

SECTION 9

The Status of Relevant Information for Resource and Habitat Management

Marine habitats and their inhabitants have attracted far less research and study than terrestrial habitats or freshwaters. Therefore, much less information is available for management of marine aquarium fish resources than for freshwater fish resources.

The sustainability of all aquatic resources depends on the extraction pressure or rate of extraction. Where an aquatic resource such as a fish resource is renewable, its sustainability will depend on its regenerating capacity, linked to its reproduction and growth characteristics. For effective management of natural populations, therefore, it is necessary to get the relevant biological and ecological data in order to ensure that the resource is not over-exploited and that the habitat is not adversely impacted. This data is also required for information dissemination to interested personnel and stakeholders.

The other important data needed relates to extraction pressure – numbers of collectors, quantities collected and exported, etc. It is expected that the licensing scheme of the Ministry of Fisheries, which is under way, will generate this data.

9.1 Information required for sustainable management

The concept of sustainability has been around for a long time, although it has entered popular culture only relatively recently. Its recent interpretation views sustainable development as development that meets the needs of the present without compromising the ability of future generations to meet their own needs (WECD, 1987). This concept interlinks the conservation and sustainable use aspects and leads us to the concept of sustainable management of our natural resources, including our rich heritage of biological diversity.

9.1.1 Status of Information Available for Sustainable Management

The programme started recently by the Ministry of Fisheries to license fish collectors will yield information on fish collection. Together with customs data on exports, it should be possible to generate some information about extraction pressure on the natural resource base. Such an information base is not fully developed as yet.

Some qualitative data on the ecological/biological aspects of the freshwater aquarium fish resource is available, particularly through the work of Pethiyagoda (1991) and Senanayake (1980). This and other available data for freshwater fish are summarised above, in Section 6.

As regards the marine aquarium resource, extremely little information is available. Detailed quantitative data on reefs, reef processes and data on the diversity of the reef biota are lacking for Sri Lankan reefs (Ekaratne, 1997c). As for the species base of our reef ecosystems, species diversity and richness are known with some degree of comprehensiveness only for the scleractinian coral and fish fauna. Data on the status and condition of a few Sri Lankan reefs is available from a few reef surveys carried out so far by the National Aquatic Resources Agency (NARA). It is essential for NARA to expand its surveys to include other reef areas. NARA is well equipped to do such surveys and some of the reefs have been surveyed qualitatively for fish and scleractinian coral cover, but not for other organisms, while the extensive reef formations in the north and east have not been surveyed due to security reasons.

NARA's survey programme has revealed the existence of 183 species of stony corals in 68 genera, and over 300 species of fish in 62 families, including 35 species of Butterflyfish, as also the occurrence of spiny lobsters, dolphins, whale sharks and five species of sea turtles. Another three species of stony corals new to Sri Lanka

and two species new to science were discovered early this year (Ekaratne *et al*, in prep.). The common reef-building corals belong to the families of Acroporidae, Agariciidae, Faviidae, Caryophyllidae, Merulinidae, Mussidae, Oculinidae, Pocilloporidae and Poritidae. Common octocorals include *Sarcophyton*, *Sinularia* and dendronephthids. (Mergner and Scheer, 1974; Rajasuriya, 1994; Rajasuriya and de Silva 1988; Ekaratne, 1997c).

In relation to the smaller animals (mostly invertebrates) that contribute and maintain the complex inter-relationships of reef ecosystems, we know almost nothing or very little. To fill these gaps, a start has been made only now, as for example with the Biodiversity Skills Enhancement Project implemented by March for Conservation (MfC), Sri Lanka. This organisation provides taxonomic training, particularly with regard to reef invertebrates, and a data base is being compiled for these organisms (e.g., Ekaratne *et al*, 1997b).

Mergner and Scheer (1974) provide the only documentation on zonation of a reef habitat in Sri Lanka, indicating the paucity of knowledge on such important issues. Quantitative data on reefs are lacking, and studies on reef ecological processes have commenced only recently at Colombo University. It has been found that, at Hikkaduwa Sanctuary, coral recruitment extended almost throughout the year, and was maximum from May to August. In south-west reefs, the linear growth of *Acropora formosa* ranged from 5.0 to 18.7 mm month⁻¹, with maximum growth in February/March and a lesser peak in September/October. *A. formosa* weight increments were high from March to July and peaked in June/July, in phase with pre-recruitment periods. Plankton studies of reef lagoons are likewise lacking and are limited to a study by Colombo University where annual cycles of plankton availability are being documented (Ekaratne, 1997c, Samaraweera and Ekaratne, 1996; Abeysirigunawardena, and Ekaratne, 1998).

Data on physico-chemical factors associated with reefs are also lacking and are limited to a few studies, including that of Colombo University. It is surprising that though sediment and particulate matter have been widely identified as one of the major impacting agents on reef ecosystems (e.g., Rajasunya and White, 1995; Ekaratne, 1990b, 1997a), no related documentary data existed up to last year. A Colombo University study undertaken last year showed that south-west reefs experienced high loads of particulate matter, including sandy material, from May to November, with maximum loads of up to 3.2 kg day⁻¹m⁻². Such studies are urgently needed for other reef locations over acceptable time scales.

The removal of coral ("coral mining") for conversion into wall plastering material is well documented by the Coast Conservation Department (CCD), while reef organism removal for the export aquarium industry was the focus of a study by Wood (1985). The status of marine aquarium fish is being studied under the leadership of Dr Elizabeth Wood (by the Marine Conservation Society jointly with NARA, on a Darwin Initiative funding programme). This would form a very good data base on completion. Colombo University is cataloguing the exports in the aquarium export trade. Together with the above-mentioned Darwin Initiative study, the results would form a robust data base on this trade practice. The Crown-of-thorns starfish, *Acanthaster planci*, merits further study. So do the effects of other organisms (such as didemnids, corallivorous gastropods, sponges and algal species like *Halimeda* and *Ulva*) on reef ecosystems bioerosion studies; some of which are being presently carried out by Colombo University.

