7	1550.7	2691.9	3936.6	3863.2	3883.7
Sri Lanka	2011.9	2562.4	2870.3	1360.2	1177.2	1528.4	1639.5	1502.1	2181.6
FAR EAST									
Thailand	14.2	66.1	18.9	0.0	0.0	0.0	0.0	0.0	0.0
Hong Kong	21.4	447.7	348.1	223.9	268.9	106.1	139.4	267.0	145.8
Singapore	5.3	81.0	21.9	0.0	42.6	28.3	0.0	0.0	0.0
Japan	468.3	664.3	282.1	202.3	260.6	196.1	390.6	331.4	356.0
Malaysia	0.0	1.3	0.0	0.0	0.0	0.0	0.1	0.0	0.0
China	0.0	0.0	0.0	0.0	29.6	0.0	0.0	0.0	0.0
Taiwan	0.0	35.8	27.1	0.0	0.0	0.0	0.0	11.5	0.0
Sub total	509.2	1296.2	698.1	426.2	601.6	330.5	530.2	609.9	501.9
OTHERS									
Bahrain	0.0	9.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
U.A.E	0.0	2.0	0.0	0.0	0.0	0.0	0.0	47.6	17.2
South Africa	14.6	0.0	0.0	0.8	0.0	0.0	0.0	7.1	0.0
Sub total	14.6	11.2	0.0	0.8	0.0	0.0	0.0	54.6	17.2
USA	150.6	42.6	166.8	114.5	159.4	281.1	305.4	465.8	435.6
GRAND TOTAL	4412.1	5659.0	5647.2	3482.4	3488.9	4832.0	6411.6	6495.6	7020.0

The proforma aquarium fish export forms allowed analyses of species-wise data. From a sample of 364 data sheets, 178,696 fish and 6,999 invertebrates in about 25 families were estimated to have been exported during 2003. Seventy percent of the fish exports were made up of 22 species and includes anthias (Serranidae), wrasses (Labridae), dart fishes (Microdesmidae), trigger fishes (Balistidae), surgeon fishes (Acanthuridae),

blennies (Blenniidae) and gobies (Gobiidae). This information is shown on Table 4 along with quotas set for Category B species in 2003.

Table 3: Average unit prices for aquarium fish offered for major destinations (prices in Rf) Source: ERSS/MoFAMR, MCS.

Destinations	1995	1996	1997	1998	1999	2000	2001	2002	2003
Europe	31.99	20.91	22.67	23.91	19.99	40.01	41.28	43.42	43.38
Sri Lanka	15.61	14.98	20.45	15.54	17.11	25.21	28.95	25.05	23.24
Far East	50.16	49.53	63.07	70.02	58.63	60.64	47.42	50.38	50.52
USA	47.86	8.88	12.11	13.24	20.33	40.05	58.06	72.18	65.12
Others	68.01	78.86	-	47.11	-	-	-	31.88	48.18

The composition of the most commonly exported species of fish in 2003 has some differences to that in 1994 reported by Adam (1996). Butterfly fishes and angel fishes are lacking from the present composition. The reasons for this are not clear, and may be due to decreasing demand from the clients. *Labroides dimidiatus* which was not on the list in 1994 is heavily exploited at present, exporting 10,907 fish in 2003, 4,907 fish beyond the quota set for that year. This species is very commonly traded globally but is not known to adapt well to aquarium environments (Wabnitz *et al.*, 2003). *L. dimidiatus* has major effects on the patterns of fish activity in the reef environment and is thought to indirectly affect fish demography through the elimination of numerous parasites (Grutter *et al.*, 2003). Grutter *et al.* (2003) found that there were less transient species on reefs where *L. dimidiatus* were excluded. Although the distribution of resident fish was not affected, the large species that were, could affect other reef organisms. Another study found that the effects of removal of *L. dimidiatus* were not evident immediately but that there was a significant decline in fish diversity detected after 4-20 months of elimination of the wrasse (Bshary, 2003).

Another important observation is the disappearance of species such as *Gobiodon citrinus* (Poison goby) and *Oxymonacanthus longirostris* (Long nose filefish) which were highly exported prior to the extensive bleaching event in 1998. The long nose filefish is an obligate coralivore feeding predominantly on polyps of corals in the genus *Acropora* (Barlow, 1987). Both poison goby and long nose filefish lives exclusively among the branches of staghorn corals (Acroporidae) (Barlow, 1987; Kuitert, 1998), which were most severely affected during the bleaching event (McClanahan, 2000).

