Biodiversity Conservation Prioritisation Project (BCPP) India

Endangered Species Project

Conservation Assessment and Management Plan
(C.A.M.P.) Workshops

REPORT

By Zoo Outreach Organisation / CBSG, India

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Authored by Participants

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Mangroves of India

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Report of BCPP CAMP on Indian Mangroves

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Biodiversity Conservation Prioritisation Project (BCPP) India
Conservation Assessment and Management Plan (C.A.M.P.) Workshops for Mangroves of India

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Soil Invertebrates of Southern Indian
Amphibians of India
Reptiles of India
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Mammals of India
Indian Freshwater fishes

Biodiversity Conservation Prioritisation Project (BCPP) India
Conservation Assessment and Management Plan (C.A.M.P.) Workshops for Mangroves of India

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Mangroves of India

Executive Summary

Biodiversity Conservation Prioritisation Project, India -- Endangered Species Project
Conservation Assessment and Management Plan (C.A.M.P.) Workshops

Indian Mangroves
Hosted by National Institute of Oceanography, Goa
21 – 25 July, 1997

EXECUTIVE SUMMARY

Introduction

The Biodiversity Conservation Prioritisation Project, India undertook a prioritisation exercise for species, sites and strategies for conservation. The Endangered Species Subgroup selected the Conservation Assessment and Management Plan Workshop Process and the IUCN Red List Criteria (Revised, 1994) for assessing conservation status of species.

A Conservation Assessment and Management Plan (C.A.M.P.) Workshop was conducted for 176 taxa of mangroves of India and its associated fauna and flora (algae, fish and invertebrates) to assess their status in the wild. The Workshop took place from 21 – 25 July, 1997 in Goa hosted by the National Institute of Oceanography. Mangrove Society of India was the other local collaborator. Forty-eight participants from 25 institutions with expertise ranging from field biology to forest management attended the workshop.

All mangrove plants were assessed at the workshop. The workshop participants refered extensively to the checklist of Indian mangrove species prepared by the National Institute of Oceanography. The checklist was scrutinised at the workshop and only those species or subspecies that were known to have occurred or occuring in India were evaluated. There were some additions and deletions to the checklist based on the participants' views.

In total 176 taxa (including species and subspecies) were evaluated at the workshop. The selection of species for assessment was not a problem in the case of mangroves because the plan of action involved firstly assessment of all endemic taxa followed by the assessment of non-endemic taxa, depending on availability of time. The workshop was a success in that the participants assessed 60 mangrove plants, 23 algae, 51 marine fishes and 42 invertebrates occuring in Indian mangroves in the stipulated 5 days.

The expertise available at the workshop included reputed field biologists with years of field experience both in the past and currently. Participants worked in five working groups for five days. Information for every taxa was entered on "Taxon Data Sheets" in which details of the taxon distribution, population numbers, habitat structure, threats affecting the taxa, population decline and the quality of data provided for the taxa are entered. This information was used to assess the status of every taxon and assign a category of threat according to the IUCN Red List categories. Taxon specific recommendations were also made after categorisation for use in conservation action planning.

CAMP methodology

The Conservation Assessment and Management Plan process is a methodology for rapid assessment of taxa in the wild. This methodology is a rational and objective method of assigning threat categories and deriving recommendations for conservation action plans through participatory group inputs from many stakeholders. A CAMP process is a platform for a congregation of 10 to 40 experts from related fields such as field biologists, ecologists, habitat experts, wildlife managers, forest officials, captive managers, university researchers, academicians, non-governmental organisations, policy makers and other relevant stakeholders. The CAMP Workshop is organised and conducted by objective facilitators who do not have a professional or personal stake in the outcome of the assessments.

The assessment is also followed by research and conservation recommendations for every taxon. CAMPs provide a rational and comprehensive means of assessing priorities for intensive management within the context of the broader conservation needs of threatened taxa.

The Conservation Breeding Specialist Group developed the CAMP process methodology first for identifying priorities in captive management planning for the global zoo community, which needed to know the *in situ* conservation status of species in their care. The methodology, however, has proved so effective for assessing

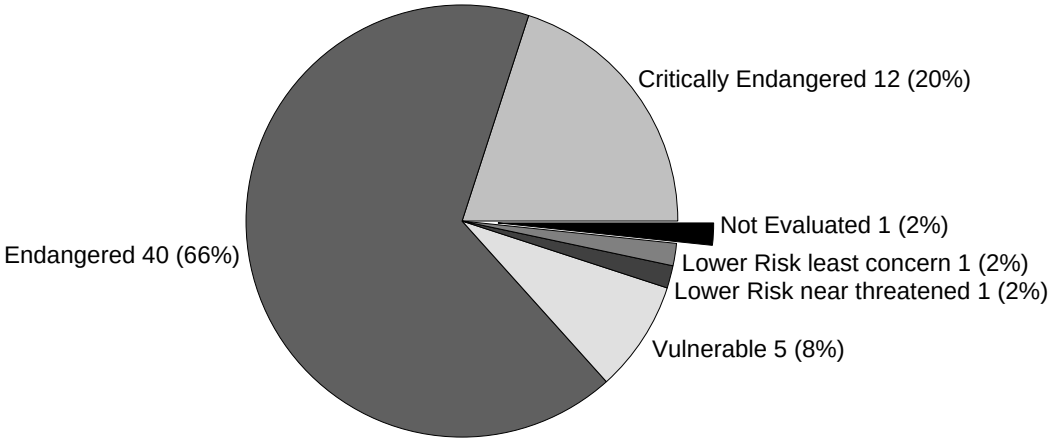
status in the wild that it has been recognised by IUCN SSC Specialist Groups, governmental and non-governmental agencies, conservation action planners and policy makers all over the world. The CAMP methodology is emerging as an effective means of conducting biodiversity inventory, identification and monitoring, thus satisfying Agenda item 7 in the Conservation on Biological Diversity.

The CAMP process is a flexible process that allows much need-based variations to be incorporated in its conduct. Before the workshop, preliminary Taxon Data Sheets called "Biological Information Sheet" was sent in advance to all known reptile researchers in India and all other people listed in the invitee list. Along with the Biological Information Sheet was also mailed the CAMP Manual to help the respondants in understanding the concept and objective of the workshop and the IUCN categories. The Biological Information Sheet is a modified Taxon Data Sheet that is more self-explanatory and does not require the help of an interpretive manual while answering. This exercise helped in gathering information from different areas about different taxa before hand and the sheets were also utilised extensively at the workshop by participants for information that was not available within the context of the workshop. The sheets therefore provided the means of representation for participants who could not attend the workshop for some reason.

Report

The mangrove ecosystem is an interphase between terrestrial forests and aquatic (marine) ecosystems and includes diversified macrohabitats such as mangrove dominated forests, litter laden forest floors, mudflats, adjacent coral reefs (in Andaman and Nicobar islands) and contiguous water courses which may be rivers, bays, intertidal creeks and channels and, backwaters. Thus, this ecosystem offers innumerable microhabitats for a diversity of faunal and floral species. Indian mangroves can be broadly divided into two kinds – east coast deltaic and west coast non-deltaic mangroves. Apart from these, there are mangroves in the Andaman and Nicobar Islands. Mangrove plants were assessed by 2 groups of participants – west coast group and east coast

Status of Indian mangrove plants



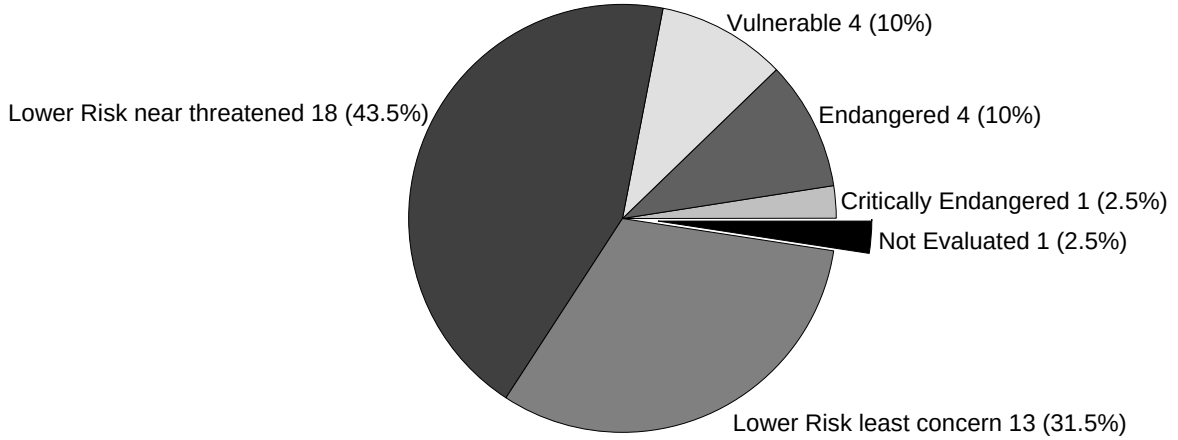
Number of mangrove plants assessed = 60
Number of threatened mangroves = 57

group. The east coast group also assessed mangrove taxa of the Andaman and Nicobar islands. Totally 58 mangrove plants and 1 species of sea grass were assessed at the workshop. Sixty-seven percent of the assessed mangrove plants are Endangered, while 97% of all mangrove plants assessed are threatened.

Separately, in other working groups, marine algae, mangrove invertebrates and marine fishes were assessed simultaneously. The respective groups evaluated 23 algae, 51 fishes and 42 invertebrates.

About 500 species of invertebrates have been reported from Indian mangroves out of which little more than 50% are insects and 20 % are zooplankton species. Amongst the remaining, molluscs and crustaceans are dominated (45%) in number of species followed by polychaetes. The majority of insect fauna reported so far are visitors. However, very recently 276 species of insects have been reported from the mangals of Andaman and Nicobar Islands out of which 197 species are herbivores, 36 species are predators and 43 species of parasitoides. At this workshop, only invertebrates which spend a majority of their adult lives in mangroves were assessed.

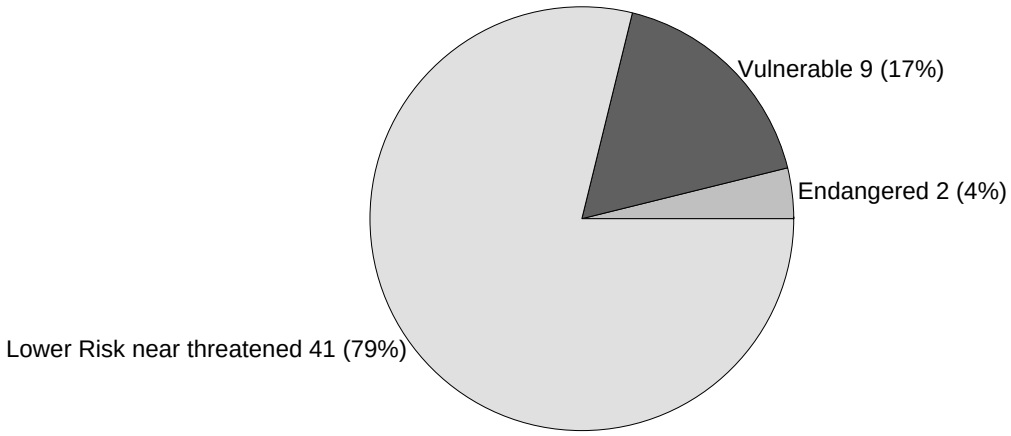
Status of assessed invertebrates



Number of invertebrates assessed = 41
Number of threatened invertebrates = 9

In recent years, there is a global awarness for increased fish production under capture and culture conditions of coastal waters, estuaries, backwaters and mangrove swamps which constitute one of the most valuable and vulnerable natural resources of a nation's economy. The biodiversity of the various finfish species in the above ecosystems affects the natural resources. Marine finfishes based on finfish catch data, threats to mangroves and over exploitation of stocks were evaluated at the workshop. Though detailed information was not available, it was realised hat from the fish catch data, a distinct decreasing trend was noticeable in finfish populations.

Status of assessed marine fishes

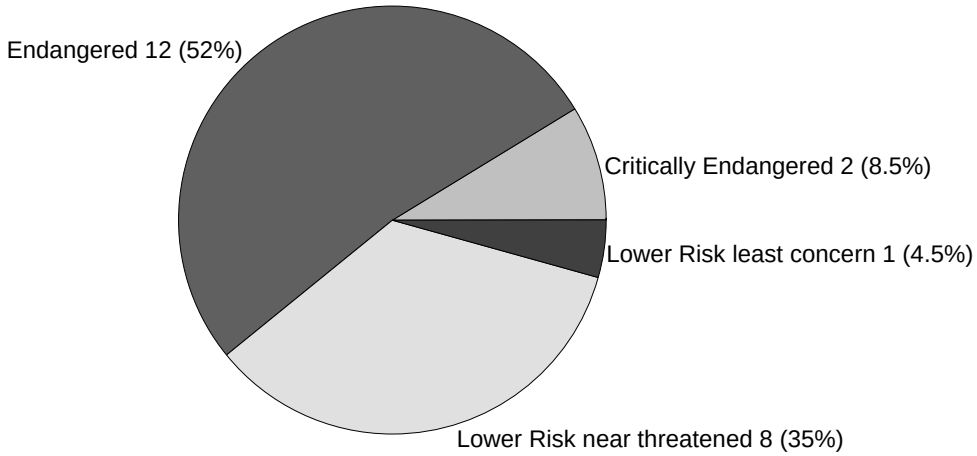


Number of marine fishes assessed = 52
Number of threatened marine fishes = 11

Altogether 624 species of marine macro-algae occur along the Indian coast. In India, forty-eight marine algal species are reported from the mangrove swamps. At the workshop, 23 algal species were assessed, which belong to 3 major groups such as Chlorophyta - green algae; Phaeophyta - brown algae and Rhodophyta - red algae. Mangrove regions in the tropics have been observed to harbor a number of economically/ commercially important algae such as *Monostroma oxyspermum* (high nutritional value), *Gracilaria verrucosa* (agarophyte), *Catnella impudica, Caloglossa lepriurii* (dyes and food vale) and *Caulerpa* sp. (bioactive substance), etc.

The marine algal distribution in this region, along the Indian coast has so far been restricted to the taxonomical level, i.e. taxonomic identification and geographical occurrence. Actual availability of these species (in terms of biomass) still remains doubtful. Some estuaries along Central west coast of India are studied extensively by Jagtap and Untawale *et al.* However, from the east coast meager data is available (except for Sunderban) the

Status of assessed marine algae



Number of marine algae assessed = 23
Number of threatened marine algae = 14

species are mentioned along with the open coast intertidal algae; some times without monitoring the habitat.

Categorisation of taxa was done according to the 1994 IUCN Red List categories. For a taxon to be threatened, any one of the five criteria within the categories has to be satisfied. These criteria or factors that are used in a categorisation of threat are 1. Population reduction; 2. Restricted distribution; 3. Population estimates; 4. Restricted population and 5 Probability of extinction. The degree of threat depending on each or any of these five criteria determines the threat category.

One of the major outcomes of this workshop was the post-assessment research and management recommendations for every mangrove taxon. Participants identified lacunae areas that need prioritisation and this is indicated in the recommendation section. Survey, monitoring and habitat management are the most frequently recommended research and management tools for understanding distribution and trends of mangroves. The workshop was also an ideal forum to discuss controversial issues such as taxonomy and nomenclature of Indian mangrove fauna and flora. There is some confusion about classification of mangroves, which has led to confusion among field biologists. Unfortunately, due to lack of time, no special issue working groups could be convened to formally discuss classfification of mangroves. However, it was felt that most of the biologists were happy to be able to discuss those issues within their working groups while assessing the status. It was also felt that a need for a network to identify and bring together reptile researchers in and around India required urgent action.

Alphabetical list of mangroves assessed at the workshop

Taxon	Family	IUCN	Criteria used
Acanthus ebracteatus	Acanthaceae	CR	(B1, 2c)
Acanthus ilicifolius	Acanthaceae	EN	(B1, 2c)
Acanthus volubilis	Acanthaceae	CR	(B1, 2c)
Acrostichum aureum	Pteridaceae (Fern)	LRlc	---
Aegialitis rotundifolia	Plumbaginaceae	EN	(B1, 2c)
Aegiceras corniculatum	Myrsinaceae	EN	(B1, 2c)
Aeluropus lagopoides	Poaceae	EN	(B1, 2b)
Aglaia cuculata	Meliaceae	EN	(B1, 2c)
Arthrocnemum indicum	Chenopodiaceae	VU	(A1ab)
Avicennia alba	Avicenniaceae	CR	(A1ac)
Avicennia marina var. *acutissima*	Avicenniaceae	EN	(A1cd)

Taxon	Family	IUCN	Criteria used
Avicennia marina var. *resinifera*	Avicenniaceae	CR	(B1, 2bcd; D)
Avicennia officinalis	Avicenniaceae	EN	(B1, 2b)
Brownlowia tersa	Tiliaceae	EN	(B1, 2c)
Bruguiera cylindrica	Rhizophoraceae	EN	(A1cd, 2d; B1, 2c)
Bruguiera gymnorrhiza	Rhizophoraceae	CR	(A1cd)
Bruguiera parviflora	Rhizophoraceae	CR	(A1cd)
Bruguiera sexangula	Rhizophoraceae	VU	(B1, 2cd)
Cenchrus ciliaris	Poaceae/ Panicoideae/ Paniceae	EN	(B1, 2c)
Cerbera manghas	Apocynaceae	EN	(B1, 2c)
Ceriops decandra	Rhizophoraceae	EN	(A1cd, 2d; B1, 2c)
Ceriops tagal	Rhizophoraceae	EN	(B1, 2ac)
Clerodendrum inerme	Verbenaceae	EN	(B1, 2c)
Cynometra ramiflora	Fabaceae	EN	(B1, 2c)
Derris heterophylla	Fabaceae	EN	(B1, 2c)
Derris trifoliata	Fabaceae	EN	(B1, 2c)
Excoecaria agallocha	Euphorbiaceae	VU	(B1, 2c)
Finlaysonia obovata	Asclepiadaceae	CR	(B1, 2c)
Halophila beccarii	Hydrocharitaceae	EN	(B1, 2cd)
Heretiera fomes	Sterculiaceae	EN	(B1, 2bc)
Heretiera kanikensis	Sterculiaceae	CR	(B1, 2c; C2b; D)
Heretiera littoralis	Sterculiaceae	EN	(A2bcd; B1, 2cd)
Kandelia candel	Rhizophoraceae	EN	(B1, 2c)
Lumnitzera littorea	Combretaceae	CR	(B1, 2c)
Lumnitzera racemosa	Combretaceae	EN	(B1, 2c)
Myriostachya wightiana	Poaceae	EN	(B1, 2c)
Nypa fruticans	Arecaceae	EN	(B1, 2abc)
Phoenix paludosa	Arecaceae	EN	(B1, 2c)
Porteresia coarctata	Poaceae	VU	(B1, 2c)
Rhizophora annamalayana	Rhizophoraceae	NE	---
Rhizophora apiculata	Rhizophoraceae	EN	(A2bd
Rhizophora lamarckii	Rhizophoraceae	CR	(B1, 2c; C2a)
Rhizophora mucronata	Rhizophoraceae	VU	(A2cd; B1,2c)
Rhizhophora stylosa	Rhizophoraceae	CR	(B1, 2c)
Salicornia brachiata	Chenopodiaceae	LRnt	---
Scyphiphora hydrophyllacea	Rubiaceae	EN	(B1, 2c)
Sesuvium portulacastrum	Aizoaceae	EN	(B1, 2c)
Sonneratia alba	Sonneratiaceae	EN	(A2cd)
Sonneratia apetala	Sonneratiaceae	EN	(A2bdc; B1, 2c)
Sonneratia caseolaris	Sonneratiaceae	EN	(A2bcd; B1, 2c)
Sonneratia griffithii	Sonneratiaceae	CR	(B1, 2c)
Sporobolus virginicus	Poaceae	EN	(B1, 2c)
Suaeda maritima	Chenopodiaceae	EN	(B1, 2bc)
Suaeda monoica	Chenopodiaceae	EN	(B1, 2abc)
Suaeda nudiflora	Chenopodiaceae	EN	(B1, 2ac)
Tamarix troupii	Tamaricaceae	EN	(B1, 2bcd)
Urochondra setulosa	Poaceae	EN	(B1, 2c)
Xylocarpus granatum	Meliaceae	EN	(A1acd, 2bcd; B1, 2ac)
Xylocarpus mekongensis	Meliaceae	EN	(B1, 2c)
Xylocarpus moluccensis	Meliaceae	EN	(B1, 2c)

Alphabetical list of marine algae assessed at the workshop

Taxon	Family	IUCN	Criteria used
Bostrychia tenella	Polysiphonaceae	EN	(B1, 2c)
Caloglossa leprieurii	Catnellaceae	EN	(B1, 2c)
Catnella impudica	Catnellaceae	EN	(B1, 2c)
Catnella repens	Catnellaceae	EN	(B1, 2c)
Chaetomorpha linum	Cladophoraceae	EN	(B1, 2abc)
Codium fragile	Codiaceae	EN	(B1, 2c)
Colpomenia sinuosa	Colpomeniaceae	LRnt	--

Taxon	Family	IUCN	Criteria used
Dichotomosiphon salina *	Codiaceae	CR	(B1, 2bcd)
Dictyota indica	Dictyotaceae	EN	(B1, 2a)
Enteromorpha clathrata	Ulvaceae	LRlc	—
Enteromorpha intestinalis	Ulvaceae	LRnt	—
Gracilaria verrucosa	Gracilariaceae	EN	(B1, 2bc)
Hypnea musciformis	Hypneaceae	LRnt	—
Monostroma oxyspermum	Monostromataceae	EN	(B1, 2c)
Padina tetrastromatica	Dictyotaceae	LRnt	—
Rhizoclonium ciperium	Rhizocloniaceae	EN	(B1, 2c)
Rhizoclonium kerneri	Rhizocloniaceae	LRnt	—
Rhizoclonium kochianum	Rhizocloniaceae	LRnt	—
Sargassum ilicifolium	Sargassaceae	LRnt	---
Spatoglossum asperum	Dictyotaceae	LRnt	—
Ulva patengansis	Ulvaceae	CR	(B1, 2c)
Ulva reticulata	Ulvaceae	EN	(B1, 2c)
Vaucheria prescottii	Vaucheraiceae	EN	(B1, 2c)

Alphabetical list of mangrove invertebrates assessed at the workshop

Taxon	Family	IUCN	Criteria used
Atacira flaviluna	Noctuidae	LRlc	---
Attacus mcmulleni *	Saturniidae/ Lepiodoptera	LRlc	---
Bactronophorus thoracites	Teredenidae	LRlc	---
Balanus amphitrite	Balanidae	LRlc	---
Bankia campanellata	Teredenidae	LRlc	---
Bankia carinata	Teredenidae	LRlc	---
Bankia rochi	Teredenidae	LRlc	---
Cardisoma carnifex	Gecarcinidae	CR	(A1c)
Crassostrea gryphoides	Ostreidae	LRnt	---
Dicyathifer manni	Teredinidae	LRlc	---
Dotilla myctiroides	Ocypodidae	LRnt	---
Geloina erosa	Geloindae	EN	(B1, 2c)
Gonodontis clelia	Geometridae	LRlc	---
Lyrodus pedicellatus	Teredenidae	LRlc	---
Macrophthalmus depressus	Ocypodidae	LRnt	---
Macrophthalmus convexus	Ocypodidae	EN	(B1, 2c)
Martesia striata	Pholadidae	LRlc	---
Meretrix casta *	Veneridae	VU	(A1cd)
Metapenaeus dobsoni	Unknown	LRnt	---
Modiolus striatulus	Mytilidae	LRnt	---
Nausitora dunlopei	Teredeinidae	LRlc	---
Nausitora hedleyi	Teredenidae	LRlc	---
Ocypode ceratophthalma	Ocypoidae	LRnt	---
Penaeus caniliculatus	Palaemonidae	VU	(B1, 2c)
Penaeus indicus	Palaemonidae	LRnt	---
Penaeus japonicus	Palaemonidae	VU	(B1, 2c)
Penaeus merguiensis	Palaemonidae	LRnt	---
Penaeus monodom	Palaemonidae	LRnt	---
Penaeus semisulcaetus	Palaemonidae	LRnt	---
Perna viridis	Mytilidae	LRnt	---
Pilodius nigrocrinitus	Xanthidae	EN	(B1, 2c)
Polyura schreiber *	Nymphalidae	NE	---
Saccostrea cucullata	Ostreidae	LRnt	---
Scylla serrata	Portunidae	LRnt	---
Sesarma taeniolata	Grpsidae	VU	(B1, 2c)
Sphaeroma terebrans	Sphagomidae	LRlc	---
Thalassina anomala	Thalassinidae	LRnt	---
Uca dussumieri	Ocypodidae	LRnt	---
Uca lactea	Ocypodidae	LRnt	---

Taxon	Family	IUCN	Criteria used
Uca tetragonon	Ocypodidae	EN	(B1, 2c)
Uca vocans	Ocypodidae	LRnt	---

Alphabetical list of marine fishes assessed at the workshop

Taxon	Family	IUCN	Criteria used
Alecits indicus	Carangidae	LRnt	---
Ambassis commersoni	Ambassidae	LRnt	---
Anguilla bicolar	Anguillidae	LRnt	---
Anodentestoma chacunda	Clupidae	LRnt	---
Arius subrostratus	Ariidae	VU	(A1acd)
Boleophthalmus boddari	Gobiidae	VU	(A1ac, 2c)
Boleophthalmus dussumieri	Gobiidae	EN	(B1, 2c)
Carangoides ciliarius	Carangidae	LRnt	---
Caranx ignobilis	Carangidae	LRnt	---
Caranx sexfasciates	Carangidae	LRnt	---
Chanos chanos	Chanidae	LRnt	---
Dasyatis uarnak	Trygonidae	VU	(B1, 2e)
Elopes machnata	Elopidae	VU	(A1acd)
Epinephelus tauvina	Serranidae	LRnt	---
Etroplus suratensis	Chichillidae	LRnt	---
Glassogobius giurus	Gobiidae	LRnt	---
Hilsa kelee	Clupeidae	LRnt	---
Lates calcarifer	Centropomidae	LRnt	---
Leiognathus splendens	Leiognathidae	VU	(A1b, 2b)
Lethrenus nebulosus	Lethrenidae	LRnt	---
Liza dussumieri	Mugilidae	LRnt	---
Liza macrolepis	Mugilidae	LRnt	---
Liza parsia	Mugilidae	LRnt	---
Lobotes surinamensis	Lobotidae	LRnt	---
Lutjanus argentimaculatus	Lutjanidae	LRnt	---
Lutjanus fulviflammus	Lutjanidae	LRnt	---
Lutjanus johni	Lutjanidae	LRnt	---
Lutjanus russelli	Lutjanidae	LRnt	---
Lutjanus sebae	Lutjanidae	LRnt	---
Megalops cyprinoides	Megalopidae	LRnt	---
Mugil cephalus	Mugilidae	LRnt	---
Muraena macrura	Muraenidae	LRnt	---
Muraenesex cinereus	Muraenidae	LRnt	---
Muraenichthys schultzei	Muraenidae	VU	(B1, 2c)
Nematalosa nasus	Clupidae	LRnt	---
Osteomugil cunensius	Mugilidae	LRnt	---
Otolithus ruber	Sciaenidae	LRnt	---
Periophthalmus koelreuteri	Gobiidae	VU	(A1ac)
Plotosus canius	Plotosidae	LRnt	---
Pomadasys hasta	Pomadasydae	LRnt	---
Polynemus indicus	Polynemidae	LRnt	---
Psammaperca waigaensis	Centropomidae	VU	(A1acd)
Scartelaos viridis	Gobiidae	EN	(A1ac; B1, 2c)
Secutor ruconius	Leiognathidae	VU	(A1a, 2b)
Siganus canaliculatus	Siganidae	LRnt	---
Siganus javus	Siganidae	LRnt	---
Sillago sihama	Sillaginidae	LRnt	---
Sphyraena barracuda	Sphyraenidae	LRnt	---
Tenualosa ilisha	Clupidae	LRnt	---
Therapon jarbua	Teraponidae	LRnt	---
Therapon puta	Teraponidae	LRnt	---
Trypauchen vagina	Trypauchenidae	LRnt	---

IUCN Red List Categories and Criteria explained in brief below

* IUCN Red List *Categories :*

CR – Critically endangered -- a taxon is Critically endangered when it is facing an extremely high risk of extinction in the wild in the immediate future as defined by the criteria.

EN – Endangered -- a taxon is Endangered when it is not Critically endangered but is facing a very high risk of extinction in the wild in the near future as defined by the criteria.

VU – Vulnerable -- a taxon is Vulnerable when it is not Critically endangered or Endangered but is facing a high risk of extinction in the wild in the medium term future as defined by the criteria.

LR – Lower risk – a taxon is Low Risk when it has been evaluated and does not qualify for any of the threatened categories, Critically endangered, Endangered, Vulnerable, or Data Deficient. (LR-nt – near threatened, LR-lc –least concern, LR-cd – conservation dependent.

DD – Data deficient – A taxon is Data Deficient when there is inadequate information to make a direct or indirect assessment of its risk of extinction based on its distribution and/or population status.

NE – Not evaluated – A taxon is Not Evaluated when it has not yet been assessed against the criteria.

** IUCN Red List *Criteria*

A – Population reduction – (1) observed, infered, suspected or estimated reduction, or **(2)** projected or predicted reduction of at least 20% (VU), or 50% (EN), or 80% (CR) in 10 years or 3 generations whichever is longer based on **(a)** Direct observation; **(b)** index of abundance appropriate for the taxon; **(c)** decline in areas of occupancy, extent of occurrence and/or quality of habitat; **(d)** actual or potential levels of exploitation; **(e)** effects of introduced taxa, hybridisation, pathogens, pollutants, competitors, or parasites.

B – Restricted distribution -- Extent of occurrence estimated to be less than 20,000 sq km. (VU), or 5,000 sq km (EN) or 100 sq km (CR) and/or area of occupancy estimated to be less than 2000 sq.km. (VU), or 500 sq km (EN), or 10 sq km (CR), and qualifying for any two of the following : **(1)** severely fragmented, or known to exist in not more than 10 locations (VU), or 5 locations (EN), or single location (CR); **(2)** continuing decline, observed, inferred, projected in any **(a)** extent of occurance, **(b)** area of occupancy; **(c)** area, extent and/or quality of habitat; **(d)** number of locations or subpopulations; **(e)** number of mature individuals; **(3)** extreme fluctuation in either **(a)** extent of occurance, **(b)** area of occupancy, **(c)** number of populations or subpopulations, **(d)** number of mature individuals.

C – Population estimates – population estimated to number less than 10,000 (VU), or 2,500 (EN), or 250 (CR) mature individuals and either **(1)** estimated, continuing decline of at least 10% in 10 years or 3 generations or whichever is longer (VU), or 20% in 5 years or 2 generations, whichever is longer (EN), or 25% in 3 years or 1 generation whichever is longer (CR) OR in **(2)** continuing decline, observed, projected, inferred, number of mature individuals and population structure in the form of either **(a)** severely fragmented [no subpopulation estimated to contain more than 1000 (VU), or 250 (EN), or 50 (CR) mature individuals] ; **(b)** all individuals are in a single subpopulation.

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Summary Data Tables for Selected Species of Northern, Northeastern and Central Indian Medicinal Plants are on the following pages. Below is a Key to the symbols used in the tables :

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Data Quality: 1= Reliable census or population monitoring; 2 = General field studies; 3 = Informal field sight-ings; 4 = Indirect information; 5 Museum/ herbarium/ collection/ records; 6 = Hearsay/ popular.belief

Threat: L = Loss of habiat; Lf = Loss of habitat due to fragmentation; D = Diseases; E = Edaphic factors (changes in); F = Fishing; Fd = Dynamite fishing; H = Harvest; Hf = Harvest for food; Hm = Harvest for medicine; Ht = Harvest for timber; I = Human interference; P = Predation; Ps = Pesticides; Pu = Pollution; S = Catastrophic event; Sn = Siltation; T =Trade; Tp = Trade of parts

Research Recommendations: G= Genetic management; H=Husbandry research; Hm = Habitat maangement; Lh= Life history studies; Lm = Limiting factor management; Lr = Limiting factor research; M = Monitoring; O = Other (specific to the species); P = PHVA; PP = PHVA pending further work; S= Survey search and find; T = Taxonomic and morphological genetic stdies; Tl= Translocations

Cultivation Recommendations : 1= Captive breeding/ cultivation for conservation either only in *in situ* or both *in situ* and *ex situ* with the population maintaining 90% genetic diversity for 100 years; 2 = same as 1 but periodic reinforcement of captive stock or cultivation with genetic materials from the wild; 3 = Captive breeding or cultivation only for research, education or husbandry but not for conservation; 4 = Captive breeding or cultivation for sustainable utilisation or commercial purposes; P = pending

Level of difficulty: 1 = Least difficult; 2 = Moderately difficult; 3 = Very difficult; Unk = Unknown

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Mangroves of India

Summary Data Table

Summary Data Table for mangroves of India

Species	Range	Area	No of loc./ F	% decl.	Year/ gen.	Pop. no.	Data qual.	Threats	IUCN	Criteria used	Research recommend.	Capt. Brdin	Lev. Diff.
Acanthus ebracteatus	B	A	1	Unk	Unk	Unk	2	L	CR	RD	S, M, Hm, Lh	P	Unk
Acanthus ilicifolius	C	B	Many,F	10	20 yrs	Unk	2, 3	Dm, I, H, L	EN	RD	T, M, Lm, G,O	3	No
Acanthus volubilis	B	A	3, F	Unk	Unk	> 2500	2	Hm, L	CR	RD	S, M, Hm, Lr	1	3
Acrostichum aureum	C	B	50, F	I5	20 yrs	Unk	2, 3	No	LRlc	—	M,O	No	No
Aegialitis rotundifolia	B	B	3, F	< 20	10 yrs	> 2500	2	I, L	EN	RD	Hm, Lh, M	1	Unk
Aegiceras corniculatum	C	B	Many,F	15	20 yrs	Unk	2, 3	Gr, I, L, T	EN	RD	Hm, M, Lh	1	2
Aeluropus lagopoides	C	B	Maby,F	15	20 yrs	Unk	2, 3	Gr, I, L, T	EN	RD	H, M	3	1
Aglaia cucullata	B	B	3, F	Unk	Unk	> 2500	2	L,T	EN	RD	S, Hm, M, Lh	1	Unk
Arthrocnemum indicum	B	D	SF	20	10 yrs	NK	2	L	VU	PR	M, Hm, H, Lh	3	Unk
Avicennia alba	B	B	15, F	80	3 gen.	Unk	2, 3	G, I, L, Pu,	CR	PR	T, S, M, G, Hm, Lr, P, O	1	3
Avicennia marina var. acutissima	C	C	80, F	> 80	3 gen.	Unk	2,3	Gr, I, H, Hf, L, Ov, T	EN	PR	T, Hm, S, M, Lr, O	2	2
Avicennia marina var. resinifera	A	A	1	Unk	Unk	10 -15	2, 3	I, L	CR	RD, NM,PE	T, S, M, G, Lr	1	3
Avicennia officinalis	C	B	70, F	25	20 yrs	Unk	2, 3	Gr, Dm, I, Hf,Ht, H, L, Ov, T	EN	RD	M, T, Hm, H, O,Lr	1	3
Brownlowia tersa	B	B	5, F	< 30	10 yrs	> 2500	2	L	EN	RD	M, Lr	1	2
Bruguiera cylindrica	B	B	30, F	> 50	3 gen.	Unk	2	I, ,Ht, H, L, Ov, T	EN	PR,RD	T, S, Lm, Hm, M	1	2
Bruguiera gymnorhiza	B	B	40, F	> 80	3 gen.	Unk	2, 3	I, Ht, H, Hm, L, Ov, T	CR	PR	T, M, S, G, Hm, P	1	2
Bruguiera parviflora	C	B	35,F	> 80	3 gen.	Unk	2, 3	I, Ht, H, L, Ov, T	CR	PR	T, M, S, Lr, P	1	3
Bruguiera sexangula	B	A	6, F	Unk	Unk	> 2500	2	I, L	VU	RD	S, M	No	1
Cenchrus ciliaris	B	B	Many,F	No		Unk	2	Gr, I, Pu,T	EN	RD	M, H, Lh, Hm	1	Unk
Cerbera manghas	B	B	60, F	30	3 gen	Unk	2, 3	I, H, Tp,T	EN	RD	S, Lm	3	1
Ceriops decandra	B	B	<30, F	> 50	>3 gen	Unk	2, 3	I, Ht, H, L, Ov, T	EN	PR, RD	T, S, Hm, O	2	1
Ceriops tagal	C	B	80, F	40	3 gen.	Unk	2, 3	I, Ht, H, Hm, L, Ov, T	EN	RD	M, Hm	1	2
Clerodendrum inerme	C	B	80, F	30	>20	Unk	2, 3	C, I	EN	RD	M	No	Unk
Cynometra ramiflora	B	B	3, F	20	25 yrs	> 2500	2, 3	I, Ht, L, Ov, T	EN	RD	Hm, Lm, T, M	1	2
Derris heterophylla	B	B	30, F	20	>20 yrs	Unk	2, 3	I, Hm, L, T	EN	RD	S, Lm, M, Lr	2	2
Derris trifoliata	B	B	about 60 F,	30	>20 yrs	Unk	2	I, Hm, L, T	EN	RD	T, S, Hm, M	2	2
Excoecaria agallocha	C	C	80,F	> 30	20 yrs	Unk	2, 3	I, H, L, Ov, T	VU	RD	M, Hm	3	2
Finlaysonia obovata	B	A	3, F	Unk	Unk	> 2500	2	I, L	CR	RD	M, Hm	1	1
Halophila beccarii	B	B	+_ 80,F	10-15	10 yrs	Unk	2	E, I, L, Sn	EN	RD	S, H, PP	Unk	Unk
Heretiera fomes	B	B	4, F	> 20	10 yrs	> 2500	2	I, Ht, L	EN	RD	Hm, M	P	1
Heretiera kanikensis	B	A	1	Unk	Unk	< 50	2	I, Hf, L,	CR	RD,NM, PE	S, M, Hm, Lh, Lr	1	2

Species	Range	Area	No of loc./ F	% decl.	Year/ gen.	Pop. no.	Data qual.	Threats	IUCN	Criteria used	Research recommend.	Capt. Brdin	Lev. Diff.
Heretiera littoralis	B	B	20, F	30	20 yrs	Unk	2, 3	C, I, Ht, H, L, Ov, T	EN	PR,RD	T, S, M, Lm, Lr, O	2	3
Kandelia candel	C	B	50, F	30	20 yrs	Unk	2, 3	I, H, L, Pu	EN	RD	G, Hm, S, M	2	2
Lumnitzera littorea	B	B	2, F	No	Unk	<2500	2	I, L	CR	RD	S, Hm, Lr, M	P	3
Lumnitzera racemosa	C	B	45, F	30	20 yrs	Unk	2, 3	I, H, L	EN	RD	T, M, S, Hm, O	2	2
Myriostachya wightiana	B	B	>10, F	Decr.	Unk	>2500	2	H, Tp, T	EN	RD	M, Hm	1	1
Nypa fruticans	B	B	3, F	< 50	10 yrs	>2500	2	I, H, Hf,T	EN	RD	Hm, M	1	1
Phoenix paludosa	B	B	6, F	20	10 yrs	Many	2	L, Ov, Tp,T	EN	RD	M, Hm, Lr	P	3
Porteresia coarctata	C	C	75, F	10	20 yrs	Unk	2, 3	Gr, I, L, Sn	VU	RD	T, S, M, Hm	2	1
Rhizophora annamalayana	A	A	1	< 20	10 yrs	<250	2	G, I, Hf, L	NE	—	T, S, M, Hm, Lr, Lh	P	3
Rhizophora apiculata	B	B	45, F	20	10 yrs	Unk	2, 3	C, Ht, H, L, Ov, Pu, T	EN	PR	T, G, Hm, Lm, Lr, Lh, O	1, 2	2
Rhizophora lamarckii	A	A	1	Stable	Unk	<100	2, 3,	G, Hyb, L	CR	RD,PE	T, S, M, Hm, Lr, Lh, O	1, 2	3
Rhizophora mucronata	C	C	85, F	40	25 yrs	Unk	2, 3	D, I, Ht, H, L, Ov, Tp, T	VU	PR,RD	T, Hm, Lm, Lr, M,G	1, 2	2
Rhizhophora stylosa	B	A	2, F	Unk	Unk	>2500	2	I, L	CR	RD	Hm, M	1	1
Salicornia brachiata	C	C	Many	20	20 yrs	Unk	2, 3	C, E, F, Hf, L, Pu, T	LRnt	—	O	No	1
Scyphiphora hydrophylaceae	B	B	2	< 50	3 gen.	>2500	2	I, L	EN	RD	S, Hm, Lr, M	P	3
Sesuvium portulacastrum	B	B	Many,F	> 20	10 yrs	Unk	2	I, Hf,L	EN	RD	S, M, Hm, Lh	1	Unk
Sonneratia alba	C	C	70, F	30	20 yrs	Unk	2, 3	Gr, C, Dm, I, Ht, H, L, Ov, T	EN	PR	M, Hm, O	2	3
Sonneratia apetala	B	B	40, F	30	20 yrs	Unk	2, 3	C, I, Ht, H,L, Ov, Pu,T	EN	PR,RD	M, Hm, Lm, O	2	3
Sonneratia caseolaris	C	B	45, F	20	10 yrs	Unk	NK	C, I, L, Ov,T	EN	PR,RD	T, S, M, G, Hm, Lm, Lr, O	2	3
Sonneratia griffithii	B	A	3, F	Unk	Unk	Unk	2	L	CR	RD	Hm, M	1	1
Sporobolus virginicus	B	B	Many,F	20	10 yrs	Many	2, 3	I, L,Gr,T	EN	RD	M, Hm, Lh, H	1	Unk
Suaeda maritima	B	B	50, F	< 20	20 yrs	Many	2, 3	I, L	EN	RD	M, Lr, Hm	1	2
Suaeda monoica	B	B	25, F	No	Unk	Unk	2, 3,	C, I, L	EN	RD	M, Hm, Lr	2	2
Suaeda nudiflora	B	B	40, F	No	Unk	Unk	2, 3	C, I, L	EN	RD	M, Hm, Lr	2	2
Tamarix troupii	B	B	20, F	20	10 yrs	Unk	2, 3	I, L,	EN	RD	T, M, S, Lh, Hm	1	Unk
Urochondra setulosa	B	B	10, F	10	20 yrs	Unk	2	Sl, Sn	EN	RD	O	3	Unk
Xylocarpus granatum	B	B	20, F	50	3 gen.	Unk	2, 3	C, I, Ht, H, L, Ov, T	EN	PR,RD	T, S, G, Hm, O	1	2
Xylocarpus mekaongensis	B	B	3, F	Decli	Unk	<2500	2	Ht, L	EN	RD	Hm	P	1
Xylocarpus molluccensis	B	B	6, F	Unk	Unk	>2500	2	E, G, Ht, H, L	EN	RD	Hm, M, Lr, Lh	P	1