Developing in situ methods suited for sustainable management is an accepted priority area in resource management. Some preliminary work carried out by the University of Colombo at Hikkaduwa Marine Sanctuary, using *Acropora* species, indicates the feasibility of re-establishment, restoration and rehabilitation of degraded reef areas. These methods require field testing on a broader scale and constitute another important area meriting future research focus, particularly in view of the coral bleaching and mortality that is being experienced over a wide geographic scale.

Reef-associated habitats which have a high biodiversity and nursery value also require identification for effective reef management and for planning the design of a Protected Area Network. Such habitats have been identified

by Colombo University. These include *Halimeda* mats that harbour a rich diversity of organisms (polychaetes, amphipods, shrimps, crabs, molluscs, bryozoans, ascidians, foraminiferans, nemerteans, pycnogonids and platyhelminths). During periods of strong wave force, *Halimeda* clumps also served as a protective nursery habitat for a number of reef-associated organisms, including pipe fish, gobies, ophiuroids, holothuroids, echinoids, crabs, olives and other molluscs (Ekaratne, 1997c).

Identification of niche types that are associated with reef ecosystems have been carried out to a limited extent by Colombo University, where six niche types have been identified at the Hikkaduwa Marine Sanctuary (Abeyasingunawardena. and Ekaratne, 1996). Studies on food and feeding of a few reef-dwelling fish species have been carried out at Colombo University (Janz, Ekaratne and Perera, 1996). Such studies would also assist in designing protected areas by identifying types and threshold levels of various interacting species that are required to maintain the desired fish species biodiversity and richness within a defined reef area.

9.1.2 *Information & Training Required for Sustainable Management*

Applying sound comprehensive scientific information to the development of a national fishery policy can reduce or eliminate much of the uncertainty that is impeding protection of freshwater and marine fisheries today. Implementation of science-based fishery management plans will help resolve the problems facing some fisheries, such as overfishing and the loss of spawning and nursery habitat, including fragile freshwater and coastal habitats. But improved management and correction of overfishing alone will not be enough to overcome the decline in fish stocks. Protection and restoration of aquatic ecosystems and proper care of watersheds and riparian habitats are critically important. New policies need to be initiated and existing ones continued and enhanced to eliminate, mitigate, and prevent activities that degrade habitats.

There is little reef expertise in the country, with not more than a handful of people engaged in established reef research programmes. This lack of suitably qualified and trained personnel is identified as the main impediment to the collection of research data enabling effective conservation and sustainable management of Sri Lankan reefs.

A basic requirement for sustainable management of a natural resource is to know our species base (species diversity and species richness) and get acquainted with the interacting ecological processes that sustain this species base, in turn requiring that the biological diversity be understood.

The sustainable utilisation of a natural resource, such as an exploitable fish species, requires that we have data with regard to the quantities that we can harvest without impairing its potential to maintain a population size with which the species can perpetuate itself in the long term. For estimating such quantities, we need to know the following;

- population sizes
- population-influencing processes, such as growth, reproduction, interactions, environmental impacts, etc.
- the influence that harvestable quantities would have on the population
- measures that could be adopted for stock regeneration whenever it becomes necessary to do so

The training of more researchers in reef ecology would be pivotal for understanding the ecological processes that need to be incorporated into appropriate reef management strategies in Sri Lanka. Personnel who have high quality university degrees, and thus the academic background to understand ecosystem processes, need to be trained with a view to developing a good ecological research perspective.

Conservation, by itself and for its own sake, would mean keeping the natural resource without subjecting it to anthropogenic change through its utilisation and would be possible only within legally protected areas, such as marine reserves.

Such conservation would require that we identify areas which would characterise representative reefecosystems that, in our opinion, merit their being preserved outside the influence of human intervention. For this purpose of identifying areas for conservation, it is necessary for us to have a sufficiently robust data base that would yield information as to the variety, richness and spatial functions of the habitats within reefecosystems. Research to collect the data for such an information base is therefore important if we are to delimit conservation areas or zones and accord them legally protected status.

Conservation could also mean the conservation of a given species or a number of species. This however, would become meaningful for coral reef conservation only if such species conservation was carried out as part of a functioning ecosystem (as *in situ* conservation), rather than in isolation or away from its normal habitat (= *ex situ* conservation). The advantage of *in situ* conservation is that it would conserve not only the species in question, but other interacting species and, of course, the ecosystem as a functional entity.

As against conservation, sustainable management requires a far greater input of time, effort, personnel and other resources as well as a more detailed information data base that needs to be updated continuously and related to the management strategy that is being applied. Sustainable management also requires that the user community be educated about the advantages of using a resource sustainably as against using it as a “common property” natural resource where every user would exploit the resource maximally without being accountable for its long-term upkeep or sustainability.

Sustainable management depends on a cohesive holistic approach. Ecological data is only one of its necessary components. Data relating to socio-economics, education, community empowerment, policy and institutional reform and major land-use methods should be used both separately and in combination to establish an integrated practical strategy over a period of time.

9.2 A Final Word

The multitude of exploitative and resource-degrading practices carried on at present in Sri Lanka together with the paucity of knowledge on reef and freshwater ecology, dictate that a precautionary approach be speedily adopted for sustainable management of Sri Lanka’s aquatic ecosystems. This is essential so that these ecosystems can continue to sustain the capacity of the aquarium export trade to generate jobs and earn foreign exchange, as well as meet the requirements of future generations. It is their natural resources which we hold in trust.