Table 4: Twenty two most commonly exported species and their estimates of quantity exported in 2003. Also given are the quotas set for species (for category B) in 2003. Source: MRC, ERSS/MoFAMR, MCS.

Common name	Scientific Name	Nos. exported in 2003	2003 Quotas
Scalefin anthias, Wreckfish	<i>Pseudanthias squamipinnis</i>	27,466	
Powder blue	<i>Acanthurus leucosternon</i>	11,677	
Blue diesel cleaner	<i>Labroides dimidiatus</i>	10,907	6,000
Purple wreckfish, Yellowback anthias	<i>Pseudanthias evansi</i>	9,600	
Fire (tail) goby, fire dartfish	<i>Nemateleotris magnifica</i>	9,000	10,000
Decora or Elegant dartfish, Elegant firefish	<i>Nemateleotris decora</i>	5,908	10,000
Persian blenny, Midas blenny, Brown blenny	<i>Ecsenius midas</i>	5,074	
Lipstick or Orangespine surgeonfish	<i>Naso lituratus</i>	5,074	
Watchman goby, Blue band goby, Blue streak goby	<i>Valenciennesa strigata</i>	5,029	
Silver-streak anthias	<i>Pseudanthias cooperi</i>	4,804	
Silver-streak goldie, Threadfin anthias	<i>Nemanthias carberryi</i>	4,570	
Blue trigger, Red tooth trigger	<i>Odonus niger</i>	3,646	
Resplendent anthias	<i>Pseudanthias pulcherrimus</i>	3,187	
Dragon wrasse, Rock mover wrasse	<i>Novaculichthys taeniorus</i>	3,036	2,000
Pyjama or Sixstrip wrasse	<i>Pseudocheilinus hexataenia</i>	2,961	5,000
Orange-spotted blenny	<i>Istiblennius chrysospilos</i>	2,591	
Clown surgeonfish, Striped surgeonfish	<i>Acanthurus lineatus</i>	2,516	
Yellow wrasse, Lemon meringue	<i>Halichoeres leucoxanthus</i>	2,476	1,200
Short-snout anthias	<i>Pseudanthias parvirostris</i>	2,474	
Dawn goby	<i>Amblyelotris aurora</i>	2,200	
Maldives clown	<i>Amphiprion nigripes</i>	2,148	3,000
Picasso, Lagoon triggerfish	<i>Rhinecanthus aculeatus</i>	2,050	3,000

The poison goby and the long nose filefish disappeared from the northern and central atolls of Maldives but were observed in the southern most atolls where the impacts of bleaching were less severe (Charles Anderson pers comm., 2003). Discussions with the collectors in 2000 revealed that these two species went extinct within the collection areas since 1998. As a result, the export quota for the poison goby and long nose filefish was reduced from 17,500 and 10,000 to 500 and 1,000 respectively in 2001. However, it may be more reasonable to set quotas for these 2 species at zero until their populations resume to pre-bleaching levels. At present, a few individuals have been observed on some reefs from where they had disappeared previously (Charles Anderson pers comm., 2003). The data shows that since 1998, 73 long nose filefishes were exported in 2001 and 4 poison gobies and

12 long nose filefishes were exported in 2003. Allowing export of these species will hinder replenishment of their populations.

Among the invertebrates traded were starfishes, sea anemones, and nudibranchs. It has to be noted that the red starfish (unknown species) was one of the most exported species with a total of 3,989 individuals exported in 2003.

5. Management Initiatives: Monitoring and Regulation of the Trade

The aquarium trade has been monitored by the Government since commencement of the fishery. Monitoring has been predominantly in the form of export data collected by MCS. Apart from the crude estimates of potential yields for 65 aquarium fishes within 7 nautical miles of Male' carried out by Edwards and Shepherd (1994), there has been no assessment undertaken for species targeted by the aquarium fishery. Such a study needs to be repeated to obtain valuable information on the present abundance and distribution of commonly exported species to aid review of present export quotas. In addition to exploitation, natural disturbances such as coral bleaching events can affect species abundance and distributions. Therefore reliance on export data solely may underestimate impacts of the aquarium trade on certain species.

5.1. Collection methods

All destructive methods of fish collection in the aquarium fishery have been banned by the Government. Use of hand nets have been normal practice for collection since inception of the fishery. The use of moxy nets began around 1995 but its use was banned from 6th October 1997 through a notification letter (FA-A1/29/97/49) due to the high level of destruction to the coral reef environment.