Summary Data Table for marine algae

Species	Range	Area	No of loc./ F	% decline	Year/ gen.	Pop. no.	Data quality	Threats	IUCN	Crit. Used	Research Recommend.	Capt. Breed	Lev. Diff.
Bostrychia tenella	C	B	Many,F	15-20	20 yrs	Unk	2	I, L, Pu, Sn	EN	RD	S, Lh, PP	No	Unk
Caloglossa leprieurii	B	B	Many	15-20	20 yrs	Unk	2	I, L, Pu, Sn	EN	RD	S, Lh, PP	No	Unk
Catnella impudica	C	B	+_30, F	5-10	10 yrs	Unk	2	L	EN	RD	S, M, Lh, PP	No	Unk
Catnella repens	B	B	Many,F	30	20 yrs	Unk	2	I, L, Pu, Sn	EN	RD	S, Lh, PP	No	Unk
Chaetomorpha linum	B	B	4, F	10-15	20 yrs	Unk	2	I, L	EN	RD	S, T, Lh, PP	No	Unk
Codium fragile	B	B	4, F	Unk	Unk	Unk	2	I, L	EN	RD	S, M, T, Lh,PP	4	3
Colpomenia sinuosa	B	B	20,	10	10 yrs	Unk	2	I, L	LRnt	No	S, T, Lh, PP	No	Unk
Dichotomosiphon salina *	A	A	1	10	20 yrs	Unk	2	I	CR	RD	S, T, Lh, PP	No	Unk
Dictyota indica	B	B	15, F	10	20 yrs	Unk	2	I, L	EN	RD	S, M, T, Lh,PP	No	Unk
Enteromorpha clathrata	C	C	Many	Unk	Unk	Unk	2	__	LRlc	—	T, S, Lh, PP	No	Unk
Enteromorpha intestinalis	C	C	Many	No	Unk	Unk	2	L	LRnt	—	S, M, PP	3	2
Gracilaria verrucosa	B	B	11, F	10-15	10 yrs	Unk	2	I, L, Ov, T	EN	RD	T, S, Lh, PP	4	2
Hypnea musciformis	C	C	30	15-20	10 yrs	Unk	2	L, Ov, I, T	LRnt	—	S, G, M, PP	4	2
Monostroma oxyspermum	B	B	5, F	Unk	Unk	Unk	2	Gr, L, I	EN	RD	S, M, PP	4	2
Padina tetrastromatica	C	C	Many	5-10	20 yrs	Unk	2	L, I	LRnt	—	M, PP	4	3
Rhizoclonium ciperium	B	B	<5,F	Unk	Unk	Unk	2	L	EN	RD	S, T, Lh, PP	No	Unk
Rhizoclonium kerneri	B	B	Many	5-10	20 yrs	Unk	2	L	LRnt	—	S, T, Lh, PP	No	Unk
Rhizoclonium kochianum	B	B	Many	15-20	20 yrs	Unk	2	L	LRnt	—	S, T, Lh, PP	No	Unk
Sargassum ilicifolium	C	C	20	15-20	10 yrs	Unk	2	I, L, Ov, T	LRnt	Unk	S, G, M, PP	4	2
Spatoglossum asperum	C	C	Many	5-10	20 yrs	Unk	2	L	LRnt	—	S, M, PP	No	Unk
Ulva patengansis	A	A	1	Unk	Unk	Unk	2	L	CR	RD	S, T, M	No	Unk
Ulva reticulata	C	B	4, F	15-20	20 yrs	Unk	2	L, P, I	EN	RD	T, S, M, Lh,PP	No	Unk
Vaucheria prescottii	B	B	5, F	Unk	Unk	Unk	2	L	EN	RD	S, T, Lh, PP	No	Unk

Summary Data Table for marine fishes

Species	Range	Area	No of loc./ F	% decline	Year/ gen.	Pop. no.	Data Qual.	Threats	IUCN	Crit. used	Research recommend.	Capt. breed	Lev. diff.
Alecits indicus	D	D	Many	Unk	Unk	Unk	3,4	F, Pu, T	LRnt	—	M, Hm	No	Unk
Ambassis commersoni	D	D	Many	Decl.	Unk	Unk	2	L, Pu	LRnt	—	M	No	Unk
Anguilla bicolar	D	D	Many	Unk	Unk	Unk	3	Dm, L, Pu, T	LRnt	—	M, Hm, Lh	3	2
Anodentestoma chacunda	D	D	Many	Unk	Unk	Unk	3,4	F, L, T	LRnt	—	M, Hm	No	Unk
Arius subrostratus	D	D	Many	20%	10 yrs	Unk	3,4	L, Ov, Pu, T	VU	PR	M	No	Unk
Boleophthalmus boddari	D	C	Many,F	20%	10 yrs	Unk	3	L, Pu	VU	PR	M, Lh, S	Unk	Unk
Boleophthalmus dussumieri	B	C	Many, F	20	10 yrs	Unk	2, 3, 4	L, Pu	EN	RD	M, S, Lh	Unk	Unk
Carangoides ciliarius	D	D	Many	Decl.	Unk	Unk	3, 4	L, Ov, Pu, T	LRnt	—	M, Hm, Lr,Lh	4	Unk
Caranx ignobilis	D	D	Many	Unk	Unk	Unk	3,4	F, L, T	LRnt	—	M	No	Unk
Caranx sexfasciates	D	D	Many	Unk	Unk	Unk	3,4	L, Ov, T	LRnt	—	M	No	Unk
Chanes chanes	D	D	Many	Decli	Unk	Unk	3,4	F, L, Ov, T	LRnt	—	M, Lh, Hm	No	Unk
Dasyatis uarnak	C	D	8, F	Decli.	Unk	Unk	3,4	F, I, T	VU	RD	M, S	No	1
Elopes machnata	D	C	Many	50%	20 yrs	Unk	2	F, L, Pu, T	VU	PR	M, Hm	No	Unk
Epinephelus tauvina	D	D	Many	Decli	Unk	Unk	3,4	L, Ov, T	LRnt	—	M, Lr, Hm, Lh	1	2
Etroplus suratensis	D	D	Many	Unk	Unk	Unk	3	L, Ov, T	LRnt	—	M, Hm	No	Unk
Glassogobius giurus	D	D	Many	20%	20 yrs	Unk	3	Dm, L, T	LRnt	—	M,Hm	No	Unk
Hilsa kelee	D	D	Many	10%	10 yrs	Unk	3	Dm, L, Ov, Pu, T	LRnt	—	M, Hm	No	Unk
Lates calcarifer	D	D	Many	Decli	Unk	Unk	3	F, L, T	LRnt	—	M, Hm Lh	4	3
Leiognathus splendens	D	D	Many	20%	10 yrs	Unk	3,4	Ov,T	VU	PR	M, O	No	Unk
Lethrenus nebulosus	D	D	Many	Unk	Unk	Unk	3,4	L, Ov, T	LRnt	---	M, Hm	3	2
Liza dussumieri	D	D	Many	Decl.	Unk	Unk	3,4	L, Ov, Pu, Sn, T	LRnt	—	M, Hm	4	1
Liza macrolepis	D	D	Many	Decl.	Unk	Unk	3	L, Ov, Pu, T	LRnt	—	M, Lh, Hm	4	2
Liza parsia	D	D	Many	Unk	Unk	Unk	1,4	L, Ov, Pu, Sn, T	LRnt	—	M, Lh	4	1
Lobotes surinamensis	D	D	Many	Unk	Unk	Unk	4	L, Ov, T	LRnt	—	M	No	Unk
Lutjanus argentimaculatus	D	D	Many	Decl.	Unk	Unk	3,4	L, Ov, T	LRnt	—	M, Hm, Lr	4	2
Lutjanus fulviflammus	D	D	Many	Unk	Unk	Unk	3,4	L, Ov, Sn, T	LRnt	—	M	4	2
Lutjanus johni	D	D	Many	Decl.	Unk	Unk	3,4	L, Ov, Sn, T	LRnt	—	M, Hm, Lr	4	2
Lutjanus russelli	D	D	Many	Decl.	Unk	Unk	3,4	L, Ov, T	LRnt	—	M, Lr, Hm	4	2
Lutjanus sebae	D	D	Many	Decl.	Unk	Unk	3,4	L, Ov,T	LRnt	—	M, Hm	4	2
Megalops cyprinoides	D	D	Many	Unk	Unk	Unk	3	L, Ps, Pu, Sn	LRnt	—	M, Hm	No	Unk
Mugil cephalus	D	D	Many	Decl.	Unk	Unk	3,4	L, Ov, Pu, Sn, T	LRnt	—	M, H, Hm	4	1
Muraena macrura	D	D	Many	Unk	Unk	Unk	2, 3	L, Ps, Pu, Sn,T	LRnt	—	M, S, Lh	No	Unk
Muraenesex cinereus	D	D	Many	Unk	Unk	Unk	3, 6	L	LRnt	—	S, M, Hm, Lr	1, 2	3
Muraenichthys schultzei	D	C	Many F	20%	20 yrs	Unk	1, 2	L, Pu	VU	RD	M, Lh, S	Unk	Unk
Nematalosa nasus	C	D	Many	Unk	Unk	Unk	3,4	L, Sn, T	LRnt	—	M, Hm, Lr	No	3

Species	Range	Area	No of loc./ F	% decline	Year/ gen.	Pop. no.	Data Qual.	Threats	IUCN	Crit. used	Research recommend.	Capt. breed	Lev. diff.
Osteomugil cunensius	D	D	Many	Decl.	Unk	Unk	3,4	L, Ov, T	LRnt	—	M, Hm	4	Unk
Otolithus ruber	C	D	Many	Unk	Unk	Unk	3,4	L, Ov, T	LRnt	—	M, Hm, Lr	4	3
Periophthalmus koelreuteri	D	D	Many	20%	10 yrs	Unk	2	L, Pu	VU	PR	M, Lh, S, Hm	Unk	Unk
Plotosus canius	D	D	Many	Unk	Unk	Unk	3	L, Pu, T	LRnt	—	S, M	No	Unk
Pomadasys hasta	D	D	Many	Decl.	Unk	Unk	3,4	F, L, T	LRnt	—	M, Hm	Unk	Unk
Polynemus indicus	D	D	Many	Decl.	Unk	Unk	3,4	L, Ov, Pu, Sn, T	LRnt	—	M, Hm	No	Unk
Psammaperca waigaensis	D	C	Many	50%	20 yrs	Unk	2, 3	F, L, Pu, T	VU	PR	M	Unk	Unk
Scartelaos viridis	B	C	15, F	50%	10 yrs	Unk	2	L	EN	PR, RD	M	No	Unk
Secutor ruconius	D	D	Many	20%	10 yrs	Unk	3, 5	Ov	VU	PR	M	No	Unk
Siganus canaliculatus	D	D	Many	Decl.	Unk	Unk	3, 4	L, Ov, Sn,	LRnt	—	M, Hm	4	1
Siganus javus	D	D	Many	Decl	Unk	Unk	3, 4	L, Sn, T	LRnt	—	M, Hm, Lh	No	Unk
Sillago sihama	D	D	Many	Decl.	Unk	Unk	3, 4	L, Ov, T	LRnt	—	M, Lr, Lh	4	2
Sphyraena barracuda	D	D	Many	Unk	Unk	Unk	3, 4	F, L, P, T	LRnt	—	M, Hm	No	3
Tenualosa ilisha	D	D	F	Decl.	Unk	Unk	3, 4	Dm, L, Ov, Pu, T	LRnt	—	M, Hm	No	Unk
Therapon jarbua	D	D	Many	Unk	Unk	Unk	1	I, L, T	LRnt	—	M, Hm	No	Unk
Therapon puta	D	D	Many	Decl.	Unk	Unk	3, 4	F, I, L, T	LRnt	—	M, Lh, Hm	No	1
Trypauchen vagina	D	D	Many	10%	10 yrs	Unk	3	F,T	LRnt	—	M	Unk	Unk

Summary data table for mangrove invertebrates

Species	Range	Area	No of loc./ F	% decline	Year/ gen.	Pop. no.	Data quality	Threats	IUCN	Crit. used	Research recommend.	Capt. Breed	Lev. Diff.
Atacira flaviluna	C	C	Many	Unk	Unk	Unk	2	No	LRlc	No	S, M, Lh	Unk	Unk
Attacus mcmulleni *	C	C	Many	Unk	Unk	Unk	2	No	LRlc	No	S, M	Unk	Unk
Bactronophorus thoracites	C	C	Many	Unk	Unk	Unk	2	No	LRlc	—	M	Unk	Unk
Balanus amphitrite	D	D	Many	No dec.	Unk	Unk	2	No	LRlc	—	M	No	Unk
Bankia campanellata	C	C	Many	Unk	Unk	Unk	2	No	LRlc	—	M	No	Unk
Bankia carinata	C	C	Many	Unk	Unk	Unk	2	No	LRlc	—	M	Unk	Unk
Bankia rochi	C	C	Many	Unk	Unk	Unk	2	No	LRlc	—	M	No	Unk
Cardisoma carnifex	C	C	3, F	> 80	10 yrs.	Unk	2, 5	L	CR	PR	S, M, Lh, PP	No	Unk
Crassostrea gryphoides	C	C	Many	Unk	Unk	Unk	2	Hf, T	LRnt	Unk	G, H	4	1
Dicyathifer manni	C	C	Many	Unk	Unk	Unk	2	No	LRlc	—	M	Unk	Unk
Dotilla myctiroides	C	C	Many	Unk	Unk	Unk	2	I, Pu	LRnt	—	S, M	No	Unk
Geloina erosa	C	B	4, F	Unk	Unk	Unk	2	Hf, L, T	EN	RD	S, M, H	4	3
Gonodontis clelia	C	C	Many	Unk	Unk	Unk	2		LRlc	—	S, M, Lh	Unk	Unk
Lyrodus pedicellatus	C	C	Many	Unk	Unk	Unk	2	No	LRlc	—	M	No	Unk
Macrophthalmus	C	C	Many	Unk	Unk	Unk	2, 5	L	LRnt	—	S, M	No	Unk
Macrophthalmus convexus	B	B	2, F	Unk	Unk	Unk	2, 5	L	EN	RD	S, M	No	Unk
Martesia striata	C	C	Many	Unk	Unk	Unk	2	No	LRlc	—	M	No	Unk
Meretrix casta *	B	C	Many	20-25	10 yrs	Unk	1, 2, 3	L, Ov, T	VU	PR	H, Hm	4	3
Metapenaeus dopsoni	D	D	Many	No	Unk	Unk	1, 2	Ov, T	LRnt	—	H	No	Unk
Modiolus striatulus	C	C	Many	Unk	Unk	Unk	2, 5	I, L	LRnt	—	M	No	Unk
Nausitora dunlopei	C	C	Many	Unk	Unk	Unk	2	No	LRlc	No	M	Unk	Unk
Nausitora hedleyi	C	C	Many	Unk	Unk	Unk	2	No	LRlc	—	M	No	Unk
Ocypode ceratophthalma	C	C	Many	Unk	Unk	Unk	2	I, Pu	LRnt	—	S, M	No	Unk
Penaeus caniliculatus	C	C	4	Unk	Unk	Unk	2	C	VU	RD	S, M, H	4	1
Penaeus indicus	D	D	Many	Unk	Unk	Unk	2	Ov, T	LRnt	—	H, G	No	Unk
Penaeus japonicus	C	C	3, F	Unk	Unk	Unk	2	C	VU	RD	S, Lh, H	4	2
Penaeus merguiensis	B	D	Many	No	Unk	Unk	2	Ov, T	LRnt	—	S, M, H	No	Unk
Penaeus monodom	D	D	Many	No	Unk	Unk	2, 5	D, Ov, T	LRnt	—	H, G	4	1
Penaeus semisulcaetus	C	C	Many	Stable	Unk	Unk	2, 5,	Ov, T	LRnt	—	M, H	4	2
Perna viridis	C	C	Many	Unk	Unk	Unk	2	Hf, Pu, T	LRnt	—	G, H	4	1
Pilodius nigrocrinitus	C	B	> 4, F	Unk	Unk	Unk	2, 5	I, L	EN	RD	S, M, Lh, PP	P	Unk
Polyura schreiber *	B	B	3	Unk	Unk	Unk	2, 3	L	NE	No	T, S, M, Lh, P	Unk	Unk
Saccostrea cucullata	C	C	Many	Unk	Unk	Unk	2	Hf, T	LRnt	—	M, H	1	2
Scylla serrata	C	C	Many	Unk	Unk	Unk	2	Hf, L, Pu, T	LRnt	—	S, M, H	4	3
Sesarma taeniolata	C	C	4	Unk	Unk	Unk	2	I, L	VU	RD	S, M	Unk	Unk
Sphaeroma terebrans	C	C	Many	Unk	Unk	Unk	2		LRlc	—	M	Unk	Unk
Thalassina anomala	C	C	Many	Unk	Unk	Unk	2	I, L	LRnt	—	S, M	No	Unk
Uca dussumieri	C	C	Many	Unk	Unk	Unk	2	L	LRnt	—	M	No	Unk
Uca lactea	C	C	Many	Unk	Unk	Unk	2, 5	L	LRnt	—	M	No	Unk
Uca tetragonon	B	B	5, F	Unk	Unk	Unk	2	I, L	EN	RD	S, M	No	Unk
Uca vocans	C	C	Many	Unk	Unk	Unk	2, 5	L	LRnt	—	S, M	No	Unk

Mangroves of India

Report

Biodiversity Conservation Prioritisation Project, India -- Endangered Species Project
Conservation Assessment and Management Plan (C.A.M.P.) Workshops

Indian Mangroves
Hosted by National Institute of Oceanography, Goa 21 –25 July, 1997

REPORT

Convention on Biological Diversity

The Convention on Biological Diversity adopted in Nairobi in May 1992 and signed by more than 150 states in June 1992 at Rio de Janeiro, came into force officially in December 1993. The Convention is a "framework agreement" in that its provisions are expressed as goals and policies (as opposed to "obligations"), leaving the implementation of its provisions up to individual parties (the states) at the national level. In the Convention, the importance of non-governmental organisations in implementing the provisions was specifically mentioned.

Articles in the Convention cover objectives, terminology, principles, legislation, cooperation and strategy as applied to various issues and methodology. One of the very basic methods of organising conservation action is prioritisation. Article 7 of the Convention deals with Identification and Monitoring, calling on parties to identify components of biological diversity important for its conservation and sustainable use. Components of an "indicative list" include:
* Ecosystems and habitats
* Species and communities, and
* Described genomes and genes of social, scientific and economic value.

Knowledge of species and communities can reveal crucial facts necessary to the management of ecosystems and habitats as well as to the identification of important genomes and genes. Identification, listing and prioritisation of species are one of the important tasks in conservation. In India, it is well known by biologists across many taxon groups that species information has many gaps. In many instances, the species has not been surveyed or studied since its description, perhaps in the 18th or 19th century. Even species, which have been studied more recently in the 20th century, require constant attention due to the fact that the very fabric of the earth is changing so rapidly. It is common knowledge today that the ecosystems and habitats which sustain species are deteriorating exponentially as a result of population expansion, industrialisation, and the build-up of habits resulting from decades and centuries of thinking the Earth and its resources were unlimited. Awareness of this fact is, of course, the raison d'être for the Convention on Biological Diversity itself.

Biodiversity Conservation Prioritisation Project – Endangered Species Component

The Biodiversity Conservation Prioritisation Project (BCPP) is an attempt to amalgamate the knowledge of government, academics, enthusiasts, and other knowledgeable persons of India to meet obligations of the Convention on Biological Diversity. This Project was funded by the Biodiversity Support Program, a consortium of organisations, USAID, World Resources Institute and the Nature Conservancy, and coordinated by World Wide Fund for Nature. It consists of three segments, sites, species and strategies for biodiversity conservation. The overall aim of the species segment is to list out species which need to be conserved for their biodiversity value in order of priority, under categories of medicinal and economic value, wild relatives of domesticated and cultivated species and other endangered fauna, flora and microorganisms.

An Endangered Species Subgroup decided to use the IUCN criteria to assess the conservation status of a large part of Indian species diversity. A workshop "process" called the Conservation Assessment and Management Plan (CAMP) developed by the Conservation Breeding Specialist Group, SSC, IUCN was selected by the subgroup as the methodology to use for conducting the assessments. CBSG, India, a Regional Network of the Conservation Breeding Specialist Group was asked to conduct the "CAMP" workshops on the basis of their experience and expertise. The IUCN Red List criteria are central to the CAMP process.

IUCN Red List

Earlier efforts to monitor the earth's resources and activate conservation measures include the Red Data Books of IUCN, now called the World Conservation Union. The IUCN Red Data Books have provided a guide for species conservation status for the last three decades. A few years ago, it was felt that both the categories and methodology used by individuals compiling the Red Data Books needed review. Over a seven-year period, the IUCN Criteria for Endangerment used in compiling Red Data Books, were examined, revised, reviewed and

improved over six different iterations. The present system, the IUCN Red List Categories, 1994, is more objective, numerate, and consistent for all groups. The revised IUCN Red List Categories provide a methodology for assessment and categorisation, which can be applied, to any group of organisms (except microorganisms). The revised IUCN Red List criteria is being used now by conservation actioners and scientists all over the world and is considered the best possible method available today for assessing the conservation status of species.

Conservation Assessment and Management Plan

One of the great difficulties of carrying out basic tasks such as identification and monitoring, creation of management and action plans and recovery programmes for species, is coordinating the great mass and variety of specialist knowledge and agency authority. Much time and energy is wasted in duplication of effort, territorial and ownership disputes, and inability to find and adhere to a common ground. The business community, realising the importance of effective communication and teamwork, has developed a broad spectrum of management strategies and tools which are used daily to manage time and human interaction. More and more, the conservation community is recognising the importance of using some of these tools to achieve their goals, rapidly and effectively. The Conservation Breeding Specialist Group (CBSG) of the Species Survival Commission of IUCN has pioneered the use of some these tools in well-planned strategic problem-solving and task-performance exercises. CBSG calls these exercises “processes” because — in the contemporary conservation scenario — nothing is static except the fact of change itself.

The Conservation Action and Management Plan Workshop was developed by CBSG for the purpose of prioritising species for conservation action including an *ex situ* component. Over the last decade, CBSG has conducted dozens of CAMP workshops for literally hundreds of species, using (and thereby testing) the then current iteration of the IUCN Red List Categories as their basic methodology to glean a status ranking. The IUCN Red List guidelines and criteria are used in all CAMP workshops to assess and assign a category to each species.

For the CAMP Workshop CBSG has developed a Taxon Data Sheet and a Spreadsheet format which includes parameters necessary to assess the IUCN status as well as provide other useful information necessary for creating management and action plans. The spreadsheet organises the information in a concise manner so that it is accessible at a glance. The information in this Report is organised on spreadsheets in the Report section, followed by the individual Taxon Data Sheets. A CAMP Workshop also utilises principles of management psychology to guide human interaction. A set of Guidelines for Group Interaction is presented to the workshop participants who agree as a group to work accordingly in order to complete the task. Objective Facilitators (persons trained in management skills and the workshop process) are used to lead and guide the workshop so that individual and professional bias does not affect group decisions and to assist in maintaining the integrity and focus of the workshop.

CAMP Workshops bring together a variety of specialists and enthusiasts from academic, government, managerial, and even the commercial sector to evaluate taxa for setting priorities for conservation action. The fear of loss and hope of recovery of species drives CAMP Workshops. Individuals part with unpublished information in order to contribute to a body of information which will provide strategic guidance for application of intensive management and information gathering. CAMP Workshop results, are, or should be, dynamic, leading to specific conservation activities in forest, market, classroom, courtroom — locally and nationally as well as on the international stage.

Conservation of Indian Mangroves

The Coastal landscape consists of an array of bounded in-shore ecosystems with certain physiologically specialised and ecologically adapted plants, which have evolved remarkable adaptations to survive in sand, mud and tidal situations. These ecosystems have become vulnerable to exploitation by local people leading to changes involving a rapid eco-degradation of the whole.

Mangroves are estuarine, especially along the tidal riverbanks, shallow lagoons, backwater creeks, mud flats and depressed basins under tidal ebb and flow. It is obvious that plants growing under tidal influence possess varied structural modifications to overcome the saline and water logged conditions. The existence of correlation is striking between the saline situation and the adaptive features of the mangrove as evidenced by the appearance or disapperarance of vivipary, pneumatophores or breathing roots of bizarre forms, buttressed trunks and succulence in leaves in a graded sequence along tidal to upslope of the habitat. They constitute a “guild” due to their special mode of life rather than a forest type as thought of by some.

The classification of the sea-shores in different parts of the world has received much attention from ecologists for several years. Most of the classifications deal with the intertidal region and its flora and fauna. Recognition of biological zones, the pattern of their arrangements and the inventory of the flora and fauna have helped to build a

solid system of classification of universal applicability despite minor variations in the number of zones from region to region or from author to author.

In India, Champion (1936) proposed a preliminary classification based on physiognomic dominance of plant communities into vegetation types. Of the several types recognised he had grouped the coastal vegetation under Moist tropical seral types into Beach forests and Tidal forests purely based on edaphic conditions under which they grow. The coastal terrestrial communities were reclassified by Champion and Seth (1968) under Moist tropical forests into Littoral and Swamp forests taking into account the situations under which they were growing. The classification proposed by Champion and Seth (1968) has a regional overtone in respect of Sunderbans of West Bengal and ill-suited to other coastal regions of peninsular India, especially to non-deltaic West coast of India. Similarly, a few classifications based on tidal inundation have limited applicability and need more studies from that angle.

During the recent year, based on extensive field data, Rao and Sastry (1974 b) have proposed a reclassification of the Indian coastal vegetation in greater detail, but adhering to the original framework given by Champion and Seth (1968). Blasco (1975) has treated the entire coastal vegetation under the collective term 'Mangrove' and the details are worked out in respect of zonation, ecology, flora, silviculture and dynamism in respect of different coastal regions in India. In the past, Indian field biologists have classified the mangrove vegetation on a regional basis giving particular attention to the flora distribution without critical evaluation of the mangroves niches. Some of the classifications are purely subjective, and not done as an ecosystem in a coordinated basis in respect of tides, geomorphology and soil gradients and salinity percentage.

In India mangrovephytes classification is based on visual and improper studies of a few selected habitats. Further, confusion and anthropogenic influences on mangrove habitats are not taken into record, but accorded the same status as distinct natural vegetation. This has led to improper classification as mangroves and associates without differentiating the adaptive characteristics of true mangroves from its nearby associates and also from inland plants occuring near the mangroves habitat without any of the adaptive features of eumangroves. To overcome this difficulty, it is imperative to consider mangroves under intertidal habitats as a whole with a clear cut subdivision under 3 categories namely estuarine, eumangroves and proestuarine (euobligate), which includes prohaline and euhaline and eufacultative (transgress) taxa. Each of these categories are described in Table 1 followed by representative taxon under each category in Table 2. This classification depicts their fidelity placement and adaptive features so as to help conservation, afforestation and regeneration problems.

Goals of the workshop on Indian mangroves

1. To assess the conservation status and assign an IUCN Red List ranking to taxa of Indian mangroves using population, habitat and threat information. Selected mangrove associates such as algae, invertebrates and fishes of India named by workshop participants at the BCPP CAMP were also assessed.

2. To provide information about the species, which would be useful in drawing up species specific as well as ecosystem specific action plans and management plans, including recommendations for *in situ* and *ex situ* management, research, survey and monitoring, cultivation, investigation of limiting factors, taxonomic and other specific research, education and activism.

3. To produce a Conservation Assessment and Management Plan Report for the species of mangroves and selected associates of flora and fauna, which after review and comment by workshop participants, would be distributed to all individuals and agencies relevant to mangrove conservation.

4. To provide a forum for interactive discussion on mangroves as an ecosystem and design ecosystem based management plans.

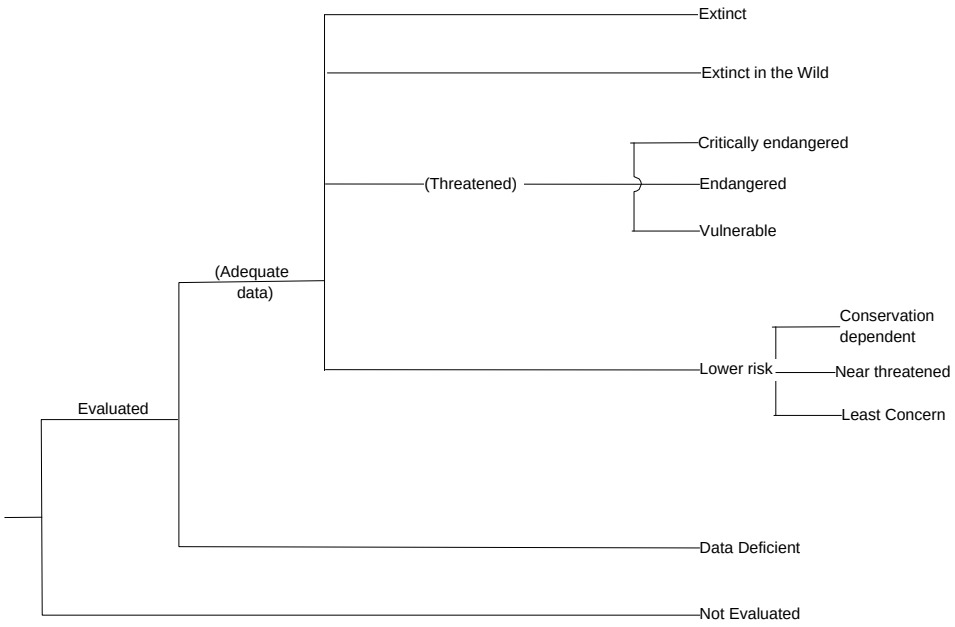
Results and Discussion

Not a single species of mangroves or its associated fauna such as invertebrates and fishes or flora such as algae is listed in any Red Data Book. It is generally known that the mangrove ecosystem is threatened in India and that there is more than 50% reduction in mangroves in the last 50 years. However, there had been no systematic assessment of the status of individual mangrove species. At the CAMP workshop described in this Report, individual species were assessed according to the IUCN categories of 1994.

As mentioned previously, the IUCN categories have undergone a series of revisions since 1991 to enhance their applicability to organisms other than mammals and to reflect the last two decades' development of new conservation sciences, population dynamics and conservation biology. The version of the IUCN categories used in this workshop is the most recent version, which was ratified by the IUCN General Assembly in 1994 and has far more objective criteria for assessment. The categories can be divided into 5 divisions, viz.

1. Extinct (Extinct and Extinct in the wild),
2. Threatened (Critically Endangered, Endangered and Vulnerable)
3. Non-threatened (Lower Risk – near threatened, conservation dependent and least concern)
4. Data Deficient and
5. Not Evaluated.

Structure of the Categories



Methodology

Global Red Lists and Red Data Books, for the most part, have been a compilation of information by one person or a group of persons, usually from temperate countries, who have access to all available literature on distribution and ecological information with reference to a particular species. The status according to old IUCN categories was derived based on these individual's perception of the status as understood from literature. Later, this exercise was broadened to include some range country representatives from different continental regions if indeed the exercise was global in scope, such as the IUCN Red Data Books. In India national assessment such as the Indian Red Data Books relied on some specialists from the different regions of the country. Thus, there are many different methods in deriving status categories by different groups both internationally (such as those done by BirdLife International, World Conservation Monitoring Centre and the different Specialist Groups of the IUCN) and nationally (such as – for India – Botanical Survey of India or Zoological Survey of India). In all of these methods, specialists were asked to provide information on a taxon, which was gathered by post and evaluated by the coordinator at a central office. However they were coordinated, all the above methods of deriving status for a Red Data Book or other species review follow the IUCN Red List categories.

The methodology for assessment of threat adopted in India at a Conservation Assessment and Management Plan Workshop depends upon on-the-spot interaction between specialists and is, therefore, quite different from other methods which rely on data assembled by indirect methods. The objective is the same but in a CAMP Workshop every attempt is made to assemble a representative group of field biologists with direct field experience of the species and their habitat. Information is collected from several sources on the target taxa. Small working groups discuss this information as compared to the personal field experience of participants interactively and extensively until the group reaches a consensus on every fact.

The questionnaire form described earlier (the Taxon Data Sheet, based on IUCN guidelines for deriving status as well as some additional questions) is provided and used to record this consensually processed information. Prior to the workshop, Biological Information Sheets (user-friendly Taxon Data Sheet) were sent to all mangrove specialists and people on the invitation list for information on species they had surveyed. These sheets were later used at the workshop, which ensured participation and input from those who could not attend the workshop but had returned the information sheets with information. The advantages of being able to have discussions on information provided by several active field biologists as opposed to one person compiling data is, or should be, self-evident. Among the advantages of accruing better quality and quantity of information, the payoff resulting

from participant "buy in" of the process is most worthwhile. In a national assessment this can have very positive effects on future research.

The Conservation Assessment and Management Plan for Indian mangroves was aimed to cover all mangrove plant taxa of India which number about 60 along with its associates such as marine algae, marine fishes and marine invertebrates. At the beginning of the workshop a strategy was decided for the exercise and participants divided into four working groups that would assess mangroves according to the above groups. The mangrove plants group split into two groups one for the west coast and the other for the east coast and Andaman and Nicobar Islands. It was also decided to first assess all Indian political endemics before going on to assess non-endemics.

Since this was the first All India exercise in mangrove species status evaluation, it also provided researchers an opportunity to discuss checklists and taxonomy with other mangrove specialists, field biologists and taxonomists in India. Working Groups were formed to discuss special issues as related to mangrove asociated inverterates, fishes and marine algae. A group also discussed the interaction of these associates with mangroves and a Mangrove ecosystem schematic diagram was constructed. A special working group was also convened to discuss the IUCN Criteria as applied to Mangroves.

Assessment

There is no complete list of mangrove species in India. This is because of differences in classification of mangroves by researchers – eumangroves, associates, etc. However, an agreed or "working" checklist of mangrove species for the purpose of the workshop was accepted by participants. According to this list, 59 species of mangrove plants and one seagrass were assessed. With respect to invertebrates, fishes and algae, no checklist was available and the number of species is thought to be quite extensive. However, the participants at the workshop selected some taxa in each of those groups for assessment as per their knowledge and expertise. Therefore the lists of mangrove associate fauna and flora are not complete, rather a few examples of all the groups have been assessed. In all 176 taxa were assessed comprising of 23 algae, 52 fishes, and 41 invertebrates apart from the 60 mangrove plants.

The IUCN categories are stated to work best at the global level. Guidelines for regional or national assessments are being discussed but have not been developed to date. In the absence of national or regional guidelines, however, the current Red List Criteria were used even for national assessments. Certain of the criteria are not so straightforward when applied to a national or regional population, however, it was found that any anomaly was "conservative" in favour of the species. In other words, some of the non-endemic taxa may have been given a higher category than their population status actually deserves. The alternative, however, was to leave off assessing non-endemic taxa until specific national/ regional guidelines are developed, a process which could take years. In India, "wildlife" definition and legislation applies to all wildlife occurring naturally in India with no prejudice towards endemic species. While endemicity enhances the conservation value of a species, other considerations – legislative, ecosystemic, etc - are also valid. A biodiversity inventory should include all species.

Of the 176 taxa assessed only a few are Indian endemics. Most of the mangrove plants have a distribution beyond the political boundaries of India thereby making them non-endemics. Similarly many marine fishes and algae have a distribution beyond the country's political limits and therefore are non-endemics.

Results

Mangrove plants

A total of 60 taxa of mangrove plants were assessed at the workshop. A definite number could not be listed because some taxa considered were regarded as "doubtful" due to possibly erroneous identification. Taxonomic confusion and differences in classification of mangrove species added to the difficulty in compiling a complete checklist. However, as stated before, a tentative checklist of Indian mangroves includes some 60 to 70 taxa. The assessments were restricted to only previously described taxa and not those being described at the time of the workshop or in press.

Of the assessed taxa, a total of 23 families are represented among Indian mangrove plants of which family Rhizophoraceae is the most represented followed by Poaceae and Chenopodiaceae. All other families have 4 or less taxa representing them.

Table 1. Taxa and families of mangrove plants assessed.