SECTION 10

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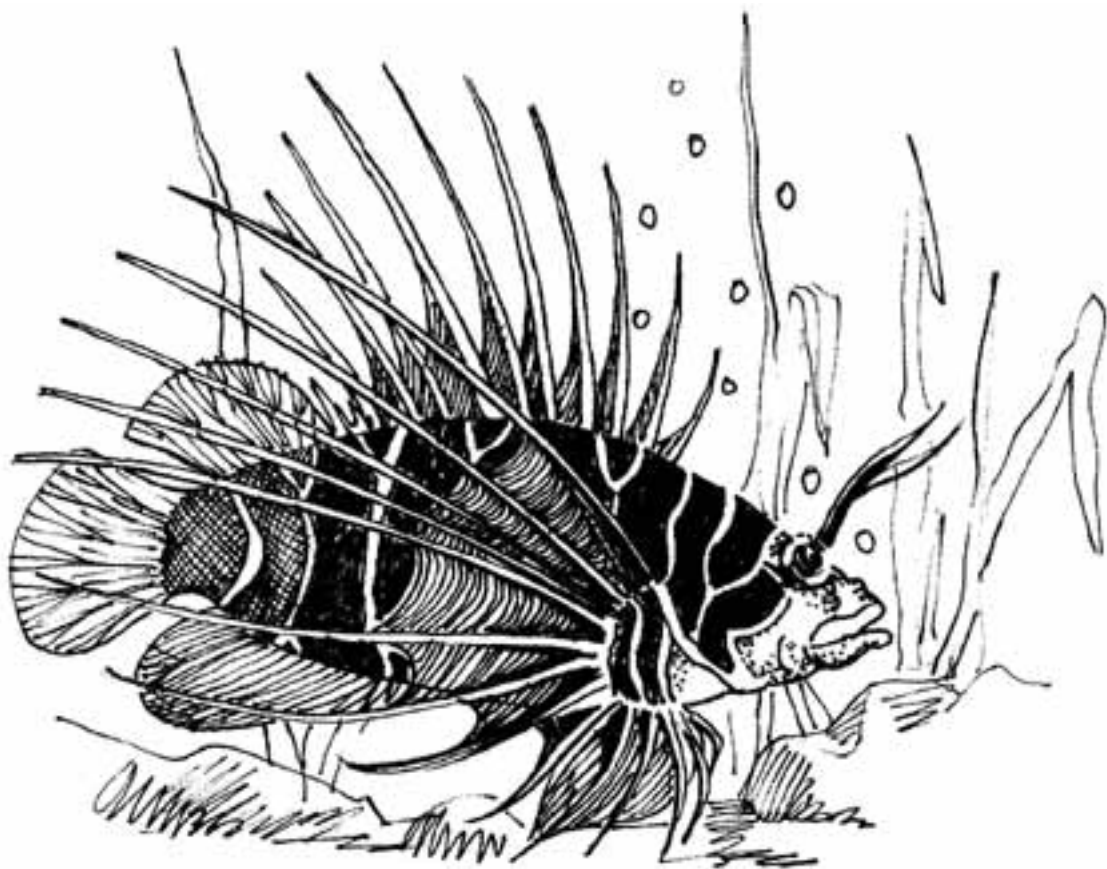
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SECTION 11

Annexes

Annex 1. Commonly used vernacular names of exported freshwater aquarium fish

<i>Zoological name</i>	<i>English name</i>	<i>Sinhala name</i>
1. <i>Anguilla bicolor</i>	Level-finned eel	<i>Kalu aandha</i>
2. <i>Chela laubuca</i>	Blue laubuca	<i>Tatu dandiya</i>
3. <i>Danio malabaricus</i>	Giant danio	<i>Ruth kailaya</i>
4. <i>Daniopathirana</i>	Barred danio	
5. <i>Esomus thermoicos</i>	Flying barb	<i>Ravul dandiva</i>
6. <i>Garra ceylonensis</i>	Stone sucker	<i>Gal pandi</i>
7. <i>Puntius amphibius</i>	Scarlet-banded barb	<i>Mada ipila</i>
8. <i>Puntius asoka</i>	Asoka barb	<i>Asoka pethiya</i>
9. <i>Puntius bimaculatus</i>	Redside barb	<i>ipili kadaya</i>
10. <i>Puntius chola</i>	Swamp barb	<i>Kota ipilla</i>
11. <i>Puntius cumingii</i>	Cuming's barb	<i>Pothaya</i>
12. <i>Puntius dorsalis</i>	Long-snouted barb	<i>Katu kureya</i>
13. <i>Puntius filamentosus</i>	Filamented barb	<i>Pethiva</i>
14. <i>Puntius nigrofasciatus</i>	Black ruby barb	<i>Bulath hapaya</i>
15. <i>Puntius pleurotaenia</i>	Black-lined barb	<i>Hitha messa</i>
16. <i>Puntius ticto</i>	Tic-tac-toe barb	<i>Thith pethiya</i>
17. <i>Puntius titteya</i>	Cherry barb	<i>Lay thiththeya</i>
18. <i>Puntius vittatus</i>	Silver barb	<i>Podipethiya</i>
19. <i>Rasbora daniconius</i>	Striped rasbora	<i>Dandiya</i>
20. <i>Rasbora vaterifloris</i>	Golden rasbora	<i>Hal mal dandiya</i>
21. <i>Lepidocephalichthys thermalis</i>	Common spiny loach	<i>Ehirava</i>
22. <i>Acanthobitis urophthalmus</i>	Tiger loach	<i>Vairan ehirava</i>
23. <i>Schistura notostigma</i>	Banded mountain loach	<i>Kandu ehirava</i>
24. <i>Mystus gulio</i>	Long-whiskered catfish	<i>Anguluwa</i>
25. <i>Mystus keletius</i>	Yellow catfish	<i>Path ankutta</i>
26. <i>Mystus vittatus</i>	Striped dwarf catfish	<i>Iri ankutta</i>
27. <i>Ompok bimaculatus</i>	Butter catfish	<i>Walapoththa</i>
28. <i>Heteropneustes fossilis</i>	Stinging catfish	<i>Hunga</i>

Contd...