5.2. Conflicts arising from the aquarium fishery

Minimizing conflicts between the aquarium fishery and tourism and other fisheries have been a major concern of the Maldivian government since the commencement of the fishery. During the early years, there was some conflict between the fishery and tourism as there were instances when fish collection was carried out while recreational divers were in the water. Now collectors are advised by their employers not to dive while tourist divers are in the vicinity. Establishment of the 25 protected dive sites where any type of fishing except bait fishing is banned has also contributed to minimizing this conflict. However, the sites are not monitored for illegal activities and the regulations are not enforced. Conflicts between aquarium fisheries and other fisheries have been negligible. The main issue has been exploitation of livebait species by aquarium collectors, although they were minor bait species. This disagreement has been resolved since the ban on export of all species utilized as live bait in the pole and line fishery.

5.3. Awareness initiatives

A guide to fish identification was prepared by MRC in 1996 to aid those involved in the fishery, including Customs officials, fish collectors and managerial staff. This guide is regularly updated to include new species or to reflect any changes in the quota system. The catalogue has also strengthened monitoring through more informed and accurate data filled out by the exporters. In addition to the guide, a workshop was held in 1996 for exporters and MCS officials involved in the trade to increase awareness of the fishery and to provide information on strengthening data collection and monitoring. Similar workshops were held in 2002 and 2003.

5.4. Licensing and data analysis

An important component of monitoring and regulating the trade is to carry out regular reviews of the data, to assess trends and to assess whether existing levels of exploitation are sustainable. An example is the case of the poison goby and the long nose filefish which was discussed in Section 4.4. Disappearance of these species was not detected until a review was done in 2000, 2 years after the bleaching event. This could have been avoided if the species-wise data are regularly analysed.

At present, quotas are given out to the exporters by MTI. The exporters are required to present the relevant license with each consignment. MCS keeps tally of the numbers of each species exported to ensure that fish are not exported beyond the quotas given under that particular license. However, in 2002, eight species in Category B were exported beyond their respective quotas. This can be avoided through frequent analysis of species-wise data from the proforma sheets, which would show if the export numbers are approaching quotas set for the year. MRC could play a larger role in monitoring quotas using data from the proforma sheets. However, the data transfer process between MRC, MTI and MCS needs to be strengthened to make sure that all information is available to MRC in a timely manner in order to carry out the analysis.

5.5. International management initiatives

The Marine Aquarium Council (MAC) is an international non-profit organization working towards ensuring sustainability of the marine aquarium trade. It is a global network of organizations from different backgrounds including ornamental collectors, industry, hobbyists, conservation groups, government agencies and public aquariums. Its goals include establishing standards, certification and labelling for quality and increasing public awareness of the role of the industry in conservation. MAC has been working closely with the World Conservation Monitoring Centre (WCMC) to provide reliable data on the marine ornamentals trade to aid management of the industry. WCMC has developed a Global Marine Aquarium Database (GMAD) to “gather, integrate, collect, standardize and provide fast and easy access to data on the trade of individual species” (Wabnitz *et al.*, 2003). GMAD is available free online or can be downloaded, and provides estimates based on quantitative data, for the first time for fish and invertebrates (Wabnitz *et al.*, 2003). It is important to collaborate with such agencies to work together towards a more sustainable aquarium trade.

A request by one of the Maldivian exporting companies was for the Government to provide them with some type of certification which they can use to acquire more clients and to display with their products. However, before such a system can be established, there is a need to develop a set of criteria to assess the processes and infrastructure of the industry. Codes of conduct need to be developed for collectors along with internationally

acceptable standards for packaging and holding facilities (Edwards and Shepherd, 1992).

6. Recommendations

The following recommendations include those made by Edwards and Shepherd (1992), Adam (1996) and through this study.

- Establish designated areas for collection of fish for the aquarium trade.
- Increase consistency of names used by exporters, collectors, clients and the government agencies.
- Introduce daily log books to obtain information on collection areas, hours spent on collection, mortality of fish.
- Develop a code of conduct for fish collectors.
- Develop criteria or acceptable standards for holding facilities.
- Develop criteria for providing certification to exporters from the government.
- Affiliate with international management bodies such as the Marine Aquarium Council World Conservation and Monitoring Centre.
- Carry out a stock assessment of the species exported in the aquarium trade.
- Strengthen monitoring of the exports and regulation of the trade through increasing transparency of responsibilities of the different agencies involved in the trade.
- Set quotas for all species traded including those in Category C.
- Substitute the present system of value based licensing with quota based licences.