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SPECIES	IUCN
Acanthaceae	
Acanthus ebracteatus	CR
Acanthus ilicifolius	EN
Acanthus volubilis	CR
Aizoaceae	
Sesuvium portulacastrum	EN
Apocynaceae	
Cerbera manghas	EN
Arecaceae	
Nypa fruticans	EN
Phoenix paludosa	EN
Asclepiadaceae	
Finlaysonia obovata	CR
Avicenniaceae	
Avicennia alba	CR
Avicennia marina var. acutissima	EN
Avicennia marina var. resinifera	CR
Avicennia officinalis	EN
Chenopodiaceae	
Arthrocnemum indicum	VU
Salicornia brachiata	LRnt
Suaeda maritima	EN
Suaeda monoica	EN
Suaeda nudiflora	EN
Combretaceae	
Lumnitzera littorea	CR
Lumnitzera racemosa	EN
Euphorbiaceae	
Excoecaria agallocha	VU
Fabaceae	
Cynometra ramiflora	EN
Derris heterophylla	EN
Derris trifoliata	EN
Hydrocharitaceae	
Halophila beccarii	EN
Meliaceae	
Aglaia cuculata	EN
Xylocarpus granatum	EN
Xylocarpus mekongensis	EN
Xylocarpus moluccensis	EN
Mysinaceae	
Aegiceras corniculatum	EN

SPECIES	IUCN
Plumbaginaceae	
Aegialitis rotundifolia	EN
Poaceae	
Aeluropus lagopoides	EN
Myriostachya wightiana	EN
Porteresia coarctata	VU
Sporobolus virginicus	EN
Urochondra setulosa	EN
Poaceae; Panicoidae; Paniceae	
Cenchrus ciliaris	EN
Pteridaceae	
Acrostichum aureum	LRlc
Rhizophoraceae	
Bruguiera cylindrica	EN
Bruguiera gymnorrhiza	CR
Bruguiera parviflora	CR
Bruguiera sexangula	VU
Ceriops decandra	EN
Ceriops tagal	EN
Kandelia candel	EN
Rhizophora annamalayana	NE
Rhizophora apiculata	EN
Rhizophora lamarckii	CR
Rhizophora mucronata	VU
Rhizhophora stylosa	CR
Rubiaceae	
Scyphiphora hydrophyllacea	EN
Sonneratiaceae	
Sonneratia alba	EN
Sonneratia apetala	EN
Sonneratia caseolaris	EN
Sonneratia griffithii	CR
Sterculiaceae	
Heretiera fomes	EN
Heretiera kanikensis	CR
Heretiera littoralis	EN
Tamaricaceae	
Tamarix troupii	EN
Tiliaceae	
Brownlowia tersa	EN
Verbenaceae	
Clerodendrum inerme	EN

Table 2. Criteria used in assessing threatened mangrove plant taxa

Species	IUCN	Assessed for	Threatened due to	Criteria
Acanthus ebracteatus	CR	A & N Is.	Restricted distribution	B1, 2c
Acanthus ilicifolius	EN	E. & W. coast, A & N Is.	Restricted distribution	B1, 2c
Acanthus volubilis	CR	E. coast, A & N Is.	Restricted distribution	B1, 2c
Acrostichum aureum	LR-lc	E. & W. coast, A & N Is.	—	—
Aegialitis rotundifolia	EN	E. coast, A & N Is.	Restricted distribution	B1, 2c
Aegiceras corniculatum	EN	E. & W. coast	Restricted distribution	B1, 2c
Aeluropus lagopoides	EN	E. & W. coast, salt pans	Restricted distribution	B1, 2b
Aglaia cuculata	EN	E. coast, A & N Is.	Restricted distribution	B1, 2c
Arthrocnemum indicum	VU	E. & W. coast	Population reduction	A1a, 1b
Avicennia alba	CR	E. & W. coast, A & N Is.	Population reduction	A1a, 1c
Avicennia marina var. acutissima	EN	E. & W. coast	Population reduction	A1c, 1d
Avicennia marina var. resinifera	CR	W. coast	Restricted distribution, Population estimation, Restricted population	B1, 2b, 2c, 2d; C2d; D2
Avicennia officinalis	EN	E. & W. coast	Restricted distribution	B1, 2b
Brownlowia tersa	EN	E. coast, A & N Is.	Restricted distribution	B1, 2c
Bruguiera cylindrica	EN	E. & W. coast, A & N Is.	Population reduction, Restricted distribution	A1c, 1d, 2d; B1, 2c
Bruguiera gymnorrhiza	CR	E. & W. coast, A & N Is.	Population reduction	A1c, 1d
Bruguiera parviflora	CR	E. & W. coast, A & N Is.	Population reduction	A1c, 1d
Bruguiera sexangula	VU	E. coast, A & N Is.	Restricted distribution	B1, 2c, 2d
Cenchrus ciliaris	EN	E. & W. coast, dry inland areas	Restricted distribution	B1, 2c
Cerbera manghas	EN	E. & W. coast	Restricted distribution	B1, 2c
Ceriops decandra	EN	E. & W. coast, A & N Is.	Population reduction, Restricted distribution	A1c, 1d, 2d; B1, 2c
Ceriops tagal	EN	E. & W. coast, A & N Is.	Restricted distribution	B1, 2a, 2c
Clerodendrum inerme	EN	E. & W. coast	Restricted distribution	B1, 2c
Cynometra ramiflora	EN	E. coast, A & N Is.	Restricted distribution	B1, 2c
Derris heterophylla	EN	E. & W. coast, A & N Is.	Restricted distribution	B1, 2c
Derris trifoliata	EN	E. & W. coast	Restricted distribution	B1, 2c
Excoecaria agallocha	VU	E. & W. coast	Restricted distribution	B1, 2c
Finlaysonia obovata	CR	E. coast, A & N Is.	Restricted distribution	B1, 2c
Halophila beccarii	EN	E. & W. coast	Restricted distribution	B1, 2c, 2d
Heretiera fomes	EN	E. coast, A & N Is.	Restricted distribution	B1, 2b, 2c
Heretiera kanikensis *	CR	E. coast	Restricted distribution, Population estimation, Restricted population	B1, 2c; C2b; D2
Heretiera littoralis	EN	E. & W. coast, A & N Is.	Population reduction, Restricted distribution	A2b, 2c, 2d; B1, 2c
Kandelia candel	EN	E. & W. coast	Restricted distribution	B1, 2c
Lumnitzera littorea	CR	E. coast, A & N Is.	Restricted distribution	B1, 2c
Lumnitzera racemosa	EN	E. & W. coast	Restricted distribution	B1, 2c
Myriostachya wightiana	EN	E. coast	Restricted distribution	B1, 2c
Nypa fruticans	EN	E. coast, A & N Is.	Restricted distribution	B1, 2a, 2b, 2c
Phoenix paludosa	EN	E. coast, A & N Is.	Restricted distribution	B1, 2c
Porteresia coarctata	VU	E. & W. coast	Restricted distribution	B1, 2c
*Rhizophora anamalayana**	NE	E. coast	—	—
Rhizophora apiculata	EN	E. & W. coast	Population reduction	A2b, 2d;
Rhizophora lamarckii	CR	E. coast, A & N Is.	Restricted distribution, Population estimation	B1, 2c; C2a
Rhizophora mucronata	VU	E. & W. coast	Population reduction, Restricted distribution	A2c, 2d; B1,2c
Rhizhophora stylosa	CR	E. coast, A & N Is.	Restricted distribution	B1, 2c
Salicornia brachiata	LRnt	E. & W. coast	—	—
Scyphiphora hydrophylaceae	EN	E. coast, A & N Is.	Restricted distribution	B1, 2c
Sesuvium portulacastrum	EN	E. & W. coast	Restricted distribution	B1, 2c
Sonneratia alba	EN	E. & W. coast	Population reduction	A2c, 2d

Species	IUCN	Assessed for	Threatened due to	Criteria
Sonneratia apetala	EN	E. & W. coast	Population reduction, Restricted distribution	A2b, 2c, 2d; B1, 2c
Sonneratia caseolaris	EN	E. & W. coast, A & N Is.	Population reduction, Restricted distribution	A2b, 2c, 2d; B1, 2c
Sonneratia griffithii	CR	E. coast, A & N Is.	Restricted distribution	B1, 2c
Sporobolus virginicus	EN	W. coast	Restricted distribution	B1, 2c
Suaeda maritima	EN	E. & W. coast	Restricted distribution	B1, 2b, 2c
Suaeda monoica	EN	E. & W. coast	Restricted distribution	B1, 2a, 2b, 2c
Suaeda nudiflora	EN	E. & W. coast	Restricted distribution	B1, 2a, 2c
Tamarix troupii	EN	W. coast	Restricted distribution	B1, 2b, 2c, 2d
Urochondra setulosa *	EN	W. coast	Restricted distribution	B1, 2c
Xylocarpus granatum	EN	E. & W. coast	Population reduction, Restricted distribution	A1acd, 2bcd; B2a, 2b, 2c
Xylocarpus mekaongensis	EN	E. coast, A & N Is.	Restricted distribution	B1, 2c
Xylocarpus moluccensis	EN	E. coast, A & N Is.	Restricted distribution	B1, 2c

* Indian endemics, assessed Globally.

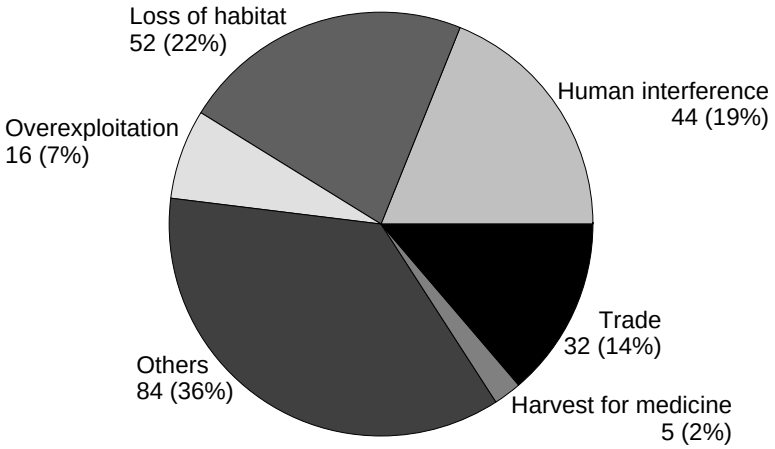
Threats

Most of the taxa assessed at this workshop are under threat (Table 3). Habitat loss, human interference and trade are the main threats affecting mangrove plant taxa in India.

Threats can be classified into those affecting the habitat and those affecting the taxon population, though some of the factors affect both habitat and population. With reference to habitat quality changes, any small or large impact of human interference on the habitat could affect the regeneration capability or the habitat structure of the area, or the individual taxon in question. Therefore threats affecting habitat and threats affecting populations are not independent of each other.

Threats affecting habitat such as logging, cultivation, human settlements, fragmentation, introduction of exotic plants or monocultures and plantations are the main contributing factors to the taxa assessed here. All these along with factors that affect population numbers such as human interference, overexploitation, harvesting for various purposes and trade result in many of the taxa having been evaluated as threatened.

Threats affecting mangroves



Number of mangrove species assessed = 60
Number of threatened mangrove species = 58

Table 3. Threat and trade information for selected species of Indian mangrove plants assessed according to the New IUCN categories

SPECIES	THREATS	IUCN
Acanthus ebracteatus	Loss of habitat	CR
Acanthus ilicifolius	Damming, Human interference, Harvest, Loss of habitat	EN
Acanthus volubilis	Harvest for medicine, Loss of habitat	CR
Acrostichum aureum	No	LR-lc
Aegialitis rotundifolia	Human interference, Loss of habitat	EN
Aegiceras corniculatum	Cattle grazing, Human interference, Loss of habitat, Trade (L)	EN
Aeluropus lagopoides	Cattle grazing, Human interference, Loss of habitat, Trade (L)	EN
Aglaia cuculata	Loss of habitat ,Trade (L, D)	EN
Arthrocnemum indicum	Loss of habitat	VU
Avicennia alba	Genetic problems, Human interference, Loss of habitat, Pollution,	CR
Avicennia marina var. acutissima	Cattle grazing, Human interference, Harvest, Harvest for food, Loss of habitat, Over exploitation, Trade (L, D)	EN
Avicennia marina var. resinifera	Human interference, Loss of habitat	CR
Avicennia officinalis	Cattle grazing, Damming, Human interference, Harvest for food, Harvest for timber, Harvest, Loss of habitat, Over exploitation, Trade (L)	EN
Brownlowia tersa	Loss of habitat	EN
Bruguiera cylindria	Human interference, ,Harvest for timber, Harvest, Loss of habitat, Over exploitation, Trade (D,C)	EN
Bruguiera gymnorrhiza	Human interference, Harvest for timber, Harvest, Harvest for medicine, Loss of habitat, Over exploitation, Trade (D,C)	CR
Bruguiera parviflora	Human interference, Harvest for timber, Harvest, Loss of habitat, Over exploitation, Trade (L)	CR
Bruguiera sexangula	Human interference, Loss of habitat	VU
Cenchrus ciliaris	Cattle grazing, Human interference, Pollution, Trade (L, D)	EN
Cerbera manghas	Human interference, Harvest, Trade (L),Trade for parts	EN
Ceriops decandra	Human interference, Harvest for timber, Harvest, Loss of habitat, Over exploitation, Trade (D	EN
Ceriops tagal	Human interference, Harvest for timber, Harvest, Hm, Loss of habitat, Over exploitation, Trade (D)	EN
Clerodendrum inerme	Climate, Human interference	EN
Cynometra ramiflora	Human interference, Harvest for timber, Loss of habitat, Over exploitation, Trade (D)	EN
Derris heterophylla	Human interference, Harvest for medicine, Loss of habitat, Trade (L)	EN
Derris trifoliata	Human interference, Harvest for medicine, Loss of habitat, Trade (L)	EN
Excoecaria agallocha	Human interference, Harvest, Loss of habitat, Over exploitation, Trade (L)	VU
Finlaysonia obovata	Human interference, Loss of habitat	CR
Halophila beccarii	Changes in Edaphic factors, Human interference, Loss of habitat, Siltation	EN
Heretiera fomes	Human interference, Harvest for timber, Loss of habitat	EN
Heretiera kanikensis	Human interference, Harvest for food, Loss of habitat	CR
Heretiera littoralis	Climate, Human interference, Harvest for timber, Harvest, Loss of habitat, Over exploitation, Trade (L)	EN
Kandelia candel	Human interference, Harvest, Loss of habitat, Pollution	EN
Lumnitzera littorea	Human interference, Loss of habitat	CR
Lumnitzera racemosa	Human interference, Harvest, Loss of habitat	EN
Myriostachya wightiana	Harvest, Trade for parts, Trade (L)	EN
Nypa fruticans	Human interference, Harvest, Harvest for food	EN
Phoenix paludosa	Loss of habitat, Over exploitation, Trade (L), Trade for parts	EN
Porteresia coarctata	Cattle grazing, Human interference, Loss of habitat, Siltation	VU
Rhizophora annamalayana	Genetic problems, Human interference, Harvest for food, Loss of habitat	NE
Rhizophora apiculata	Climate, Harvest for timber, Harvest, Loss of habitat, Over exploitation, Pollution, Trade (C, D)	EN
Rhizophora lamarckii	Genetic problems, Hybridization, Loss of habitat	CR

SPECIES	THREATS	IUCN
Rhizophora mucronata	D, Human interference, Harvest for timber, Harvest, Loss of habitat, Over exploitation, Trade for parts, Trade (C, D)	EN
Rhizhophora stylosa	Human interference, Loss of habitat	CR
Salicornia brachiata	Climate, Changes in Edaphic factors, Fishing, Harvest for food, Loss of habitat, Pollution, Trade (L, D)	LR-nt
Scyphiphora hydrophylaceae	Human interference, Loss of habitat	EN
Sesuvium portulacastrum	Human interference, Harvest for food, Loss of habitat	EN
Sonneratia alba	Cattle grazing, Climate, Damming, Human interference, Harvest for timber, Harvest, Loss of habitat, Over exploitation, Trade (L, D)	EN
Sonneratia apetala	Climate, Human interference, Harvest for timber, Harvest, Loss of habitat, Over exploitation, Pollution, Trade (L)	EN
Sonneratia caseolaris	Climate, Human interference, Loss of habitat, Over exploitation, Trade(L)	EN
Sonneratia griffithii	Loss of habitat	CR
Sporobolus virginicus	Human interference, Loss of habitat, Cattle grazing, Trade (L)	EN
Suaeda maritima	Human interference, Loss of habitat	EN
Suaeda monoica	Climate, Human interference, Loss of habitat	EN
Suaeda nudiflora	Climate, Human interference, Loss of habitat	EN
Tamarix troupii	Human interference, Loss of habitat	EN
Urochondra setulosa	Landslide, Siltation	EN
Xylocarpus granatum	Climate, Human interference, Harvest for timber, Harvest, Loss of habitat, Over exploitation, Trade	EN
Xylocarpus mekaongensis	Harvest for timber, Loss of habitat	EN
Xylocarpus molluccensis	Changes in Edaphic factors, Genetic problems, Harvest for timber, Harvest, Loss of habitat	EN

Trade

Of the very many different kinds of threats, trade plays a considerable part in causing mangrove taxa to be categorised as threatened. Trade and other factors that work along with those such as harvest, harvest for medicine, harvest for timber and harvest for food comprise a major liability to the mangrove plants.

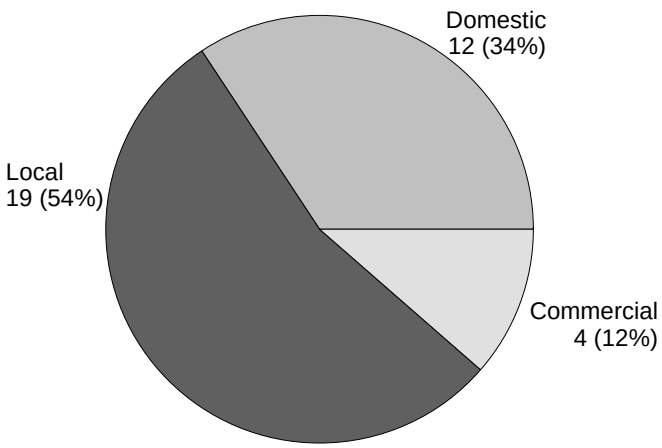
In the present exercise it is seen that 45% of all the assessed taxa and 43% of threatened taxa are in trade (Table 3).

Subsistence living can also take a toll on the survival of some taxa. Recent trends in reduction of wild populations by a variety of threats have resulted in decline in the populations of the taxa. Hence, any unsustainable utilisation, even for subsistence living could tip the scale.

Twenty-seven taxa are assessed to be in trade (Table 3). Depending on the scope and quantity of trade, four levels such as local trade, domestic trade, commercial trade and international trade are listed. While some of the taxa are being traded at one level only, many are being traded at two or more levels. Most of the trade is either at local, commercial or domestic levels while a few taxa are traded internationally (Figure and Table 3).

Twenty-six of the threatened taxa are categorised to be in trade (Table 3). Trade along with other factors is a threat to the survivability of the taxon in the wild. Figure below indicates different levels of trade of threatened taxa.

Trade in threatened mangrove taxa



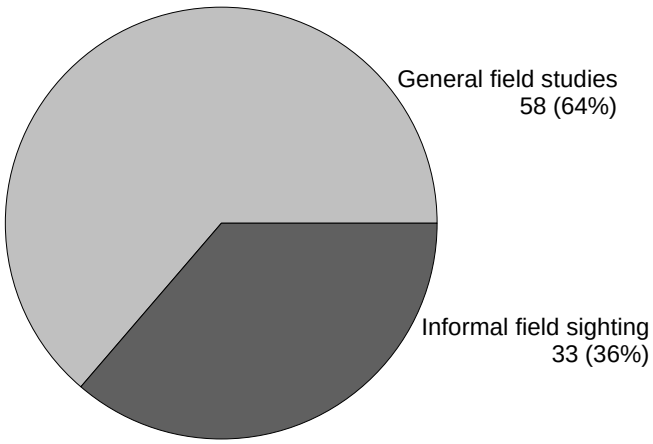
Number of threatened taxa in trade = 26

Trade has been a contentious issue for the last many years and has assumed greater importance in recent years due to factors, which compromise the biodiversity convention, indigenous people's rights, and foreign trade. The most recent "scare" is patents, which have aroused much suspicion and frustration among the Indian political, economic, and scientific community towards countries whose actions compromise local community rights in India. However, there are no mangrove taxa that are in international trade.

Data Quality

Data quality for all taxa assessed in this workshop is either by or a combination of General field studies (58 taxa), Informal field sighting (33 taxa). Reliable census information is not available for a single taxon, based on which the assessment could be made. However, general field studies and informal sightings for most of the taxa had enough information in categorising taxa under the IUCN categories since most of the information was based on restricted distribution.

Data quality



The IUCN guidelines for assessment clearly suggest a "conservative" approach in favour of the taxa, e.g. " . . . the absence of high quality data should not deter attempts at applying the criteria, as methods involving estimation, inference and projection are emphasized to be acceptable throughout. Inference and projection may

be based on extrapolation of current or potential threats into the future (including dependence on other taxa), so factors related to population abundance or distribution (including dependence on other taxa), so long as these can reasonably be supported. Suspected or inferred patterns in either the recent past, present or near future can be based on any of a series of related factors, and these factors should be specified. Taxa at risk from threats posed by future events of low probability but with severe consequences (catastrophes) should be identified by the criteria (e.g. small distribution, few locations). Some threats need to be identified particularly early, and appropriate actions taken, because their effects may be irreversible, or nearly so (pathogens, invasive organisms, hybridization)."

The exercise to determine the status of any taxon should not be hindered by the fact that there is no hard information available. Thorough, all-encompassing hard data is practically impossible to gather for even a single taxon, and the time required to actually gather such detailed information could delay conservation measures for threatened taxa. The combination of elements which make up a CAMP workshop such as group effort of botanists including field workers, both past and present, museum curators, ecologists, theoreticians, policy makers and related specialists together, good faith and impartial facilitation provide informed advice for conservation action planning. The results of this Workshop are an outcome of such an exercise.

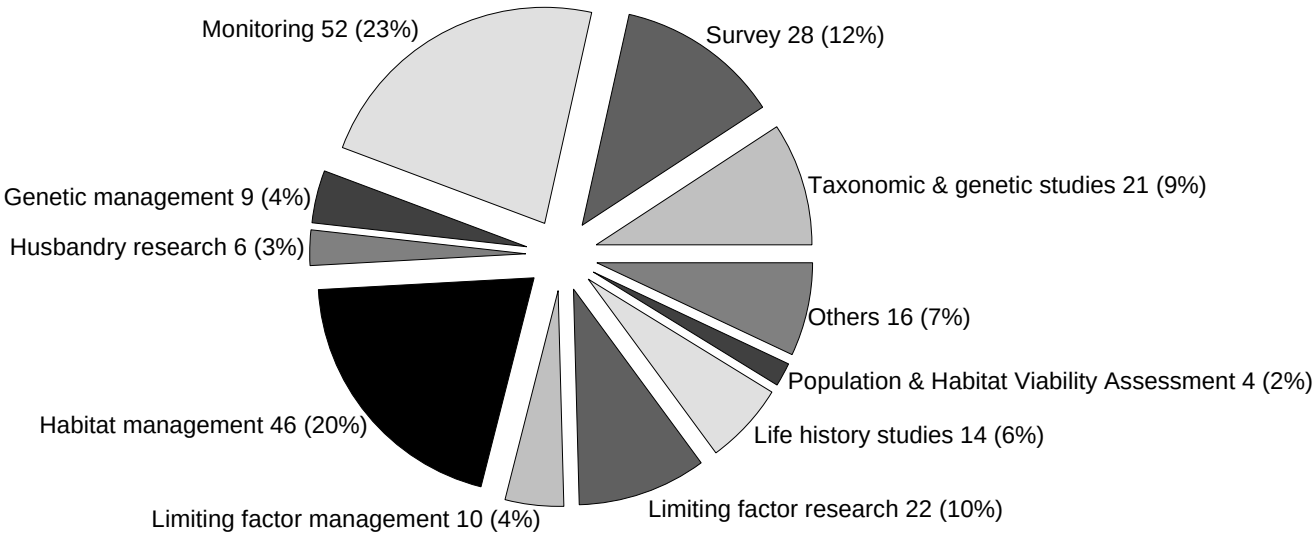
Conservation action and recommendations

The previous section dealt with the different values for assessing the IUCN categories for the taxa. This section deals with the need for conservation action to be taken to insure that the taxa are conserved in the wild and that their habitat is safe. Conservation action can take many forms. The first action is keeping the habitat inviolate, which may be the best way of insuring survival of taxa. However, habitat protection alone may not be sufficient. Constant pressure on habitat and individual taxa has forced many taxa to become threatened. This creates other complications such as small and isolated or fragmented populations, which may propel the taxon into an "extinction vortex". To overcome these complications and possible extinction, remedial actions need to be taken up simultaneously.

An understanding of the basic biology and behaviour of a taxon can also help in identifying individual areas of conservation action and implementation.

Table 4 shows that Monitoring has been recommended for 52 of the 60 taxa followed by Habitat management, Survey, Limiting factor research, Taxonomic studies, Life history studies, Limiting factor management, Genetic management, Husbandry research and other taxon specific recommendations.

Research and management recommendations



Monitoring studies have been carried out for many taxa for population and habitat to determine population trends or effects of harvest and other human-influenced changes in the environment. Monitoring has been strongly recommended for future action plans. For many taxa whose extent of occurrence far exceeds the area of occupancy, the recommendation is for more surveys within the range as to identify other locations. Most of the assessed taxa are not very well understood in terms of their basic biology or husbandry for cultivation. Since they

are traded and being exploited in the wild for medicinal and other purposes, cultivation for sustainable utilisation has been recommended as one of the most urgent tasks. However, in many cases propagation techniques are yet to be perfected or no attempt at all has been made to cultivate the taxa. For this reason, husbandry research, limiting factor research and life history studies have been recommended for many taxa.

Recommendations for the assessed taxa include those described above and also Population and Habitat Viability Assessment and Cultivation. Forty-eight threatened taxa are recommended for cultivation. Population and Habitat Viability Assessment is recommended for 4 of the 26 threatened taxa.

Table 4. Research and management recommendations for mangrove taxa

	T	S	M	G	H	Hm	Lm	Lr	Lh	P	O
CR	5	9	12	3	-	10	-	7	3	3	2
EN	13	16	33	5	5	31	9	13	9	1	12
VU	2	2	5	1	1	4	1	1	1	-	-
LR-nt	-	-	-	-	-	-	-	-	-	-	1
LR-lc	-	-	1	-	-	-	-	-	-	-	1
DD	-	-	-	-	-	-	-	-	-	-	-
NE	1	1	1	-	-	1	-	1	1	-	-
Total	21	28	52	9	6	46	10	22	14	4	16

Cultivation and the level of difficulty

Cultivation recommendations are at four levels, Levels 1, 2, 3 and 4 (see taxon data sheet definitions). Level 1 is for taxa to be interactively managed *in situ* and *ex situ* so as to retain 90% genetic diversity for 100 years. Level 2 is for *ex situ* populations to be infused with fresh genetic material from the wild so as to retain sufficient diversity. Level 3 is not for conservation but only for education, husbandry and research. Level 4 is for commercial and sustainable utilisation.

In this workshop, a cultivation programme for 48 of the threatened taxa is recommended (Table 5), although for most of the taxa techniques for cultivation are not in place or still very difficult. Level of difficulty of cultivating the taxa is given in table 6.

Table 5. Cultivation recommendations for mangrove plants

Cultivation	Level 1	Level 2	Level 3	Level 4	Pend.	No
CR	10	1	-	-	2	-
EN	17	13	4	-	5	2
VU	1	2	2	-	-	1
LRnt	-	-	-	-	-	1
LRlc	-	-	-	-	-	1
DD	-	-	-	-	-	-
NE	-	-	-	-	1	-
Total	28	16	6	0	8	5

Table 6. Level of difficulty in cultivating mangrove plants

Level of difficulty	Level 1	Level 2	Level 3	Unknown
CR	3	2	6	1
EN	8	15	7	10
VU	2	2	-	1
LRnt	1	-	-	-
LRlc	-	-	-	1
DD	-	-	-	-
NE	-	-	1	-
Total	14	19	14	13

There are very few systematic and patient efforts in developing techniques for mangrove taxa in trade. Of the 60 taxa, cultivation knowledge exists for 33 taxa. Cultivation techniques are in place and propagation is easy for 14 taxa, while techniques are not in place for cultivation or cultivation is very difficult for 14 taxa. The remaining 31.6% of the plants are only partially understood for cultivation (Table 6).

Mangroves are being overexploited from the wild for local and domestic trade. Populations have shrunk to the extent that any harvest even for subsistence living could result in the plant going extinct. It is therefore suggested that cultivation be taken up to meet all of the demands of the local and domestic needs. Cultivation is a must for there is no alternative if the taxon is to survive in the wild. Any delay would only mean that a much-depleted wild gene pool only would be available to utilise for cultivation programmes.

Marine algae

Twenty-three taxa of marine algae were assessed at the mangrove CAMP. This was the first time that any algal species was assessed at the species level using the IUCN categories. The IUCN categories are applicable to all taxa except microorganisms. The taxa of marine algae chosen for assessment were therefore macroorganisms though colonies of thallus were considered as single individuals rather than every strand or cell. The algal taxa were also chosen based on their dependence on mangroves. Though some of the taxa are found along the coasts of India, most of the marine algae are dependent on mangroves. Reduction in the extent of occurrence of mangroves has resulted in the reduction of marine algae. All of the threatened taxa were based on the criteria of restricted distribution. Only one species of algae is endemic to India and was assessed globally, while the rest were assessed nationally since their distribution extended beyond the political limits of the country.

Table 7. Family-wise listing of algae assessed at the worshop

Taxon	IUCN
Catnellaceae	
Caloglossa leprieurii	EN
Catnella impudica	EN
Catnella repens	EN
Cladophoraceae	
Chaetomorpha linum	EN
Codiaceae	
Codium fragile	EN
Dichotomosiphon salina *	CR
Colpomeniaceae	
Colpomenia sinuosa	LRnt
Dictyotaceae	
Dictyota indica	EN
Padina tetrastromatica	LRnt
Spatoglossum asperum	LRnt
Gracilariaceae	
Gracilaria verrucosa	EN
Hypneaceae	
Hypnea musciformis	LRnt
Monostromataceae	
Monostroma oxyspermum	EN
Polysiphonaceae	
Bostrychia tenella	EN
Rhizocloniaceae	
Rhizoclonium ciperium	EN
Rhizoclonium kerneri	LRnt
Rhizoclonium kochianum	LRnt
Sargassaceae	
Sargassum ilicifolium	LRnt
Ulvaceae	
Enteromorpha clathrata	LRlc
Enteromorpha intestinalis	LRnt
Ulva patengansis	CR
Ulva reticulata	EN
Vaucheraiceae	
Vaucheria prescottii	EN

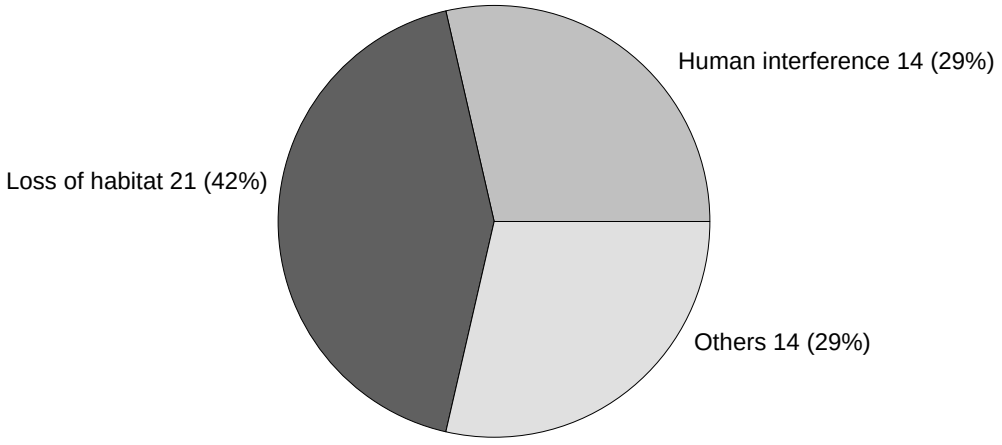
Table 8. List of mangrove associated marine algae assessed

Taxon	Assessed for	IUCN	Threatened due to	Criteria
Bostrychia tenella	E. & W. coast	EN	Restricted distribution	B1, 2c
Caloglossa leprieurii	E. & W. coast & islands	EN	Restricted distribution	B1, 2c
Catenella impudica	E. & W. coast	EN	Restricted distribution	B1, 2c
Catenella repens	E. & W. coast & islands	EN	Restricted distribution	B1, 2c
Chaetomorpha linum	E. & W. coast	EN	Restricted distribution	B1, 2a, 2b, 2c
Codium fragile	E. & W. coast & islands	EN	Restricted distribution	B1, 2c
Colpomenia sinuosa	E. & W. coast & islands	LR-nt	No	No
Dichotomosiphon salina *	W. coast	CR	Restricted distribution	B1, 2b, 2c, 2d
Dictyota indica	W. coast, A & N Is.	EN	Restricted distribution	B1, 2a
Enteromorpha clathrata	E. & W. coast	LR-lc	—	—
Enteromorpha intestinalis	E. & W. coast	LR-nt	—	—
Gracilaria verrucosa	E. & W. coast	EN	Restricted distribution	B1, 2b, 2c
Hypnea musciformis	E. & W. coast & islands	LR-nt	—	—
Monostroma oxyspermum	W. coast	EN	Restricted distribution	B1, 2c
Padina tetrastromatica	E. & W. coast & islands	LR-nt	—	—
Rhizoclonium ciperium	E. & W. coast & islands	EN	Restricted distribution	B1, 2c
Rhizoclonium kerneri	E. & W. coast & Islands	LR-nt	—	—
Rhizoclonium kochianum	E. & W. coast	LR-nt	—	—
Sargassum ilicifolium	E. & W. coast & Islands	LR-nt	Unknown	Unk
Spatoglossum asperum	W. coast	LR-nt	—	—
Ulva patengansis	East coast	CR	Restricted distribution	B1, 2c
Ulva reticulata	W. & E. coast	EN	Restricted distribution	B1, 2c
Vaucheria prescottii	E. Coast	EN	Restricted distribution	B1, 2c

Threats

Marine algae also are threatened: of the 23 taxa assessed, 14 are threatened due to human interference, loss of habitat, pollution and siltation. Marine algae are dependent on mangroves, which are primarily threatened due to factors mentioned earlier. Because of loss of vegetation upstream, the estuaries get silted with the runoff soil, which in turn settles on the algal thallus and kills them. Human interference in the form of clearing mangroves further threatens the existance of algae. Three of the assessed species are also traded locally and domestically as fodder for livestock and for matress making.

Threats affecting marine algae



Number of threatened marine algae = 14
Number of algae assessed = 23

Table 9. Threats to marine algae

Taxa	Threats	IUCN
Bostrychia tenella	Human interference, Loss of habitat, Pollution, Siltation	EN
Caloglossa leprieurii	Human interference, Loss of habitat, Pollution, Siltation	EN
Catnella impudica	Loss of habitat	EN
Catnella repens	Human interference, Loss of habitat, Pollution, Siltation	EN
Chaetomorpha linum	Human interference, Loss of habitat	EN
Codium fragile	Human interference, Loss of habitat	EN
Colpomenia sinuosa	Human interference, Loss of habitat	LR-nt
Dichotomosiphon salina *	Human interference	CR
Dictyota indica	Human interference, Loss of habitat	EN
Enteromorpha clathrata	No	LR-lc
Enteromorpha intestinalis	Loss of habitat	LR-nt
Gracilaria verrucosa	Human interference, Loss of habitat, Over exploitation, Trade (C)	EN
Hypnea musciformis	Loss of habitat, Over exploitation, Human Interference, Trade (C, L)	LR-nt
Monostroma oxyspermum	Cattle grazing, Loss of habitat, Human Interference	EN
Padina tetrastromatica	Loss of habitat, Human Interference	LR-nt
Rhizoclonium ciperium	Loss of habitat	EN
Rhizoclonium kerneri	Loss of habitat	LR-nt
Rhizoclonium kochianum	Loss of habitat	LR-nt
Sargassum ilicifolium	Human interference, Loss of habitat, Over exploitation, Trade (L)	LR-nt
Spatoglossum asperum	Loss of habitat	LR-nt
Ulva patengansis	Loss of habitat	CR
Ulva reticulata	Loss of habitat, Predation, Human Interference	EN
Vaucheria prescottii	Loss of habitat	EN

Recommendations

Survey, monitoring, taxonomic, life history and PHVA recommendations have been suggested for marine algae as priority since not much is known about their distribution, biology or population dynamics.

Research and management recommendations

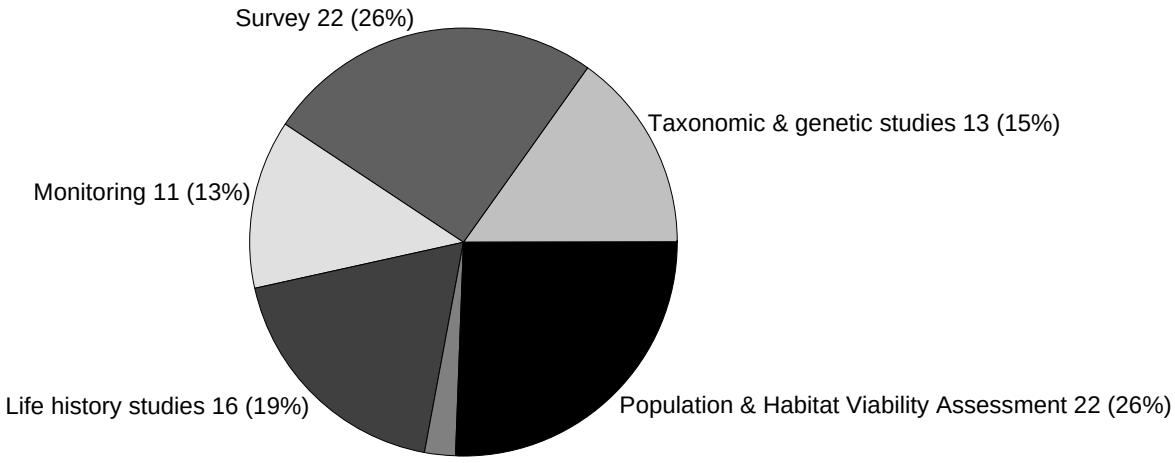


Table 10. Research and management recommendations for algae.

	T	S	M	G	H	Hm	Lm	Lr	Lh	P	O
CR	2	2	1	-	-	-	-	-	1	1	-
EN	7	12	5	-	-	-	-	-	11	12	-
LR-nt	3	7	5	2	-	-	-	-	3	8	-
LR-lc	1	1	-	-	-	-	-	-	1	1	-
DD	-	-	-	-	-	-	-	-	-	-	-
Total	13	22	11	2	0	0	0	0	16	22	0

Cultivation recommendation and level of difficulty

Six taxa have been recommended for cultivation for sustainable utilisation while only one has been recommended for cultivation for research. No alga has been recommended for cultivation for conservation. This could be due to the reason that nothing is known about cultivating algae since some information on cultivation is available for only one species while for the rest it is either unknown or too difficult.

Table 11. Cultivation recommendations for algae

Cultivation	Level 1	Level 2	Level 3	Level 4	Pend.	No
CR	-	-	-	-	-	2
EN	-	-	-	3	-	9
VU	-	-	-	-	-	-
LRnt	-	-	1	3	-	4
LRlc	-	-	-	-	-	1
DD	-	-	-	-	-	-
NE	-	-	-	-	-	-
Total	0	0	1	6	0	16

Table 12. Level of difficulty in cultivating algae

Level of difficulty	Level 1	Level 2	Level 3	Unknown
CR	-	-	-	2
EN	-	2	1	9
VU	-	-	-	-
LRnt	-	3	1	4
LRlc	-	-	-	1
DD	-	-	-	-
NE	-	-	-	-
Total	0	5	2	16

Mangrove fishes

Fifty-two taxa of marine fishes with direct dependence on mangroves were assessed at the workshop. Marine fishes form an important component of a dynamic mangrove ecosystem since the fingerlings are directly dependent on mangroves for their nourishment and during the growth phase. Mangroves are therefore breeding grounds for many marine fishes. Not much is known about marine fishes, their biology and distribution. However, sufficient information was available at the workshop to assess the population trends based on catch data of marine fishes over the last 3 decades. Eleven of the 52 fishes are threatened with extinction while the rest are near threatened.