29. <i>Oryzias melastigma</i>	Blue eye	<i>Hande titteya</i>
30. <i>Aplocheilus dayi</i>	Day's killifish	<i>Uda handeya</i>
31. <i>Aplocheilus parvus</i>	Dwarf panchax	<i>Udda</i>
32. <i>Aplocheilus werneri</i>	Werner's killifish	<i>fri handeya</i>
33. <i>Microphis brachyurus</i>	Short-tailed pipefish	
34. <i>Monodactylus argenteus</i>	Mono	<i>Kapuwa</i>
35. <i>Toxotes charareus</i>	Archer fish	<i>Dhimitta</i>
36. <i>Scatophagus argus</i>	Scat	<i>Ilattiya</i>
37. <i>Etroplus maculatus</i>	Orange chromide	<i>Kaha koraliya</i>
38. <i>Etroplus suratensis</i>	Pearl spot	<i>Koraliya</i>
39. <i>Butis butis</i>	Upside down sleeper	<i>Vaneya</i>
40. <i>Eleotrisfusca</i>	Brown gudgeon	<i>Puwak badilla</i>
41. <i>Glossogobius giuris</i>	Bar eyed goby	<i>Weligowwa</i>
42. <i>Redigobius bairearops</i>	Rhino-horn goby	
43. <i>Schismatogobius deraniyagalai</i>	Red-neck goby	
44. <i>Sicyopterus grisseus</i>	Gara	
45. <i>Sicyopus jonklaasi</i>	Lipstick goby	
46. <i>Anabas testudineus</i>	Climbing perch	<i>Kavaiya</i>
47. <i>Belontia signata</i>	Combtail	<i>Thalkossa</i>
48. <i>Malpulurra kretseri</i>	Ornate paradisefish	<i>Malpulutta</i>
49. <i>Pseudosphromenus cupanus</i>	Spike-tailed paradisefish	<i>Pulutta</i>
50. <i>Channa orienralis</i>	Smooth-breasted snakehead	<i>Kola kanaya</i>
51. <i>Channa striata</i>	Murrel	<i>Loolla</i>
52. <i>Macrognathus aral</i>	Lesser spiny eel	<i>Bata kola theliya</i>
53. <i>Mastacembelus armatus</i>	Marbled spiny eel	<i>Gan theliya</i>
54. <i>Tetraodon fluviatilis</i>	Common puffer	<i>Paeththaya</i>

**Annex 2. Names under which marine fish are exported from / through Sri Lanka
as recorded in Customs returns from exporters (note that a single fish species
is sometimes referred to by multiple names)**

<i>Group</i>	<i>Family</i>	<i>Scientific name</i>
Surgeon fish (15 spp.)	Acanthuridae (23 + spp.)	<i>Acanthurus bariene</i>
		<i>Acanthurus blochii</i>
		<i>Acanthurus ibelie</i>
		<i>Acanthurus leucosternon</i>
		<i>Acanthurus lineatus</i>
		<i>Acanthurus nigricans</i>
		<i>Acanthurus pyroferus</i>
		<i>Acanthurus sohal</i>
		<i>Acanthurus tennentii</i>
		<i>Acanthurus trioglossus/triostegus</i>
		<i>Acanthurus xanthopterus</i>
		<i>Acanthurus nigroris</i>
		<i>Ctenochaetus marginatus</i>
		<i>Ctenochaetus striatus</i>
		<i>Ctenochaetus strigosus</i>
Unicorn fish (3+spp.)	Acanthuridae	<i>Paracanthurus hepatus</i>
		<i>Naso brevirostris</i>
		<i>Naso lituratus</i>
		<i>Naso viamingi</i>
Tangs (5+ spp.)	Acanthuridae	<i>Naso sp.</i>
		<i>Zebrasoma desjardini</i>
		<i>Zebrasoma scopas</i>
		<i>Zebrasoma veliferum</i>
		<i>Naso lituratus</i>
		<i>Zebrasoma xanthurus</i>
Glass fish (1 sp)	Ambassidae (1 sp)	<i>Zebrasoma sp.</i>
		<i>Ambassis sp.</i>
Frog Fish (2+ spp.)	Antennariidae (2+ spp.)	<i>Antennarius hispidus</i>
		<i>Antennarius biocellatus</i>

Contd

		<i>Antennarius</i> sp.
		<i>Histrio histrio</i>
Cardinal fish (2+ spp.)	Apogonidae (2+ spp.)	<i>Apogon angustatus</i>
		<i>Apogon</i> sp. (<i>A. cyanosoma</i> , <i>A. Endeketaenia</i>)
		<i>Sphaeramia nematoptera</i>
Trigger fish (16+spp.)	Balistidae (16+spp.)	<i>aculeatus</i> = <i>Rhinecanthus aculeatus</i>
		<i>Balistoides conspicillum</i>
		<i>Balistapus undulatus</i>
		<i>Balistoides viridescence</i>
		<i>Monocanthus parda/is</i>
		<i>Melichthys indicus</i>
		<i>Odonus niger</i>
		<i>Oxymonocanthus longiristris</i>
		<i>Pseudobalistes fuscus</i>
		<i>Pseudobalistes flavimarginatus</i>
		<i>Rhinecanthus assasi</i>
		<i>Rhinecanthus aculeatus</i>
		<i>Rhinecanthus rectangulus</i>
		<i>Rhinecanthus verrucosus</i>
		<i>Sufflamen bursa</i>
		<i>Sufflamen chrysopterus</i>
		<i>Balistes rectangulus</i>
Needle fishes (1 spp.)	Belonidae (1 spp.)	<i>Balistes aculiatus</i>
Blennies (10+spp.)	Blennidae (10+spp.)	<i>Blennies</i>
		<i>Strongylura ancisa</i>
		<i>Ecsenius pulcher</i>
		<i>Escenius bicolor</i>
		<i>Escenius lineatus</i>
		<i>Escenius midas</i>
		<i>Escenius naucrates</i>
		<i>Escenius frontalis</i>
		<i>Escenius species</i>
		<i>Me/acanthus smithii</i>
		<i>Malacanthus brevirostris</i>

Contd

		<i>Plagiotremus sp.</i>
		<i>Scorpion blenny</i>
Flounders (5 spp.)	Bothidae (5 spp.)	<i>Bothus mancus??</i>
		<i>Bothus ocellatus</i>
		<i>Pseudorhombus jenvnsii</i>
		<i>Pseudorhombus sp.</i>
		<i>Scopthalmus aquosus</i>
Dragonets (1+ sp.)	Callionymidae (1+ sp.)	<i>Synchiropus marmotatus</i>
		<i>Synchiropus sp.</i>
		<i>Xceinus sp.</i>
Trevallies (2 spp.)	Carangidae (2 spp.)	<i>Caranx sem</i>
		<i>Gnathanodon speciosus</i>
Sharks (1+ sp.)	Carcharhinidae (1+ sp)	<i>Carcharhinus melanopterus</i>
Bamboo sharks (1 sp.)		<i>Cheiloscylidium taeniourus</i>
Butterfly fishes (34+ spp.)	Chaetodontidae (34+spp.)	<i>Chaetodon auriga</i>
		<i>Chaetodon chrysurus/xanthurus</i>
		<i>Chaetodon citrinellus</i>
		<i>Chaetodon collaris</i>
		<i>Chaetodon decussatus</i>
		<i>Chaetodon falcatus</i>
		<i>Chaetodon guttatus</i>
		<i>Chaetodon klenii</i>
		<i>Chaetodon larvatus</i>
		<i>Chaetodon lineolatus</i>
		<i>Chaetodon lunula</i>
		<i>Chaetodon madagascariensis</i>
		<i>Chaetodon megaprora</i>
		<i>Chaetodon melanotus</i>
		<i>Chaetodon meyeri</i>
		<i>Chaetodon mesoleucos</i>
		<i>Chaetodon mitratus</i>
		<i>Chaetodon oxyfasciatus</i>
		<i>Chaetodon plebeius</i>
		<i>Chaetodon rafflesii</i>