7. References

- Adam, M.S. (1996). The aquarium fishery of the Maldives. In: D.J. Nickerson and M.H. Maniku (eds.) *Workshop on integrated reef resources management in the Maldives*. Bay of Bengal Program, Madras, India, pp 93-115.
- Barlow, G. (1987). Spawning, egg and larvae of the longnose filefish *Oxymonacanthus longirostris*, a monogamous coralivore. *Environmental Biology of Fish*, **20**: 183-194.
- Bshary, R. (2003). The cleaner wrasse, *Labroides dimidiatus*, is a key organism for reef fish diversity at Ras Mohammed National Park, Egypt. *Journal of Animal Ecology*, **72**: 169-176.
- Edwards, A.J. (1988). *Preliminary report on the aquarium fish export trade in the Republic of Maldives*. Report to Marine Research Section, Ministry of Fisheries, Republic of Maldives, pp 21.
- Edwards, A. J. and A.D. Shepherd. (1992). Environmental implications of aquarium-fish collection in the Maldives, with proposals for regulation. *Environmental Conservation*, **19**(1): 61-72.
- Grutter, A., Murphy, J.M. and J.H. Choat. (2003). Cleaner fish drives local fish diversity on coral reefs. *Current Biology*, **13**: 64-67.
- Kuiter, R. H. (1998). *Fishes of Maldives*. Atoll Editions. Victoria, Australia.
- McClanahan, T. R. (2000). Bleaching damage and recovery potential of Maldivian coral reefs. *Marine Pollution Bulletin*, **40**: 587-597.
- McClanahan, T.R. and Mangi, S. (2000). Spillover of Exploitable Fishes from a Marine Park and its Effects on the Adjacent Fishery. *Ecological Applications*, **10** (6): 1792-1805.
- Palumbi, S.R. (2003). *Marine Reserves: A Tool for Ecosystem Management and Conservation*. PEW Ocean Commission.

- Roberts, C.M., Bohnsack, J.A., Gell, F., Hawkins, J.P. and Good ridge, R. (2001). Effects of Marine Reserves on Adjacent Fisheries. *Science*, **294**: 1920-1923.
- Russ, G.R. and Alcala, A.C. (1996). Do marine reserves export adult fish biomass? Evidence from Apo Island, central Phillipines. *Marine Ecology Progress Series*, **132**: 1-9.
- Saleem, M.R. and I. Naeem. (2000). A review of the tropical live fish industry of the Maldives. In: D. Hopley, P. Hopley, J. Tamelander and T. Done (eds.) *Abstracts: Proceedings of the ninth international coral reef symposium, Bali, Indonesia*. International Society for Reef Studies, pp 204.
- Tissot, B.N., Walsh, W.J. and L.E. Hallacher. (2002). *The effectiveness of marine protected areas and the impacts of aquarium fish collecting in Hawai'i: Final Report Year 2001*. Hawaii Coral Reef Initiative, Honolulu, HI and NOAA, Silver Springs, MD, pp 24.
- Wabnitz, C., Taylor, M., Green, E. and T. Razak. (2003). *From Ocean to Aquarium*. UNEP-WCMC, Cambridge, UK, pp 64.
- Wilhelmsson, D., Haputhanthri, S.S.K., Rajasuriya, A. and S.P. Vidanage. (2002). Monitoring the trends of marine ornamental fish collection in Sri Lanka. In: O. Linden, D. Souter, D. Wilhelmsson and D. Obura (eds.) *Coral Reef Degradation in the Indian Ocean: Status report 2002*. CORDIO, Sweden pp 158-166.
- Wood, E.M. (1985). *Exploitation of coral reef fishes for the aquarium trade*. Marine Conservation Society, Ross on Wye, UK, pp 86.