Table 13. Family-wise listing of marine fishes assessed at the workshop

Taxon	IUCN
Ambassidae	
Ambassis commersoni	LRnt
Anguillidae	
Anguilla bicolar	LRnt
Ariidae	
Arius subrostratus	VU
Carangidae	
Alecits indicus	LRnt
Carangoides ciliarius	LRnt
Caranx ignobilis	LRnt
Caranx sexfasciates	LRnt
Centropomidae	
Lates calcarifer	LRnt
Psammaperca waigaensis	VU
Chanidae	
Chanos chanos	LRnt
Chichillidae	
Etroplus suratensis	LRnt
Clupidae	
Anodentestoma chacunda	LRnt
Hilsa kelee	LRnt
Nematalosa nasus	LRnt
Tenualosa ilisha	LRnt
Elopidae	
Elopes machnata	VU
Gobiidae	
Boleophthalmus boddari	VU
Boleophthalmus dussumieri	EN
Glassogobius giurus	LRnt
Periophthalmus koelreuteri	VU
Scartelaos viridis	EN
Leiognathidae	
Leiognathus splendens	VU
Secutor ruconius	VU
Lethrenidae	
Lethrenus nebulosus	LRnt
Lobotidae	
Lobotes surinamensis	LRnt

Taxon	IUCN
Lutjanidae	
Lutjanus argentimaculatus	LRnt
Lutjanus fulviflammus	LRnt
Lutjanus johni	LRnt
Lutjanus russelli	LRnt
Lutjanus sebae	LRnt
Megalopidae	
Megalops cyprinoides	LRnt
Mugilidae	
Liza dussumieri	LRnt
Liza macrolepis	LRnt
Liza parsia	LRnt
Mugil cephalus	LRnt
Osteomugil cunensius	LRnt
Muraenidae	
Muraena macrura	LRnt
Muraenesex cinereus	LRnt
Muraenichthys schultzei	VU
Plotosidae	
Plotosus canius	LRnt
Polynemidae	
Polynemus indicus	LRnt
Pomadasydae	
Pomadasys hasta	LRnt
Sciaenidae	
Otolithus ruber	LRnt
Serranidae	
Epinephelus tauvina	LRnt
Siganidae	
Siganus canaliculatus	LRnt
Siganus javus	LRnt
Sillaginidae	
Sillago sihama	LRnt
Sphyraenidae	
Sphyraena barracuda	LRnt
Teraponidae	
Therapon jarbua	LRnt
Therapon puta	LRnt

Taxon	IUCN
Trygonidae	
Dasyatis uarnak	VU

Taxon	IUCN
Trypauchenidae	
Trypauchen vagina	LRnt

Table 14. Basis for criteria for threatened fishes

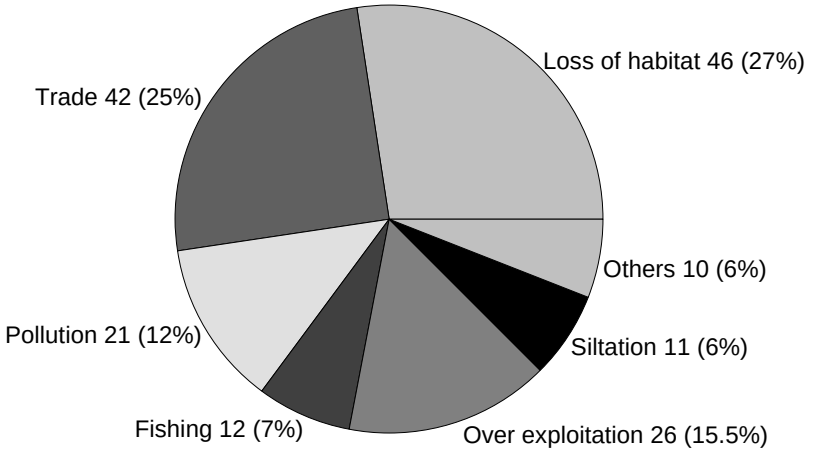
Taxon	IUCN	Assessed for	Threatened due to	Criteria
Alectis indicus	LR-nt	E. & W. coastal waters	—	—
Ambassis commersoni	LR-nt	E. & W. coastal waters	—	—
Anguilla bicolar	LR-nt	E. & W. coastal waters	—	—
Anodentestoma chacunda	LR-nt	E. & W. coastal waters	—	—
Arius subrostratus	VU	E. & W. coastal waters	Population reduction	A1a,1c,1d
Boleophthalmus boddari	VU	E. & W. coastal waters	Population reduction	A1a, 1c, 2c
Boleophthalmus dussumieri	EN	W. coastal waters	Restricted distribution	B1, 2c
Carangoides ciliarius	LR-nt	E. & W. coastal waters	—	—
Caranx ignobilis	LR-nt	E. & W. coastal waters	—	—
Caranx sexfasciates	LR-nt	E. & W. coastal waters	—	—
Chanes chanes	LR-nt	E. & W. coastal waters	—	—
Dasyatis uarnak	VU	E. & W. coastal waters	Restricted distribution	B1, 2e
Elopes machnata	VU	E. & W. coastal waters	Population reduction	A1a, 1c, 1d
Epinephelus tauvina	LR-nt	E. & W. coastal waters	—	—
Etroplus suratensis	LR-nt	E. & W. coastal waters	—	—
Glassogobius giurus	LR-nt	E. & W. coastal waters	—	—
Hilsa kelee	LR-nt	E. & W. coastal waters	—	—
Lates calcarifer	LR-nt	E. coastal waters	—	—
Leiognathus splendens	VU	E. & W. coastal waters	Population reduction	A1b, 2b
Lethrenus nebulosus	LR-nt	E. & W. coastal waters	--	--
Liza dussumieri	LR-nt	E. & W. coastal waters	—	—
Liza macrolepis	LR-nt	E. & W. coastal waters	—	—
Liza parsia	LR-nt	E. & W. coastal waters	—	—
Lobotes surinamensis	LR-nt	E. & W. coastal waters	—	—
Lutjanus argentimaculatus	LR-nt	E. & W. coastal waters	—	—
Lutjanus fulviflammus	LR-nt	E. & W. coastal waters	—	—
Lutjanus johni	LR-nt	E. & W. coastal waters	—	—
Lutjanus russelli	LR-nt	E. & W. coastal waters	—	—
Lutjanus sebae	LR-nt	E. & W. coastal waters	—	—
Megalops cyprinoides	LR-nt	E. & W. coastal waters	—	—
Mugil cephalus	LR-nt	E. & W. coastal waters	—	—
Muraena macrura	LR-nt	E. & W. coastal waters	—	—
Muraenesex cinereus	LR-nt	E. & W. coastal waters	—	—
Muraenichthys schultzei	VU	E. & W. coastal waters	Restricted distribution	B1,2c
Nematalosa nasus	LR-nt	E. & W. coastal waters	—	—
Osteomugil cunensius	LR-nt	E. & W. coastal waters	—	—
Otolithus ruber	LR-nt	E. & W. coastal waters	—	—
Periophthalmus koelreuteri	VU	E. & W. coastal & estuarine waters	Population reduction	A1a, 1c
Plotosus canius	LR-nt	E. & W. coastal waters	—	—
Pomadasys hasta	LR-nt	E. & W. coastal waters	—	—
Polynemus indicus	LR-nt	E. & W. coastal waters, A & N Is.	—	—
Psammaperca waigaensis	VU	E. & W. coastal waters	Population reduction	A1a, 1c, 1d
Scartelaos viridis	EN	E. & W. coastal waters	Population reduction, Restricted distribution	A1a, 1c,B1,2c
Secutor ruconius	VU	E. & W. coastal waters	Population reduction	A1a, 2b
Siganus canaliculatus	LR-nt	E. & W. coastal waters	—	—
Siganus javus	LR-nt	E. & W. coastal waters	—	—
Sillago sihama	LR-nt	E. & W. coastal waters	—	—
Sphyraena barracuda	LR-nt	E. & W. coastal waters	—	—
Tenualosa ilisha	LR-nt	E. & W. coastal waters	—	—
Therapon jarbua	LR-nt	E. & W. coastal waters	—	—
Therapon puta	LR-nt	E. & W. coastal waters	—	—

Taxon	IUCN	Assessed for	Threatened due to	Criteria
Trypauchen vagina	LR-nt	E. & W. coastal waters	—	—

Threats

Since all the assessed fishes are dependent on mangroves for breeding, loss of mangrove habitat is a major threat to marine fishes. Trade is an important threat because of unsustainable and unscientific fishery practices which leads to over exploitation. Siltation in the mangroves and extensive use of pesticides upstream has led to the deterioration of the mangrove habitat for fishes. The figure below and table 12 show the kinds of threats affecting marine fishes.

Threats affecting marine fishes



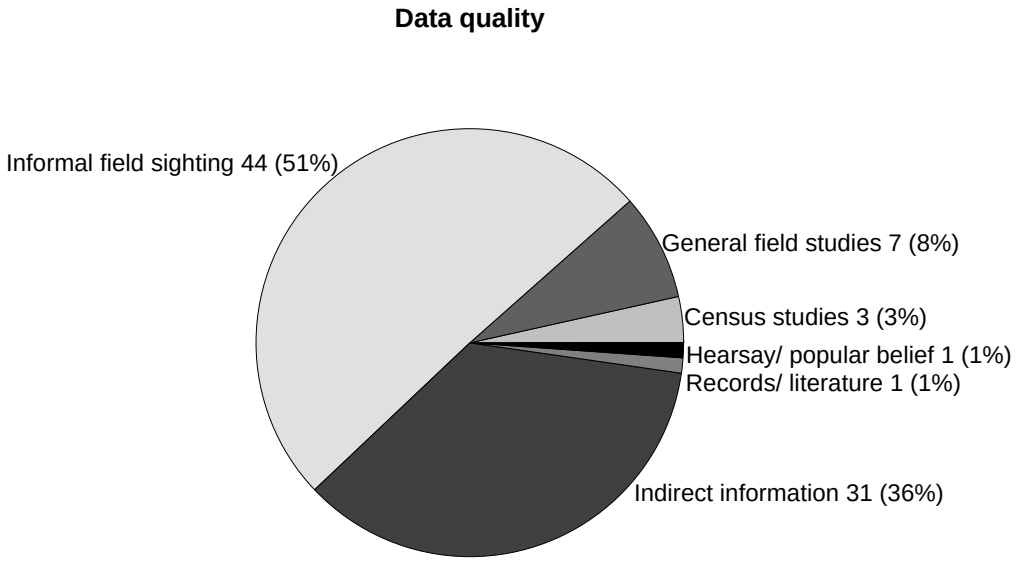
Number of marine fishes assessed = 52
Number of threatened marine fishes = 11

Table 15. Threats to marine fishes

SPECIES	THREATS	IUCN
Alecits indicus	Fishing, Pollution, Trade(L)	LRnt
Ambassis commersoni	Loss of habitat, Pollution	LRnt
Anguilla bicolor	Damming, Loss of habitat, Pollution, Trade (D)	LRnt
Anodentestoma chacunda	Fishing, Loss of habitat, Trade (L)	LRnt
Arius subrostratus	Loss of habitat, Over exploitation, Pollution, Trade (L, D, C)	VU
Boleophthalmus boddari	Loss of habitat, Pollution	VU
Boleophthalmus dussumieri	Loss of habitat, Pollution	VU
Carangoides ciliarius	Loss of habitat, Over exploitation, Pollution, Trade (C, D)	LRnt
Caranx ignobilis	Fishing, Loss of habitat, Trade (L)	LRnt
Caranx sexfasciates	Loss of habitat, Over exploitation, Trade (L, I)	LRnt
Chanos chanos	Fishing, Loss of habitat, Over exploitation, Trade (L)	LRnt
Dasyatis uarnak	Fishing, Human interference, Trade (L)	VU
Elopes machnata	Fishing, Loss of habitat, Pollution, Trade (L)	VU
Epinephelus tauvina	Loss of habitat, Over exploitation, Trade (L,I)	LRnt
Etroplus suratensis	Loss of habitat, Over exploitation, Trade (L)	LRnt
Glassogobius giurus	Damming, Loss of habitat, Trade (D)	LRnt
Hilsa kelee	Damming, Loss of habitat, Over exploitation, Pollution, Trade (L)	LRnt
Lates calcarifer	Fishing, Loss of habitat, Trade (L,I)	LRnt
Leiognathus splendens	Over exploitation, Trade (L)	VU
Lethrenus nebulosus	Loss of habitat, Over exploitation, Trade (L,I)	LRnt
Liza dussumieri	Loss of habitat, Over exploitation, Pollution, Siltation, Trade (L)	LRnt
Liza macrolepis	Loss of habitat, Over exploitation, Pollution, Trade (L)	LRnt

SPECIES	THREATS	IUCN
Liza parsia	Loss of habitat, Over exploitation, Pollution, Siltation, Trade (L)	LRnt
Lobotes surinamensis	Loss of habitat, Over exploitation, Trade (L)	LRnt
Lutjanus argentimaculatus	Loss of habitat, Over exploitation, Trade (L,I)	LRnt
Lutjanus fulviflammus	Loss of habitat, Over exploitation, Siltation, Trade (L,I)	LRnt
Lutjanus johni	Loss of habitat, Over exploitation, Siltation, Trade (L,I)	LRnt
Lutjanus russelli	Loss of habitat, Over exploitation, Trade (L,I)	LRnt
Lutjanus sebae	Loss of habitat, Over exploitation, Trade (L)	LRnt
Megalops cyprinoides	Loss of habitat, Pesticides, Pollution, Siltation	LRnt
Mugil cephalus	Loss of habitat, Over exploitation, Pollution, Siltation, Trade (L)	LRnt
Muraena macrura	Loss of habitat, Pesticides, Pollution, Siltation,Trade(L)	LRnt
Muraenesex cinereus	Loss of habitat	LRnt
Muraenichthys schultzei	Loss of habitat, Pollution	VU
Nematalosa nasus	Loss of habitat, Siltation, Trade (L)	LRnt
Osteomugil cunensius	Loss of habitat, Over exploitation, Trade (L)	LRnt
Otolithus ruber	Loss of habitat, Over exploitation, Trade (L,I)	LRnt
Periophthalmus koelreuteri	Loss of habitat, Pollution	VU
Plotosus canius	Loss of habitat, Pollution, Trade (L)	LRnt
Pomadasys hasta	Fishing, Loss of habitat, Trade (L)	LRnt
Polynemus indicus	Loss of habitat, Over exploitation, Pollution, Siltation, Trade (L, I)	LRnt
Psammaperca waigaensis	Fishing, Loss of habitat, Pollution, Trade (L)	VU
Scartelaos viridis	Loss of habitat	EN
Secutor ruconius	Over exploitation	VU
Siganus canaliculatus	Loss of habitat, Over exploitation, Siltation	LRnt
Siganus javus	Loss of habitat, Siltation, Trade (L)	LRnt
Sillago sihama	Loss of habitat, Over exploitation, Trade (L)	LRnt
Sphyraena barracuda	Fishing, Loss of habitat, Predation, Trade (L)	LRnt
Tenualosa ilisha	Damming, Loss of habitat, Over exploitation, Pollution, Trade (L)	LRnt
Therapon jarbua	Human interference, Loss of habitat, Trade (L)	LRnt
Therapon puta	Fishing, Human interference, Loss of habitat, Trade (L, D)	LRnt
Trypauchen vagina	Fishing,Trade(L)	LRnt

Data quality



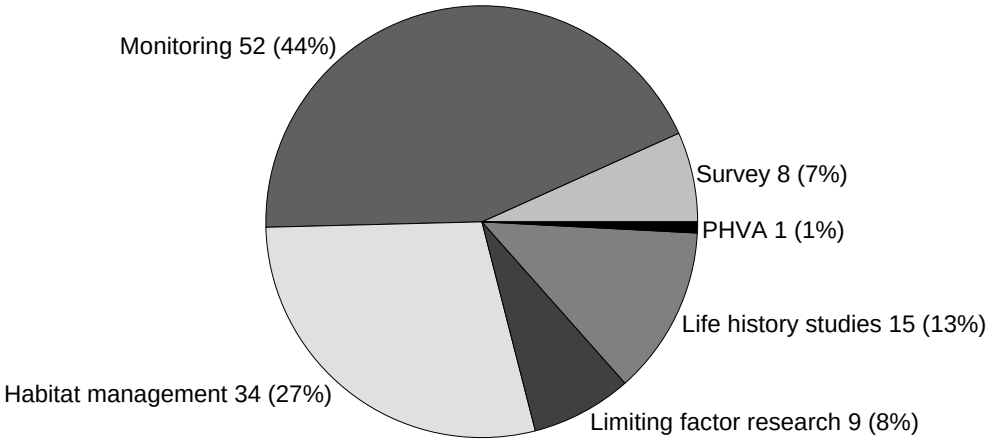
Number of marine fishes assessed = 52

Very little information is available about population distribution or dynamics of marine fishes. This is largely evident by the fact that -- in terms of data quality -- only 11% of data is through reliable census and general field studies, while the rest is through informal field sightings and indirect information through fishery records from various governmental fishery institutes.

Recommendations

Monitoring is very highly recommended for management of marine fishes since no information is available on population trends and the effects of various threats both to the marine environment and the mangroves. Habitat management has been given a great deal of importance because of the degree of dependence fishes have on mangrove ecosystem and that any loss or damage to the ecosystem would be reflected in the population structure of fishes.

Research and management recommendations



Number of marine fishes assesed = 52

Table 16. Research and management recommendations for fishes

	T	S	M	G	H	Hm	Lm	Lr	Lh	P	O
CR	-	-	-	-	-	-	-	-	-	-	-
EN	-	-	1	-	-	-	-	-	-	-	-
VU	-	5	10	-	-	2	-	-	4	1	-
LR-nt	-	-	39	-	-	30	1	10	10	-	-
LR-lc	-	-	-	-	-	-	-	-	-	-	-
DD	-	-	-	-	-	-	-	-	-	-	-
Total	0	5	50	0	0	32	1	10	14	1	0

Captive breeding and level of difficulty

Captive breeding is not a recommendation for marine fishes because the popular feeling among the participants was that fish populations can recover from very low population densities and that a special effort in breeding them for conservation is not necessary.

Table 17. Captive breeding recommendations for marine fishes

Breeding	Level 1	Level 2	Level 3	Level 4	Pend.	No
CR	-	-	-	-	-	-
EN	-	-	-	-	-	1
VU	-	-	-	-	5	5
LRnt	2	1	6	11	2	20
LRlc	-	-	-	-	-	-

Breeding	Level 1	Level 2	Level 3	Level 4	Pend.	No
DD	-	-	-	-	-	-
NE	-	-	-	-	-	-
Total	2	1	6	11	7	26

Table 18. Level of difficulty in breeding fishes in captivity

	Level 1	Level 2	Level 3	Unknown
CR	-	-	-	-
EN	-	-	-	2
VU	1	-	-	8
LRnt	5	10	5	21
LRlc	-	-	-	-
DD	-	-	-	-
NE	-	-	-	-
Total	6	10	5	31

Mangrove invertebrates

The last group of taxa to be assessed at the mangrove workshop was invertebrates associated with the mangrove ecosystem. A total of 40 taxa were assessed, which included marine, terrestrial and arboreal forms.

Table 19. Family-wise listing of mangrove invertebrates assessed at the workshop

Taxon	IUCN
Balanidae	
Balanus amphitrite	LRlc
Gecarcinidae	
Cardisoma carnifex	CR
Geloindae	
Geloina erosa	EN
Geometridae	
Gonodontis clelia	LRlc
Grpsidae	
Sesarma taeniolata	VU
Mytilidae	
Modiolus striatulus	LRnt
Perna viridis	LRnt
Noctuidae	
Atacira flaviluna	LRlc
Nymphalidae	
*Polyura schreiber **	NE
Ocypodidae	
Dotilla myctiroides	LRnt
Macrophthalmus depressus	LRnt
Macrophthalmus convexus	EN
Uca dussumieri	LRnt
Uca lactea	LRnt
Uca tetragonon	EN
Uca vocans	LRnt
Ocypode ceratophthalma	LRnt
Ostreidae	
Crassostrea gryphoides	LRnt
Saccostrea cucullata	LRnt
Palaemonidae	
Metapenaeus dobsoni	LRnt
Penaeus caniliculatus	VU
Penaeus indicus	LRnt
Penaeus japonicus	VU
Penaeus merguiensis	LRnt
Penaeus monodom	LRnt
Penaeus semisulcaetus	LRnt
Pholadidae	
Martesia striata	LRlc
Portunidae	
Scylla serrata	LRnt
Saturniidae/ Lepiodoptera	
*Attacus mcmulleni **	LRlc
Sphagomidae	
Sphaeroma terebrans	LRlc
Teredeinidae	
Nausitora dunlopei	LRlc
Bactronophorus thoracites	LRlc

Taxon	IUCN
Bankia campanellata	LRlc
Bankia carinata	LRlc
Bankia rochi	LRlc
Lyrodus pedicellatus	LRlc
Nausitora hedleyi	LRlc
Dicyathifer manni	LRlc
Thalassinidae	

Taxon	IUCN
Thalassina anomala	LRnt
Veneridae	
Meretrix casta *	VU
Xanthidae	
Pilodius nigrocrinitus	EN

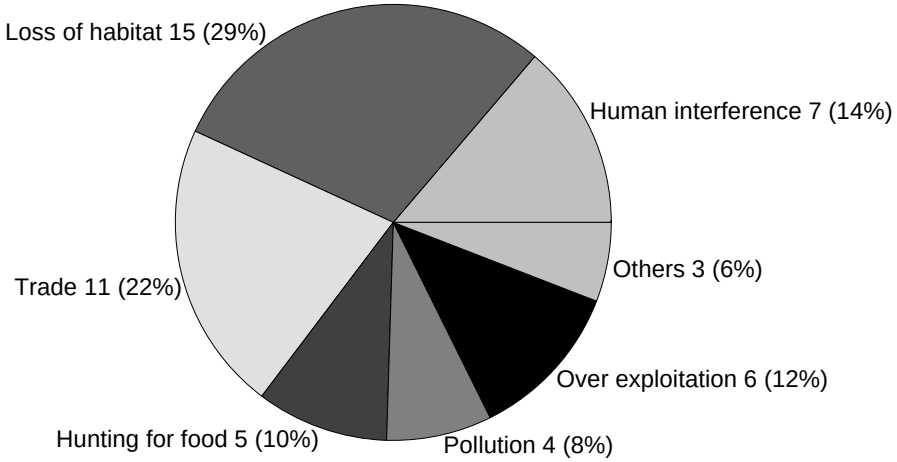
Table 20. Basis for assessment of mangrove invertebrates

Taxon	IUCN	Assessed for	Criteria	Subcritera
Atacira flaviluna	LRlc	A & N Is.	--	--
Attacus mcmulleni	LRlc	A & N Is.	--	--
Bactronophorus thoracites	LRlc	E. coast, A & N Is.	—	—
Balanus amphitrite	LRlc	E. & W. Coast & Is.	—	—
Bankia campanellata	LRlc	E. & W. coast	—	—
Bankia carinata	LRlc	E. & W. coast	—	—
Bankia rochi	LRlc	E. & W. coast, A & N Is.	—	—
Cardisoma carnifex	CR	E. coast, A & N Is.	Restricted distribution	B1, 2c
Crassostrea gryphoides	LRnt	E. & W. coast, A & N Is.	Unknown	Unknown
Dicyathifer manni	LRlc	E. & W. coast, A & N Is.	—	—
Dotilla myctiroides	LRnt	E. & W. coast, A & N Is.	—	—
Geloina erosa	EN	E. & W. coast	Restricted distribution	B1, 2c
Gonodontis clelia	LRlc	A & N Is.	—	—
Lyrodus pedicellatus	LRlc	E. & W. coast, A & N Is.	—	—
Macrophthalmus depressus	LRnt	E. & W. coast, A & N Is.	—	—
Macrophthalmus convexus	EN	E. & W. coast, A & N Is.	Restricted distribution	B1, 2c
Martesia striata	LRlc	E. & W. coast, A & N Is.	—	—
Meretrix casta	VU	E. & W. coast	Population reduction	A1, 1c , 1d
Metapenaeus dopsoni	LRnt	E. & W. coast, A & N Is.	—	—
Modiolus striatulus	LRnt	E. & W. coast, A & N Is.	—	—
Nausitora dunlopei	LRlc	E. & W. coast, A & N Is.	No	No
Nausitora hedleyi	LRlc	E. & W. coast, A & N Is.	—	—
Ocypode ceratophthalma	LRnt	E. & W. coast & Is.	—	—
Penaeus caniliculatus	VU	E. & W. coast	Restricted distribution	B1, 2c
Penaeus indicus	LRnt	A & N Is.	—	—
Penaeus japonicus	VU	E. & W. coast	Restricted distribution	B1, 2c
Penaeus merguiensis	LRnt	W. coast, A & N Is.	—	—
Penaeus monodom	LRnt	E. & W. coast, A & N Is.	—	—
Penaeus semisulcaetus	LRnt	E. & W. coast	—	—
Perna viridis	LRnt	E. & W. coast, A & N Is.	—	—
Pilodius nigrocrinitus	EN	E. coast, A & N Is.	Restricted distribution	B1, 2c
Polyura schreiber	NE	A & N Is.	No	No
Saccostrea cucullata	LRnt	E. & W. coast, A & N Is.	—	—
Scylla serrata	LRnt	E. & W. coast, A & N Is.	—	—
Sesarma taeniolata	VU	E. & W. coast, A & N Is.	Restricted distribution	B1, 2c
Sphaeroma terebrans	LRlc	E. & W. coast, A & N Is.	—	—
Thalassina anomala	LRnt	E. & W. coast, A & N Is.	—	—
Uca dussumieri	LRnt	E. & W. coast, A & N Is.	—	—
Uca lactea	LRnt	E. & W. coast, A & N Is.	—	—
Uca tetragonon	EN	A & N Is.	Restricted distribution	B1, 2c
Uca vocans	LRnt	E. coast, A & N Is.	—	—

Threats

Nine of the 42 invertebrates were assessed as threatened. Taxa that are threatened are so due to loss of habitat, human interference, trade and over exploitation. Many of the invertebrate taxa taken up at the workshop, however, are without any threats and therefore came into non-threatened categoriesTable 17 indicates the different types of threats affecting invertebrate taxa in mangroves.

Threats to mangrove invertebrates



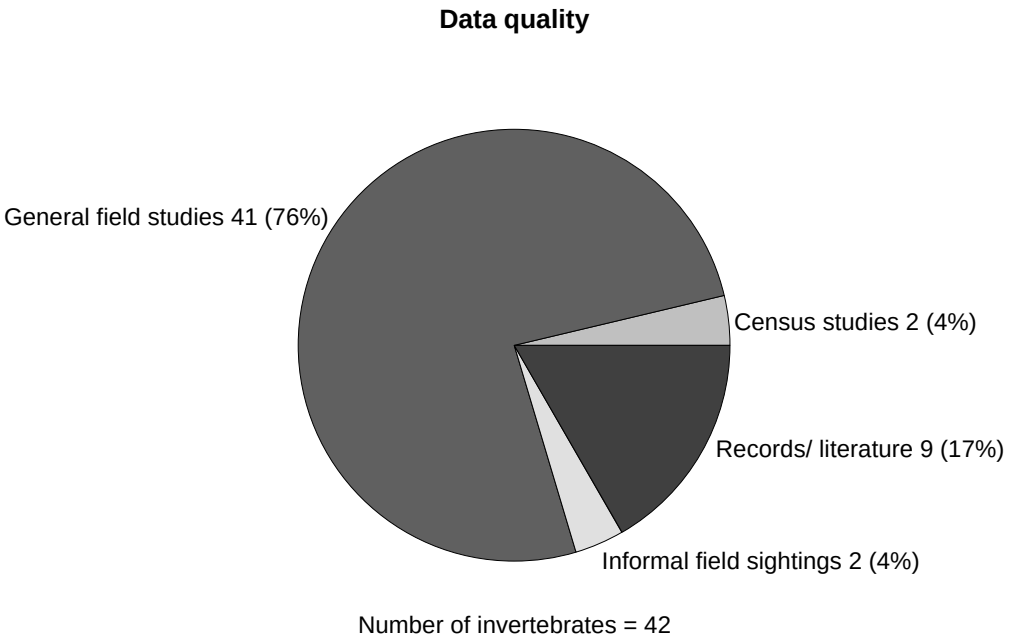
Number of invertebrates assessed = 42
Number of threatened invertebrates = 9

Table 21. Threats affecting mangrove invertebrates

Taxon	Threats	IUCN
Atacira flaviluna	No	LR-lc
Attacus mcmulleni	No	LR-lc
Bactronophorus thoracites	No	LR-lc
Balanus amphitrite	No	LR-lc
Bankia campanellata	No	LR-lc
Bankia carinata	No	LR-lc
Bankia rochi	No	LR-lc
Cardisoma carnifex	Loss of habitat	CR
Crassostrea gryphoides	Harvest for food, Trade (L)	LR-nt
Dicyathifer manni	No	LR-lc
Dotilla myctiroides	Human interference, Pollution	LR-nt
Geloina erosa	Harvest for food, Loss of habitat, Trade (L)	EN
Gonodontis clelia	No	LR-lc
Lyrodus pedicellatus	No	LR-lc
Macrophthalmus depressus	Loss of habitat	LR-nt
Macrophthalmus convexus	Loss of habitat	EN
Martesia striata	No	LR-lc
Meretrix casta	Loss of habitat, Over exploitation, Trade (C, L, D)	VU
Metapenaeus dopsoni	Over exploitation, Trade (L, I)	LR-nt
Modiolus striatulus	Human interference, Loss of habitat	LR-nt
Nausitora dunlopei	No	LR-lc
Nausitora hedleyi	No	LR-lc
Ocypode ceratophthalma	Human interference, Pollution	LR-nt
Penaeus caniliculatus	Climate	VU
Penaeus indicus	Over exploitation, Trade (L, I)	LR-nt
Penaeus japonicus	Climate	VU
Penaeus merguiensis	Over exploitation, Trade (L, I)	LR-nt
Penaeus monodom	Disease, Over exploitation, Trade (L, I)	LR-nt
Penaeus semisulcaetus	Over exploitation, Trade (L)	LR-nt
Perna viridis	Harvest for food, Pollution, Trade (L)	LR-nt
Pilodius nigrocrinitus	Human interference, Loss of habitat	EN
Polyura schreiber	Loss of habitat	NE
Saccostrea cucullata	Harvest for food, Trade (L)	LR-nt
Scylla serrata	Harvest for food, Loss of habitat, Pollution, Trade (C, L, D, I)	LR-nt
Sesarma taeniolata	Human interference, Loss of habitat	VU

Taxon	Threats	IUCN
Sphaeroma terebrans	No	LR-lc
Thalassina anomala	Human interference, Loss of habitat	LR-nt
Uca dussumieri	Loss of habitat	LR-nt
Uca lactea	Loss of habitat	LR-nt
Uca tetragonon	Human interference, Loss of habitat	EN
Uca vocans	Loss of habitat	LR-nt

Data Quality



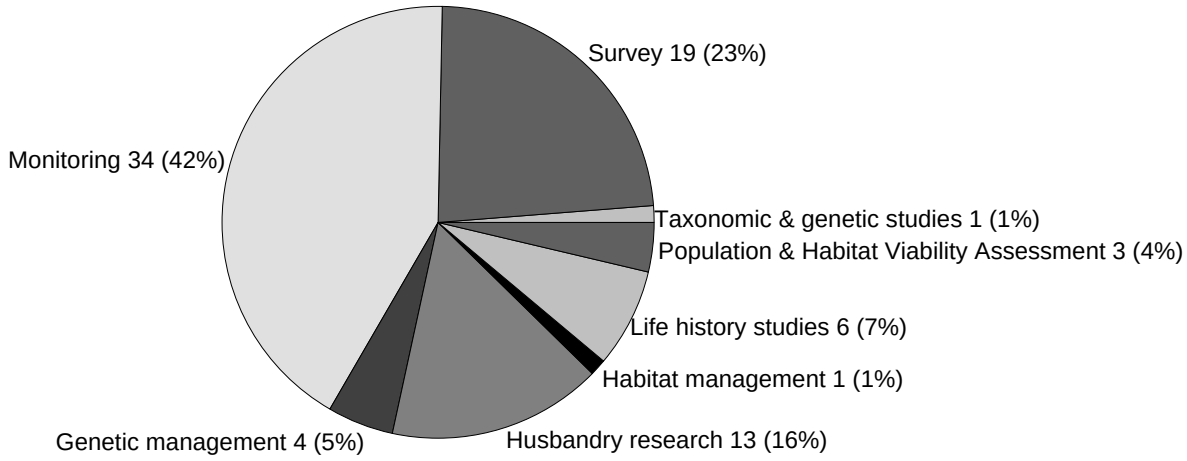
Recommendations

Monitoring and Survey have been suggested as priority research and management recommendations due to lack of knowledge about population distribution, dynamics or threats affecting mangroves and invertebrates. Captive breeding has been recommended for only 1 taxon for conservation while 9 taxa have been recommended for captive breeding for sustainable utilisation. For most of the taxa, the participants did not have any information on the level of difficulty in breeding invertebrates in captivity.

Table 22. Research and management recommendations for mangrove invertebrates

	T	S	M	G	H	Hm	Lm	Lr	Lh	P	O
CR	-	1	1	-	-	-	-	-	1	1	-
EN	-	4	4	-	1	-	-	-	1	1	-
VU	-	3	2	-	3	1	-	-	1	-	-
LR-nt	-	7	12	4	9	-	-	-	-	-	-
LR-lc	-	3	14	-	-	-	-	-	2	-	-
DD	-	-	-	-	-	-	-	-	-	-	-
NE	1	1	1	-	-	-	-	-	1	1	-
Total	1	19	34	4	13	1	0	0	6	3	0

Research and management recommendations



Number of invertebrates assessed = 42

Table 23. Captive breeding recommendation for invertebrates

Breeding	Level 1	Level 2	Level 3	Level 4	Pend.	No
CR	-	-	-	-	-	1
EN	-	-	-	1	1	2
VU	-	-	-	3	1	-
LRnt	1	-	-	5	-	-
LRlc	-	-	-	-	8	9
DD	-	-	-	-	-	5
NE	-	-	-	-	-	-
Total	1	0	0	9	10	17

Table 24. Level of difficulty in breeding invertebrates in captivity

Level of difficulty	Level 1	Level 2	Level 3	Unknown
CR	-	-	-	-
EN	-	-	1	3
VU	1	1	1	1
LRnt	3	2	1	12
LRlc	-	-	-	13
DD	-	-	-	-
NE	-	-	-	1
Total	4	3	3	30

Special Issue Working Groups

Special working groups were formed at the workshop to discuss issues of importance in the context of assessing and conserving the mangrove ecosystem. Four groups were formed for the following subjects 1. Invertebrates, 2. Marine fishes, 3. IUCN Red List criteria and 4. Marine algae. The working group reports are presented below.

Invertebrates Working Group
Members: B.A. Daniel, A.K. Das, S.N. Harkantra, A. Kutty, B. Ingole, P. Mohanaraj, R.M. Sharma.

The mangrove ecosystem being the interphase between terrestrial forests and aquatic (marine) ecosystems, it includes diversified macrohabitats such as mangrove dominated forests, litter laden forest floors, mudflats, adjacent coral reefs (in Andaman and Nicobar islands) and contiguous water courses which may be rivers, bays, intertidal creeks and channels and, backwaters. Thus, this ecosystem offers innumerable microhabitats for a large number of invertebrate species.

About 500 species of invertebrates have been reported from Indian mangroves out of which little more than 50% are insects and 20 % are zooplankton species. Amongst the remaining, molluscs and crustaceans are dominated (45%) in number of species followed by polychaetes. The majority of insect fauna reported so far are visitors. However, very recently (Veenakumari, *et al.*, 1997) reported the occurrence of 276 species of insects from the mangals of Andaman and Nicobar Islands out of which 197 species are herbivores, 36 species are predators and 43 species of parasitoides. Since only localized data of these insects are available these were not considered for assessment.

We have concentrated mainly on the assessement of resident animals which, almost exclusively spent their adult life in the mangals. Besides, we have also generated enormous data on economically important shell fishes where enough data are available.

Fishes Working Group Report
Members: M. Borkar, R.S. Lalmohan, P. Jeyaseelan, A. Kumar, P. Nammalvar, D. Parulekar, N. Rajendran, K.M. Panaisivam, A. Ramesh

In recent years, there is a global awarness for increased fish production under capture and culture conditions of coastal waters, estuaries, backwaters and mangrove swamps which constitute one of the most valuable and vulnerable natural resources of a nation's economy. The biodiversity of the various finfish species in the above ecosystems affects the natural resources. The following finfish species are included in the Lower risk - near threatened category.

Carangoides ciliarius Gunther, *Dasyatis uarnak* (Forsskal), *Hilsa kelee* (Cuvier), *Liza dussumieri* [=*L. subviridis* (Valenciennes)], *Liza macrolepis* (Smith), *Liza parsia* Hamiltens & Buchanan *Lutjanus fulviflammus* (Forsskal), *Lutjanus seleae* (Cuvier), *Lutjanus russelli* (Bleeker), *Megalops cyprinoides* (Broussonet), *Mugil cephalus* Linnaeus, *Osteomugil cunensius* (Valenciennes), *Plotosus canius* (Ham & Buch), *Pomadasys hasta* Bloch, *Sillago sihama* (Forsskal), *Siganus canaliculatus* (Linnaeus), *Siganus javus* (Linneaus), *Therapon puta* Cuvier, *Trypauchen vagina* (Bloch & Schneider).

Based on the finfish catch data, information on the loss of mangrove habitat due to human activities and over-exploitation of the stocks during seasons, it may be inferred that the distribution and abundance of finfish species were altered in the natural habitat. Before coming to the conclusion the rate of decline, reasons of decline, status of the habitat both quality and quantity were taken into consideration. Most of the species show a declining trend though we don't have specific data on each species. In fact we have data on the groups only, as perches or groupers or shads. However these data indicate the reduction of catch and the general trend.

Population monitoring and the life history studies should be done and will be important for the days to come.

The following finfish species are included in the Lower risk- least concern category:
Alectis indicus (Ruppell), *Ambassis commersoni* (Cuvier), *Caranx ignobilis, Caranx sexfasciates* Linneaus, *Etroplus suratensis* (Bloch), *Glassogobius giurus* (Hamilton-Buchanan), *Lethrenus nebulosus* (Forsskal), *Lobotes surinamensis* (Bloch), *Muraena macrura* (Bleeker), *Nematalosa nasus* (Bloch), *Sphyraena barracuda* (Walbaum), *Therapon jarbua* (Forsskal)

The above species are included in the LR-lc category as they have large area of distribution along the east and west coast of India and having global distribution extending from the east coast of Africa to Pacific coast. Some of them are transient population in the mangroves visiting the areas for feeding. Some of them form a fishery of local importance in trawlers and gillnets. Here also we have no specific data on the species. As a whole these data do not give indication of general decline though the personal perception of individual workers have shown decline to some extent. The general decline of many species may also be due to over exploitation. As management measures, the mesh size regulation in the capture of the many finfish species are to be imposed. This may avoid the species and number reduction on the fishery. Only medium size fishes are to be caught leaving the mature and early juveniles of the individual species in the natural habitat so as to maintain the stable populations.

Recommendations.

1. Before the construction of dams, environmental impact assessment should be made in the content of fisheries. The down stream impact of the rivers should also be studied as it is related to silt load of the rivers which is critical for the nutrient cycle.

2. Before the introduction of the new craft and gear their impact on fish populations should be verified.

3. The source of pollution and their impact on the fish habitat are to be assessed.

4. There should be regulation on the capture of juvenile in the mangrove areas. Regular monitoring studies should be undertaken

5. Habitat enhancement schemes such as regulation and replanting of mangroves flow of water methods for capture fishes should be considered.

The following finfish species are coming under VU.
Anguilla bicolar McClellandi, *Arius subrostratus* Valenciennes, *Boleophthalmus boddari* Cuvier, *Boleophthalmus dussumieri* Cuv. & Val., *Chanos chanos* (Forsskal), *Leiognathus splendens* (Cuvier), *Muraenichthys schultzei* (Bleeker), *Peripothalmus koelreuteri*, *Secutor ruconius* Ham & Buch, *Psammaperca waigaensis* (Cuvier), *Tenualosa ilisha* Ham.-Buch., *Elopes machnata* (Forsskal)

The above species are treated as vulnerable as their population has delivered in many areas mainly due to human disturbance like overfishing, dams, pollution, etc. Here also we may not have specific data on the species. But overall perception indicates decline in the fishery. For some of the species their distribution is fragmented while for some, dams and pollution form limiting factors. Environment impact assessment is required for the decline. Indiscriminate catch of larvae and juveniles is one of the important factors which affects the population. *Chanos chanos* and *Elops* population have declined mainly due to the over-exploitation of the juveniles which come to the coastal, mangrove and mudflats for feeding. *Chanos* which formed a fishery has just vanished along the Indian coast. The decline is well-documented. Before 40 years there was regular fry collection in Pamban and Rameshwaram, along the south-east coast. Now this fishery has been totally disappeared. Dams have done great harm to the hilsa fishery. *Hilsa ilisha* population has greatly declined due to large dams. Dams also block the sediment load to the mangrove. But very little attention is paid. Farakka Barrage and Mettur dams have caused great harm to the mangoves. Over fishing also have caused harm.

The following finfish species are coming under EN.
Boleophthalmus viridis , *Hamilton* Buchanon.

The major reasons for categorising this species as EN are its restricted range, being a resident of mangrove habitat, fragmentation of its habitat, and past and expected decline in the area and quality of habitat. Even though there is no quantitative data, some of the group members felt that there has been a drastic decline in the population in the last decade. The reasons cited in the vulnerable section also apply here also. Perhaps more detailed investigation may bring to light more species under this category.

Comments on IUCN Criteria Working Group
Members: L.J. Bhosale, S. Deshmukh, H.S. Kanvinde, K. Kathiresan, A.G. Untawale, S. Wafar, S.R. Yadav.

The Working Group felt that although the IUCN criteria laid down for the assessment of data sheet (on page 11 of the *Reference Manual,* 2nd Ind.Ed.), is quite comprehensive and well prepared, it, however, requires some modifications while systematically applying it to mangrove species. The Working Group discussed the following parameters of difficulty and tried to form a general consensus about the range and scope of difficulties in applying the criteria to mangrove species.

1. The Working Group felt that in general the following parametres used in the Red List categories have more applicability for animal groups; Extent of occurrence (A B C D); Area of occupancy (A B C D); Locations - For continuous, Population trends, World population, Generation time, Regional population/ distribution; Application of Red data Book (Red list) categories

2. The Working Group felt that an "ecosystem specific" sheet could be developed, particularly for the special group of plants “mangroves” which have:

i) Restricted distribution (Geographical)
ii) Almost uniform habitat
iii) Almost uniform ecosystem
iv) Limited number of species (limited diversity of species)
v) Exposed to almost same types of threats continuously
vi) Difficulty in their regeneration/propagation

3. The Working Group found that while filling up the data sheet forms, some species such as *Acanthus ilicifolius, Clerodendrum inerme, Avicennia marina* var. *acutissima* which are quite common along the coast, came under

'Critically Endangered or Endangered' categories based on the IUCN categories. This may not be the correct projection of these species in reality.

4. The Working Group therefore feels that the present categories need modification with reference to plants such as mangroves.