Contd...

		<i>Chuetodon semilarvatus</i>
		<i>Chaetodon tennetti</i>
		<i>Chaetodon trfacialis</i>
		<i>Chaetodon train gulum</i>
		<i>Chaetodon trifaciatu</i>
		<i>Chaetodon unimaculatus</i>
		<i>Chaetodon vagabundus</i>
		<i>Chaetodon xanthocephalus</i>
		<i>Forcipiger longirostris</i>
		<i>Hemitaurichthys zoster</i>
		<i>Heniochus permutatus</i>
		<i>Heniochus sp.</i>
		<i>Heniochus pleurotaenia</i>
		<i>Heniochus acuminatus</i>
		<i>Heniochus singlarias</i>
Hawkfishes (5 spp.)	Cirrhitidae (5 spp.)	<i>Cirrhitichthys oxycephelus</i>
		<i>Cirrhitichthys aureus</i>
		<i>Cirrhitichthys griseum</i>
		<i>Oxycirrhites zypus</i>
		<i>Paracirrhitesforsteri</i>
(1 sp.)	Clinidae	<i>Cristiceps aurantiacus</i>
(1 sp.)	Dactyloptidae	<i>Dactyloptera orientalis</i>
Rays (1 sp.)	Dasyatidae	<i>Taeniura lymma</i>
Porcupine fishes (3 spp.)	Diodontidae	<i>Diodon sp.</i>
		<i>Diodon histrix</i>
		<i>Diodon liturosus</i>
Bat /Spade fishes (2 spp.)	Ephippidae/Platicidae	<i>Platax orbicuraris</i>
		<i>Platax teira</i>
Cornet fishes (1 sp.)	Fistularidae	<i>Fistularia commersonii</i>
Mojarras (1 sp.)	Gerridae	<i>Gerres argyreus</i>
Gobies (28 +spp.)	Gobidae	<i>Amblygobius albimacula</i>
		<i>Amblyeleotris guttata</i>
		<i>Amblyeleotris steinitzi</i>
		<i>Amblyeleotris callopareia</i>

Contd

Soap Fish (1 sp.)
Sweetlips (8 spp.)

Grammistidae
Haemulidae

Amblyeleotris sp.
Cryptocentrus cinctus
Fusigobius sp.
Gobiodon citrinus
Gobiodon sp.
Istigobius sp.
Istigobius rigillius
Priolepis cincta
Priolepis cinctus
Ptereleotris evides
Prereleotris zebra
Valencianea puellaris
Anthlygobius species
Gobionellus stigmaticus
Amblyliotris diagonalis
Amblyliotris maculata
valenciennea helsdingenii
Valencinnea sexguttata
Valencianna strigata
Valenciennea longipinnis
Valenciennea wardi
Vajenciennea sp.
Ptereleotris heteropterus
Ptereleotris microlepis
Nemateleotris decora
Nemateleotris magnifica
Gobius viamosa
Amblygobious niger
Gobious niger
Goby species
Grammistes sexlineatus
Gaterin diagrammus
Gaterin lineatus
Gaterin orientalis

Contd...

		<i>Gaterin pictus</i>
		<i>Gaterin sp.</i>
		<i>Plectorhinchus albovittatus</i>
		<i>Plectorhinchus diagrammus</i>
		<i>Plectorhinchus lineatus</i>
		<i>Plectorhynchus orientalis</i>
(1 sp.)	Haloclavidae	<i>Haloc/avidae sp.</i>
Halfbeaks (1 sp.)	Hemiramphidae	<i>Hemiramphus sp.</i>
Sea Horses (2 spp.)	Hippocampidae	<i>Hippocampus kuda</i>
		<i>Hippocampus hippocampus</i>
		<i>Myripristis berndti</i>
		<i>Myripristis murdjan</i>
		<i>Neoniphon sammara</i>
		<i>Sargocentron caudimaculatum</i>
		<i>Sargocentron diadema</i>
		<i>Sargocentron spiniferum</i>
		<i>Holocentrus sp.</i>
		<i>Holocentrus diadema</i>
		<i>Holocentrus rubrum</i>
		<i>Holocentrus sargocentron diadema</i>
		<i>Kuhlia nwriginata</i>
Flagtails (1 sp.)	Kuhliidae	<i>Anampses lineatus</i>
Wrasses(/Diesel) (42+ spp.)	Labridae	<i>Anampses melanurus</i>
		<i>Bodianus axillaris</i>
		<i>Bodianus diana</i>
		<i>Bodianus bilunulatus</i>
		<i>Bodianus bicolor</i>
		<i>Cheilinus chiorurus</i>
		<i>Consformosa</i>
		<i>Fissilabrus labroides</i>
		<i>Cons sp.</i>
		<i>Gomphosus greeni</i> G. caeruleus
		<i>Ginogisus varius</i>
		<i>Gomphosus varius</i>

Contd

Halichoenes argus
Halichoenes centriquadrus
Halichoeres marginatus
Halichoeres scapularis
Halichoeres trispilus
Halichoenes zeylonicus
Halichoeres nebulosus
Halichoeres sp.
Hemigymnus fasciatus
Hemigymnus melapterus
Labroides bicolor
Labroides dimidiatus
Labnoides phthirophagus
Macropharyngodon bipartitus
Macropharyngodon geoffroyi
Macropharyngodon ornatus
Novaculichthys taeniorus
Pseudocheilinus hexataenia
Red rare wrasse
Thallasoma hardwicki
Thallasoma lunare
Thallasoma quinquavirrata
Cons gaimard
Cons gaimard africana
Larabicus quadnilineatus
Gomphosus caeruleus
Cinhihahinis sp.
Cirrhlalabus/Cinhihahinis rubriventralis
Halichoeres leucoxanthus
Stethojulis trilineata
Halichoenes hortulanus
Cirrhlalabus sp.
Anampses meleagrides
Paracheilinus filamentosus

Contd...