Appendices

Table 1. Export Banned Aquarium Fish (Category A) in 2003

Code no.	Name of the Species	Scientific Name
	ANGELFISHES (POMACANTHIDAE)	
ANG-A-007	Armitage's angelfish	<i>Apolemichthys armitagei</i>
	BUTTERFLYFISHES (CHAETODONTIDAE)	
BUT-A-010	Meyer's butterflyfish, Maypole butterflyfish	<i>Chaetodon meyeri</i>
BUT-A-011	Triangular	<i>Chaetodon triangulum</i>
BUT-A-016	Oval butterflyfish	<i>Chaetodon trifasciatus</i>
	DAMSELFISHES (POMACENTRIDAE)	
DAM-A-004	Green damsel, Bluegreen chromis	<i>Chromis viridis</i>
DAM-A-002	Jade damselfish, Blue damsel, Sapphire damselfish	<i>Pomacentrus pavo</i>
	All species of bait fish are export banned (but not all damsel fishes)	
	PUFFERFISHES (TETRAODONTIDAE)	
	All species of puffer fish are export banned	
PUF-A-001	Spotted toby, Honeycomb toby	<i>Canthigaster janthinoptera</i>
PUF-A-002	Jewel, Solanders toby	<i>Canthigaster solandri</i>
PUF-A-003	Saddleback pufferfish, Model toby	<i>Canthigaster valentini</i>
	PORCUPINEFISHES (DIODONTIDAE)	
	All species of porcupine fish are export banned	
POR-A-001	Shortspine porcupine	<i>Diodon liturosus</i>
	PARROT FISHES (SCARIDAE)	
	All species of parrot fish are export banned	
PAR-A-001	Bicolor parrot	<i>Ctetoscarus bicolor</i>
	SURGEONFISHES (ACANTHURIDAE)	
SUR-A-007	Regal blue, Palette surgeonfish	<i>Paracanthurus hepatus</i>
	EELS	
	All species of eels are export banned	
EEL-A-001	Marble moray	<i>Uropterygius marmoratus</i>

Table 2. Aquarium Fish Subject to Export Quota (Category B) in 2003.... 1

Code no.	Name of the Species	Scientific Name	Quota
ANGELFISHES (POMACANTHIDAE)			
ANG-B-001	Flagfin, Flagfish or Threespot angelfish	<i>Apolemichthys trimaculatus</i>	1,000
ANG-B-008	Yellowtail angelfish	<i>Apolemichthys xanthurus</i>	100
ANG-B-002	Two spines (angelfish)	<i>Centropyge bispinosus</i>	50
ANG-B-009	Whitetail angelfish	<i>Centropyge flavicauda</i>	100
ANG-B-010	Yellowfin angelfish	<i>Centropyge flavipectorals</i>	100
ANG-B-003	Bluefin dwarf, Many spined angelfish	<i>Centropyge multispinis</i>	2,000
ANG-B-004	Emperor angelfish, Imperial angelfish	<i>Pomacanthus imperator</i>	2,000
ANG-B-005	Yellowmask angelfish, Bluefaced angelfish	<i>Pomacanthus xanthometopon</i>	200
ANG-B-006	Royal angelfish, Regal angelfish	<i>Pygoplites diacanthus</i>	2,500
BATFISHES (EPHIPPIDAE)			
BAT-B-001	Orbicular batfish	<i>Platax orbicularis</i>	200
BOXFISHES (OSTRACIIDAE)			
BOX-B-001	Yellow boxfish, Yellow trunkfish	<i>Ostracion cubicus</i>	1,000
BOX-B-002	Spotted box fish	<i>Ostracion meleagris</i>	1,000
BUTTERFLYFISHES (CHAETODONTIDAE)			
BUT-B-001	Threadfin butterflyfish	<i>Chaetodon auriga</i>	3,000
BUT-B-004	Saddleback butterflyfish	<i>Chaetodon falcula</i>	3,000
BUT-B-013	Yellowhead or Goldring butterflyfish	<i>Chaetodon xanthocephalus</i>	3,000
DAMSELFISHES (POMACENTRIDAE)			
DAM-B-003	Sebae clown, Clark's anemonefish	<i>Amphiprion clarkii</i>	3,000
DAM-B-001	Maldives clown	<i>Amphiprion nigripes</i>	3,000
DAM-B-005	Three-stripe damsel	<i>Dascyllus aruanus</i>	10,000
DAM-B-006	Cloudy damsel, Two bar dascyllus	<i>Dascyllus carneus</i>	1,000
DAM-B-007	Three-spot, Domino	<i>Dascyllus trimaculatus</i>	5,000
DAM-B-008	Redtop damsel, Indian damsel	<i>Pomacentrus indicus</i>	2,000
DART FISHES (MICRODESMIDAE)			
DAR-B-001	Decora or Elegant dartfish, Elegant firefish	<i>Nemateleotris decora</i>	10,000
DAR-B-002	Fire (tail) goby, fire dartfish	<i>Nemateleotris magnifica</i>	10,000
FILEFISHES (MONACANTHIDAE)			
FIL-B-001	Longnose filefish	<i>Oxymonacanthus longirostris</i>	1,000
GOBIES (GOBIIDAE)			
GOB-B-001	Poison or Yellow coral-goby, Four bar goby	<i>Gobiodon citrinus</i>	500
HAWKFISHES (CIRRIHITIDAE)			
HAW-B-004	Stocky hawk fish	<i>Cirrihitus pinnulatus</i>	500
HAW-B-002	Longnose hawkfish	<i>Oxycirrhites typus</i>	500
HAW-B-003	Black side hawkfish	<i>Paracirrhites forsteri</i>	300
LONG FINS (PLESIOPIIDAE)			
LON-B-001	Long fin , Comet	<i>Callopleysiops altivelis</i>	50
LON-B-002	Red tipped longfin	<i>Plesiops coeruleolineatus</i>	50
SCORPIONFISH (SCORPAENIDAE)			
SCO-B-001	Dwarf lionfish, Short fin	<i>Dendrochirus brachypterus</i>	100
SCO-B-002	Broadbarred firefish, Ragged firefish, Antenna turkeyfish	<i>Pterois antennata</i>	1,000
SCO-B-003	Devil firefish, Devil turkeyfish	<i>Pterois miles</i>	3,000
SCO-B-004	Radial firefish, Clearfin turkeyfish	<i>Pterois radiata</i>	1,000
SCO-B-005	Zebra lionfish	<i>Dendrochirus zebra</i>	100