5. The Working Group also felt that the fact about the meagre/inadequate present knowledge of the plant species particularly the 'Mangroves' which are inadequately explored, cannot be neglected while practicaly applying the IUCN categories for assessment of the species.

Marine Algae Working Group

Members: A.G. Untawale, V.K. Dhargalkar, T.G. Jagtap, G.V. Deshmuke.

Altogether 624 species of marine macro-algae occur along the Indian coast. In India, forty-eight marine algal species are reported from the mangrove swamps. In our Working Group, however, we restricted ourselves to 25 macro algal species. These algae belong to 3 major groups such as Chlorophyta - green algae; Phaeophyta - brown algae and Rhodophyta - red algae. Mangrove regions in the tropics have been observed to harbor a number of economically/ commercially important algae such as *Monostroma oxyspermum* (high nutritional value), *Gracilaria verrucosa* (agarophyte), *Catnella impudica, Caloglossa lepriurii* (dyes and food vale) and *Caulerpa* sp. (bioactive substance), etc.

Species like *Enteromorpha clathrata* is most common on both east and west coast region. It has been observed that number of researchers working on the mangrove ecosystem in India have not paid much attention to work out ecological significance of these algae in mangrove ecosystem.

Marine algae in the mangrove swamps contribute in two ways; the first is towards the detritus and second is providing food for molluscs and other crustaceans. The association of the algae and fauna in mangrove area has yet to be studied.

The marine algal distribution in this region, along the Indian coast has so far been restricted to the taxonomical level, i.e. taxonomic identification and geographical occurrence. Actual availability of these species (in terms of biomass) still remains doubtful. Some estuaries along Central west coast of India are studied extensively by Jagtap and Untawale *et al.* However, from the east coast meager data is available (except for Sunderban) the species are mentioned along with the open coast intertidal algae; some times without monitoring the habitat. The third problem we faced during the assessment is that some of the species are present on the open coast as well in mangrove area. Therefore, while assessing and to give status, an error might have occurred.

Thus we feel that more systematic study is required to project a correct picture of marine algae in the mangrove swamps. Some species *Cladophora* and *Rosenvingea* should be investigated for the species level. It would be worth investigating role of marine algae in the mangrove food chain. This should be given priority. Similarly, it is required to work out the economics of commercially important algae.

Mangrove environment provides ideal location to undertake the seaweed cultivation studies for economically important seaweed species such as *Monostroma* and *Gracilaria* as wave action is minimized. A number of mangrove regions in the countries in southwest Asia have been used for the cultivation of economically important algae.

Conclusion

Participants at the workshop were strong in their belief that that mangrove ecosystem conservation is much required. The BCPP Conservation Assessment workshop has helped in understanding the urgent need to protect threatened taxa from extinction and manage them in the near future. Some of these taxa and the entire ecosystem may not survive if timely action is not taken, that is if they are not man-managed. Many of them, because of their small population size and restricted distribution, require intensive care and habitat management and may survive only with human support.

The IUCN categories and definitions to the Taxon Data Sheet

The Final version of the IUCN Red List Categories (December 1994) has evolved from inputs from specialists in different groups of taxa all over the world. Red List Categories were first introduced in the early 70s and only in 1991 a revaluation of the categories was done by Georgina Mace and Russell Lande which was called Version 1. For the first time a quantitative approach was introduced in assessing mammalian taxa. Version 2 and later versions attempted the approach of quantification for assessment for all groups of taxa except microorganisms. Non-threatened categories were also introduced during that iteration of the IUCN categories. The present version has been distinctly classified into threatened categories and non-threatened categories and a set of guidelines and criteria help in assessing the threat status of any taxa. The structure of the categories is given in Figure 1 of the Report.

The IUCN categories also give the option of assigning a taxon that is not endangered to a non-threatened category. The non-threatened categories are termed Lower Risk -near threatened, Lower Risk -least concern and Lower Risk -conservation dependent (see definitions of IUCN categories).

Definitions of the categories :
(These definitions are taken from the IUCN Guidelines for the Revised IUCN Red List Criteria but the examples have been added for this Report.)

EXTINCT (EX)
A taxon is Extinct when there is no reasonable doubt that its last individual has died.

EXTINCT IN THE WILD (EW)
A taxon is Extinct in the Wild when it is known only to survive in cultivation, in captivity, or as a naturalized population (or population) well outside the past range.

CRITICALLY ENDANGERED (CR)
A taxon is Critically Endangered when it is facing an extremely high risk of extinction in the wild in the immediate future as defined by the criteria listed in Table 1. An example of a Critically Endangered mangrove invertebrate from the present Report is *Caradisoma carnifex,* which has been classified as such because of reduction in population over the last 10 years.

ENDANGERED (EN)
A taxon is Endangered when it is not Critically Endangered but is facing a very high risk of extinction in the wild in the near future, as defined in the criteria listed in Table 1. The species *Bostrychia tenella*, a marine alga, is Endangered and has been categorised as such because of its restricted distribution in the west coast, fragmented and declining due to change in its quality of habitat, area and extent of occurrence.

VULNERABLE (VU)
A taxon is Vulnerable when it is not Critical or Endangered but is facing a high risk of extinction in the wild in the medium term future, as defined by the criteria listed in Table 1. An example of a species that is Vulnerable is *Arthrocnemum indicum,* a mangrove plant because of population reduction over the last 10 years.

LOWER RISK (LR) A taxon is Lower Risk when it has been evaluated and does not qualify for any of the above categories -- Critically Endangered, Endangered, Vulnerable -- and is not Data Deficient. There are to sub-categories for Lower Risk which will be explained below

LOWER RISK -conservation dependent (LRcd)
Taxa which do not currently qualify under any of the categories above may be classified as conservation dependent. To be considered conservation dependent, a taxon must be the focus of a continuing taxon-specific or habitat-specific conservation program which directly affects the taxon in question. The cessation of this program would result in the taxon qualifying for one of the threatened categories above. There was no species assessed as LRcd in this workshop.

LOWER RISK -near threatened (LRnt)
A taxon is near threatened when it is not Critically Endangered, Endangered, or Vulnerable but is, none-the-less, felt to be facing a risk of being threatened. Species example: *Carangoides ciliaris* (marine fish)

LOWER RISK -least concern (LRlc)
A taxon is considered of least concern when it is not threatened, conservation dependent or near threatened. An example of a invertebrate classified as least concern is *Nausitora dulopei*.

DATA DEFICIENT (DD)
A taxon is Data Deficient when there is inadequate information for making a direct, or indirect, assessment of its risk of extinction based on its distribution and/ or population status.

NOT EVALUATED (NE) A taxon is Not Evaluated when it has not yet been assessed against the criteria for some reason. An example of a mangrove plant that was categorised as Not Evaluated is *Rhizophora anamalayana*.

Application of the IUCN categories
The IUCN categories can be applied at three levels, viz. Global, Regional and National.

Global assessment: This term is used when applying the IUCN categories to a taxon in its entire distributional range. In this sense, "global" does not mean that the assessment is being made to a taxon with a "world-wide" or global distribution. For example, *Urochondra setulosa* (mangrove invertebrate) has a very limited distribution, found only in Andaman and Nicobar Islands, which is the "global distribution" of the species. Therefore, it has been assessed at the Global level in this workshop.

The IUCN categories work best at the Global level. This is tantamount to saying that the IUCN categories can be applied best to political endemics. Political endemics are endemics that do not have a distribution across political boundaries, that is, between nations. In this workshop all Indian endemics have been assessed globally.

National assessment: The term National Assessment means applying the IUCN categories to a taxon with respect to its distributional range throughout India. The present categories cannot be applied to taxa at the National level without undertaking many complex exercises. Factors such as distributional range in the neighbouring countries also needs to be known since the guidelines for categorisation at the National level takes into consideration migration of the taxon across political boundaries. Also, it is required to understand the life history of the taxa to be able to qualify for any of the criteria of Restricted Distribution, Population Estimates and Population Restriction. The exercise of a National Assessment can be undertaken only in the presence of experts with species knowledge from all the countries throughout which the taxon is distributed.

In this workshop, all non-endemics have been assigned IUCN categories based on National Assessment. This is because the taxa have been assessed for their complete distributional range in India and for a comprehensive National Action Plan, the assessment has been classified so.

Regional assessment: The term Regional Assessment means applying the IUCN categories to a taxon in part of its distributional range. A regional assessment, by deriving the status of the taxon for a region, which may differ from other regions in which it is found, thereby facilitates conservation activities, which can be implemented more appropriately over a smaller area. In this workshop, no mangrove taxon was assessed at the regional level.

The IUCN categories work best when applied to political endemics, as distribution range does not pose problems for assessment. Assessments for all endemics taxa (197) have been made at the Global level. The remaining non-endemic taxa (251) have been assessed Nationally. Nationally assessed taxa are denoted by the letter "N" following the IUCN category.

Criteria
The threatened categories of the IUCN Red List — Critically Endangered, Endangered and Vulnerable are derived based on 5 criteria (See Guidelines for Criteria for threat categories end of this report), viz:
A. Population reduction (PR)
B. Restricted distribution (either extent of occurrence or area of occupancy) (RD)
C. Population number, restricted distribution and fluctuation (PE)
D. Adult population numbers (Mature individuals) or restricted population (RP)
E. Probability of extinction (PX)

The subcriteria within each of the above criteria vary to determine if a taxon is Critically Endangered, Endangered or Vulnerable. While assigning a threat category to a taxon, the criteria that the threat is based on is also given.

Population Reduction
Population reduction is not easy to estimate since it involves also estimation of loss of habitat and various threats affecting the population. Information from direct observation is the best source but in many cases there are no population monitoring studies and precise figures are difficult to derive. Therefore educated estimates with good reasoning is also encouraged to derive this information (See IUCN Guidelines under section Data Quality). For threatened categories, the minimum percent decline in population is 20% over 3 generations or 10 years whichever is longer. Depending on the rate of decline, the taxon is assigned a threat category (see IUCN categories chart before the Summary Data Table in the Executive Summary section).

Restricted Distribution
As per IUCN guidelines for Restricted Distribution (see definitions for Taxon Data Sheets) a taxon is assessed as threatened if it has a restricted distribution. To meet this criterion the taxa also has to qualify two of the three subcriteria (see IUCN categories chart end of this report). Restricted distribution as per IUCN is less than 20,000 sq.km. for the Extent of Occurrence and/ or less than 2,000 sq.km. for the Area of Occupancy of the taxa.

Number of locations
This subcriteria is important to know if the taxon is assessed according to the "Extent of occurrence" criteria. Any taxon distributed in less than 10 locations would qualify for a limited location distribution which would qualify it for the threatened subcriteria. Depending on the number of locations below 10, the taxon would qualify for one subcriteria under Vulnerable, Endangered or Critically Endangered categories (see IUCN guidelines end of report)

If for any taxon, the number of locations is more than ten, then the question of whether the locations are fragmented or not becomes important. According to the guidelines, a population is fragmented from the other if there is no movement of genetic material between the populations. In most cases for plants it is difficult to assess what would be the critical distance for fragmentation. Information of number of locations is purely on the participants' judgement and their view of the soil invertebrate biology and migration capability. In certain cases the concept of fragmentation is very clear while not so in others.

Number of Mature Individuals
As per IUCN guidelines for the Number of Mature Individuals (see definitions for Taxon Data Sheets) a taxon is assessed as threatened if it has less than 1,000 mature individuals. Depending on the number, the degree of threat will be assigned.

It is always very difficult to estimate the number of mature individuals especially if the taxon is small and has a short generation time. In this CAMP no invertebrate was assessed based on the number of mature individuals

Data Quality
Assessments cannot be relied upon if there is no proper methodology or facts. It is therefore important to provide an authenticated account with the results. Data Quality is of six types, viz.
a) Reliable census or monitoring
b) General field study
c) Informal field sighting
d) Indirect information (from trade, local experts, practitioners, etc)
e) Herbarium/ museum/ literature/ collection records
f) Hearsay/ popular beliefs

Research recommendations
Research recommendations for most of the taxa are made based on the amount of information available and the need for understanding and managing the taxa in the wild. This is part of the conservation action plan that the group derives after the assessment of every taxon. The recommendations are:
a) Survey (S)
b) Monitoring (M)
c) Taxonomic and morphological genetic studies (T)
d) Genetic management (G)
e) Husbandry research (H)
f) Habitat management (Hm)
g) Limiting factor research (Lr)
h) Limiting factor management (Lm)
i) Life history studies (Lh) and
j) Other taxon specific recommendations (O)
k) Population and Habitat Viability Assessment

Captive breeding recommendations
Recommendations also include *ex situ* management and action plan along with *in situ* conservation. This includes different levels such as:
a) Level 1: Captive breeding for metapopulation management by maintaining 90% heterozygosity for 100 years by supplementing individuals or genetic material from captivity into the wild.
b) Level 2: For maintaining healthy genetic material in captivity by required input from the wild.
c) Level 3: Captive breeding not for conservation but either for research, education or husbandry.
d) Level 4: Captive breeding for either of the above and for sustainable utilisation.
e) Pending: Captive breeding pending further input from research or scientists.
f) No: Captive breeding not recommended.

Level of difficulty
This is an indicator of whether captive breeding is known, partly known or unknown for any taxon that is recommended for captive breeding
a) Level 1 -- Least difficult: Captive breeding techniques completely known for either the taxon or similar taxon.
b) Level 2 – Moderately difficult: Captive breeding techniques only partially in place for the taxon or similar taxon.
c) Level 3 – Very difficult: Captive breeding techniques not known for the taxon or similar taxa.
d) Not known: Information about the level of difficulty of captive breeding not known by the assessors.

Mangroves of India

Taxon Data Sheets

TAXON DATA SHEETS

Mangroves

1. *Acanthus ebracteatus* Vahl. — CR/N (B1, 2c) — **Family:** Acanthaceae. **Taxonomic status:** Species. **Habit:** Woody shrub with succulent branches. **Habitat:** Eumangrove. **Global Distribution:** Indo-Malaysia, Australasia (Malaysia, Philippines, Java, Singapore, Sri Lanka, New Guinea, Western Australia, Thailand, India). **Current Regional Distribution:** Andaman & Nicobar Islands. **-Range (sq. km):** < 5,000. **-Area Occupied (sq. km):** < 10. **-Number of location**: 1 (Andaman). **Population Trends - % change: -% Decline:** Not known. **-Time / Rate (Yrs or gens):** Not known. **-No of Mature Individuals:** Not known. **Global Population:** Not known. **Regional Population:** Not known. **Data Quality:** General field studies. **Recent Field Studies:** Krishna Kumar, 1990-92 in Andaman. **Threats:** Loss of habitat. **Trade:** No. **Other Comments:** A closely related species to *A. ilicefolius* (Vegetatively) but the difference from it in the absence of pair of stipular spines at the base of the leaves and in having a pair of bracteoles beneath each flower. **Status: -IUCN: CRITICALLY ENDANGERED (Nationally).DATA DEFICIENT (Gobally)**. **-Criteria based on: B1, 2c** (Restricted distribution, single location, continuing decline observed in extent of occurrence, area of occupancy and/or quality of habitat). **-CITES:** No. **-IWPA(1972;91):** No. **-RDB National (1994):** No. **-RDB International (1996):** No. **Recommendations: -Research management:** Survey; Monitoring; Habitat management; Life history studies. **-PHVA:** No. **Cultivation Program Recommendations: -Cultivation:** Pending. **-Level of difficulty:** Not known. **Existing Cultivation:** None. **-Names of facilities:** —. **Sourcers (Refer Appendix):** 150, 158 **. Compilers:** K. Kathiresan, H. Kanvinde, K. Muniyandi, T.S. Srinivasamurthy, S.D. Oswin, P.S. Rajasekhar, K. Kumar, T.A. Rao.

2. *Acanthus ilicifolius* L. — EN/N (B1, 2c) — **Family:** Acanthaceae. **Taxonomic status:** Species. **Habit:** Shrub or herb with aerial roots from decumbent stems. **Habitat:** Eumangrove. Tidal muddy land. **Global Distribution:** Indo-malayan and Australasia (Malaysia, Philippines, Singapore, Sri Lanka, Thailand, Australia, India). **Current Regional Distribution:** East and west coast, Andaman & Nicobar islands. **-Range (sq. km):** < 20,000. **-Area Occupied (sq. km):** < 500. **-Number of location**: Many; Fragmented . **Population Trends - % change: -% Decline:** 10 %. **-Time / Rate (Yrs or gens):** 20 yrs. **-No of Mature Individuals:** Not known. **Global Population:** Not known. **Regional Population:** Continuing decline. **Data Quality:** General field studies; Informal field sightings. **Recent Field Studies:** S. Deshmukh, 1990-97 in East and west coast; L.J. Bhosale, 1990-97 in Maharashtra; A. Untawale, Jagtap, Wafar 1990-97 in East and west coast; .K.V. Billore, 1968-72 in Thane dist., S. Deshmukh, 1986-90 in East and west coast. T.A. Rao, 1987 in Andaman; T.A. Rao, 1960-97 in Coastal India (East and west) coastal Islands. **Threats:** Damming; Human interference; Harvest; Loss of habitat. **Trade:** Not known. **Other Comments:** Use of the plant for medicinal purpose is under research. **Status: -IUCN: ENDANGERED (Nationally). DATA DEFICIENT (Globally). -Criteria based on: B1, 2c** (Restricted distribution, severely fragmented, continuing decline .observed in extent of occurrence, area of occupancy and quality of habitat). **-CITES:** No. **-IWPA(1972;91):** No. **-RDB National (1994):** No. **-RDB International (1996):** No. **Recommendations: -Research management:** Taxonomic and morphological genetic studies; Monitoring; .Limiting factor management; Genetic management; Others (Autoecological studies). **-PHVA:** No. **Cultivation Program Recommendations: -Cultivation:** Level 3. **-Level of difficulty:** No. **Existing Cultivation:** None. **-Names of facilities:** —.**Sourcers (Refer Appendix):** 19, 39, 70, 72-101, 103-145. **Compilers:** S. Wafar, M.R. Almeida, L.J. Bhosale, T.A. Rao, K.N. Desai, S. Deshmukh, C.N. Mohanan, S.R. Yadav, A.G. Untawale, A. Singh, K.V. Billore, R.K. Singh.

3. *Acanthus volubilis* Wall — CR/N (B1, 2c) — **Family:** Acanthaceae. **Taxonomic status:** Species. **Habit:** Twining climber. **Habitat:** Proestuarine. Mangrove tidal swamp. **Global Distribution:** Indo-malayan, Australasia (India). **Current Regional Distribution:** East coast, Andaman & Nicobar Islands. **-Range (sq. km):** < 5,000. **-Area Occupied (sq. km):** < 10. **-Number of location**: 3 (Andaman, Sunderbans, Bhittarkanika); Fragmented. **Population Trends - % change: -% Decline:** Not known. **-Time / Rate (Yrs or gens):** Not known. **-No of Mature Individuals:** > 2500. **Global Population:** Not known. **Regional Population:** Continuing decline observed. More than 2500 mature individuals. **Data Quality:** General field studies (L.K. Banerjee, 1983 Sunderbans)**. Recent Field Studies:** Dager *et al*., 1991 in Andaman; L.K. Banerjee et al., 1989. **Threats:** Harvest for medicine; Loss of habitat. **Trade:** No. **Other Comments:** Medicinal plants. used for leaves - dressing boils. After a period 90 years, it has been collected in Sunderbans. **Status: -IUCN: CRITICALLY ENDANGERED (Nationally). DATA DEFICIENT (Globally). -Criteria based on: B1, 2c** (Restricted distribution, severely fragmented, continuing decline .observed in extent of occurrence, area of occupancy and quality of habitat). **-CITES:** No. **-IWPA(1972;91):** No. **-RDB National (1994):** No. **-RDB International (1996):** No. **Recommendations: -Research management:** Survey; Monitoring; Habitat management; Limiting factor research. **-PHVA:** No. **Cultivation Program Recommendations: -Cultivation:** Level 1. **-Level of difficulty:** Very difficult. **Existing Cultivation:** None. **-Names of facilities:** —. **Sourcers (Refer Appendix):** 7, 158**. Compilers:** K. Kathiresan, H. Kanvinde, K. Muniyandi, T.S. Srinivasamurthy, S.D. Oswin, P.S. Rajasekhar, K. Kumar, T.A. Rao.

4. *Acrostichum aureum* L. — LRlc/N — **Family:** Pteridaceae (Fern). **Taxonomic status:** Species. **Habit:** Fern, steps woody arising from a stout woody rhizome, horizontal, irregular. **Habitat:** Mangrove weed. Down stream and intertidal (Back water). **Global Distribution:** Indo-malaysia, Australasia (India, Malaysia, The Philippines, Singapore, Sri Lanka, Thailand, Papua New Guinea), West and east America, West Africa, East Africa. **Current Regional Distribution:** Throughout Indian coast . **-Range (sq. km):** < 20,000. **-Area Occupied (sq. km):** < 500. **-Number of location**: Many (Sunderbans, Mahanadi delta, Malabar coast, Konkan coast Andaman); Fragmented. Population Trends - % change. -% Decline: Increasing by 5%. **-Time / Rate (Yrs or gens):** 20 yrs. **-No of Mature Individuals:** Not known. **Global Population:** Not known. **Regional Population:** Increase in population (by 5% in 20 years). **Data Quality:** General field studies; Informal field sightings. **Recent Field Studies:** T.A. Rao, 1973 in Kerala; T.A. Rao, 1960-97 in Coastal India; T.A. Rao, 1987 in Andaman; K.J. Thomas, 1962 in Kerala; T.A. Rao and P.V. Suresh, 1990**. Threats:** No. **Trade:** No. **Other Comments:** Mangrove weed. Secondary formation flourishes on abused mangrove habitat. **Status: -IUCN: LOWER RISK - LEAST CONCERN (Nationally). DATA DEFICIENT (Globally). -Criteria based on:** —. **-CITES:** Not known. **-IWPA(1972;91):** Not known. **-RDB National (1994):** Not known. **-RDB International (1996):** Not known. **Recommendations: -Research management:** Monitoring; Others

(Autoecological studies). **-PHVA:** No. **Cultivation Program Recommendations: -Cultivation:** No. **-Level of difficulty:** No. **Existing Cultivation:** None. **-Names of facilities:** —. **Sourcers (Refer Appendix):** 70, 72-101, 103-145. **Compilers:** S. Wafar, M.R. Almeida, L.J. Bhosale, T.A. Rao, K.N. Desai, S. Deshmukh, C.N. Mohanan, S.R. Yadav, A.G. Untawale, A. Singh, K.V. Billore, R.K. Singh.

5. *Aegialitis rotundifolia* Roxb. — EN/N (B1, 2c) — **Family:** Plumbaginaceae. **Taxonomic status:** Species. **Habit:** Shrubs and small tree. **Habitat:** Obligate associate (Proestuarine). Mangrove swamp. **Global Distribution:** Indo-malaysia (India, Sri Lanka, Thailand, Burma). **Current Regional Distribution:** East coast, Andaman & Nicobar Islands. **-Range (sq. km):** < 5,000. **-Area Occupied (sq. km):** < 500. **-Number of location**: 3 (Sunderbans; Mahanadi Delta; Andaman); Fragmented . **Population Trends - % change: -% Decline:** < 20 %. **-Time / Rate (Yrs or gens):** 10 yrs. **-No of Mature Individuals:** > 2500. **Global Population:** Not known. **Regional Population:** Continuing decline. Over 2500 mature individuals. **Data Quality:** General field studies (T.A. Rao and A.R.K. Sastri, 1974 in Sunderbans, West Bengal). **Recent Field Studies:** H. Kanvinde, 1995 in Bhitarkanika. **Threats:** Human interference; Loss of habitat. **Trade:** No. **Other Comments:** Gregarious homogenous patches occuring behind the *Avicennia* zone, towards the sea. Rarely seen in Andaman. **Status: -IUCN: ENDANGERED (Nationally). DATA DEFICIENT (Globally). -Criteria based on: B1, 2c** (Restricted distribution, limited location, severely fragmented, continuing decline observed in extent of occurrence, area of occupancy and quality of habitat). **-CITES:** No. **-IWPA(1972;91):** No. **-RDB National (1994):** No. **-RDB International (1996):** No. **Recommendations: -Research management:** Habitat management; Life history studies; Monitoring. **-PHVA:** No. **Cultivation Program Recommendations: -Cultivation:** Level 1. **-Level of difficulty:** Not known. **Existing Cultivation:** None. **-Names of facilities:** —. **Sourcers (Refer Appendix):** 7, 124, 158**. Compilers:** K. Kathiresan, H. Kanvinde, K. Muniyandi, T.S. Srinivasamurthy, S.D. Oswin, P.S. Rajasekhar, K. Kumar, T.A. Rao.

6. *Aegiceras corniculatum* (L.) Blanco — EN/N (B1, 2c) — **Family:** Myrsinaceae. **Taxonomic status:** Species. **Habit:** Tree/Shrub with stender broom like stilt roots. **Habitat:** Eumangrove. Intertidal and brackish swamps. **Global Distribution:** Indo-malaysia and Australasia (India, Indonesia, Malaysia, Pakistan, the Phillipines, Singapore, Sri Lanka, Thailand, Australia, Papua New Guinea). **Current Regional Distribution:** East and west coasts of India. **-Range (sq. km):** < 20,000. **-Area Occupied (sq. km):** < 500. **-Number of location**: Many; Fragmented. Population Trends - % change. -% Decline: 15 %. **-Time / Rate (Yrs or gens):** 20 yrs. **-No of Mature Individuals:** Not known. **Global Population:** Not known. **Regional Population:** Continuing decline observed. **Data Quality:** General field studies; Informal field sightings. . **Recent Field Studies:** T.A. Rao, 1960-97 in Coastal states of India; T.A. Rao, 1987 in Andaman; K.V. Billore, 1968-72 in Thane Dist., northern Maharashtra . **Threats:** Cattle grazing; Human interference; Loss of habitat; Trade. **Trade:** Local (fire wood). **Other Comments:** Eumangrove. Fragrant white flowers and curious crescent-shaped yellow fruits.in bunches. Base of trunk with white round lenticel. **Status: -IUCN: ENDANGERED (Nationally). DATA DEFICIENT (Globally). -Criteria based on: B1, 2c** (Restricted distribution, severely fragmented, continuing decline .observed in extent of occurrence, area of occupancy and quality of habitat). **-CITES:** No. **-IWPA(1972;91):** No. **-RDB National (1994):** No. **-RDB International (1996):** No. **Recommendations: -Research management:** Habitat management; Monitoring; Life history research. **-PHVA:** No. **Cultivation Program Recommendations: -Cultivation:** Level 1. **-Level of difficulty:** Moderate difficult. **Existing Cultivation:** None. **-Names of facilities:** —. **Sourcers (Refer Appendix):** 19, 42, 45-60, 62-68, 70, 72-101, 103-145**. Compilers:** S. Wafar, M.R. Almeida, L.J. Bhosale, T.A. Rao, K.N. Desai, S. Deshmukh, C.N. Mohanan, S.R. Yadav, A.G. Untawale, A. Singh, K.V. Billore, R.K. Singh.

7. *Aeluropus lagopoides* (L.) Trin. ex. Thw. — EN/N (B1, 2b) — **Family:** Poaceae (Graminae). **Taxonomic status:** Species. **Habit:** Perennial (Saline grass, Creeping, glabrous). **Habitat:** Transgress taxon. Down stream (Salt marshes), Intermediate (upper intertidal).**Global Distribution:** East Africa (Arabia, West Asia), Indo-malaysia (Sri Lanka, India). **Current Regional Distribution:** East and west coasts of India, Rajasthan, Punjab (Salt pans). **-Range (sq. km):** < 20,000. **-Area Occupied (sq. km):** < 500. **-Number of location**: Many; Fragmented. Population Trends - % change. -% Decline: 15%. **-Time / Rate (Yrs or gens):** 20 yrs. **-No of Mature Individuals:** Not known. **Global Population:** Continuing decline along Arabia and west Asia. **Regional Population:** Continuing decline along India. **Data Quality:** General field studies; Informal field sightings. **Recent Field Studies:** T.A. Rao, 1961-64 in Saurashtra; T.A. Rao, 1970 in West Bengal; T.A. Rao, 1990 in Karnataka; K.V. Billore, 1968-72 in Thana dist., (Northern Maharashtra)**. Threats:** Cattle grazing; Human interference; Loss of habitat; Trade. **Trade:** Local (fodder). **Other Comments:** Trangress taxon. **Status: -IUCN: ENDANGERED (Nationally). DATA DEFICIENT (Globally). -Criteria based on: B1, 2b** (Restricted distribution, severely fragmented, continuing decline .observed in extent of occurrence, area of occupancy and quality of habitat). **-CITES:** Not known. **-IWPA(1972;91):** Not known. **-RDB National (1994):** Not known. **-RDB International (1996):** Not known. **Recommendations: -Research management:** Husbandry research; Monitoring. **-PHVA:** No. **Cultivation Program Recommendations: -Cultivation:** Level 3. **-Level of difficulty:** Least difficult. **Existing Cultivation:** None. **-Names of facilities:** —. **Sourcers (Refer Appendix):** 19, 42, 45-60, 62-68, 70, 72-101, 103-145. **Compilers:** S. Wafar, M.R. Almeida, L.J. Bhosale, T.A. Rao, K.N. Desai, S. Deshmukh, C.N. Mohanan, S.R. Yadav, A.G. Untawale, A. Singh, K.V. Billore, R.K. Singh.

8. *Aglaia cuculata* (Roxb.) Pelleg. — EN/N (B1, 2c) — (*Amoora cucullata* Roxb.). **Family:** Meliaceae. **Taxonomic status:** Species (Dioecious). **Habit:** Tree. **Habitat:** Proestuarine. Mangroves. **Global Distribution:** Indo-malaysia (India, Pakistan, Sri Lanka, Thailand, Indonesia). **Current Regional Distribution:** East coast, Andaman & Nicobar Islands. **-Range (sq. km):** < 5,000. **-Area Occupied (sq. km):** < 500. **-Number of location**: 3 (Sunderbans; Mahanadi; Andaman & Nicobar); Fragmented. **Population Trends - % change: -% Decline:** Not known. **-Time / Rate (Yrs or gens):** Not known. **-No of Mature Individuals:** > 2500. **Global Population:** Not known. **Regional Population:** May be declining. > 2500 mature individuals at present. **Data Quality:** General field studies (L.K. Bannerjee and T.A. Rao, 1990 in Mahanadi Delta). **Recent Field Studies:** Proestuarine. Basal cup of terminal leaflet strong root suckers are the identity marks. **Threats:** Loss of habitat. **Trade:** No. **Other Comments:** Used for making toys and cigars. **Status: -IUCN: ENDANGERED (Nationally). DATA DEFICIENT (Globally). -Criteria based on: B1, 2c** (Restricted distribution, limited location, severely fragmented, continuing decline observed in extent of occurrence, area of occupancy and quality of habitat). **-CITES:** No. **-IWPA(1972;91):** No. **-RDB**

National (1994): No. **-RDB International (1996):** No. **Recommendations: -Research management:** Survey; Habitat management; Monitoring; Life history studies. **-PHVA:** No. **Cultivation Program Recommendations: -Cultivation:** Level 1. **-Level of difficulty:** Not known. **Existing Cultivation:** None. **-Names of facilities:** —. **Sourcers (Refer Appendix):** 5, 6, 150**. Compilers:** K. Kathiresan, H. Kanvinde, K. Muniyandi, T.S. Srinivasamurthy, S.D. Oswin, P.S. Rajasekhar, K. Kumar, T.A. Rao.

9. *Arthrocnemum indicum* (Willd.) Moq. — VU/N (A1a, b) — **Family:** Chenopodiaceae. **Taxonomic status:** Species. **Habit:** Herb. **Habitat:** Obligate associate (Proestuarine). Saline blanks.**Global Distribution:** Sri Lanka, India. **Current Regional Distribution:** East and west coasts of India. **-Range (sq. km):** < 5,000. **-Area Occupied (sq. km):** > 2,000. **-Number of location**: Severly fragmented. **Population Trends - % change: -% Decline:** 20 %. **-Time / Rate (Yrs or gens):** 10 yrs. **-No of Mature Individuals:** inumerable. **Global Population:** Not known. **Regional Population:** Continuing decline observed. **Data Quality:** General field study (T.A. Rao and A.R.K. Sastry, 1974 in East coast of India). **Recent Field Studies:** K**.** Kathiresan, 1995 in Portonovo **. Threats:** Loss of habitat. **Trade:** No. **Other Comments:** Edible by livestock. Obligate proestuarine associate mangrove. **Status: -IUCN: VULNERABLE (Nationally). DATA DEFICIENT (Globally). -Criteria based on: A1a, 1b** (Observed continuing decline due to reduction in abundance). **-CITES:** No. **-IWPA(1972;91):** No. **-RDB National (1994):** No. **-RDB International (1996):** No. **Recommendations: -Research management:** Monitoring; Habitat management; Husbandry research; Life history studies. **-PHVA:** No. **Cultivation Program Recommendations: -Cultivation:** Level 3. **-Level of difficulty:** Not known. **Existing Cultivation:** None. **-Names of facilities:** —. **Sourcers (Refer Appendix):** 131. **Compilers:** K. Kathiresan, H. Kanvinde, K. Muniyandi, T.S. Srinivasamurthy, S.D. Oswin, P.S. Rajasekhar, K. Kumar, T.A. Rao.

10. *Avicennia alba* Bl. — CR/N (A1a, 1c) — **Family:** Avicenniaceae. **Taxonomic status:** Species. **Habit:** Tree/Shrub. Branches pale dark greying, black sooted. **Habitat:** Eumangrove. Down stream, Lower and Middle (intertidal region). **Global Distribution:** Indo-malaysia and Australasia (India, Indonesia, Malaysia, the Phillipines, Singapore, Sri Lanka, Thailand, Papua New Guinea). **Current Regional Distribution:** East and west coast, Andaman & Nicobar Islands. **-Range (sq. km):** < 5,000. **-Area Occupied (sq. km):** < 500. **-Number of location**: +/- 15; Fragmented . Population Trends - % change. -% Decline: 80%. **-Time / Rate (Yrs or gens):** 3 generations. **-No of Mature Individuals:** Not known. **Global Population:** Not known. **Regional Population:** Continuing decline in 3 generations. **Data Quality:** General field studies; Information field sightings (T.A. Rao, 1984-89 in Karnataka, A. Untawale *et al*., 1980 in Goa, T.A. Rao, 1960-97 in Coastal India).**Recent Field Studies:** S. Deshmukh, 1992-96 in Sunderbans. **Threats:** Genetic problem; Human interference; Loss of habitat; Pollution. **Trade:** No. **Other Comments:** Fodder use. Eumangrove. Air layering appears to be very promising. . **Status: -IUCN: CRITICALLY ENDANGERED (Nationally). DATA DEFICIENT (Globally). -Criteria based on: A1a, 1c** (Observed continuing decline due to decrease in extent of occurrence, area of occupancy and/or quality of habitat). **-CITES:** No. **-IWPA(1972;91):** No. **-RDB National (1994):** No. **-RDB International (1996):** No. **Recommendations: -Research management:** Taxonomic and morphological genetic studies; Survey; Monitoring; Genetic management; Habitat management; Limiting factor research; Other (Population dynamics; Bio-climatic studies). **-PHVA:** Yes. **Cultivation Program Recommendations: -Cultivation:** Level 1. **-Level of difficulty:** Very difficult. **Existing Cultivation:** None. **-Names of facilities:** —.**Sourcers (Refer Appendix):** 19, 28, 42, 45-60, 62-68, 70, 72-101, 103-145. **Compilers:** S. Wafar, M.R. Almeida, L.J. Bhosale, T.A. Rao, K.N. Desai, S. Deshmukh, C.N. Mohanan, S.R. Yadav, A.G. Untawale, A. Singh, K.V. Billore, R.K. Singh.

11. *Avicennia marina* (Forsk.) Vierh. var. *acutissima* — *EN/N (A1c, 1d)* — Stapf and Mold. — **Family:** Avicenniaceae. **Taxonomic status:** Variety. **Habit:** Tree/ Shrub. **Habitat:** Eumangrove. Down stream, Intermediate (Lower, Middle and higher intertidal region). **Global Distribution:** West and east America, West and east Africa, Indo-malaysia, Australasia (India). **Current Regional Distribution:** East and west coasts. **-Range (sq. km):** < 20,000. **-Area Occupied (sq. km):** < 2,000. **-Number of location**: Many; Fragmented. Population Trends - % change. -% Decline: > 80%. **-Time / Rate (Yrs or gens):** 3 generations. **-No of Mature Individuals:** Not known. **Global Population:** Not known. **Regional Population:** Continuing decline inferred over 3 generations. **Data Quality:** General field study; Informal field sightings. **Recent Field Studies:** T.A. Rao, 1960-63 in Saurashtra; T.A. Rao, 1983-97 in Karnataka; K.V. Billore, 1968-72 in Thane District (northern Maharashtra). **Threats:** Cattle grazing; Human interference; Harvest; Harvest for food; Loss of habitat; Overexploitation; Trade. **Trade:** Local; Domestic (as a fuel wood). **Other Comments:** Eumangrove. Ethno-botanical utilization. Leaves elliptic, ovate and fruits apiculate. (Air layering is not successful). **Status: -IUCN: ENDANGERED (Nationally). DATA DEFICIENT (Globally). -Criteria based on: A1c, 1d** (Continuing decline due to decline in extent of occurrence, area of.occupancy and quality of habitat and due to actual or potential levels of .exploitation). **-CITES:** No. **-IWPA(1972;91):** No. **-RDB National (1994):** No. **-RDB International (1996):** No. **Recommendations: -Research management:** Taxonomic and morphological genetic studies; Habitat management; Survey; Monitoring; Limiting factor research; Other (Population dynamics - Genecology). **-PHVA:** No. **Cultivation Program Recommendations: -Cultivation:** Level 2. **-Level of difficulty:** Moderately difficult . **Existing Cultivation:** None. **-Names of facilities:** —. **Sourcers (Refer Appendix):** 22; 114-214. **Compilers:** S. Wafar, M.R. Almeida, L.J. Bhosale, T.A. Rao, K.N. Desai, S. Deshmukh, C.N. Mohanan, S.R. Yadav, A.G. Untawale, A. Singh, K.V. Billore, R.K. Singh.

12. *Avicennia marina var. resinifera* (Forst.) Bakh. — CR/N (B1, 2b, 2c, 2d; D) — **Family:** Avicenniaceae. **Taxonomic status:** Variety. **Habit:** Tree/ Shrub. **Habitat:** Eumangrove. Intermediate - middle intertidal region. . **Global Distribution:** Indo-malaysia, Australasia (Australia, India, New Guinea, the Phillipines, Sumatra). **Current Regional Distribution:** West coast. **-Range (sq. km):** < 100. **-Area Occupied (sq. km):** < 10. **-Number of location**: 1 (Malvan; Maharashtra state). **Population Trends - % change: -% Decline:** Not known. **-Time / Rate (Yrs or gens):** Not known. **-No of Mature Individuals:** 10 -15. **Global Population:** Not known. **Regional Population:** Very few individual remaining. **Data Quality:** General field studies; Informal field sightings. **Recent Field Studies:** L.J. Bhosale**. Threats:** Human interference; Loss of habitat. **Trade:** No. **Other Comments:** The taxonomy of this variety needs to be reviewed with reference to its solitary occurrence in nature in west coast of India. **Status: -IUCN: CRITICALLY ENDANGERED (Nationally). DATA DEFICIENT**

(Globally). -Criteria based on: B1, 2b, 2c, 2d (Restricted distribution, single location, continuing decline observed in extent of occurrence, area of occupancy and quality of habitat and decrease in number of mature individuals)**; D** (Very few mature individuals). **-CITES:** No. **-IWPA(1972;91):** No. **-RDB National (1994):** No. **-RDB International (1996):** No. **Recommendations: -Research management:** Taxonomic and morphological genetic studies; Survey; Monitoring; Genetic management; Limiting factor research. **-PHVA:** No. **Cultivation Program Recommendations: -Cultivation:** Level 1. **-Level of difficulty:** Very difficult. **Existing Cultivation:** None. **-Names of facilities:** —. **Sourcers (Refer Appendix):** 18. **Compilers:** S. Wafar, M.R. Almeida, L.J. Bhosale, T.A. Rao, K.N. Desai, S. Deshmukh, C.N. Mohanan, S.R. Yadav, A.G. Untawale, A. Singh, K.V. Billore, R.K. Singh.