		<i>Halichoeresflavescens</i>
		Wrasses
		<i>Thalassoma lutescens</i>
Emperor fish (2 spp.)	Lethnidae	<i>Lethrinus harak</i>
		<i>Lethrinus ornatus</i>
Snappers (4 spp.)	Lutjanidae	<i>Lutianus sebae</i>
		<i>Lutjanus decussatus</i>
		<i>Lutjanus fulviflamma</i>
		<i>Lutjanus kasmira</i>
(1 sp.)	Microdesmidae	<i>Macolar niger</i>
File fishes (3 spp.)	Monocanthidae	<i>Alutera scripta</i>
		<i>Amanses scopas</i>
		<i>Pervagor melanocephalus</i>
Mullets (1 sp.)	Mugilidae	<i>Mugil sp.</i>
Goat fishes (5 spp.)	Mullidae	<i>Parupeneus barberinus</i>
		<i>Panupeneus bifasciatus</i>
		<i>Parupeneus cyclostomus</i>
		<i>Parupeneusfiavolineatus</i>
		<i>Parupeneus indicus</i>
		<i>Parupeneus sp.</i>
Moray Eels (11+ spp.)	Muraenidae	<i>Echidna zebra</i>
		<i>Echidna nebulosa</i>
		<i>Eel nebulosa</i>
		<i>Gymnorhorax javanicus</i>
		<i>Gymnothorax favagieneus</i>
		<i>Gymnothoraxpnasinus</i>
		<i>Gymnothoraxfunnebris</i>
		<i>Gymnothorax tessalata</i>
		<i>Gymnothorwc sp.</i>
		<i>Rhinomuraena quaesita</i>
		<i>Siderea grisea</i>
		<i>Gymnomuraena zebra</i>
		<i>Muraehana zebra</i>
		<i>Muraehana brown</i>

Contd...

Sandperches (3 spp.)	Mugiloididae / Pinguipedidae	<i>Gymnothorax mordax</i>
		<i>Gymnothorax nub i/is</i>
		<i>Muraena tessellata</i>
		<i>Mirolabrichthys dispar</i>
		<i>Parapercis clathrata</i>
Snake Eels (2 spp.)	Ophichthidae/Muraenidae	<i>Parapercis schuinslands</i>
		<i>Parapercis sp.</i>
		<i>Myrichthys maculosus</i>
Cat sharks (1 sp.)	Orectolobidae	<i>Myrichthys colubrinus</i>
		<i>Chiloscyllium plagiosum</i>
Cowfish (1 sp.)		<i>Chiloscyllium confusum</i>
Boxfish (3 spp.)		<i>Lactoria cornuta</i>
		<i>Ostracion cubicus</i>
		<i>Ostracion melegris</i>
Cat fish (3 spp.)	Plotosidae	<i>Tetrasomus gibbosus</i>
		<i>Thysanophrys sp.</i>
		<i>Plotosus angularis</i>
		<i>Angels</i>
Angel fish (20+ spp.)	Pomacanthidae	<i>Plotosus lineatus</i>
		<i>Apolemichthys trimaculatus</i>
		<i>Apolemichthys xanthurus</i>
		<i>Apolemichthys armira gei</i>
		<i>Centropyge argi</i>
		<i>Centropyge argus</i>
		<i>Centropyge eibli</i>
		<i>Centropyge multispinis</i>
		<i>Centropyge bluefin</i>
		<i>Centropyge sp.</i>
		<i>Neopomacanthus nemurus</i>
		<i>Pornacanthus annularis</i>
		<i>Pomacanthus asfur</i>
		<i>Pomacanthus imperator</i>
<i>Pomacanthus semicirculatus</i>		
	<i>Pomacanthus sp.</i>	

Contd

Damsels, anemone fish (37 spp.) Pomacentridae

Pygoplites diacanthus
Centropyge flavopectoralis
Centropyge acanthops
Pomacanthus maculosus
Holocanthus xanthurus
Holocanthus sp.
Abudefduf saxatilis
Damsels
Abudefduf septemfasciatus
Abudefduf sordidus
Abudefduf vaigiensis
Amphiprion sp.
Amphiprion sebae
Amphiprion nigripes
Amphiprion melanopus
Amphiprion xanthurus
Amphiprion callopareta
Blue damsel
Chromis dimidiata
Chromis ternatensis
Chromis viridis
Chrysiptera biocellata
Chrysiptera glauca
Chrysiptera leucopoma
Chrysiptera unimaculata
Chrysurus chrysurus
Dascyllus aruanus
Dascyllus trimaculatus
Green damsel
Neopomacentrus azysron
Neopomacentrus bonang
Neopomacentrus filamentosus
Neopomacentrus nemurus
Plectroglyphidodon dickii