Quota is given in number of individuals

Table 2. Aquarium Fish Subject to Export Quota (Category B) in 2003....continued

Code no.	Name of the Species	Scientific Name	Quota
	ANTHIAS & GROUPERS (SERRANIDAE)		
SEA-B-010	Yellow-fin grouper,	<i>Epinephelus flavocaeruleus</i>	50
SEA-B-005	Red grouper, Coral grouper	<i>Cephalopholis miniata</i>	100
SEA-B-006	Coronation (trout) grouper, Moontail sea-bass, Lyretail	<i>Variola louti</i>	100
SEA-B-007	Lyretail grouper	<i>Variola albimarginata</i>	50
	SURGEONFISHES (ACANTHURIDAE)		
SUR-B-008	Sailfin tang	<i>Zebrasoma desjardini</i>	2,100
	TRIGGERFISHES (BALISTIDAE)		
TRI-B-001	Clown trigger	<i>Balistoides conspicillum</i>	800
TRI-B-004	Picasso, Lagoon triggerfish	<i>Rhinecanthus aculeatus</i>	3,000
	WRASSES (LABRIDAE)		
WRA-B-001	Leaf or Deep sea wrasse	<i>Anampses lineatus</i>	500
WRA-B-002	Marble, Yellowtail or Spotted wrasse	<i>Anampses meleagrides</i>	500
		<i>Anapses</i>	
WRA-B-019	Blue spotted or Peacock wrasse	<i>caeruleopunctatus</i>	200
WRA-B-003	Polkadot or Axil spot hogfish	<i>Bodianus axillaris</i>	500
WRA-B-016	Twospot hogfish, Slender hogfish	<i>Bodianus bimaculatus</i>	500
WRA-B-023	Diana's hogfish	<i>Bodianus diana</i>	200
WRA-B-004	Tripletail wrasse	<i>Cheilinus trilobatus</i>	500
WRA-B-015	Dwarf parrot fish, Exquisite wrasse	<i>Cirrhilabrus exquisitus</i>	500
WRA-B-024	Rosy scaled wrasse, Deep sea cirrhilabrus	<i>Cirrhilabrus rubrisquamis</i>	50
WRA-B-026	Clown coris	<i>Coris aygula</i>	100
WRA-B-025	African (wrasse) coris	<i>Coris cuvieri</i>	250
WRA-B-005	Queencoris, Red wrasse	<i>Coris frerei</i>	100
WRA-B-020	Zig Zag Wrasse	<i>Halichoeres scapularis</i>	1,000
WRA-B-017	Adorned wrasse	<i>Halichoeres cosmetus</i>	200
WRA-B-007	Yellow wrasse, Lemon meringue	<i>Halichoeres leucoxanthus</i>	1,200
WRA-B-008	Yellow diesel cleaner, Bicolour cleaner wrasse	<i>Labroides bicolor</i>	1,000
WRA-B-009	Blue diesel cleaner	<i>Labroides dimidiatus</i>	6,000
		<i>Macropharyngodon</i>	
WRA-B-010	Rare wrasse, Divided wrasse	<i>bipartitus</i>	2,000
WRA-B-011	Dragon wrasse, Rock mover wrasse	<i>Novaculichthys taeniorus</i>	2,000
WRA-B-018	McCosker's wrasse	<i>Paracheilinus mccoskeri</i>	300
		<i>Pseudocheilinus</i>	
WRA-B-012	Pyjama or Sixstrip wrasse	<i>hexataenia</i>	5,000
WRA-B-021	Chiesel tooth	<i>Pseudodax moluccanus</i>	300
		<i>Thalassoma</i>	
WRA-B-027	Five stripe wrasse, Red-ribbon wrasse	<i>quinquevittatum</i>	100
WRA-B-022	Peacock wrasse	<i>Xyrichtys pavo</i>	200