13. *Avicennia officinalis* L. — EN/N (B1, 2b) — **Family:** Avicenniaceae . **Taxonomic status:** Species. **Habit:** Tree (Medium sized)/ Shrub. Aerial still roots more commonly developed. **Habitat:** Eumangrove. Intermediate upstreams (lower intertidal). **Global Distribution:** Indo-malaysia and Australasia (India, Indonesia, Malaysia, Singapore, the Philippines). **Current Regional Distribution:** East and west coasts of India. **-Range (sq. km):** < 20,000. **-Area Occupied (sq. km):** < 500. **-Number of location**: Many; Fragmented . Population Trends - % change. -% Decline: 25 %. **-Time / Rate (Yrs or gens):** 20 yrs. **-No of Mature Individuals:** Not known. **Global Population:** Not known. **Regional Population:** Continuing decline observed. **Data Quality:** General field studies; Informal field sightings. **Recent Field Studies:** T.A. Rao, 1960-92 in Coastal India; K.V. Billore, 1968-72 in Thane Dist., (Northern Maharashtra)**. Threats:** Cattle grazing; Damming; Human interference; Harvest for timber; Harvest; Harvest for food; Loss of habitat; Overexploitation; Trade. **Trade:** Local. **Other Comments:** (Air layering is successful). **Status: -IUCN: ENDANGERED (Nationally). DATA DEFICIENT (Globally). -Criteria based on: B1, 2b** (Restricted distribution, severely fragmented, continuing decline .observed in area of occupancy). **-CITES:** No. **-IWPA(1972;91):** No. **-RDB National (1994):** No. **-RDB International (1996):** No. **Recommendations: -Research management:** Monitoring; Taxonomic and morphological genetic studies; Habitat management; Husbandry research; Other (Regeneration propagation); Limiting factor research . **-PHVA:** No. **Cultivation Program Recommendations: -Cultivation:** Level 1. **-Level of difficulty:** Very difficult. **Existing Cultivation:** None. **-Names of facilities:** —. **Sourcers (Refer Appendix):** 19, 42, 45-60, 62-68, 70, 72-101, 103-145. **Compilers:** S. Wafar, M.R. Almeida, L.J. Bhosale, T.A. Rao, K.N. Desai, S. Deshmukh, C.N. Mohanan, S.R. Yadav, A.G. Untawale, A. Singh, K.V. Billore, R.K. Singh.

14. *Brownlowia tersa* (L.) Kostern. — EN/N (B1, 2c) — *(B. lanceolata* Benth.). **Family:** Tiliaceae. **Taxonomic status:** Shrub/species. **Habit:** . **Habitat:** Associate -Proestuarine. Along tidal creeks and shallow channels. **Global Distribution:** Indo-Burma, Malaysia, Singapore, Thailand, Philippines. **Current Regional Distribution:** East coast, Andaman & Nicobar Islands. **-Range (sq. km):** < 5,000. **-Area Occupied (sq. km):** < 500. **-Number of location**: 5 (Sunderbans; Mahanadi; Andaman & Nicobar); Fragmented. **Population Trends - % change: -% Decline:** < 30 %. **-Time / Rate (Yrs or gens):** 10 yrs. **-No of Mature Individuals:** > 2500. **Global Population:** Not known. **Regional Population:** > 2500 mature individuals -Continuing decline observed. **Data Quality:** General field studies. **Recent Field Studies:** L.K. Bannerjee and T.A. Rao, 1990 in Mahanadi Delta, Orissa; H. Kanvinde in1995 Orissa. **Threats:** Loss of habitat. **Trade:** No. **Other Comments:** Only Tiliaceae member found in mangrove habitat. Identified by bilobed asymmetncal fruit and paniculate flower cluster. Fruit for relief of boils. **Status: -IUCN: ENDANGERED (Nationally). DATA DEFICIENT (Globally). -Criteria based on: B1, 2c** (Restricted distribution, limited location, severely fragmented, continuing decline observed in extent of occurrence, area of occupancy and quality of habitat). **-CITES:** No. **-IWPA(1972;91):** No. **-RDB National (1994):** No. **-RDB International (1996):** No. **Recommendations: -Research management:** Monitoring; Limiting factor research. **-PHVA:** Not known. **Cultivation Program Recommendations: -Cultivation:** Level 1. **-Level of difficulty:** Moderately difficult. **Existing Cultivation:** None. **-Names of facilities:** —. **Sourcers (Refer Appendix):** 15, 6, 58**. Compilers:** K. Kathiresan, H. Kanvinde, K. Muniyandi, T.S. Srinivasamurthy, S.D. Oswin, P.S. Rajasekhar, K. Kumar, T.A. Rao.

15. *Bruguiera cylindrica* (L) Bl. — EN/N (A1c, 1d, 2d; B1, 2c) — Family: Rhizophoraceae. **Taxonomic status:** Species. **Habit:** Tree/Shrub. **Habitat:** Eumangrove. Downstream, Intermediate (middle intertidal region). **Global Distribution:** Indo-malaysia and Australasia (India, Indonesia, Malaysia, the Phillipines, Singapore, Sri Lanka, Thailand, Australia). **Current Regional Distribution:** West and east coasts, Andaman islands. **-Range (sq. km):** < 5,000. **-Area Occupied (sq. km):** < 500. **-Number of location**: 30; Fragmented. **Population Trends - % change: -% Decline:** > 50%. **-Time / Rate (Yrs or gens):** 3 generations. **-No of Mature Individuals:** Not known. **Global Population:** Not known. **Regional Population:** Continuing decline observed . **Data Quality:** K.V. Billore, 1968-72 in Thane Dist., (northern Maharashtra); R.L. Mitra and L.K. Bannerjee, 1979 in East coast of India. **Recent Field Studies:** T.A. Rao, 1960-97 in Coastal India. **Threats:** Human interference; Harvest for timber; Harvest; Loss of habitat; Overexploitation; Trade. **Trade:** Domestic; Commercial. **Other Comments: --. Status: -IUCN: ENDANGERED (Nationally). DATA DEFICIENT (Globally). -Criteria based on: A1c, 1d, 2d** (Continuing decline due to decrease in extent of occurrence, area of occupancy and quality of habitat and in mature individuals and predicted decline in number of mature individuals); **B1, 2c** (Restricted distribution, severely fragmented, continuing decline in extent of occurrence, area of occupancy and quality of habitat). **-CITES:** No. **-IWPA(1972;91):** No. **-RDB National (1994):** No. **-RDB International (1996):** No. **Recommendations: -Research management:** Taxonomic and morphological genetic studies; Survey; Limiting factor management; Habitat management; Monitoring. **-PHVA:** No. **Cultivation Program Recommendations: -Cultivation:** Level 1. **-Level of difficulty:** Moderately difficult. **Existing Cultivation:** None. **-Names of facilities:** —. **Sourcers (Refer Appendix):** 19, 42, 47, 45-60, 62-68, 70, 72-101, 103-145. **Compilers:** S. Wafar, M.R. Almeida, L.J. Bhosale, T.A. Rao, K.N. Desai, S. Deshmukh, C.N. Mohanan, S.R. Yadav, A.G. Untawale, A. Singh, K.V. Billore, R.K. Singh.

16. *Bruguiera gymnorrhiza* (L.) Savigny — CR/N (A1c, 1d) — **Family:** Rhizophoraceae. **Taxonomic status:** Species. **Habit:** Tree. high with short buttressess, bark rough, fissured. Geniculate pneumatophore. **Habitat:** Eumangrove. Lower and Middle streams; Intertidal areas.**Global Distribution:** East Africa, Indo-malaysia and Australasia (India, Indonesia, Pakistan, the Phillipines, Singapore, Sri Lanka, Thailand, Australia, Fiji, Papua New Guinea). **Current Regional Distribution:** East and west coast, Andaman & Nicobar Islands. **-Range (sq. km):** < 5,000. **-Area Occupied (sq. km):** < 500. **-Number of location**: Many; Fragmented . **Population Trends - % change: -% Decline:** > 80%. **-Time / Rate**

(Yrs or gens): 3 generations. **-No of Mature Individuals:** Not known. **Global Population:** Not known. **Regional Population:** Continuing decline observed. . **Data Quality:** General field studies; Informal field sightings;. **Recent Field Studies:** T.A. Rao, 1960-97 in Coastal India, R.L. Mitra and L.K. Bannerjee, 1979 in East coast of India. **Threats:** Human interference; Harvest for timber; Harvest; Harvest for medicine;.Loss of habitat; Overexploitation; Trade. **Trade:** Domestic; Commerial (suspected). **Other Comments:** Flower exposed for some time and bagged, develops propagules. **Status: -IUCN: CRITICALLY ENDANGERED (Nationally). DATA DEFICIENT (Globally). -Criteria based on: A1c, 1d**. **-CITES:** No. **-IWPA(1972;91):** No. **-RDB National (1994):** No. **-RDB International (1996):** No. **Recommendations: -Research management:** Taxonomic and morphological genetic studies; Monitoring; Survey; Genetic management; Habitat management. **-PHVA:** Yes. **Cultivation Program Recommendations: -Cultivation:** Level 1. **-Level of difficulty:** Moderate difficult. **Existing Cultivation:** None. **-Names of facilities:** —. **Sourcers (Refer Appendix):** 19, 42, 47, 45-60, 62-68, 70, 72-101, 103-145 . **Compilers:** S. Wafar, M.R. Almeida, L.J. Bhosale, T.A. Rao, K.N. Desai, S. Deshmukh, C.N. Mohanan, S.R. Yadav, A.G. Untawale, A. Singh, K.V. Billore, R.K. Singh.

17. *Bruguiera parviflora* (Roxb.) Wt. and Arn. ex Griff. — CR/N (A1c, 1d) — **Family:** Rhizophoraceae. **Taxonomic status:** Species. **Habit:** Tree. **Habitat:** Eumangrove. Intermediate (higher intertidal region). **Global Distribution:** Indo-malaysia and Australasia (India, Indonesia, Malaysia, the Phillipines, Singapore, Sri Lanka, Thailand, Australia, Papua New Guinea). **Current Regional Distribution:** East and west coast, Andaman & Nicobar Islands. **-Range (sq. km):** < 20,000. **-Area Occupied (sq. km):** < 500. **-Number of location**: Many; Fragmented . **Population Trends - % change: -% Decline:** > 80 %. **-Time / Rate (Yrs or gens):** 3 generations. **-No of Mature Individuals:** Not known. **Global Population:** Not known. **Regional Population:** Continuing decline observed over the last 3 generations. **Data Quality:** General field studies; Informal field sightings;. **Recent Field Studies:** T.A. Rao, 1969-97 in Coastal India. R.L. Mitra and L.K. Bannerjee, 1979 in East coast of India. **Threats:** Human interference; Harvest for timber; Harvest; Loss of habitat;.Overexploitation; Trade. **Trade:** Local. **Other Comments:** The species is recorded from 1 location in Karnataka (<100 mat.ind) though predominantly found only in the east coast and Andaman & Nicobar islands. The Karnataka population must be verified. Vegetative propagation - air layering tried, but difficult to propogate. (Decline = > 80). **Status: -IUCN: CRITICALLY ENDANGERED (Nationally). DATA DEFICIENT (Globally). -Criteria based on: A1c, 1d** (Population reduction due to decline in extent of occurrence, area of occupancy, quality of habitat and number of mature individuals). **-CITES:** No. **-IWPA(1972;91):** No. **-RDB National (1994):** No. **-RDB International (1996):** No. **Recommendations: -Research management:** Taxonomic and morphological genetic studies; Monitoring; Survey; Limiting factor research. **-PHVA:** Yes. **Cultivation Program Recommendations: -Cultivation:** Level 1. **-Level of difficulty:** Very difficult. **Existing Cultivation:** None. **-Names of facilities:** —. **Sourcers (Refer Appendix):** 42, 45-60, 62-68, 70, 72-101, 103-145. **Compilers:** S. Wafar, M.R. Almeida, L.J. Bhosale, T.A. Rao, K.N. Desai, S. Deshmukh, C.N. Mohanan, S.R. Yadav, A.G. Untawale, A. Singh, K.V. Billore, R.K. Singh.

18. *Bruguiera sexangula* (Lour.) Poir. — VU/N (B1, 2c, 2d) — **Family:** Rhizophoraceae. **Taxonomic status:** Species. **Habit:** Tree. **Habitat:** Eumangrove. Mangrove tidal swamp. **Global Distribution:** Indo-malayan, Australasia (India, Malaysia, Indonesia, Philippines, Singapore, Sri Lanka, Thailand, Australia, Papua New Guinea). **Current Regional Distribution:** East coast, Andaman & Nicobar Islands. **-Range (sq. km):** < 5,000. **-Area Occupied (sq. km):** < 10. **-Number of location**: 6 (Mahanadhi; Bhittarkanika; Sunderbans; South Andaman); Fragmented. **Population Trends - % change: -% Decline:** Not known. **-Time / Rate (Yrs or gens):** Not known. **-No of Mature Individuals:** > 2500. **Global Population:** Not known. **Regional Population:** May be declining overall. Continuing decline in a few locations. **Data Quality:** General field studies (V.P. Singh et al., 1986 in Andaman; R.L. Mitra and L. K. Banerjee, 1979 in East coast of India). **Recent Field Studies:** None**. Threats:** Human interference; Loss of habitat. **Trade:** No. **Other Comments:** Easily identified by solitary orange yellow flowers. The area of occupancy of this species needs more study. Three forms have been recognised by R.L. Misra and L.K. Banerjee (1979). **Status: -IUCN: VULNERABLE (Nationally). DATA DEFICIENT (Globally). -Criteria based on: B1, 2c, 2d** (Restricted distribution, severely fragmented, continuing decline observed in extent of occurrence, area of occupancy, quality of habitat and number of locations or subpopulations). **-CITES:** —. **-IWPA(1972;91):** No. **-RDB National (1994):** No. **-RDB International (1996):** No. **Recommendations: -Research management:** Survey; Monitoring. **-PHVA:** No. **Cultivation Program Recommendations: -Cultivation:** No. **-Level of difficulty:** Least difficult. **Existing Cultivation:** None. **-Names of facilities:** —. **Sourcers (Refer Appendix):** 6, 47, 153, 154**. Compilers:** K. Kathiresan, H. Kanvinde, K. Muniyandi, T.S. Srinivasamurthy, S.D. Oswin, P.S. Rajasekhar, K. Kumar, T.A. Rao.

19. *Cenchrus ciliaris* — EN/N (B1, 2c) — **Family:** Poaceae, Panicoideae, Paniceae. **Taxonomic status:** Species. **Habit:** Perennial saline grass. **Habitat:** Associate. Coastal Muddy soil of Saurashtra to inland soil. Transgress taxon. **Global Distribution:** Mediterrarean. Tropical Africa and India. **Current Regional Distribution:** West and east coast, Dry areas. **-Range (sq. km):** < 5,000. **-Area Occupied (sq. km):** < 500. **-Number of location**: Many (West coastal villages of Saurashtra); Fragmented. **Population Trends - % change: -% Decline:** No change. **-Time / Rate (Yrs or gens):** —. **-No of Mature Individuals:** Not known. **Global Population:** Not known. **Regional Population:** May be declining. **Data Quality:** General field study. **Recent Field Studies:** T.A. Rao, *et al.*, 1966, 1967, 1971 and 1977 in Saurashtra coast. **Threats:** Cattle grazing; Human interference; Pollution; Trade. **Trade:** Local; Domestic. **Other Comments:** As a common grass distributing all the coastal sites wherever the Mangroves and sandy areas extend. Hotter and drier parts of India. A valuable fodder especially for hay; a useful lawn grass. **Status: -IUCN: ENDANGERED (Nationally). DATA DEFICIENT (Globally). -Criteria based on: B1, 2c** (Restricted distribution, severely fragmented, continuing decline observed in extent of occurrence, area of occupancy and/or quality of habitat). **-CITES:** No. **-IWPA(1972;91):** No. **-RDB National (1994):** No. **-RDB International (1996):** No. **Recommendations: -Research management:** Monitoring; Husbandry research; Life history studies; Habitat management. **-PHVA:** No. **Cultivation Program Recommendations: -Cultivation:** Level 1. **-Level of difficulty:** Not known. **Existing Cultivation:** None. **-Names of facilities:** —. **Sourcers (Refer Appendix):** 86, 87, 88, 91, 129. **Compilers:** .K. Kathiresan, H. Kanvinde, K. Muniyandi, T.S. Srinivasamurthy, S.D. Oswin, P.S. Rajasekhar, K. Kumar, T.A. Rao.

20. *Cerbera manghas* L. — EN/N (B1, 2c) — **Family:** Apocynaceae. **Taxonomic status:** Species. **Habit:** Tree (15m, grayish smooth bark). **Habitat:** Proestuarine. Upstream, Intermediate (lower and middle intertidal regions).**Global Distribution:** Indo-malaysia and Australasia (India, Philippines, Singapore, Sri Lanka, Thailand). **Current Regional**

Distribution: East and west coasts. **-Range (sq. km):** < 5,000. **-Area Occupied (sq. km):** < 500. **-Number of location**: Many; Fragmented . **Population Trends - % change: -% Decline:** 30 %. **-Time / Rate (Yrs or gens):** 3 generations. **-No of Mature Individuals:** Not known. **Global Population:** Malaysia, China, Australia. **Regional Population:** Continuing decline observed. **Data Quality:** General field studies; Informal field sightings. **Recent Field Studies:** T.A. Rao, 1960-97 in Coastal India. **Threats:** Human interference; Harvest; Trade; Trade for parts. **Trade:** Local. **Other Comments:** Fruits are harvested for poisoning fishes. Poison found in seeds. Used as firewood. White flowers with yellow throat turning purple belatedly. **Status: -IUCN: ENDANGERED (Nationally). DATA DEFICIENT (Globally). -Criteria based on: B1, 2c** (Restricted distribution, limited location, severely fragmented, continuing decline observed in extent of occurrence, area of occupancy and quality of habitat). **-CITES:** No. **-IWPA(1972;91):** No. **-RDB National (1994):** No. **-RDB International (1996):** No. **Recommendations: -Research management:** Survey; Limiting factor management. **-PHVA:** No. **Cultivation Program Recommendations: -Cultivation:** Level 3. **-Level of difficulty:** Least difficult. **Existing Cultivation:** None. **-Names of facilities:** —. **Sourcers (Refer Appendix):** 42, 45-60, 62-68, 70, 72-101, 103-145. **Compilers:** S. Wafar, M.R. Almeida, L.J. Bhosale, T.A. Rao, K.N. Desai, S. Deshmukh, C.N. Mohanan, S.R. Yadav, A.G. Untawale, A. Singh, K.V. Billore, R.K. Singh.

21. *Ceriops decandra* (Griff.) Ding Hou — EN/N (A1a, 1d, 2d; B1, 2c) —

(*C. roxburghiana*). **Family:** Rhizophoraceae. **Taxonomic status:** Species. **Habit:** Shrub/Small tree. Evergreen, small to modrately tall, curiously shaped pneumatophores. **Habitat:** Eumangrove. Intermediate (middle and higher intertidal region). **Global Distribution:** Indo-malaysia and Australasia (Indonesia, India, Malaysia, Pakistan, the Philippines, Sri Lanka, Thailand, Australia, Papua New Guinea). **Current Regional Distribution:** East coasts, Parts of West coast; Andaman islands. **-Range (sq. km):** < 5,000. **-Area Occupied (sq. km):** < 500. **-Number of location**: 25-30; Fragmented . **Population Trends - % change: -% Decline:** > 50 %. **-Time / Rate (Yrs or gens):** 3 generations. **-No of Mature Individuals:** Not known. **Global Population:** East Africa to Australia. **Regional Population:** Continuing decline observed. **Data Quality:** General field studies; Informal field sightings. **Recent Field Studies:** T.A. Rao, 1960-97 in Coastal India. **Threats:** Human interference; Harvest for timber; Harvest; Loss of habitat; Overexploitation. **Trade:** Domestic. **Other Comments:** Could be commercially exploited - illegally. Self sterility is observed in the taxon. **Status: -IUCN: ENDANGERED (Nationally). DATA DEFICIENT (Globally). -Criteria based on: A1c, 1d, 2d** (Population reduction due to decline in extent of occurrence, area of occupancy, quality of habitat and number of mature individuals and predicted decline in number of mature individuals)**; B1, 2c** (Restricted distribution, severely fragmented, continuing decline observed in extent of occurrence, area of occupancy and quality of habitat). **-CITES:** No. **-IWPA(1972;91):** No. **-RDB National (1994):** No. **-RDB International (1996):** No. **Recommendations: -Research management:** Taxonomic and morphological genetic studies; Survey; Habitat management; Other (Propagation, afforestation; studies on microclimate; microbeal ecology). **-PHVA:** No. **Cultivation Program Recommendations: -Cultivation:** Level 2. **-Level of difficulty:** Least difficult. **Existing Cultivation:** None. **-Names of facilities:** —. **Sourcers (Refer Appendix):** 42, 45-60, 62-68, 70, 72-101, 103-145. **Compilers:** S. Wafar, M.R. Almeida, L.J. Bhosale, T.A. Rao, K.N. Desai, S. Deshmukh, C.N. Mohanan, S.R. Yadav, A.G. Untawale, A. Singh, K.V. Billore, R.K. Singh.

22. *Ceriops tagal* (Perr.) C.B. Rob — EN/N (B1, 2a, 2c)

— **Family:** Rhizophoraceae. **Taxonomic status:** Species. **Habit:** Tree/Shrub. **Habitat:** Eumangrove. Downstream, Intermediate (middle and higher Intertidal region). **Global Distribution:** East Africa, Indo-malaysia and Australasia (India, Indonesia, Pakistan, Malaysia, the Philippines, Singapore, Sri Lanka, Thailand). **Current Regional Distribution:** East and west coasts, Andaman & Nicobar islands. **-Range (sq. km):** < 20,000. **-Area Occupied (sq. km):** < 500. **-Number of location**: Many; Fragmented. **Population Trends - % change: -% Decline:** 40 %. **-Time / Rate (Yrs or gens):** 3 generations. **-No of Mature Individuals:** Not known. **Global Population:** Not known. **Regional Population:** Continuing decline observed. **Data Quality:** General field studies; Informal field sightings. **Recent Field Studies:** T.A. Rao, 1960-97 in Coastal India; K.V. Billore, 1968-72 in Thane Dist., (Northern Maharashtra). **Threats:** Human interference; Harvest for timber; Harvest; Harvest for medicine;.Loss of habitat; Overexploitation; Trade. **Trade:** Domestic. **Other Comments:** May be illegally exported also - for use in paper industries and tanning industries from W.Bengal to Thailand and Bangladesh. **Status: -IUCN: ENDANGERED (Nationally). DATA DEFICIENT (Globally). -Criteria based on: B1, 2a, 2c** (Restricted distribution, severely fragmented, continuing decline observed in extent of occurrence and/or area of occupancy and quality of habitat). **-CITES:** No. **-IWPA(1972;91):** No. **-RDB National (1994):** No. **-RDB International (1996):** No. **Recommendations: -Research management:** Monitoring; Habitat management. **-PHVA:** No. **Cultivation Program Recommendations: -Cultivation:** Level 1. **-Level of difficulty:** Moderate difficult. **Existing Cultivation:** None. **-Names of facilities:** —. **Sourcers (Refer Appendix):** 19, 42, 45-60, 62-68, 70, 72-101, 103-145. **Compilers:** S. Wafar, M.R. Almeida, L.J. Bhosale, T.A. Rao, K.N. Desai, S. Deshmukh, C.N. Mohanan, S.R. Yadav, A.G. Untawale, A. Singh, K.V. Billore, R.K. Singh.

23. *Clerodendrum inerme* Gaertn. — EN/N (B1, 2c)

— **Family:** Verbenaceae. **Taxonomic status:** Species. **Habit:** Straggling Shrub. **Habitat:** Obligate associate (Proestuarine). Upstream, Intermediate (upper intertidal regions). **Global Distribution:** Indo-malaysia (lower, middle intertidal). **Current Regional Distribution:** East and west coasts of India. **-Range (sq. km):** < 20,000. **-Area Occupied (sq. km):** < 500. **-Number of location**: Many; Fragmented . **Population Trends - % change: -% Decline:** Projected decline of 30 %. **-Time / Rate (Yrs or gens):** over 20 yrs. **-No of Mature Individuals:** Not known. **Global Population:** Not known. **Regional Population:** Continuing gradual decline observed but a projected drastic decline in the future. **Data Quality:** General field studies; Informal field sightings.**Recent Field Studies:** T.A. Rao, 1960-97 in Coastal India; K.V. Billore, 1968-72 in Thane Dist., **Threats:** Climate; Human interference. **Trade:** No. **Other Comments:** But projection of 30% over next 20 yrs. Used as hedge plant. **Status: -IUCN: ENDANGERED (Nationally). DATA DEFICIENT (Globally). -Criteria based on: B1, 2c** (Restricted distribution, severely fragmented, continuing decline observed in extent of occurrence, area of occupancy and/or quality of habitat). **-CITES:** No. **-IWPA(1972;91):** No. **-RDB National (1994):** No. **-RDB International (1996):** No. **Recommendations: -Research management:** Monitoring. **-PHVA:** No. **Cultivation Program Recommendations: -Cultivation:** No. **-Level of difficulty:** Not known. **Existing Cultivation:** . **-Names of facilities:** Cultivation in inland waterways. **Sourcers (Refer Appendix):** 19, 42, 45-60, 62-68, 70, 72-101, 103-145. **Compilers:** S. Wafar, M.R. Almeida, L.J. Bhosale, T.A. Rao, K.N. Desai, S. Deshmukh, C.N. Mohanan, S.R. Yadav, A.G. Untawale, A. Singh, K.V. Billore, R.K. Singh.

24. *Cynometra ramiflora* L. — EN/N (B1, 2c) — **Family:** (Caesalpinaceae) Fabaceae. **Taxonomic status:** Species. **Habit:** Small tree. **Habitat:** Associate - Proestuarine. Mangrove habitats of Coastal India. **Global Distribution:** Indo-malayasia, Australasia (India, Indonesia, Malaysia, Singapore, Sri Lanka, Thailand, Australia, Papua New Guinea). **Current Regional Distribution:** East coast, Andaman & Nicobar Islands. **-Range (sq. km):** < 5,000. **-Area Occupied (sq. km):** < 500. **-Number of location**: 3 (Sunderbans; Andaman); Fragmented. **Population Trends - % change: -% Decline:** 20 %. **-Time / Rate (Yrs or gens):** 25 yrs. **-No of Mature Individuals:** > 2500. **Global Population:** Not known. **Regional Population:** Continuing declining. More than 2500 mature individuals presently. **Data Quality:** General field studies; Informal field sightings (S.K. Bannerjee et al., 1989 in Sunderbans; S.K. Bannerjee and T.A. Rao, 1990 in Orissa). **Recent Field Studies:** K. Kumar, 1992-96 Andaman; R. Mandal, 1996 Sunderbans**. Threats:** Human interference; Harvest for timber; Loss of habitat; Overexploitation; Trade. **Trade:** Domestic. **Other Comments:** IIT Campus in Bombay has 2 individuals of this species. **Status: -IUCN: ENDANGERED (Nationally).DATA DEFIECIENT (Globally)**. **-Criteria based on: B1, 2c** (Restricted distribution, limited location, severely fragmented, continuing decline observed in extent of occurrence, area of occupancy and quality of habitat). **-CITES:** No. **-IWPA(1972;91):** No. **-RDB National (1994):** No. **-RDB International (1996):** No. **Recommendations: -Research management:** Habitat management; Limiting factor management; Taxonomic and morphological genetic studies; Monitoring. **-PHVA:** Not known. **Cultivation Program Recommendations: -Cultivation:** Level 1. **-Level of difficulty:** Moderately difficult. **Existing Cultivation:** None. **-Names of facilities:** —. **Sourcers (Refer Appendix):** 5, 6, 7, 46, 158. **Compilers:** K. Kathiresan, H. Kanvinde, K. Muniyandi, T.S. Srinivasamurthy, S.D. Oswin, P.S. Rajasekhar, K. Kumar, T.A. Rao.

25. *Derris heterophylla* (Willd.) Back. and Bakh. — EN/N (B1, 2c) — **Family:** Fabaceae. **Taxonomic status:** Species. **Habit:** Climber. Twining shrubs very large climbers, dark purple smooth stem, Young parts pubescent. **Habitat:** Proestuarine. Upstream (lower intertidal region). **Global Distribution:** Indo-Malaysia and Australasia (Singapore). **Current Regional Distribution:** East and west coasts, Andaman & Nicobar islands. -Elevation: . **-Range (sq. km):** < 5,000. **-Area Occupied (sq. km):** < 500. **-Number of location**: 30; Fragmented . **Population Trends - % change: -% Decline:** 20 %. **-Time / Rate (Yrs or gens):** > 20 yrs. **-No of Mature Individuals:** Not known. **Global Population:** Not known. **Regional Population:** Continuing decline observed. **Data Quality:** General field studies; Informal field sightings. **Recent Field Studies:** T.A. Rao, 1960-97 in Coastal India. **Threats:** Human interference; Harvest for medicine; Loss of habitat; Trade. **Trade:** Local. **Other Comments: --. Status: -IUCN: ENDANGERED (Nationally). DATA DEFICIENT (Globally). -Criteria based on: B1, 2c** (Restricted distribution, severely fragmented, continuing decline observed in extent of occurrence, area of occupancy and quality of habitat). **-CITES:** No. **-IWPA(1972;91):** No. **-RDB National (1994):** No. **-RDB International (1996):** No. **Recommendations: -Research management:** Survey; Limiting factor management; Monitoring; Limiting factor research. **-PHVA:** No. **Cultivation Program Recommendations: -Cultivation:** Level 2. **-Level of difficulty:** Moderate difficult. **Existing Cultivation:** None. **-Names of facilities:** —. **Sourcers (Refer Appendix):** 42, 45-60, 62-68, 70, 72-101, 103-145. **Compilers:** S. Wafar, M.R. Almeida, L.J. Bhosale, T.A. Rao, K.N. Desai, S. Deshmukh, C.N. Mohanan, S.R. Yadav, A.G. Untawale, A. Singh, K.V. Billore, R.K. Singh.

26. *Derris trifoliata* Lour. — EN/N (B1, 2c) — (D. uliginosa Benth.). **Family:** Fabaceae. **Taxonomic status:** Species. **Habit:** Climber (Rambling climbers). **Habitat:** Transgress taxon. Upstream. **Global Distribution:** Madagascar, Indo-malaysia and Australasia (India, Malaysia, the Philippines, Singapore). **Current Regional Distribution:** East and west coasts. **-Range (sq. km):** < 5,000. **-Area Occupied (sq. km):** < 500. **-Number of location**: Many; Fragmented. **Population Trends - % change: -% Decline:** 30 %. **-Time / Rate (Yrs or gens):** > 20 yrs. **-No of Mature Individuals:** Not known. **Global Population:** Not known. **Regional Population:** Continuing decline observed over 20 years. **Data Quality:** K.V. Billore, 1968-72 in Thane Dist. . **Recent Field Studies:** T.A. Rao, 1960-97 in Coastal India. **Threats:** Human interference; Harvest for medicine; Loss of habitat; Trade. **Trade:** Local. **Other Comments: --. Status: -IUCN: ENDANGERED (Nationally). DATA DEFICIENT (Globally). -Criteria based on: B1, 2c** (Restricted distribution, severely fragmented, continuing decline observed in extent of occurrence, area of occupancy and quality of habitat). **-CITES:** No. **-IWPA(1972;91):** No. **-RDB National (1994):** No. **-RDB International (1996):** No. **Recommendations: -Research management:** Taxonomic and morphological genetic studies; Survey; Habitat management; Monitoring. **-PHVA:** Not known. **Cultivation Program Recommendations: -Cultivation:** Level 2. **-Level of difficulty:** Moderate difficult. **Existing Cultivation:** None. **-Names of facilities:** —. **Sourcers (Refer Appendix):** 19, 42, 45-60, 62-68, 70, 72-101, 103-145. **Compilers:** S. Wafar, M.R. Almeida, L.J. Bhosale, T.A. Rao, K.N. Desai, S. Deshmukh, C.N. Mohanan, S.R. Yadav, A.G. Untawale, A. Singh, K.V. Billore, R.K. Singh.

27. *Excoecaria agallocha* L. — VU/N (B1, 2c) — **Family:** Euphorbiaceae. **Taxonomic status:** Species. **Habit:** Tree/ Shrubs with serpentine pneumatophores, white spoted lenticel. **Habitat:** Eumangrove. Downstream, Intermediate (lower and middle intertidal regions). **Global Distribution:** Indo-malaysia and Australasia (India, Indonesia, Malaysia, the Phillipines, Singapore, Sri Lanka, Thailand, Australia, Fiji, Papua New Guinea. **Current Regional Distribution:** East and west coasts. **-Range (sq. km):** < 20,000. **-Area Occupied (sq. km):** < 2,000. **-Number of location**: Many; Fragmented. **Population Trends - % change: -% Decline:** > 30 %. **-Time / Rate (Yrs or gens):** 20 yrs. **-No of Mature Individuals:** Not known. **Global Population:** Not known. **Regional Population:** Continuing decline in the last 20 years. **Data Quality:** General field studies; Informal field sightings (K.V. Billore, 1968-72 Thane Dist., (northern Maharashtra). **Recent Field Studies:** T.A. Rao, 1960-97 in Coastal India. **Threats:** Human interference; Harvest; Loss of habitat; Overexploitation; Trade. **Trade:** Local. **Other Comments:** Fungal attacks reported on the species only. Eumangrove with deciduous character during dry season. **Status: -IUCN: VULNERABLE (Nationally). DATA DEFICIENT (Globally). -Criteria based on: B1, 2c** (Restricted distribution, severely fragmentation, continuing decline in extent of occurrence, area of occupancy and quality of habitat). **-CITES:** No. **-IWPA(1972;91):** No. **-RDB National (1994):** No. **-RDB International (1996):** No. **Recommendations: -Research management:** Monitoring; Habitat managment. **-PHVA:** No. **Cultivation Program Recommendations: -Cultivation:** Level 3. **-Level of difficulty:** Moderately difficult. **Existing Cultivation:** None. **-Names of facilities:** —. **Sourcers (Refer Appendix):** 19, 42, 45-60, 62-68, 70, 72-101, 103-145. **Compilers:** S. Wafar, M.R. Almeida, L.J. Bhosale, T.A. Rao, K.N. Desai, S. Deshmukh, C.N. Mohanan, S.R. Yadav, A.G. Untawale, A. Singh, K.V. Billore, R.K. Singh.

28. *Finlaysonia obovata* Wall. — CR/N (B1, 2c) — Family: Asclepiadaceae. **Taxonomic status:** Species. **Habit:** Climber. **Habitat:** Small tidal channels, Saline dry lands. Obligate Associate (Proestuarine). **Global Distribution:** Indo-malayan (India, Philippines, Singapore, Sri Lanka). **Current Regional Distribution:** East coast of India, Andaman & Nicobars Islands. **-Range (sq. km):** < 5,000. **-Area Occupied (sq. km):** < 10. **-Number of location**: 3 (Andaman; Sunderbans; Mahanadi Delta); Fragmented. **Population Trends - % change: -% Decline:** Not known. **-Time / Rate (Yrs or gens):** Not known. **-No of Mature Individuals:** > 2500. **Global Population:** Not known. **Regional Population:** Trends not known - may be declining. More than 2500 mature individuals. **Data Quality:** T.A. Rao and A.R.K. Sastry, 1974 in Sunderbans; S.K. Bannerjee et al., 1989 in Sunderbans. **Recent Field Studies:** H. Kanvinde, 1996. **Threats:** Human interference; Loss of habitat. **Trade:** No. **Other Comments:** Montypic species. **Status: -IUCN: CRITICALLY ENDANGERED (Nationally). DATA DEFICIENT (Globally). -Criteria based on: B1, 2c** (Restricted distribution, limited location, severe fragmentation, continuing decline in extent of occurrence, area of occupancy and quality of habitat). **-CITES:** No. **-IWPA(1972;91):** No. **-RDB National (1994):** No. **-RDB International (1996):** No. **Recommendations: -Research management:** Monitoring; Habitat management. **-PHVA:** Not known. **Cultivation Program Recommendations: -Cultivation:** Level 1. **-Level of difficulty:** Least difficult. **Existing Cultivation:** None. **-Names of facilities:** —. **Sourcers (Refer Appendix):** 5, 6, 7, 125. **Compilers:** K. Kathiresan, H. Kanvinde, K. Muniyandi, T.S. Srinivasamurthy, S.D. Oswin, P.S. Rajasekhar, K. Kumar, T.A. Rao.

29. *Halophila beccarii* Aschers — EN/N (B1, 2c, 2d) — **Family:** Hydrocharitaceae. **Taxonomic status:** Species. **Habit:** Angiosperm, partially submerged, branched creeping. **Habitat:** Proestuarine. Intertidal swamps. **Global Distribution:** Indo-malayan. **Current Regional Distribution:** East and west coast of India. **-Range (sq. km):** < 5,000. **-Area Occupied (sq. km):** < 500. **-Number of location**: Many; Fragmented . **Population Trends - % change: -% Decline:** 10-15 %. **-Time / Rate (Yrs or gens):** 10 yrs. **-No of Mature Individuals:** Not known. **Global Population:** Not known. **Regional Population:** Continuing decline observed. **Data Quality:** General field studies (Untawale and Jagtap, 1979 in west coast of India; Jagtap and Untawale 1980 ; Jagtap, 1986 in Goa; Lakshmanan and Rajeshwar, 1987 ; T.A. Rao et al., 1963 in Rameshwaram Island)**. Recent Field Studies:** None. **Threats:** Edaphic factors; Human interference; Loss of habitat; Siltation. **Trade:** No. **Other Comments:** Acts as a pioneer species on newly formed silted land under tidal influence. **Status: -IUCN: ENDANGERED (Nationally). DATA DEFICIENT (Globally). -Criteria based on: B1, 2c, 2d** (Restricted distribution, severely fragmented, continuing decline in extent of occurrence, area of occupancy and quality of habitat). **-CITES:** No. **-IWPA(1972;91):** No. **-RDB National (1994):** No. **-RDB International (1996):** No. **Recommendations: -Research management:** Survey; Husbandry research. **-PHVA:** Pending. **Cultivation Program Recommendations: -Cultivation:** Not known. **-Level of difficulty:** Not known. **Existing Cultivation:** None. **-Names of facilities:** —. **Sourcers (Refer Appendix):** 32, 33, 34, 41, 43, 90, 159**. Compilers:** K. Kathiresan, H. Kanvinde, K. Muniyandi, T.S. Srinivasamurthy, S.D. Oswin, P.S. Rajasekhar, K. Kumar, T.A. Rao.

30. *Heretiera fomes* Buch. - Ham. — EN/N (B1, 2b, 2c) — H. minor Roxb. — Family: Sterculiaceae. **Taxonomic status:** Species. **Habit:** Tree. **Habitat:** Proestuarine. Mangrove tidal swamp and estuarine upland. **Global Distribution:** Indo-malayasia, Irrawady (Myanmar), Borneo, India, Malaysia, Thailand. **Current Regional Distribution:** East coast, Andaman & Nicobar Islands. **-Range (sq. km):** < 5,000. **-Area Occupied (sq. km):** < 500. **-Number of location**: 4 (Mahanadhi Delta; Sunderbans; Andaman); Fragmented . **Population Trends - % change: -% Decline:** > 20 %. **-Time / Rate (Yrs or gens):** 10 yrs. **-No of Mature Individuals:** > 2500. **Global Population:** Not known. **Regional Population:** Continuing decline observed. **Data Quality:** General field studies (T.A. Rao and A.R.K. Sastry, 1974 in Sunderbans; Naskar and Guhabakshi, 1987 in Sunderbans; L.K. Bannerjee *et al*., 1989 in Snderbans; L.K. Bannerjee and T.A. Rao, 1990 in Mahanadhi Delta). **Recent Field Studies:** H. Kanvinde, 1995 in Bhitakanika. **Threats:** Human interference; Harvest for timber; Loss of habitat. **Trade:** No. **Other Comments:** There are two forms of species occurring in fresh water zone (larger in size) andin near the coasal zone (smaller in size). This habitat difference distinct in these species. Fresh water salt tolerant plants. **Status: -IUCN: ENDANGERED (Nationally). DATA DEFICIENT (Globally). -Criteria based on: B1, 2b, 2c** (Restricted distribution, limited location, severely fragmented, continuing decline in extent of occurrence, area of occupancy and quality of habitat). **-CITES:** No. **-IWPA(1972;91):** No. **-RDB National (1994):** No. **-RDB International (1996):** No. **Recommendations: -Research management:** Habitat management; Monitoring. **-PHVA:** No. **Cultivation Program Recommendations: -Cultivation:** Pending. **-Level of difficulty:** Level 1. **Existing Cultivation:** None. **-Names of facilities:** —. **Sourcers (Refer Appendix):** 5, 6, 7, 61, 125, 158**. Compilers:** K. Kathiresan, H. Kanvinde, K. Muniyandi, T.S. Srinivasamurthy, S.D. Oswin, P.S. Rajasekhar, K. Kumar, T.A. Rao.