Contd

		<i>Plectroglyphidodon lacrymatus</i>
		<i>Plectroglyphidodon leucozona</i>
		<i>Pomacentrus amboinensis</i>
		<i>Pomacentrus caeruleus</i>
		<i>Pomacentrus chrysurus</i>
		<i>Pomacentrus species</i>
		<i>Pomacentrus filamentosus</i>
		<i>Pomacentrus melanochir</i>
		<i>Stegastes sp.</i>
		<i>Multispined Damsel</i>
		<i>Paraglyphidodon polycanthus</i>
		<i>Pomacentrus philippinus</i>
		<i>Amblyglyphidodon flavilatus</i>
		<i>Stegastes nigricans</i>
		<i>Stegastes lividus</i>
		<i>Chromis multilineata</i>
		<i>Chromis sp.</i>
		<i>Dascyllus carneus</i>
		<i>Pomacentrus leucostictus</i>
Dottyback fishes (4 spp.)	Pseudochromidae	<i>Pseudochromis wilsoni</i>
		<i>Pseudochromis cupanus</i>
		<i>Pseudochromis flavivertex</i>
		<i>Pseudochromis fridmani</i>
Sting Rays (1 sp.)	Rajidae	<i>Urolophus lobatus</i>
Parrot fishes (6 spp.)	Scaridae	<i>Cetoscarus bicolor</i>
		<i>Scarus dimidiatus</i>
		<i>Scarus fraenatus</i>
		<i>Scarus gibbus</i>
		<i>Scarus rubroviolaceus</i>
		<i>Scarus sordidus</i>
Scats (5 spp.)	Scatophagidae	<i>Scatophagus argus</i>
		<i>Scatophagus bifrons</i>
		<i>Scatophagus rubrifrons</i>
		<i>Scatophagus tetracanthus</i>

Contd

Scorpion/lion fish (8 spp.)	Scorpaenidae	<i>Scatophagus greeni</i>
		<i>Dendrochirus zebra</i>
		<i>Dendrochirus biocellatus</i>
		<i>Dendrochirus brachypterus</i>
		<i>Inimicus filamentosus</i>
		<i>Pterois antennata</i>
		<i>Pterois miles / melas</i>
		<i>Pterois radiata</i>
		<i>Groupers</i>
		<i>Pterois volitans</i>
Groupers, Basslets (22+ spp.)	Serranidae	<i>Cephalopholis argus</i>
		<i>Cephalopholis boenack</i>
		<i>Cephalopholis leopardus / leoardus</i>
		<i>Epinephelus flavocoeruleus</i>
		<i>Epinephelus hexagonatus</i>
		<i>Epinephelus lanciaolatus</i>
		<i>Epinephelus merra</i>
		<i>Mirolabrichthys evansi</i>
		<i>Nemanthias carberryi</i>
		<i>Variola louti</i>
		<i>Cephalopholis miniata</i>
		<i>Pogonoperca punctata</i>
		<i>Cephalopholis polleri</i>
		<i>Anthias squamipinis</i>
		<i>Anthias kashiva</i>
		<i>Anthias evansi</i>
		<i>Anthias fuicherumus</i>
		<i>Anthias binwculatus</i>
		<i>Anthias despar</i>
		<i>Anthias parverastria</i>
		<i>Anthias squamipinnis</i>
		<i>Anthias species</i>
Sharks (1 sp.)	Sharks	<i>Anthias luzonensis</i>
		<i>Carcharinus melanopterus</i>

Contd

Rabbit fishes (3 spp.)	Siganidae	<i>Siganus canaliculatus</i> <i>Siganus javus</i> <i>Siganus lineatus</i>
Barracudas (2 spp.)	Sphyraenidae	<i>Sphynaena jello</i> <i>Corythoichthys paxtoni</i>
Pipe fish (3 spp.)	Syngnathidae/Solenostomidae	<i>Solenostomus sp.</i> <i>Stenopodidae sp.</i> <i>Syngnathus sp./corea</i>
Grunters (1 sp.)	Teraponidae	<i>Terapon jabua</i>
Puffers (8+ spp.)	Puffers	<i>Arothnon hispidus</i> <i>Arothron melagris</i> <i>Arothron nigropunctatus</i> <i>Arothron sp.</i> <i>Canthigasten reticularis</i> <i>Canthigaster margaritara</i> <i>Canthigasterjactator</i> <i>Canthigaster solandri</i> <i>Canthigaster valentini</i>
Electric Rays (1 sp.)	Tropedinidae	<i>Narcine brunneus</i>
Moorish Idol/Tobies (2 spp.)	Zanclidae	<i>Zanclus canescens</i> <i>Zanclus cornutus</i>

**Annex 3, Fish species that have been afforded legal protection
by the Fauna and Flora Protection (Amendment) Act, No 49 of 1993**

Marine Fish (seven species)

<i>Centropyge bispinosus</i>	Two spined angelfish
<i>Pygoplites diacanthus</i>	Regal angelfish
<i>Cons aygula</i>	Clown coris
<i>Labroides bicolor</i>	Bicolor wrasse
<i>Pterois radiata</i>	Lionfish
<i>Platax pinnarus</i>	Batfish
<i>Chaetodon semeion</i>	Golden buttedlytish

Freshwater Fish (12 species)

<i>Labeo fisheri</i>	Green labeo
<i>Labeo porcellus</i>	Orange-fin labeo
<i>Puntius asoka</i>	Asoka barb
<i>Puntius martenstyni</i>	Martenstyn's barb
<i>Puntius srilankensis</i>	Blotched filamented barb
<i>Puntius bandula</i>	Bandula barb
<i>Rasbora wilpita</i>	Wilpita Rasbora
<i>Schismatogobius deraniyagalai</i>	Red-neck Goby
<i>Sicyopterus halei</i>	Red-tailed Goby
<i>Sicvopus jonklaasi</i>	Lipstick goby
<i>Channa orientalis</i>	Smooth-breasted snakehead
<i>Lepidocephalichthys jonklaasi</i>	Jonklaa's Loach

Annex 4. Marine fish species that have been afforded legal protection by the Fisheries and Aquatic Resources Act, No 2 of 1996

(published on 16.7.1998)

Species prohibited from export in live form (as the first schedule)

(12 species)

<i>Chaetodon semeion</i>	Golden /Dotted butterflyfish (Chaetodontidae)
<i>Centropyge bispinosus</i>	Two-spined angelfish (Pomacanthidae)
<i>Pygoplites diacanthus</i>	Regal angelfish (Pomacanthidae)
<i>Coris aygula</i>	Clown coris (Labridae)
<i>Labroides bicolor</i>	Bicolor wrasse(Labridae)
<i>Pterois radiata</i>	Lionfish (Scorpaenidae)
<i>Platax pinnarus</i>	Batfish (Ephippidae)
<i>Epinephalus lanceolatus</i>	Giant grouper (Serranidae)
<i>Epinephalus flavocaeruleus</i>	Blue and yellow grouper (Serranidae)
<i>Plectorhynchus obscurum</i>	(Haemulidae)
<i>Plectoryhynchus albovittatus</i>	Giant sweetlips (Haemulidae)
<i>Chrysiptera kuiteri</i>	Pomacentridae