Quota is given in number of individuals

Table 3. Aquarium Fish that can be freely exported (Category C) in 2003

Code no.	Name of the Species	Scientific Name
	BLENNIES (BLENNIDAE)	
BLE-C-001	Chestnut blenny	<i>Cirripectes castaneus</i>
BLE-C-005	Zebra blenny	<i>Cirripectes quagga</i>
BLE-C-004	Reticulate blenny	<i>Cirripectes stigmaticus</i>
BLE-C-006	Bicolor blenny	<i>Ecsenius bicolor</i>
BLE-C-002	Persian blenny, Midas blenny, Brown blenny	<i>Ecsenius midas</i>
BLE-C-007	Orange-spotted blenny	<i>Istiblennius chrysospilus</i>
BLE-C-003	Disco blenny, Smith's sabre toothed blenny	<i>Meiacanthus smithi</i>
	BUTTERFLYFISHES (CHAETODONTIDAE)	
BUT-C-017	Bennett's butterflyfish	<i>Chaetodon bennetti</i>
BUT-C-002	Speckled, Lemon, Citron butterflyfish	<i>Chaetodon citrinellus</i>
BUT-C-003	Collare, Pakistani or Redtailed butterflyfish	<i>Chaetodon collare</i>
BUT-C-005	Spotted butterflyfish	<i>Chaetodon guttatissimus</i>
BUT-C-006	Klein's, Sunburst or Blacklip butterflyfish	<i>Chaetodon kleinii</i>
BUT-C-018	Lined butterflyfish	<i>Chaetodon lineolatus</i>
BUT-C-007	Raccoon butterflyfish	<i>Chaetodon lunula</i>
BUT-C-008	Pearlscale or Madagascar butterflyfish, Chrysurus	<i>Chaetodon madagaskariensis</i>
BUT-C-009	Black-backed butterflyfish	<i>Chaetodon melannotus</i>
BUT-C-019	Headband butterflyfish, Indian butterflyfish	<i>Chaetodon mitratus</i>
BUT-C-020	Spot-nape butterflyfish, Broken-bar butterflyfish	<i>Chaetodon oxycephalus</i>
BUT-C-012	Teardrop butterflyfish	<i>Chaetodon unimaculatus</i>
BUT-C-014	Long-nosed butterflyfish, Forceps fish	<i>Forcipiger flavissimus</i>
BUT-C-021	Long-nosed butterflyfish, Forceps fish	<i>Forcipiger longirostris</i>
BUT-C-015	Pyramid or Girdled butterflyfish, Tricolor	<i>Hemitaenichthys zoster</i>
	DART FISHES (MICRODESMIDAE)	
DAR-C-003	Tricolour goby, two tone dartfish	<i>Ptereleotris evides</i>
DAR-C-004	Green goby, Pale dartfish	<i>Ptereleotris microlepis</i>
DAR-C-005	Zebra goby, Zebra dartfish	<i>Ptereleotris zebra</i>
	DRAGONETS (CALLIONYMIDAE)	
DRA-C-001	Starry dragonet	<i>Synchiropus stellatus</i>
	GOATFISHES (MULLIDAE)	
GOA-C-001	Yellow Goatfish	<i>Parupeneus cyclostomus</i>
	GOBIES (GOBIIDAE)	
GOB-C-009	Dawn goby	<i>Amblyeleotris aurora</i>
GOB-C-010	Half barred goby	<i>Amblygobius semicinctus</i>
GOB-C-007	Neophyte goby, Sand goby	<i>Fusigobius neophytus</i>
GOB-C-006	Watchman goby, Blue band goby, Blue streak goby	<i>Valenciennesia strigata</i>
	HAWKFISHES (CIRRIHITIDAE)	
HAW-C-001	Coral hopper, Pixy hawkfish	<i>Cirrhichthys oxycephalus</i>
	MOORISH IDOL (ZANCLIDAE)	
MOO-C-001	Moorish idol	<i>Zanclus cornutus</i>
	PIPEFISHES (SYNGNATHIDAE)	
PIP-C-001	Red tail pipefish, Banded pipefish	<i>Corythoichthys haematopterus</i>