31. *Heretiera kanikensis* Majumdar et Banerjee — CR (B1, 2c; C2b; D) — **Family:** Sterculiaceae. **Taxonomic status:** Species. **Habit:** Tree. **Habitat:** Mangrove swamps of Bhitrakanika (Orissa). **Global Distribution:** ENDEMIC to India. **Current Regional Distribution:** East coast. **-Range (sq. km):** < 5,000. **-Area Occupied (sq. km):** < 10. **-Number of location**: 1 (Bhitarkanika, Orissa). **Population Trends - % change: -% Decline:** Not known. **-Time / Rate (Yrs or gens):** Not known. **-No of Mature Individuals:** < 50. **Global Population:** Not known. **Regional Population:** Continuing decline in the highly restricted single population. less than 50 mature individuals. **Data Quality:** General field study (N.C. Majumdar and S.K. Banerjee, 1985 in Orissa coast). **Recent Field Studies:** L.K. Bannerjee and T.A. Rao, 1990 in Orissa coast. **Threats:** Human interference; Harvest for timber; Loss of habitat. **Trade:** No. **Other Comments:** It is endemic to Mahanadi Delta and closely allied to *H. fomes* Buch. -Ham. It is a new record to Indian coast. **Status: -IUCN: CRITICALLY ENDANGERED. -Criteria based on: B1, 2c** (Restricted distribution, single location, continuing decline in extent of occurrence, area of occupancy and quality of habtiat); **C2b** (Few mature individuals in a single location); **D** (Very few numbers of mature individuals). **-CITES:** No. **-IWPA(1972;91):** No. **-RDB National (1994):** No. **-RDB International (1996):** No. **Recommendations: -Research management:** Survey; Monitoring; Habitat management; Life history studies; Limiting factor research. **-PHVA:** No. **Cultivation Program Recommendations: -Cultivation:** Level 1. **-Level of difficulty:** Moderate difficult. **Existing Cultivation:** None. **-Names of facilities:** --. **Sourcers (Refer Appendix):** 5, 7, 44. **Compilers:** K. Kathiresan, H. Kanvinde, K. Muniyandi, T.S. Srinivasamurthy, S.D. Oswin, P.S. Rajasekhar, K. Kumar, T.A. Rao.

32. *Heritiera littoralis* Dryn. — EN/N (A2b, 2c, 2d; B1, 2c, 2d) — **Family:** Sterculiaceae. **Taxonomic status:** Species. **Habit:** Tree with or without buttress. **Habitat:** Proestuarine. Intermediate (higher intertidal region).**Global Distribution:** East Africa, Indo-malaysia, Australasia (India, Malaysia, Tropical Australia and Africa, Indonesia, the Philippines, Singapore, Sri Lanka, Thailand, Australia, Fiji, Papua New Guinea). **Current Regional Distribution:** West and east coast, Andaman islands. **-Range (sq. km):** < 5,000. **-Area Occupied (sq. km):** < 500. **-Number of location**: 20; Fragmented (More in east coast and a few in west coast). **Population Trends - % change: -% Decline:** 30 % (Projected decline 50%). **-Time / Rate (Yrs or gens):** 20 yrs (Projected over 3 generations). **-No of Mature Individuals:** Not known. **Global Population:** Not known. **Regional Population:** Continuing decline observed over the last 20 yrs and decline predicted for the next 3 generations. **Data Quality:** General field studies; Informal field sightings.**Recent Field Studies:** T.A. Rao, 1962-97 in Coastal India; L.K. Bannerjee and T.A. Rao, 1990 in Orissa. **Threats:** Climate; Human interference; Harvest for timber; Harvest; Loss of habitat; Overexploitation; Trade. **Trade:** Local. **Other Comments:** Two trees in Government Museum, Trivandrum. 6 individuals cultivated in Malpe, Karnataka. . **Status: -IUCN: ENDANGERED (Nationally). DATA DEFICIENT (Globally). -Criteria based on: A2b, 2c, 2d** (Projected population reduction due to future decline in abundance, extent of occurrence, area of occupancy and quality of habitat and number of mature individuals); **B1, 2c, 2d** (Restricted distribution, severely fragmented, continuing decline observed in extent of occurrence, area of occupancy quality of habitat and number of locations or subpopulations). **-CITES:** No. **-IWPA(1972;91):** No. **-RDB National (1994):** No. **-RDB International (1996):** No. **Recommendations: -Research management:** Taxonomic and morphological genetic studies; Survey; Monitoring; Limiting factor management; Limiting factor research, Other (identification). **-PHVA:** No. **Cultivation Program Recommendations: -Cultivation:** Level 2. **-Level of difficulty:** Very difficult. **Existing Cultivation:** None. **-Names of facilities:** —. **Sourcers (Refer Appendix):** 42, 45-60, 62-68, 70, 72-101, 103-145. **Compilers:** S. Wafar, M.R. Almeida, L.J. Bhosale, T.A. Rao, K.N. Desai, S. Deshmukh, C.N. Mohanan, S.R. Yadav, A.G. Untawale, A. Singh, K.V. Billore, R.K. Singh.

33. *Kandelia candel* (L) Druce — EN/N (B1, 2c) — **Family:** Rhizophoraceae. **Taxonomic status:** Species. **Habit:** Tree/Shrub with broom shaped aerial roots. **Habitat:** Eumangrove. Downstream (lower intertidal regions). **Global Distribution:** Indo-malaysia (India, Indonesia, Malaysia, the Philippines, Sri Lanka, Thailand). **Current Regional Distribution:** East and west coasts. **-Range (sq. km):** < 20,000. **-Area Occupied (sq. km):** < 500. **-Number of location**: Many; Fragmented. **Population Trends - % change: -% Decline:** 30 %. **-Time / Rate (Yrs or gens):** 20 yrs. **-No of Mature Individuals:** Not known. **Global Population:** Not known. **Regional Population:** Continuing decline. **Data Quality:** General field studies; Informal field sightings. **Recent Field Studies:** T.A. Rao, 1960-97 in Coastal India. L.K. Bannerjee and T.A. Rao, 1990 in Mahanadhi delta. **Threats:** Human interference; Harvest; Loss of habitat; Pollution. **Trade:** No. **Other Comments:** Reported in Pichavaram mangrove in the past but it is not present to date. Self incompatibility is established by bagging experiments. **Status: -IUCN: ENDANGERED (Nationally). DATA DEFICIENT (Globally). -Criteria based on: B1, 2c** (Restricted distribution, severely fragmented, continuing decline observed in extent of occurrence, area of occupancy and quality of habtiat). **-CITES:** No. **-IWPA(1972;91):** No. **-RDB National (1994):** No. **-RDB International (1996):** No. **Recommendations: -Research management:** Genetic management; Habitat management; Survey; Monitoring. **-PHVA:** No. **Cultivation Program Recommendations: -Cultivation:** Level 2. **-Level of difficulty:** Moderate difficult. **Existing Cultivation:** None. **-Names of facilities:** —. **Sourcers (Refer Appendix):** 42, 45-60, 62-68, 70, 72-101, 103-145. **Compilers:** S. Wafar, M.R. Almeida, L.J. Bhosale, T.A. Rao, K.N. Desai, S. Deshmukh, C.N. Mohanan, S.R. Yadav, A.G. Untawale, A. Singh, K.V. Billore, R.K. Singh.

34. *Lumnitzera littorea* (Jack.) Voigt — CR/N (B1, 2c) — **Family:** Combretaceae. **Taxonomic status:** Species. **Habit:** Tree/Shrub. **Habitat:** Eumangrove. Mangrove swamp. **Global Distribution:** Indo-malaysia and Australasia (India, Indonesia, Malaysia, Philippines, Singapore, Sri Lanka, Thailand, Australia, Fiji). **Current Regional Distribution:** East coast, Andaman & Nicobar Islands. **-Range (sq. km):** < 5,000. **-Area Occupied (sq. km):** < 500. **-Number of location**: 2 (Mahanadi Delta and Andaman); Fragmented. **Population Trends - % change: -% Decline:** No change. **-Time / Rate (Yrs or gens):** Not known. **-No of Mature Individuals:** < 2500. **Global Population:** Not known. **Regional Population:** No change in populations which is less than 2500 mature indivudals. **Data Quality:** General field study. **Recent Field Studies:** Hemal Kanvinde, 1995; L.K. Bannerjee and T.A. Rao, 1990 in Thakurdian, Orissa coast. **Threats:** Human interference; Loss of habitat. **Trade:** No. **Other Comments:** It is a core mangrove species occuring in elevated interior dry areas of mangroves. **Status: -IUCN: CRITICALLY ENDANGERED (Nationally). DATA DEFICIENT (Globally). -Criteria based on: B1, 2c** (Restricted distribution, limited location, severely fragmented, continuing decline observed in extent of occurrence, area of occupancy and quality of habtiat). **-CITES:** No. **-IWPA(1972;91):** No. **-RDB National (1994):** No. **-RDB International (1996):** No. **Recommendations: -Research management:** Survey; Habitat management; Limiting factor research; Monitoring. **-PHVA:** No. **Cultivation Program Recommendations: -Cultivation:** Pending. **-Level of difficulty:** Very difficult. **Existing Cultivation:** None. **-Names of facilities:** --. **Sourcers (Refer Appendix):** 5, 6, 7. **Compilers:** K. Kathiresan, H. Kanvinde, K. Muniyandi, T.S. Srinivasamurthy, S.D. Oswin, P.S. Rajasekhar, K. Kumar, T.A. Rao.

35. *Lumnitzera racemosa* Willd. — EN/N (B1, 2c) — **Family:** Combretaceae. **Taxonomic status:** Species. **Habit:** Shrub - Small tree. Pneumatophores with less lopping lateral loops. **Habitat:** Downstream (middle, higher intertidal regions).**Global Distribution:** East Africa, Indo-malaysia and Australasia (India, Indonesia, Malaysia, the Philippines, Singapore, Sri Lanka, Thailand, Australia, Papua New Guinea). **Current Regional Distribution:** East and west coast of India. **-Range (sq. km):** < 20,000. **-Area Occupied (sq. km):** < 500. **-Number of location**: Many; Fragmented . **Population Trends - % change: -% Decline:** 30 %. **-Time / Rate (Yrs or gens):** 20 yrs. **-No of Mature Individuals:** Not known. **Global Population:** Not known. **Regional Population:** Continuing decline observed. **Data Quality:** General field studies; Informal field sightings. **Recent Field Studies:** T.A. Rao, 1960-97 in Coastal India. **Threats:** Human interference; Harvest; Loss of habitat. **Trade:** No. **Other Comments:** Seeds loos their viability under storage. They are to be planted for quick germination within a week. **Status: -IUCN: ENDANGERED (Nationally). DATA DEFICIENT (Globally). -Criteria based on: B1, 2c** (Restricted distribution, severely fragmented, continuing decline observed in extent of occurrence, area of occupancy and quality of habtiat). **-CITES:** No. **-IWPA(1972;91):** No. **-RDB National (1994):** No. **-RDB International (1996):** No. **Recommendations: -Research management:** Taxonomic and morphological genetic studies; Monitoring; Survey; Habitat management; Other (propagation, reforestation). **-PHVA:** No. **Cultivation Program Recommendations: -Cultivation:** Level

2. **-Level of difficulty:** Moderate difficult. **Existing Cultivation:** None. **-Names of facilities:** —. **Sourcers (Refer Appendix):** 42, 45-60, 62-68, 70, 72-101, 103-145. **Compilers:** S. Wafar, M.R. Almeida, L.J. Bhosale, T.A. Rao, K.N. Desai, S. Deshmukh, C.N. Mohanan, S.R. Yadav, A.G. Untawale, A. Singh, K.V. Billore, R.K. Singh.

36. *Myriostachya wightiana* (Nees ex steud) Hook. f. — EN/N (B1, 2c) — **Family:** Poaceae. **Taxonomic status:** Species. **Habit:** Perennial grass. **Habitat:** Proestuarine. Mangrove swamp (Muddy banks). **Global Distribution:** Indo-malaysia, Myanamar, Siam, Vietnam, Ceylon. **Current Regional Distribution:** East coast of India. **-Range (sq. km):** < 5,000. **-Area Occupied (sq. km):** < 500. **-Number of location**: >10 (Andaman, Sunderbans, Mahanadi, Coringa, Point Calimere); Fragmented. **Population Trends - % change: -% Decline:** Decreasing. **-Time / Rate (Yrs or gens):** Not known. **-No of Mature Individuals:** > 2500. **Global Population:** Not known. **Regional Population:** Continuing decline in numbers, estimated to be more than 2500. **Data Quality:** General field study (T.A. Rao, 1975). **Recent Field Studies:** Hemal, 1996; Rajasekar, 1994-96; L.K. Bannerjee and T.A. Rao, 1990. **Threats:** Harvest; Trade for parts. **Trade:** Local. **Other Comments:** Abundant as a pioneer. Harvested for thatching, mats. **Status: -IUCN: ENDANGERED (Nationally). DATA DEFICIENT (Globally). -Criteria based on: B1, 2c** (Restricted distribution, severely fragmented, continuing decline observed in extent of occurrence, area of occupancy and quality of habtiat). **-CITES:** No. **-IWPA(1972;91):** No. **-RDB National (1994):** No. **-RDB International (1996):** No. **Recommendations: -Research management:** Monitoring; Habitat managment. **-PHVA:** No. **Cultivation Program Recommendations: -Cultivation:** Level 1. **-Level of difficulty:** Least difficult. **Existing Cultivation:** None. **-Names of facilities:** --. **Sourcers (Refer Appendix):** 5, 6, 7, 126. **Compilers:** K. Kathiresan, H. Kanvinde, K. Muniyandi, T.S. Srinivasamurthy, S.D. Oswin, P.S. Rajasekhar, K. Kumar, T.A. Rao.

37. *Nypa fruticans* (Thunb.) Wurmb. — EN/N (B1, 2a, 2b, 2c) — **Family:** Arecaeae. **Taxonomic status:** Species. **Habit:** Palm stemless tree. **Habitat:** Eumangrove. Mangrove creeks. **Global Distribution:** Indo-malaysia and Australysia, East America, West Africa. **Current Regional Distribution:** East coast, Andaman & Nicobar Islands. **-Range (sq. km):** < 5,000. **-Area Occupied (sq. km):** < 500. **-Number of location**: 3 (Sunderbans, Andaman & Nicobar); Fragmented . **Population Trends - % change: -% Decline:** < 50. **-Time / Rate (Yrs or gens):** 10 years. **-No of Mature Individuals:** > 2500. **Global Population:** Not known. **Regional Population:** More than 2500 mature individuals. Continuing decline observed in Sunderbans. **Data Quality:** General field study. **Recent Field Studies:** Krishnakumar, 1990-92 in Andaman & Nicobar. **Threats:** Human interference; Harvest; Harvest for food; Trade. **Trade:** Local. **Other Comments:** Over exploited palm for leaves for thatching and sap for sugar, alcohol and venegar. This species is under grave threat and may become Critically Endangered. **Status: -IUCN: ENDANGERED (Nationally). DATA DEFICIENT (Globally). -Criteria based on: B1, 2a, 2b, 2c** (Restricted distribution, limited location, severely fragmented, continuing decline observed in extent of occurrence, area of occupancy and quality of habitat). **-CITES:** No. **-IWPA(1972;91):** No. **-RDB National (1994):** No. **-RDB International (1996):** No. **Recommendations: -Research management:** Habitat management; Monitoring. **-PHVA:** No. **Cultivation Program Recommendations: -Cultivation:** Level 1. **-Level of difficulty:** Least difficult. **Existing Cultivation:** Not extensive, only in Sundarbans. **-Names of facilities:** --. **Sourcers (Refer Appendix):** 7, 158. **Compilers:** K. Kathiresan, H. Kanvinde, K. Muniyandi, T.S. Srinivasamurthy, S.D. Oswin, P.S. Rajasekhar, K. Kumar, T.A. Rao.

38. *Phoenix paludosa* Roxb. — EN/N (B1, 2c) — **Family:** Arecaceae. **Taxonomic status:** Species. **Habit:** Treelet. **Habitat:** Eumangrove. Dry elevated mangrove area; Tidal banks. **Global Distribution:** Indo-malaysia, Siam, China. **Current Regional Distribution:** East coast, Andaman & Nicobar Islands. **-Range (sq. km):** < 5,000. **-Area Occupied (sq. km):** < 500. **-Number of location**: 6 (Mahanadi Delta, Sunderbans, Andaman, Muthupet, Pichavaram);Fragmented. **Population Trends - % change: -% Decline:** 20 %. **-Time / Rate (Yrs or gens):** 10 yrs. **-No of Mature Individuals:** > 10,000. **Global Population:** Not known. **Regional Population:** More than 10,000 mature individuals. Continuing decline observed. **Data Quality:** General field study. **Recent Field Studies:** Hemal, 1996 in Orissa; Oswin, 1993-97 in Muthupet; Muniyandi, 1997 in Gulf ofMannar; L.K. Banerjee and T.A. Rao, 1990. **Threats:** Loss of habitat; Overexploitation; Trade; Trade for parts. **Trade:** Local. **Other Comments:** Extensively used by local population. Natural barrier for soil erosion. **Status: -IUCN: ENDANGERED (Nationally). DATA DEFICIENT (Globally). -Criteria based on: B1, 2c** (Restricted distribution, severely fragmented, continuing decline observed in extent of occurrence, area of occupancy and quality of habitat). **-CITES:** No. **-IWPA(1972;91):** No. **-RDB National (1994):** No. **-RDB International (1996):** No. **Recommendations: -Research management:** Monitoring; Habitat management; Limiting factor research. **-PHVA:** No. **Cultivation Program Recommendations: -Cultivation:** Pending. **-Level of difficulty:** Very difficult. **Existing Cultivation:** None. **-Names of facilities:** --. **Sourcers (Refer Appendix):** 5, 7, 95, 158. **Compilers:** K. Kathiresan, H. Kanvinde, K. Muniyandi, T.S. Srinivasamurthy, S.D. Oswin, P.S. Rajasekhar, K. Kumar.

39. *Porteresia coarctat*a (Roxb.) Tateoka — VU/N (B1, 2c) — (*Oryza coarctata* Roxb.). **Family:** Poaceae. **Taxonomic status:** Species. **Habit:** Grass (Peripheral associate of mangrove vegetation). **Habitat:** Proestuarines. Downstream, Intermediate (lower intertidal region). **Global Distribution:** India, Sri Lanka, Bangladesh. Pakistan, Malaysia. **Current Regional Distribution:** East and west coasts. **-Range (sq. km):** < 20,000. **-Area Occupied (sq. km):** < 2,000. **-Number of location**: Many; Fragmented . **Population Trends - % change: -% Decline:** 10 %. **-Time / Rate (Yrs or gens):** 20 yrs. **-No of Mature Individuals:** Not known. **Global Population:** Not known. **Regional Population:** Continuing decline observed. **Data Quality:** General field studies; Informal field sightings. **Recent Field Studies:** T.A. Rao, 1960-97 in coasts. **Threats:** Cattle grazing; Human interference; Loss of habitat; Siltation. **Trade:** No. **Other Comments:** Relative of wild rice. Common specially on newly deposted silt along the intertidal regions of creeks, channels of tidal rhythm. **Status: -IUCN: VULNERABLE (Nationally). DATA DEFICIENT (Globally). -Criteria based on: B1, 2c** (Restricted distribution, severely fragmented, continuing decline observed in extent of occurrence, area of occupancy and quality of habitat). **-CITES:** No. **-IWPA(1972;91):** No. **-RDB National (1994):** No. **-RDB International (1996):** No. **Recommendations: -Research management:** Taxonomic and morphological genetic studies; Survey; Monitoring; Habitat management. **-PHVA:** No. **Cultivation Program Recommendations: -Cultivation:** Level 2. **-Level of difficulty:** Least difficult. **Existing Cultivation:** None. **-Names of facilities:** —. **Sourcers (Refer Appendix):** 42, 45-60, 62-68, 70, 72-101, 103-145. **Compilers:** S. Wafar,

M.R. Almeida, L.J. Bhosale, T.A. Rao, K.N. Desai, S. Deshmukh, C.N. Mohanan, S.R. Yadav, A.G. Untawale, A. Singh, K.V. Billore, R.K. Singh.

40. *Rhizophora stylosa* Griff. — CR/N (B1, 2c) — **Family:** Rhizophoraceae. **Taxonomic status:** Species. **Habit:** Tree. **Habitat:** Eumangrove. Mangrove swamp. **Global Distribution:** Indo-malayan (Indonesia, Philippines, Singapore, Papua, New Guinea) and Australasia. **Current Regional Distribution:** East coast, Andaman & Nicobar islands. **-Range (sq. km):** < 5,000. **-Area Occupied (sq. km):** < 10. **-Number of location**: 2 (Bhitarkanika; Andaman); Fragmented. **Population Trends - % change: -% Decline:** Not known. **-Time / Rate (Yrs or gens):** Not known. **-No of Mature Individuals:** > 2500. **Global Population:** Not known. **Regional Population:** Not known. **Data Quality:** General field studies; (Dagar et al., 1989). **Recent Field Studies:** L.K. Banerjee and T.A. Rao, 1990 **. Threats:** Human interference; Loss of habitat. **Trade:** No. **Other Comments:** Banerjee and Rao say that it is located only in one area in Bhitarkanika. . **Status: -IUCN: CRITICALLY ENDANGERED (Nationally). DATA DEFICIENT (Globally). -Criteria based on: B1, 2c** (Restricted distribution, limited location, severely fragmented, continuing decline observed in extent of occurrence, area of occupancy and quality of habitat). **-CITES:** No. **-IWPA(1972;91):** No. **-RDB National (1994):** No. **-RDB International (1996):** No. **Recommendations: -Research management:** Habitat management; Monitoring. **-PHVA:** Not known. **Cultivation Program Recommendations: -Cultivation:** Level 1. **-Level of difficulty:** Least difficult. **Existing Cultivation:** None. **-Names of facilities:** —.**Sourcers (Refer Appendix):** 5, 6, 8, 82**. Compilers:** K. Kathiresan, H. Kanvinde, K. Muniyandi, T.S. Srinivasamurthy, S.D. Oswin, P.S. Rajasekhar, K. Kumar, T.A. Rao.

41. *Rhizophora annamalayana* — NE — **Family:** Rhizophoraceae. **Taxonomic status:** Species. **Habit:** Tree. **Habitat:** Eumangrove. Mangrove swamp. **Global Distribution:** ENDEMIC to India . **Current Regional Distribution:** East coast. **-Range (sq. km):** < 100. **-Area Occupied (sq. km):** < 10. **-Number of location**: 1 (Pichavaram). **Population Trends - % change: -% Decline:** < 20%. **-Time / Rate (Yrs or gens):** 10 yrs. **-No of Mature Individuals:** < 250. **Global Population:** Not known. **Data Quality:** General field studies. **Recent Field Studies:** Kathiresan. **Threats:** Genetic problem; Human interference; Harvest for timber; Loss of habitat. **Trade:** No. **Other Comments:** It is a sterile hybrid between *R. apiculata* and *R. indigenous* and is endemic to Pichavaram. The sterility is more than 90% . This species is not taxonomically valid and therefore not evaluated. Scientific validity needs to be established. The biology of the species has to be studied in detail. **Status: -IUCN: NOT EVALUATED** . **-Criteria based on:** —. **-CITES:** No. **-IWPA(1972;91):** No. **-RDB National (1994):** No. **-RDB International (1996):** No. **Recommendations: -Research management:** Taxonomic and morphological genetic studies; Survey; Monitoring; Habitat management; Limiting factor research; Life history studies. **-PHVA:** Not known. **Cultivation Program Recommendations: -Cultivation:** Pending. **-Level of difficulty:** Very difficult. **Existing Cultivation:** None. **-Names of facilities:** —. **Sourcers (Refer Appendix):** 36. **Compilers:** K. Kathiresan, H. Kanvinde, K. Muniyandi, T.S. Srinivasamurthy, S.D. Oswin, P.S. Rajasekhar, K. Kumar, T.A. Rao.

42. *Rhizophora apiculata* Bl. — EN/N (A2b, 2d) — **Family:** Rhizophoraceae. **Taxonomic status:** Species. **Habit:** Tree. Tall and stembase without tap root system. Aerial stilt roots. **Habitat:** Eumangrove. Intermediate (lower and middle intertidal regions).**Global Distribution:** Indo-malaysia and Australasia (India, Indonesia, Malaysia, the Philippines, Singapore, Sri Lanka, Thailand, Australia, Papua New Guinea). **Current Regional Distribution:** East and west coasts. **-Range (sq. km):** < 5,000. **-Area Occupied (sq. km):** < 500. **-Number of location**: Many; Fragmented . **Population Trends - % change: -% Decline:** 20 % (Projected > 50% decline). **-Time / Rate (Yrs or gens):** 10 yrs (Over the next 3 generations). **-No of Mature Individuals:** Not known. **Global Population:** Not known. **Regional Population:** Continuing decline observed over the last 10 years and decline projected over the next 3 generations. **Data Quality:** General field studies; Informal field sightings. **Recent Field Studies:** T.A. Rao, 1960-97 in coasts. **Threats:** Climate; Harvest for timber; Harvest; Loss of habitat; Overexploitation; Pollution; Trade. **Trade:** Commerical (only in Andaman Islands by Government); Domestic. **Other Comments:** Destructive felling to clean the land for fishing. Self sterlity is proved by bagging experiments. **Status: -IUCN: ENDANGERED (Nationally). DATA DEFICIENT (Globally). -Criteria based on: A2b, 2d** (Population reduction predicted due to future decease in abundance and in number of mature individuals). **-CITES:** No. **-IWPA(1972;91):** No. **-RDB National (1994):** No. **-RDB International (1996):** No. **Recommendations: -Research management:** Taxonomic and morphological genetic studies; Genetic management; Habitat management; Limiting factor management; Limiting factor research; Life history studies; Other (Propagation, regenerations, phenology). **-PHVA:** No. **Cultivation Program Recommendations: -Cultivation:** Level 1; Level 2. **-Level of difficulty:** Moderate difficult. **Existing Cultivation:** None. **-Names of facilities:** —. **Sourcers (Refer Appendix):** 42, 45-60, 62-68, 70, 72-101, 103-145. **Compilers:** S. Wafar, M.R. Almeida, L.J. Bhosale, T.A. Rao, K.N. Desai, S. Deshmukh, C.N. Mohanan, S.R. Yadav, A.G. Untawale, A. Singh, K.V. Billore, R.K. Singh.

43. *Rhizophora lamarckii* Montr. — CR/N (B1, 2c; C2a) — **Family:** Rhizophoraceae. **Taxonomic status:** Species. **Habit:** Tree. **Habitat:** Eumangrove. Downstream, Intermediate (middle and lower intertidal region). **Global Distribution:** Indo-malaysia, Australasia (India, Australia, Papua New Guinea). **Current Regional Distribution:** Andaman islands, Tamil Nadu . **-Range (sq. km):** < 100. **-Area Occupied (sq. km):** < 10. **-Number of location**: 1 (Pitchavaram). **Population Trends - % change: -% Decline:** Population stable. **-Time / Rate (Yrs or gens):** Not known. **-No of Mature Individuals:** < 100. **Global Population:** Not known. **Regional Population:** Population stable as identity known to only a few experts, but needs to be critically examined. **Data Quality:** General field study; informal field sightins (S. Deshmukh, 1989 in Pichavaram). **Recent Field Studies:** S. Deshmukh, 1990-95 in Pichavaram; L.P. Mall, 1984-90 in Andaman; V.P. Singh, 1984-90 in Andaman; Untawale and Deshmukh, 1992. **Threats:** Genetic problem; Hybridization; Loss of habitat. **Trade:** No. **Other Comments:** A sterile hybrid (between *R. apiculata* and *R. stylosa*). Regional Population : less than 100 mature individuals. Confined only at one area along the east coast - Pichavaram. **Status: -IUCN: CRITICALLY ENDANGERED (Nationally). DATA DEFICIENT (Globally). -Criteria based on: B1, 2c** (Restricted distribution, single location, continuing decline in extent of occurrence, area of occupancy and quality of habitat); **C2a** (Very few mature individuals in fragmented population). **-CITES:** No. **-IWPA(1972;91):** No. **-RDB National (1994):** No. **-RDB International (1996):** No. **Recommendations: -Research management:** Taxonomic and morphological genetic studies; Survey; Monitoring; Habitat management; Limiting factor research; Life history studies; Other (Regeneration, vegetative, propagation,tissue culture, afforestation). **-PHVA:** No. **Cultivation Program Recommendations: -Cultivation:** Level 1; Level 2. **-Level of difficulty:**

Very difficult. **Existing Cultivation:** None. **-Names of facilities:** —. **Sourcers (Refer Appendix):** 158. **Compilers:** S. Wafar, M.R. Almeida, L.J. Bhosale, T.A. Rao, K.N. Desai, S. Deshmukh, C.N. Mohanan, S.R. Yadav, A.G. Untawale, A. Singh, K.V. Billore, R.K. Singh.

44. *Rhizophora mucronata* Poir. — VU/N (A2c, 2d; B1, 2c) — **Family:** Rhizophoraceae. **Taxonomic status:** Species. **Habit:** Tree. Tall, much branched, stem base with numerous stilt roots,present and tap root abortive. **Habitat:** Eumangrove. Intertidal, upstream (lower and middle intertidal regions). **Global Distribution:** East Africa, Indo-malaysia and Australasia (India, Indonesai, Malaysia, Philippines, Singapore, Sri Lanka, Thailand, Papua, New Guinea). **Current Regional Distribution:** East and west coasts. **-Range (sq. km):** < 20,000. **-Area Occupied (sq. km):** < 2,000. **-Number of location**: Many; Fragmented . **Population Trends - % change: -% Decline:** 40 % (Projected decline > 20 %). **-Time / Rate (Yrs or gens):** 25 yrs (over the next 3 generations). **-No of Mature Individuals:** Not known. **Global Population:** Not known. **Regional Population:** Continuing decline observed over the last 25 years and a predicted decline over the next 3 generations. **Data Quality:** General field studies; Informal field sightings (K.V. Billore, 1968-72 in Thane Dist., (Northern Maharashtra)). **Recent Field Studies:** T.A. Rao, 1960-97 in Coastal India;. **Threats:** Disease; Human interference; Harvest for timber; Harvest; Loss of habitat; Overexploitation; Trade for parts. **Trade:** Commercial (restricted to Andaman islands); Domestic. **Other Comments:** Dynamite is thrown for filming in mangroves (feature film) which is a threat in Pichavaram. Local felling for timber in Sunderbans. Self sterlity is proved by bagging experiments. **Status: -IUCN: VULNERABLE (Nationally). DATA DEFICIENT (Globally). -Criteria based on: A2c, 2d** (Projected population reduction due to future decline in extent of occurrence, area of occupancy, quality of habitat and number of mature individuals); **B1, 2c** (Restricted distribution, severely fragmented, continuing decline observed in extent of occurrence, area of occupancy and quality of habitat). **-CITES:** No. **-IWPA(1972;91):** No. **-RDB National (1994):** No. **-RDB International (1996):** No. **Recommendations: -Research management:** Taxonomic and morphological genetic studies; Genetic management; Habitat management; Limiting factor management; Limiting factor research; Monitoring. **-PHVA:** No. **Cultivation Program Recommendations: -Cultivation:** Level 1; Level 2. **-Level of difficulty:** Moderately difficult. **Existing Cultivation:** None. **-Names of facilities:** —. **Sourcers (Refer Appendix):** 19, 42, 45-60, 62-68, 70, 72-101, 103-145. **Compilers:** S. Wafar, M.R. Almeida, L.J. Bhosale, T.A. Rao, K.N. Desai, S. Deshmukh, C.N. Mohanan, S.R. Yadav, A.G. Untawale, A. Singh, K.V. Billore, R.K. Singh.

45. *Salicornia brachiata* Roxb. — LRnt/N — **Family:** Chenopodiaceae. **Taxonomic status:** Species. **Habit:** Herb. Erect or decumbant, Succulent stem, much branched, elevated saline blanks and mud flats. **Habitat:** Proestuarine. Downstream, Intermediate. Associate. **Global Distribution:** Indo-malaysia, India, Sri Lanka. South west Asia. **Current Regional Distribution:** East and west coast of India. **-Range (sq. km):** < 20,000. **-Area Occupied (sq. km):** < 2,000. **-Number of location**: Many. **Population Trends - % change: -% Decline:** 20 % (Projected increase 30 %) . **-Time / Rate (Yrs or gens):** (Over next 20 years). **-No of Mature Individuals:** Not known. **Global Population:** Not known. **Regional Population:** A projection in population increase has been cited over the next 20 years. **Data Quality:** General field studies; Informal field sightings (K.V. Billore, 1968-72 in Thane Dist., (Northern Maharashtra)). **Recent Field Studies:** T.A. Rao, 1960-97 in Coastal India. **Threats:** Climate; Edaphic factors; Fishing; Harvest for food; Loss of habitat; Pollution; Trade. **Trade:** Local; Domestic. **Other Comments:** Good formation in Tamil Nadu and less in west coast of India. Fleshy-sterns used as vegetable. **Status: -IUCN: LOWER RISK - NEAR THREATENED (Nationally). DATA DEFICIENT (Globally). -Criteria based on:** —. **-CITES:** No. **-IWPA(1972;91):** No. **-RDB National (1994):** No. **-RDB International (1996):** No. **Recommendations: -Research management:** Other (ecological studies). **-PHVA:** No. **Cultivation Program Recommendations: -Cultivation:** No. **-Level of difficulty:** Least difficult. **Existing Cultivation:** None. **-Names of facilities:** —. **Sourcers (Refer Appendix):** 19, 42, 45-60, 62-68, 70, 72-101, 103-145. **Compilers:** S. Wafar, M.R. Almeida, L.J. Bhosale, T.A. Rao, K.N. Desai, S. Deshmukh, C.N. Mohanan, S.R. Yadav, A.G. Untawale, A. Singh, K.V. Billore, R.K. Singh.

46. *Scyphiphora hydrophyllacea G*aertn. f. — EN/N (B1, 2c) — **Family:** Rubiaceae. **Taxonomic status:** Species. **Habit:** Tree. **Habitat:** Proestuarine. Mangrove swamp. **Global Distribution:** Indo-malayan, Australasia (India, Indonesia, Malaysia, Philippines, Singapore, Sri Lanka, Thailand, Australia, Papua, New Guinea). **Current Regional Distribution:** East coast, Andaman & Nicobar Islands. **-Range (sq. km):** < 5,000. **-Area Occupied (sq. km):** < 500. **-Number of location**: 2 (Coringa and Andaman). **Population Trends - % change: -% Decline:** < 50 %. **-Time / Rate (Yrs or gens):** 3 generations. **-No of Mature Individuals:** > 2500. **Global Population:** Not known. **Regional Population:** Continuing decline (drastic) observed in the last 3 generations > 2500 mature individuals in the wild. **Data Quality:** General field studies. **Recent Field Studies:** R.S. Rao, 1995 in Coringa; P.S. Raja Sekhar, 1993-95 in Coringa;.Krishna Kumar, 1990-92 in Coringa. **Threats:** Human interference; Loss of habitat. **Trade:** No. **Other Comments:** This species is restricted to Coringa and Andaman. Not found in other coastal areas of west and west coasts. The species is likely to be cut down in the future based on the destruction to Avicennia. **Status: -IUCN: ENDANGERED (Nationally). DATA DEFICIENT (Globally). -Criteria based on: B1, 2c** (Restricted distribution, limited location, severely fragmented, continuing decline observed in extent of occurrence, area of occupancy and quality of habitat). **-CITES:** No. **-IWPA(1972;91):** No. **-RDB National (1994):** No. **-RDB International (1996):** No. **Recommendations: -Research management:** Survey; Habitat management; Limiting factor research; Monitoring. **-PHVA:** No. **Cultivation Program Recommendations: -Cultivation:** Pending. **-Level of difficulty:** Very difficult. **Existing Cultivation:** None. **-Names of facilities:** —. **Sourcers (Refer Appendix):** 23, 69, 158**. Compilers:** K. Kathiresan, H. Kanvinde, K. Muniyandi, T.S. Srinivasamurthy, S.D. Oswin, P.S. Rajasekhar, K. Kumar, T.A.

47. *Sesuvium portulacastrum* L. — EN/N (B1, 2c) — **Family:** Azoaceae. **Taxonomic status:** Species. **Habit:** Perennial herb/creeper. **Habitat:** Tranogress taxon. Muddy and sandy niches. **Global Distribution:** Not known. **Current Regional Distribution:** West and east coasts. **-Range (sq. km):** < 5,000. **-Area Occupied (sq. km):** < 500. **-Number of location**: Many; Fragmented. **Population Trends - % change: -% Decline:** > 20 %. **-Time / Rate (Yrs or gens):** 10 yrs. **-No of Mature Individuals:** Not known. **Global Population:** Not known. **Regional Population:** Continuing decline observed. **Data Quality:** General field studies (Direct) (K. Muniandi, 1985 in Gulf of Munnar). **Recent Field Studies:** Kathiresan, 1996 in Pitchawaran; T.A. Rao, 1960-97 in along Indian coasts. . **Threats:** Loss of habitat; Human interference; Harvest for food (vegetable). **Trade:** No. **Other Comments:** Eaten by the people duirng famine conditions: edible after baking. **Status: -IUCN:**

ENDANGERED (Nationally). Data Deficient (Globally) . **-Criteria based on: B1, 2c** (Restricted distribution, severely fragmented, continuing decline observed in extent of occurrence, area of occupancy and quality of habitat). **-CITES:** No. **-IWPA(1972;91):** No. **-RDB National (1994):** No. **-RDB International (1996):** No. **Recommendations: -Research management:** Survey; Monitoring; Habitat management; Life history studies; Monitoring. **-PHVA:** No. **Cultivation Program Recommendations: -Cultivation:** Level 1. **-Level of difficulty:** Not known. **Existing Cultivation:** None. **-Names of facilities:** —. **Sourcers (Refer Appendix):** --. **Compilers:** K. Kathiresan, H. Kanvinde, K. Muniyandi, T.S. Srinivasamurthy, S.D. Oswin, P.S. Rajasekhar, K. Kumar.

48. *Sonneratia alba* J. Sm. — EN/N (A2c, 2d) — **Family:** Sonneratiaceae. **Taxonomic status:** Species. **Habit:** Tree with Pneumatophores. **Habitat:** Eumangrove. Downstream (lower intertidal region) . **Global Distribution:** East Africa, Indo-malaysia and Australasia (Orissa, Andaman, North tropical Australia, Micronesia, New Guinea and New Ireland. It ranges from Madagascar to Southeast Asia, the Malay Archipelago to the Philippines). **Current Regional Distribution:** East and west coast. **-Range (sq. km):** < 20,000. **-Area Occupied (sq. km):** < 2,000. **-Number of location**: Many (Sunderbans, Mahanadi, Coringa, Kerala, Karnataka, Maharashtra); Fragmented . **Population Trends - % change: -% Decline:** 30 % (Projected 60% decline). **-Time / Rate (Yrs or gens):** 20 yrs (over the next 3 generations). **-No of Mature Individuals:** Not known. **Global Population:** Not known. **Regional Population:** Continuing decline observed in the last 20 years and a projected decline over the next 3 generations. **Data Quality:** General field studies; Informal field sightings. **Recent Field Studies:** T.A. Rao, 1960-97 in Coastal India. **Threats:** Cattle grazing; Climate; Damming; Human interference; Harvest for timber; Harvest; Loss of habitat; Overexploitation; Trade. **Trade:** Local; Domestic. **Other Comments:** As per Untawale, 1985, *S. alba* is found in upper intertidal region. Pneumatophores for cork making. The family is revised in the Indian context. **Status: -IUCN: ENDANGERED (Nationally). DATA DEFICIENT (Globally).-Criteria based on: A2c, 2d** (Projected population reduction due to future decline in extent of occurrence, area of occupancy, quality of habitat and number of mature individuals). **-CITES:** No. **-IWPA(1972;91):** No. **-RDB National (1994):** No. **-RDB International (1996):** No. **Recommendations: -Research management:** Monitoring; Habitat management; Other (regeneration, propagation). **-PHVA:** No. **Cultivation Program Recommendations: -Cultivation:** Level 2. **-Level of difficulty:** Very difficult (Ovipary. Germination possible when the entire population with seeds in embeded in the roots). **Existing Cultivation:** None. **-Names of facilities:** —. **Sourcers (Refer Appendix):** 42, 45-60, 62-68, 70, 72-101, 102, 103-145, **Compilers:** S. Wafar, M.R. Almeida, L.J. Bhosale, T.A. Rao, K.N. Desai, S. Deshmukh, C.N. Mohanan, S.R. Yadav, A.G. Untawale, A. Singh, K.V. Billore, R.K. Singh.