Species restricted from export - exportable under a permit (as the second schedule)

(17 species)

<i>Chaetodon octofasciatus</i>	butterflyfish (Chaetodontidae)
<i>Chaetodon ornatissimus</i>	Ornate butterflyfish (Chaetodontidae)
<i>Chaetodon falcula</i>	Saddleback butterflyfish (Chaetodontidae)
<i>Chaetodon xanthocephalus</i>	Yellowhead butterflyfish (Chaetodontidae)
<i>Chaetodon ephippium</i>	Saddled butterflyfish (Chaetodontidae)
<i>Chaetodon unimaculatus</i>	Teardrop butterflyfish (Chaetodontidae)
<i>Chaetodon madagascariensis</i>	butterflyfish (Chaetodontidae)
<i>Chaetodon bennetti</i> 's	butterflyfish (Chaetodontidae)
<i>Chaetodon meyeri</i>	Meyers butterflyfish (Chaetodontidae)

<i>Chaetodon trianguluin</i>	Triangular butterflyfish (Chaetodontidae)
<i>Henjochus monoceros</i>	Masked bannerfish (Chaetodontidae)
<i>Heniochus pleuroraenia</i>	Phantom bannerfish (Chaetodontidae)
<i>Centropyge flavipectoralis</i>	Yellowfin anglefish (Pomacanthidae)
<i>Balistoides conspicillum</i>	Clown triggerfish (Balistidae)
<i>Pseudobaistes fuscus</i>	Blue/rippled triggerfish (Balistidae)
<i>Variola louti</i>	Lyretail grouper (Serranidae)
<i>Variola aihimarginata</i>	Whitemargin Lyretail grouper (Serranidae)

**Annex 5. Freshwater fish species that have been afforded legal protection
by the Fisheries and Aquatic Resources Act, No.2 of 1996**

(Published on 16.7.1998)

Species **prohibited from export in live** form (as the first schedule)

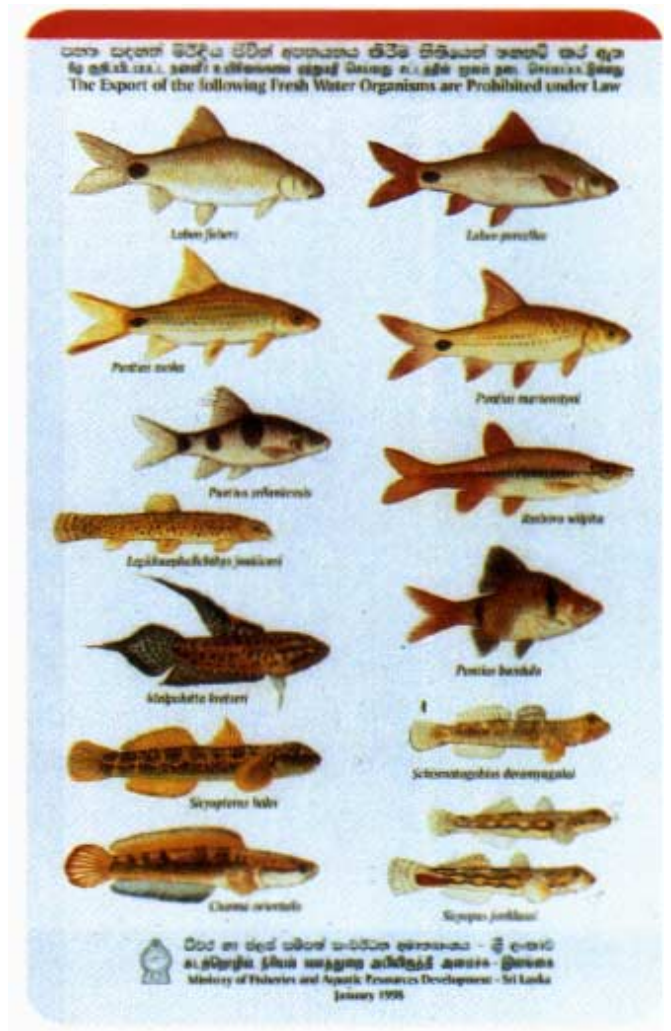
(12 species)

<i>Labeofisheri</i>	Green labeo (Cyprinidae)
<i>Labeo porcellus</i>	Orange-fin labeo (Cyprinidae)
<i>Puntius asoka</i>	Asoka barb (Cyprinidae)
<i>Puntius martenstni</i>	Martenstyn's barb (Cyprinidae)
<i>Puntius srilankensis</i>	Blotched filamented barb (Cyprinidae)
<i>Rasbora wilpita</i>	Wilpita Rasbora (Cyprinidae)
<i>Malpulutta knetseri</i>	Ornate Paradisefish (Belontiidae)
<i>Schismatogobius deraniyagafi</i>	Red-neck Goby (Gobiidae)
<i>Sicyopterus halei</i>	Red-tailed Goby (Gobiidae)
<i>Sicvopus jonklaasi</i>	Lipstick goby (Gobiidae)
<i>Channa orientalis</i>	Smooth-breasted snakehead (Channidae)
<i>Lepidocephalichthys jonklaasi</i>	Jonklaas's Loach (Cobitidae)

Species restricted **from export - exportable under a permit** (as the second schedule)

(8 species)

<i>Danio pathirana</i>	Barred danio (Cyprinidae)
<i>Puntius cumingii</i>	Cuming's barb (Cyprinidae)
<i>Puntius nigrofasciatus</i>	Black ruby barb ((Cyprinidae)
<i>Puntius titteya</i>	Cherry barb (Cyprinidae)
<i>Rasbora vaterifloris</i>	Golden rasbora (Cyprinidae)
<i>Claritas brachysorna</i>	Walking catfish (Claridae)
<i>Belonia signata</i>	Combtail (Belontiidae)
<i>Macrognathus aral</i>	Lesser spiny eel (Mastacembelidae)



Identification cards for ornamental fish in Sri Lanka printed by BOBP