Table 3. Aquarium Fish that can be freely exported (Category C) in 2003...continued

Code no.	Name of the Species	Scientific Name
	ANTHIAS & GROUPERS (SERRANIDAE)	
SEA-C-008	Silver-streak goldie, Threadfin anthias	<i>Nemanthias carberryi</i>
SEA-C-011	Bicolor anthias, Yellow-back basslet	<i>Pseudanthias bicolor</i>
SEA-C-012	Two-spot basslet	<i>Pseudanthias bimaculata</i>
SEA-C-003	Silver-streak anthias	<i>Pseudanthias cooperi</i>
SEA-C-002	Purple wreckfish, Yellowback anthias	<i>Pseudanthias evansi</i>
SEA-C-001	Longfin wreckfish, Redfin anthias, Flame anthias	<i>Pseudanthias ignitus</i>
SEA-C-013	Short-snout anthias	<i>Pseudanthias parvirostris</i>
SEA-C-009	Resplendent anthias	<i>Pseudanthias pulcherrimus</i>
SEA-C-004	Scalefin anthias, Wreckfish	<i>Pseudanthias squamipinnis</i>
	SURGEONFISHES (ACANTHURIDAE)	
SUR-C-001	Powder blue	<i>Acanthurus leucosternon</i>
SUR-C-002	Clown surgeonfish, Striped surgeonfish	<i>Acanthurus lineatus</i>
SUR-C-003	Black streak surgeonfish, Black surgeonfish	<i>Acanthurus nigricauda</i>
SUR-C-012	Brown surgeonfish	<i>Acanthurus nigrofuscus</i>
SUR-C-010	Tennent's surgeonfish, Lieutenant surgeonfish	<i>Acanthurus tennentii</i>
SUR-C-004	Convict surgeonfish	<i>Acanthurus triostegus</i>
SUR-C-013	Yellow fin surgeon, Ring tail surgeon	<i>Acanthurus xanthopterus</i>
SUR-C-005	Spotted, Goldring bristle tooth	<i>Ctenochaetus striogosus</i>
SUR-C-014	Spotted unicornfish	<i>Naso brevirostris</i>
SUR-C-006	Lipstick or Orangespine surgeonfish	<i>Naso lituratus</i>
SUR-C-011	Vlaming's unicornfish	<i>Naso vlamingii</i>
SUR-C-009	Brown sailfin, Brushtail tang	<i>Zebrasoma scopas</i>
	SWEETLIPS (HEMULIDAE)	
SWE-C-002	Sweetlips, Harlequin grunt	<i>Plectorhinchus chaetodonoides</i>
SWE-C-001	Oriental sweetlips, Oriental grunt	<i>Plectorhinchus vittatus (orientalis)</i>
	TRIGGERFISHES (BALISTIDAE)	
TRI-C-007	Orange striped trigger	<i>Balistapus undulatus</i>
TRI-C-002	Indian trigger	<i>Melichthys indicus</i>
TRI-C-003	Blue trigger, Red tooth trigger	<i>Odonus niger</i>
TRI-C-006	Yellow spotted trigger	<i>Pseudobalistes fuscus</i>
TRI-C-005	Reef trigger	<i>Rhinecanthus rectangulus</i>
	WRASSES (LABRIDAE)	
WRA-C-006	Green birdmouth, Brown birdmouth	<i>Gomphosus caeruleus</i>
WRA-C-013	Sixbar wrasse	<i>Thalassoma hardwicke</i>
WRA-C-014	Moon wrasse	<i>Thalassoma lunare</i>

Code C - may be freely exported (Total quota for Code C = 300,000)