49. *Sonneratia apetala* Buch. - Ham. — EN/N (A2b, 2c, 2d; B1, 2c) — **Family:** Sonneratiaceae. **Taxonomic status:** Species. **Habit:** Tree with dense crowns, Peg like corky. Pneumatophores present. **Habitat:** Eumangrove. Upstream (Lower and middle intertidal region). **Global Distribution:** Indo-malaysia (Sri Lanka, Burma. Rare in Sri Lanka with a population of only six trees near Muttur in the estuary of the Koddiyar River). **Current Regional Distribution:** East and west coast. **-Range (sq. km):** < 5,000. **-Area Occupied (sq. km):** < 500. **-Number of location**: Many; Fragmented (Sunderbans, Mahanadi delta, Coringa, Tamil Nadu, Kerala, Karnataka, Maharashtra). **Population Trends - % change: -% Decline:** 30 % (Projected decline 50 %). **-Time / Rate (Yrs or gens):** 20 yrs (over the next 3 generations). **-No of Mature Individuals:** Not known. **Global Population:** Not known. **Regional Population:** Continuing decline observed in the last 20 years and a projected decline over the next 3 generations. **Data Quality:** General field studies; Informal field sightings. **Recent Field Studies:** K.V. Billore, 1968-72 in Thane Dist., ; T.A. Rao, 1960-97 in coasts. **Threats:** Climate; Human interference; Harvest for timber; Harvest; Loss of habitat;.Overexploitation; Pollution; Trade . **Trade:** Local (House building, packing box, fruits for fish-bait and for tanning). **Other Comments:** This species is extinct in Picchavaram (Kathiresan). **Status: -IUCN: ENDANGERED (Nationally). DATA DEFICIENT (Globally). -Criteria based on: A2b, 2d, 2c** (Projected population reduction due to future decline in abundance, area of occupancy, extent of occurrence, quality of habitat and number of mature individuals); **B1, 2c** (Restricted distribution, severely fragmented, continuing decline observed in extent of occurrence, area of occupancy and quality of habitat). **-CITES:** No. **-IWPA(1972;91):** No. **-RDB National (1994):** No. **-RDB International (1996):** No. **Recommendations: -Research management:** Monitoring; Habitat management; Limiting factor management; Other (Propagation, regeneration). **-PHVA:** No. **Cultivation Program Recommendations: -Cultivation:** Level 2. **-Level of difficulty:** Very difficult. **Existing Cultivation:** None. **-Names of facilities:** —. **Sourcers (Refer Appendix):** 19, 102. **Compilers:** S. Wafar, M.R. Almeida, L.J. Bhosale, T.A. Rao, K.N. Desai, S. Deshmukh, C.N. Mohanan, S.R. Yadav, A.G. Untawale, A. Singh, K.V. Billore, R.K. Singh.

50. *Sonneratia caseolaris* (L.) Engl. — EN/N (A2a, 2c, 2d; B1, 2c) — **Family:** Sonneratiaceae. **Taxonomic status:** Species. **Habit:** Tree with continuous growth, tall with many drooping, branches and short breathing roots. **Habitat:** Eumangrove. Upstream (lower intertidal region). **Global Distribution:** Indo-malaysia, Australasia (India, tropical south east Asia, Sri Lanka, North Australia, Sumatra, Java, the Philippines, Papua New Guinea). **Current Regional Distribution:** West and east coast, Andaman-Islands. **-Range (sq. km):** < 20,000. **-Area Occupied (sq. km):** < 500. **-Number of location**: Many; Fragmented. **Population Trends - % change: -% Decline:** 20 % (Projected decline). **-Time / Rate (Yrs or gens):** 10 yrs (over the next 3 generations). **-No of Mature Individuals:** Not known. **Global Population:** Not known. **Regional Population:** Continuing decline observed in the last 10 yrs and a projected decline over the next 3 generations. **Data Quality:** Not known. **Recent Field Studies:** T.A. Rao, 1980-97 in West coast of India; T.A. Rao, S. Chakraborti, 1996 in BSI Fascile No. 22. **Threats:** Climate; Human interference; Loss of habitat; Overexploitation; Trade. **Trade:** Local. **Other Comments:** Untawale, upper intertidal region. Edible leave and fruits. Medicinal and pneumatophores for cork making. Foliae apical knobs as hydathodes helpful for identification from *S. alba* . Pollinators are Moths and Bats. **Status: -IUCN: ENDANGERED (Nationally). DATA DEFICIENT (Globally). -Criteria based on: A2a, 2c, 2d** (Projected population reduction due to future decline in abundance, area of occupancy, extent of occurrence, quality of habitat and number of mature individuals); **B1, 2c** (Restricted distribution, severely fragmented, continuing decline observed in extent of occurrence, area of occupancy and quality of habitat). **-CITES:** No. **-IWPA(1972;91):** No. **-RDB National (1994):** No. **-RDB International (1996):** No. **Recommendations: -Research management:** Taxonomic and morphological genetic studies; Survey; Monitoring; Genetic management; Habitat management; Limiting factor management; Limiting factor research; Other (Regeneration, propagation). **-PHVA:** No. **Cultivation Program Recommendations: -Cultivation:** Level 2. **-Level of difficulty:** Very difficult (Ovipary. Population to be used for germination of seeds). **Existing Cultivation:** None. **-Names of**

facilities: —. **Sourcers (Refer Appendix):** 42, 45-60, 62-68, 70, 72-101, 102, 103-145, **Compilers:** S. Wafar, M.R. Almeida, L.J. Bhosale, T.A. Rao, K.N. Desai, S. Deshmukh, C.N. Mohanan, S.R. Yadav, A.G. Untawale, A. Singh, K.V. Billore, R.K. Singh.

51. *Sonneratia griffithii* Kurz. — CR/N (B1, 2c) — **Family:** Sonneratiaceae. **Taxonomic status:** Species. **Habit:** Tree. **Habitat:** Eumangrove. Mangrove swamp.**Global Distribution:** Indo-malayan (India, Bangladesh, Myanmar-Mergui, West Malayan Peninsular), Australasia, Africa. **Current Regional Distribution:** Andaman & Nicobar Islands, East coast. **-Range (sq. km):** < 5,000. **-Area Occupied (sq. km):** < 10. **-Number of location**: 3 (Mahanadhi Delta and Andaman islands); Fragmented. **Population Trends - % change: -% Decline:** Not known. **-Time / Rate (Yrs or gens):** Not known. **-No of Mature Individuals:** Not known. **Global Population:** Not known. **Regional Population:** < 500 mature individuals. May be declining. New record for Orissa. **Data Quality:** General field survey. **Recent Field Studies:** L.K. Banerjee and T.A. Rao, 1990; T.A. Rao, S. Chakraborty, 1996. **Threats:** Loss of habitat (Aquaculture/agriculture). **Trade:**. **Other Comments:** Fringing mangrove tree, low density in Bhitarkanika and south Andaman. .Only 20 mature individuals in Bhitarkanika (TA Rao). **Status: -IUCN: CRITICALLY ENDANGERED (Nationally). DATA DEFICIENT (Globally). -Criteria based on: B1, 2c** (Restricted distribution, limited location, severely fragmented, continuing decline observed in extent of occurrence, area of occupancy and quality of habitat). **-CITES:** No. **-IWPA(1972;91):** No. **-RDB National (1994):** No. **-RDB International (1996):** No. **Recommendations: -Research management:** Habitat management; Monitoring. **-PHVA:** No. **Cultivation Program Recommendations: -Cultivation:** Level 1. **-Level of difficulty:** Least difficult. **Existing Cultivation:** None. **-Names of facilities:** —. **Sourcers (Refer Appendix):** 5, 6, 82, 102. **Compilers:** K. Kathiresan, H. Kanvinde, K. Muniyandi, T.S. Srinivasamurthy, S.D. Oswin, P.S. Rajasekhar, K. Kumar, T.A. Rao.

52. *Sporobolus virginicus* (L.) Kunth — EN/N (B1, 2c) — **Family:** Poaceae. **Taxonomic status:** Species. **Habit:** Grass-perennial. **Habitat:** Proestuarine. Coastal muddy and sandy niches. **Global Distribution:** Indo-malayasia (Sri Lanka, Australia, Tropical Africa, America). **Current Regional Distribution:** West coasts of India. **-Range (sq. km):** < 5,000. **-Area Occupied (sq. km):** < 500. **-Number of location**: Many; Fragmented . **Population Trends - % change: -% Decline:** 20 %. **-Time / Rate (Yrs or gens):** 10 yrs. **-No of Mature Individuals:** > 10,000. **Global Population:** Not known. **Regional Population:** Continuing decline observed. **Data Quality:** General field studies; Informal field sightings. **Recent Field Studies:** None**. Threats:** Human interference; Loss of habitat; Grazing; Trade. **Trade:** Local. **Other Comments:** Excellent grazing grass when young. . **Status: -IUCN: ENDANGERED (Nationally). DATA DEFICIENT (Globally). -Criteria based on: B1, 2c** (Restricted distribution, severely fragmented, continuing decline observed in extent of occurrence, area of occupancy and quality of habitat). **-CITES:** No. **-IWPA(1972;91):** No. **-RDB National (1994):** No. **-RDB International (1996):** No. **Recommendations: -Research management:** Monitoring; Habitat management; Life history studies; Husbandry research. **-PHVA:** No. **Cultivation Program Recommendations: -Cultivation:** Level 1. **-Level of difficulty:** Not known. **Existing Cultivation:** None. **-Names of facilities:** —. **Sourcers (Refer Appendix):** 42, 45-60, 62-68, 70, 72-101, 103-145**. Compilers:** K. Kathiresan, H. Kanvinde, K. Muniyandi, T.S. Srinivasamurthy, S.D. Oswin, P.S. Rajasekhar, K. Kumar, T.A. Rao.

53. *Suaeda maritima* L. (Dumort) — EN/N (B1, 2b, 2c) — **Family:** Chenopodiaceae. **Taxonomic status:** Species. **Habit:** Herb/under shrub. **Habitat:** Proestuarine. Common in saline estuarine embankment. **Global Distribution:** Indo-malaysia (India, Sri Lanka, Thailand), Australia, North Africa. **Current Regional Distribution:** East and west coasts . **-Range (sq. km):** < 5,000. **-Area Occupied (sq. km):** < 500. **-Number of location**: Many; Fragmented . **Population Trends - % change: -% Decline:** < 20 % (Projected decline 30 %). **-Time / Rate (Yrs or gens):** 20 yrs (over the next 20 years). **-No of Mature Individuals:** > 10,000. **Global Population:** Not known. **Regional Population:** Continuing decline projected over the next 20 years. **Data Quality:** General field studies; Informal field sightings.**Recent Field Studies:** T.A. Rao, 1960-97 in Coastal India; L.K. Banerjee and T.A. Rao, 1990. **Threats:** Human interference; Loss of habitat. **Trade:** No. **Other Comments:** A vigorous weed in coastal belts. **Status: -IUCN: ENDANGERED (Nationally). DATA DEFICIENT (Globally). -Criteria based on: B1, 2b, 2c** (Restricted distribution, severely fragmented, continuing decline observed in extent of occurrence, area of occupancy and quality of habitat). **-CITES:** No. **-IWPA(1972;91):** No. **-RDB National (1994):** No. **-RDB International (1996):** No. **Recommendations: -Research management:** Monitoring; Limiting factor research; Habitat management. **-PHVA:** No. **Cultivation Program Recommendations: -Cultivation:** Level 1. **-Level of difficulty:** Moderate difficult. **Existing Cultivation:** None. **-Names of facilities:** —. **Sourcers (Refer Appendix):** 5, 6, 42, 45-60, 62-68, 70, 72-101, 103-145. **Compilers:** S. Wafar, M.R. Almeida, L.J. Bhosale, T.A. Rao, K.N. Desai, S. Deshmukh, C.N. Mohanan, S.R. Yadav, A.G. Untawale, A. Singh, K.V. Billore, R.K. Singh.

54. *Suaeda monoica* (Forsk.) ex J.E. Gmel. -Associate — EN/N (B1, 2a, 2b, 2c) — **Family:** Chenopodiaceae. **Taxonomic status:** Species. **Habit:** Herb. Erect or decumbent shrubs. **Habitat:** Proestuarine. Associate. Downstream, intermediate (higher intertidal regions). **Global Distribution:** Indo-malaysia (India, Sri Lanka, Arabia, Egypt, E. Africa, Portugal). **Current Regional Distribution:** East and west coasts. -Elevation: . **-Range (sq. km):** < 5,000. **-Area Occupied (sq. km):** < 500. **-Number of location**: 25; Fragmented . **Population Trends - % change: -% Decline:** No siginificant decline (Projected decline 20 %). **-Time / Rate (Yrs or gens):** Not known (over the next 20 years). **-No of Mature Individuals:** Not known. **Global Population:** Not known. **Regional Population:** Continuing decline projected over next 20 yrs. **Data Quality:** General field studies; Informal field sightings; K.V. Billore, 1968-72 in Thane Dist., **Recent Field Studies:** T.A. Rao, 1960-97 in Coastal India. **Threats:** Climate; Human interference; Loss of habitat. **Trade:** No. **Other Comments:** Does not occur in Karnataka (except in Maharashtra (Mumbai). Projected 20% over next 20 years). **Status: -IUCN: ENDANGERED (Nationally). DATA DEFICIENT (Globally). -Criteria based on: B1, 2a, 2b, 2c** (Restricted distribution, severely fragmented, continuing decline observed in extent of occurrence, area of occupancy and quality of habitat). **-CITES:** No. **-IWPA(1972;91):** No. **-RDB National (1994):** No. **-RDB International (1996):** No. **Recommendations: -Research management:** Monitoring; Habitat managment; Limiting factor research. **-PHVA:** No. **Cultivation Program Recommendations: -Cultivation:** Level 2. **-Level of difficulty:** Moderate difficult. **Existing Cultivation:** None. **-Names of facilities:** —. **Sourcers (Refer Appendix):** 19, 42, 45-60, 62-68, 70, 72-101, 103-145**. Compilers:** S. Wafar, M.R. Almeida,

L.J. Bhosale, T.A. Rao, K.N. Desai, S. Deshmukh, C.N. Mohanan, S.R. Yadav, A.G. Untawale, A. Singh, K.V. Billore, R.K. Singh.

55. *Suaeda nudiflora* (Willd.) Moq. — EN/N (B1, 2a, 2c) — Family: Chenopodiaceae. **Taxonomic status:** Species. **Habit:** Shrub. Defusely branched erect. **Habitat:** Proestuarine. Associate. Downstream, intermediate (higher intertidal region). **Global Distribution:** Indo-Malaysia, Sri Lanka, Australia, North Africa, West America. **Current Regional Distribution:** East and west coasts. **-Range (sq. km):** < 5,000. **-Area Occupied (sq. km):** < 500. **-Number of location**: Many; Fragmented. **Population Trends - % change: -% Decline:** Not significant (Projected decline 30 %) . **-Time / Rate (Yrs or gens):** Not known (over the next 20 years). **-No of Mature Individuals:** Not known. **Global Population:** Dry muddy flats. **Regional Population:** Gradual continuing decline observed but higher rate projected. **Data Quality:** General field studies; Informal field sightings (K.V. Billore, 1968-72 in Thane Dist., **Recent Field Studies:** T.A. Rao, 1960-97 in Coastal India. **Threats:** Climate; Human interference; Loss of habitat. **Trade:** No. **Other Comments:** Does not occur in Karnataka. **Status: -IUCN: ENDANGERED (Nationally). DATA DEFICIENT (Globally). -Criteria based on: B1, 2a, 2c** (Restricted distribution, severely fragmented, continuing decline observed in extent of occurrence, area of occupancy and/or quality of habitat). **-CITES:** No. **-IWPA(1972;91):** No. **-RDB National (1994):** No. **-RDB International (1996):** No. **Recommendations: -Research management:** Monitoring; Habitat management; Limiting factor research. **-PHVA:** No. **Cultivation Program Recommendations: -Cultivation:** Level 2. **-Level of difficulty:** Moderate difficult. **Existing Cultivation:** None. **-Names of facilities:** —. **Sourcers (Refer Appendix):** 19, 42, 45-60, 62-68, 70, 72-101, 103-145. **Compilers:** S. Wafar, M.R. Almeida, L.J. Bhosale, T.A. Rao, K.N. Desai, S. Deshmukh, C.N. Mohanan, S.R. Yadav, A.G. Untawale, A. Singh, K.V. Billore, R.K. Singh.

56. *Tamarix troupii* Hole — EN/N (B1, 2b, 2c, 2d) — **Family:** Tamaricaceae. **Taxonomic status:** Species. **Habit:** Shrub/tree. **Habitat:** Transgrass. Coastal sandy and muddy niches (along sandy beaches, river banks and mud flats). **Global Distribution:** Indo-malayasia, India, Burma, Sri Lanka, Tropical Africa, South Asia, North Europe. **Current Regional Distribution:** West coast. **-Range (sq. km):** < 5,000. **-Area Occupied (sq. km):** < 500. **-Number of location**: 20; Fragmented . **Population Trends - % change: -% Decline:** 20 %. **-Time / Rate (Yrs or gens):** 10 yrs. **-No of Mature Individuals:** Not known. **Global Population:** Not known. **Regional Population:** Continuing decline observed. **Data Quality:** General field studies; Informal field sightings (T.A. Rao and A.R.K. Sastry, 1974 in Sunderbans; L.K. Banerjee, T.A. Rao, 1985 in Mahanadi Delta). **Recent Field Studies:** None. **Threats:** Human interference; Loss of habitat. **Trade:** No. **Other Comments:** Brakish niches are favorable for the growth. **Status: -IUCN: ENDANGERED (Nationally). DATA DEFICIENT (Globally). -Criteria based on: B1, 2b, 2c, 2d** (Restricted distribution, severely fragmented, continuing decline observed in area of occupancy, extent of occurrence and/or quality of habitat and number of locations or subpopulation). **-CITES:** No. **-IWPA(1972;91):** No. **-RDB National (1994):** No. **-RDB International (1996):** No. **Recommendations: -Research management:** Taxonomic and morphological genetic studies; Monitoring; Survey; Life history studies; Habitat management. **-PHVA:** No. **Cultivation Program Recommendations: -Cultivation:** Level 1. **-Level of difficulty:** Not known. **Existing Cultivation:** None. **-Names of facilities:** -. **Sourcers (Refer Appendix):** 6, 125. **Compilers:** K. Kathiresan, H. Kanvinde, K. Muniyandi, T.S. Srinivasamurthy, S.D. Oswin, P.S. Rajasekhar, K. Kumar, T.A. Rao.

57. *Urochondra setulosa* (Trin) Hubh. — EN (B1, 2c) — **Family:** Poaceae. **Taxonomic status:** Species. **Habit:** Perennial (grass) herb. **Habitat:** Peoestuarine and Transgress taxon. Peripheral saltcreeks and sand dunes .**Global Distribution:** ENDEMIC to India. **Current Regional Distribution:** Gujarat. **-Range (sq. km):** < 5,000. **-Area Occupied (sq. km):** < 500. **-Number of location**: 10 (Somanath to Dwarka in Saurashtra); Fragmented. Population Trends - % change. -% Decline: 10 %. **-Time / Rate (Yrs or gens):** 20 yrs. **-No of Mature Individuals:** Not known. **Global Population:** Gradual decline. **Data Quality:** General field studies. **Recent Field Studies:** Jagtap and Untawale, 1992-94 in Saurashtra; T.A. Rao, 1963-67 in Saurashtra .S. Deshmukh, 1986-87 in Saurashtra. **Threats:** Landslide; Siltation. **Trade:** No. **Other Comments:** Leaves involute with spine link pointed tips. **Status: -IUCN: ENDANGERED** . **-Criteria based on: B1, 2c** (Restricted distribution, severely fragmented, continuing decline .observed in extent of occurrence, area of occupancy and/or quality of habitat). **-CITES:** No. **-IWPA(1972;91):** No. **-RDB National (1994):** No. **-RDB International (1996):** No. **Recommendations: -Research management:** Autoeology studies. **-PHVA:** No. **Cultivation Program Recommendations: -Cultivation:** Level 3. **-Level of difficulty:** Not known. **Existing Cultivation:** None. **-Names of facilities:** —.**Sourcers (Refer Appendix):** 24, 42, 45-60, 62-68, 70, 72-101, 103-145. **Compilers:** S. Wafar, M.R. Almeida, L.J. Bhosale, T.A. Rao, K.N. Desai, S. Deshmukh, C.N. Mohanan, S.R. Yadav, A.G. Untawale, A. Singh, K.V. Billore, R.K. Singh.

58. *Xylocarpus granatum* Koen. — EN/N (A1a, 1c, 1d; A2b, 2c, 2d; B2a, 2c, 2b) — Carapa obovata Bl. — **Family:** Meliaceae. **Taxonomic status:** Species. **Habit:** Tree. **Habitat:** Eumangrove. Intermediate (middle, higher intertidal region). **Global Distribution:** East Africa, Indo-malaysia and Australasia (Australia, Sri Lanka, Malaya). **Current Regional Distribution:** East and west coast. **-Range (sq. km):** < 5,000. **-Area Occupied (sq. km):** < 500. **-Number of location**: 20; Fragmented . **Population Trends - % change: -% Decline:** 50 % (projected decline). **-Time / Rate (Yrs or gens):** 3 generations (over the next 3 generations). **-No of Mature Individuals:** Not known. **Global Population:** Not known. **Regional Population:** Rapid continuing decline observed. **Data Quality:** General field studies; Informal field sightings. **Recent Field Studies:** T.A. Rao, 1960-97 in Coastal India; L.K. Banerjee and T.A. Rao, 1990 in Mahanadi. **Threats:** Climate; Human interference; Harvest for timber; Harvest; Loss of habitat; Overexploitation; Trade. **Trade:** Local. **Other Comments:** Four sticks are standing in Picchavaram. It is almost in the West coast. Large globose fruits with pyrimidal seeds. Pneumatophores are absent but buttresed stem present; oviparous. **Status: -IUCN: ENDANGERED (Nationally). DATA DEFICIENT (Globally). -Criteria based on: A1a, 1c, 1d** (Population reduction observed due to decline in extent of occurrence, area of occupancy, quality of habitat and number of mature individuals); **A2b, 2c, 2d** (Projected population reduction due to decline in abundance, area of occupancy, extent of occurrence, quality of habitat and number of mature individuals); **B2a, 2c, 2b** (Restricted distribution, severely fragmented, continuing decline observed in extent of occurrence, area of occupancy and quality of habitat). **-CITES:** No. **-IWPA(1972;91):** No. **-RDB National (1994):** No. **-RDB International (1996):** No. **Recommendations: -Research management:** Taxonomic and morphological genetic studies; Survey; Genetic management; Habitat management; Others (propagation, afforestation). **-PHVA:** No. **Cultivation Program**

Recommendations: -Cultivation: Level 1. **-Level of difficulty:** Moderate difficult. **Existing Cultivation:** None. **-Names of facilities:** —. **Sourcers (Refer Appendix):** 5, 6, 42, 45-60, 62-68, 70, 72-101, 103-145. **Compilers:** S. Wafar, M.R. Almeida, L.J. Bhosale, T.A. Rao, K.N. Desai, S. Deshmukh, C.N. Mohanan, S.R. Yadav, A.G. Untawale, A. Singh, K.V. Billore, R.K. Singh.

59. *Xylocarpus mekongensis* (Prain) Pierre — EN/N (B1, 2c) — (*Carapa obovata* Bl.). **Family:** Meliaceae. **Taxonomic status:** Species. **Habit:** Tree. **Habitat:** Mangrove swamp. **Global Distribution:** Indo-malayan, Australasia (India, Singapore). **Current Regional Distribution:** East coast, Andaman & Nicobar Islands. **-Range (sq. km):** < 5,000. **-Area Occupied (sq. km):** < 500. **-Number of location**: 3 (Mahanadhi Delta; Sunderbans; Andaman); Fragmented. **Population Trends - % change: -% Decline:** Declining. **-Time / Rate (Yrs or gens):** Not known. **-No of Mature Individuals:** < 2500. **Global Population:** Not known. **Regional Population:** Continuing decline. **Data Quality:** General field studies (H. Harms, 1940 in West Bengal; J.G. Watson, 1928 in West Bengal).**Recent Field Studies:** L.K. Banerjee and T.A. Rao, 1990 in Mahanadi Delta. **Threats:** Harvest for timber; Loss of habitat. **Trade:** No. **Other Comments:** Absence of buttressed trunk. Species is sporadic in interior elevated areas. **Status: -IUCN: ENDANGERED (Nationally). DATA DEFICIENT (Globally). -Criteria based on: B1, 2c** (Restricted distribution, limited location, severely fragmented, continuing decline observed in extent of occurrence, area of occupancy and quality of habitat). **-CITES:** No. **-IWPA(1972;91):** No. **-RDB National (1994):** No. **-RDB International (1996):** No. **Recommendations: -Research management:** Habitat management. **-PHVA:** Not known. **Cultivation Program Recommendations: -Cultivation:** Pending. **-Level of difficulty:** Level 1. **Existing Cultivation:** None. **-Names of facilities:** —. **Sourcers (Refer Appendix):** 5, 6, 31, 161**. Compilers:** K. Kathiresan, H. Kanvinde, K. Muniyandi, T.S. Srinivasamurthy, S.D. Oswin, P.S. Rajasekhar, K. Kumar, T.A. Rao.

60. *Xylocarpus moluccensis* (Lamk.) Roem. — EN/N (B1, 2c) — **Family:** Meliaceae. **Taxonomic status:** Species. **Habit:** Tree. **Habitat:** Mangrove swamp. **Global Distribution:** Indo-malayan (India, Indonesia, Malaysiia, Philippines, Sri Lanka, Thailand, Australia, Fiji); Australasia. **Current Regional Distribution:** East coast, Andaman & Nicobar Islands. **-Range (sq. km):** < 5,000. **-Area Occupied (sq. km):** < 500. **-Number of location**: 6 (Sunderbans; Mahanadi; Andaman & Nicobar Islands; Coringa); Fragmented . **Population Trends - % change: -% Decline:** Not known. **-Time / Rate (Yrs or gens):** Not known. **-No of Mature Individuals:** > 2500. **Global Population:** Not known. **Regional Population:** Trends not known. **Data Quality:** General field studies. **Recent Field Studies:** Krishna Kumar, 1990-92 in Andaman. **Threats:** Edaphic factors; Genetic problem; Harvest for timber; Harvest; Loss of habitat. **Trade:** No. **Other Comments:** Uncommon. Groups on elevated freshwater innovated river banks in association with *Heritiera littoralis*. **Status: -IUCN: ENDANGERED (Nationally). DATA DEFICIENT (Globally). -Criteria based on: B1, 2c** (Restricted distribution, severely fragmented, continuing decline observed in extent of occurrence, area of occupancy and quality of habitat). **-CITES:** No. **-IWPA(1972;91):** No. **-RDB National (1994):** No. **-RDB International (1996):** No. **Recommendations: -Research management:** Habitat management; Monitoring; Limiting facotor research; Life history studies. **-PHVA:** No. **Cultivation Program Recommendations: -Cultivation:** Pending. **-Level of difficulty:** Least difficult. **Existing Cultivation:** None. **-Names of facilities:** —. **Sourcers (Refer Appendix):** 7. **Compilers:** K. Kathiresan, H. Kanvinde, K. Muniyandi, T.S. Srinivasamurthy, S.D. Oswin, P.S. Rajasekhar, K. Kumar, T.A. Rao.

Algae

1. *Bostrychia tenella* (Vahl) J. Ag. — EN/N (B1, 2c) — **Family:** Polysiphonaceae. **Taxonomic status:** Species. **Habit:** Thalloid (branched). **Habitat:** Mangrove pneumatophores, lower trunk, barnacles, shells. **Global Distribution:** Indo-malayasia, Australasia. **Current Regional Distribution:** East and West coasts. **-Range (sq. km):** < 20,000. **-Area Occupied (sq. km):** < 500. **-Number of location**: Many; Fragmented (Maharashtra, Goa, Karnataka, Kerala, East coast). **Population Trends - % change: -% Decline:** 15-20 %. **-Time / Rate (Yrs or gens):** 20 yrs. **-No of Mature Individuals:** Not known. **Global Population:** Not known. **Regional Population:** Average biomass 0.30 kg/m^2. Continuing decline observed. **Data Quality:** General field studies (Untawale *et al*., 1985-87 in Goa, Maharashtra; Krishnamurthy and Joshi, 1970 in Cannanore). **Recent Field Studies:** None. **Threats:** Human interference; Loss of habitat; Pollution; Siltation. **Trade:** No. **Other Comments:** --. **Status: -IUCN: ENDANGERED (Nationally). DATA DEFICIENT (Globally). -Criteria based on: B1, 2c** (Restricted distribution, severely fragmented, continuing decline observed in extent of occurrence, area of occupancy and quality of habitat). **-CITES:** No. **-IWPA(1972;91):** No. **-RDB National (1994):** No. **-RDB International (1996):** No. **Recommendations: -Research management:** Survey; Life history studies. **-PHVA:** Pending. **Cultivation Program Recommendations: -Cultivation:** No. **-Level of difficulty:** Not known. **Existing Cultivation:** None. **-Names of facilities:** --. **Sourcers (Refer Appendix):** 13, 18, 23. **Compilers:** A.G. Untawale, G.V. Deshmukhe, V.K. Dhargalkar, V.V. Agadi.

2. *Caloglossa leprieurii* (Mont) J. Ag. — EN/N (B1, 2c) - **Family:** Catnellaceae. **Taxonomic status:** Species. **Habit:** Thalloid (branched). **Habitat:** Mangrove pneumatophores, lower trunk, barnacles, shells. **Global Distribution:** Indo-malaysia, Australasia. **Current Regional Distribution:** East and West coast including islands. **-Range (sq. km):** < 5,000. **-Area Occupied (sq. km):** < 500. **-Number of location**: Many (Maharashtra, Goa, Karnataka, Kerala, East coast); Fragmented. **Population Trends - % change: -% Decline:** 15 -20 %. **-Time / Rate (Yrs or gens):** 20 yrs. **-No of Mature Individuals:** Not known. **Global Population:** Not known. **Regional Population:** Average biomass of 0.25 kg/m^2. Continuing decline observed. **Data Quality:** General field studies (Jagtap, 1985-86 in Maharashtra; Untwale et al.,1978-79 in Goa, Maharashtra; Untawale, 1985-87 in Maharashtra; Krishnamurthy and Joshi, 1971 in Maharashtra, Gujarat)**. Recent Field Studies:** None. **Threats:** Human interference; Loss of habitat; Pollution; Siltation. **Trade:** None. **Other Comments:** Utilization in dyes, food in east Asian countries. **Status: -IUCN: ENDANGERED (Nationally). DATA DEFICIENT (Globally). -Criteria based on: B1, 2c** (Restricted distribution, severely fragmented, continuing decline observed in extent of occurrence, area of occupancy and quality of habitat). **-CITES:** No. **-IWPA(1972;91):** No. **-RDB National (1994):** No. **-RDB International (1996):** No. **Recommendations: -Research management:** Survey; Life history studies. **-PHVA:** Pending. **Cultivation Program Recommendations: -Cultivation:** No. **-Level of difficulty:** —. **Existing Cultivation:** None. **-Names of facilities:** —. **Sourcers (Refer Appendix):** 11, 13, 18, 23. **Compilers:** A.G. Untawale, G.V. Deshmukhe, V.K. Dhargalkar, V.V. Agadi.

3. *Catnella impudica* (Monte.) J. Ag. — EN/N (B1, 2c) — **Family:** Catnellaceae. **Taxonomic status:** Species. **Habit:** Branched, thalloid. **Habitat:** Muddy substratum, tree trunks, dead molluscan shells, etc. **Global Distribution:** East Africa, Indo-malaysia, Australasia. **Current Regional Distribution:** East and West coast. **-Range (sq. km):** < 20,000. **-Area Occupied (sq. km):** < 500. **-Number of location**: +/- 30 (Goa, Karnataka, Gujarat, Sunderbans); Fragmented. **Population Trends - % change: -% Decline:** 5-10 %. **-Time / Rate (Yrs or gens):** 10 yrs. **-No of Mature Individuals:** Not known. **Global Population:** Not known. **Regional Population:** Biomass negligible. Continuing decline observed. **Data Quality:** General field studies (Jagtap, 1984-85 in Maharashtra; Untawale, 1984-88 in Maharashtra, Goa and Karnataka; Santra 1986-87 in Sunderbans). **Recent Field Studies:** Santra, 1994 in Sunderbans. **Threats:** Loss of habitat. **Trade:** No. **Other Comments:** --. **Status: -IUCN: ENDANGERED (Nationally). DATA DEFICIENT (Globally). -Criteria based on: B1, 2c** (Restricted distribution, severely fragmented, continuing decline observed in extent of occurrence, area of occupancy and quality of habitat). **-CITES:** No. **-IWPA(1972;91):** No. **-RDB National (1994):** No. **-RDB International (1996):** No. **Recommendations: -Research management:** Survey; Monitoring; Life history studies. **-PHVA:** Pending. **Cultivation Program Recommendations: -Cultivation:** No. **-Level of difficulty:** Not known. **Existing Cultivation:** None. **-Names of facilities:** --. **Sourcers (Refer Appendix):** 12, 17, 23. **Compilers:** A.G. Untawale, G.V. Deshmukhe, V.K. Dhargalkar, V.V. Agadi.

4. *Catnella repens* (Light foot) Batters — EN/N (B1, 2c) — **Family:** Catnellaceae. **Taxonomic status:** Species. **Habit:** Thalloid (branched). **Habitat:** Mangrove pneumatophores, lower trunk, Barnacles, Shells. **Global Distribution:** Indo-malaysia, Australasia. **Current Regional Distribution:** East and West coast including islands. **-Range (sq. km):** < 5,000. **-Area Occupied (sq. km):** < 500. **-Number of location**: Many (Maharashtra, Goa, Karnataka, Kerala); Fragmented. **Population Trends - % change: -% Decline:** 30 %. **-Time / Rate (Yrs or gens):** 20 yrs. **-No of Mature Individuals:** Not known. **Global Population:** Not known. **Regional Population:** Average biomass 0.25 kg/m^2. Continuing decline observed. **Data Quality:** General field studies (Jagtap, 1985-86 in Maharashtra; Untwale et al., 1978-79 in Goa, Maharastra; Untawala, 1985-87 in Karnataka; Krishnamurthy and Joshi, 1971 in Maharashtra, Gujarat)**. Recent Field Studies:** None**. Threats:** Human interference; Loss of habitat; Pollution; Siltation. **Trade:** No. **Other Comments:** --. **Status: -IUCN: ENDANGERED (Nationally). DATA DEFICIENT (Globally). -Criteria based on: B1, 2c** (Restricted distribution, severely fragmented, continuing decline observed in extent of occurrence, area of occupancy and quality of habitat). **-CITES:** No. **-IWPA(1972;91):** No. **-RDB National (1994):** No. **-RDB International (1996):** No. **Recommendations: -Research management:** Survey; Life history studies. **-PHVA:** Pending. **Cultivation Program Recommendations: -Cultivation:** No. **-Level of difficulty:** Not known. **Existing Cultivation:** None. **-Names of facilities:** --. **Sourcers (Refer Appendix):** 11, 13, 18, 23. **Compilers:** A.G. Untawale, G.V. Deshmukhe, V.K. Dhargalkar, V.V. Agadi.

5. *Chaetomorpha linum* (Mull.) Kuetz. — EN/N (B1, 2a, 2b, 2c) — **Family:** Cladophoraceae. **Taxonomic status:** Species. **Habit:** Filamentous unbranched. **Habitat:** Mangrove swamps. **Global Distribution:** Indo-malaysia, Australasia. **Current Regional Distribution:** West and East coasts. **-Range (sq. km):** < 5,000. **-Area Occupied (sq. km):** < 500. **-Number of location**: 4 (Karli in Ratnagiri, Mandovi, Zuari in Goa, Galjibag, Sunderbans); Fragmented. **Population Trends - % change: -% Decline:** 10-15 %. **-Time / Rate (Yrs or gens):** 20 yrs. **-No of Mature Individuals:** Not known.

Global Population: Not known. **Regional Population:** Average biomass 0.10 kg/m^2. Continuing decline observed. **Data Quality:** General field studies (Untawale et al., 1978-80 in Goa, Maharashtra, Jagtap, 1983-85 in Maharashtra; Santra, 1985-86 in Sunderbans). **Recent Field Studies:** None**. Threats:** Human interference; Loss of habitat. **Trade:** No. **Other Comments: --. Status: -IUCN: ENDANGERED (Nationally). DATA DEFICIENT (Globally). -Criteria based on: B1, 2a, 2b, 2c** (Restricted distribution, limited location, severely fragmented, continuing decline observed in extent of occurrence, area of occupancy and quality of habitat). **-CITES:** No. **-IWPA(1972;91):** No. **-RDB National (1994):** No. **-RDB International (1996):** No. **Recommendations: -Research management:** Survey; Taxonomic and morphological genetic studies; Life history studies. **-PHVA:** Pending. **Cultivation Program Recommendations: -Cultivation:** No. **-Level of difficulty:** Not known. **Existing Cultivation:** None. **-Names of facilities:** --. **Sourcers (Refer Appendix):** 12, 18, 23. **Compilers:** A.G. Untawale, G.V. Deshmukhe, V.K. Dhargalkar, V.V. Agadi.

6. *Codium fragile* (Surin) Harvey — EN/N (B1, 2c) — **Family:** Codiaceae. **Taxonomic status:** Species. **Habit:** Siphonaceous coenocytic thallus branched. **Habitat:** Mangrove swamps - on muddy substratum/intertidal. **Global Distribution:** East Africa, Indo-malaysia, Australasia. **Current Regional Distribution:** West coast. **-Range (sq. km):** < 5,000. **-Area Occupied (sq. km):** < 500. **-Number of location**: 4; Fragmented (Karli, Ratnagiri, Mandovi, Zuari). **Population Trends - % change: -% Decline:** Not known. **-Time / Rate (Yrs or gens):** Not known. **-No of Mature Individuals:** Not known. **Global Population:** Not known. **Regional Population:** Average biomass 0.60 kg/m^2 wet weight. **Data Quality:** General Field Studies (Jagtap, 1983-85 in Maharashtra; Untawale *et al*., 1983-88 in Maharashtra). . **Recent Field Studies:** None**. . Threats:** Human interference; Loss of habitat. **Trade:** No. **Other Comments:** *Codium fragile* is a potential species for bioactive substance. **Status: -IUCN: ENDANGERED (Nationally). DATA DEFICIENT (Globally). -Criteria based on: B1, 2c** (Restricted distribution, limited location, severely fragmented, continuing decline observed in extent of occurrence, area of occupancy and quality of habitat). **-CITES:** No. **-IWPA(1972;91):** No. **-RDB National (1994):** No. **-RDB International (1996):** No. **Recommendations: -Research management:** Survey; Monitoring; Taxonomic and morphological studies; Life history studies. **-PHVA:** Pending. **Cultivation Program Recommendations: -Cultivation:** Level 4. **-Level of difficulty:** Very difficult. **Existing Cultivation:** None. **-Names of facilities:** --. **Sourcers (Refer Appendix):** 12, 23. **Compilers:** A.G. Untawale, G.V. Deshmukhe, V.K. Dhargalkar, V.V. Agadi.

7. *Colpomenia sinuosa* Derb. — LRnt/N — **Family:** Colpomeniaceae. **Taxonomic status:** Species. **Habit:** Thalloid bulbose, Siphonaceous. **Habitat:** Mangrove swamps, estuarine/open coast. **Global Distribution:** East Africa, Indo-malayasia. **Current Regional Distribution:** East and West coasts including Lakshadweep and Andaman & Nicobar Islands. **-Range (sq. km):** < 5,000. **-Area Occupied (sq. km):** < 500. **-Number of location**: +/- 20 (Maharashtra, Goa, Karnataka, Gujarat, Lakshadweep Island, Andaman Nicobar islands); contiguous. **Population Trends - % change: -% Decline:** 10 %. **-Time / Rate (Yrs or gens):** 10 yrs. **-No of Mature Individuals:** Not known. **Global Population:** Not known. **Regional Population:** Biomass 1 kg/m^2. Continuing decline observed. **Data Quality:** General field studies (Untawale *et al.*,1978-80 in Maharashtra, Goa, Karnataka; Jagtap, 1983-85 in Andaman & Nicobar). **Recent Field Studies:** Deshmukhe *et al*., 1994-95in Maharashtra, Gujarat. **Threats:** Human interference; Loss of habitat. **Trade:** No. **Other Comments:** --. **Status: -IUCN: LOWER RISK - NEAR THREATENED (Nationally). DATA DEFICIENT (Globally). -Criteria based on:** No. **-CITES:** No. **-IWPA(1972;91):** No. **-RDB National (1994):** No. **-RDB International (1996):** No. **Recommendations: -Research management:** Survey; Taxonomic and morphological genetic studies; Life history studies. **-PHVA:** Pending. **Cultivation Program Recommendations: -Cultivation:** No. **-Level of difficulty:** Not known. **Existing Cultivation:** None. **-Names of facilities:** —. **Sourcers (Refer Appendix):** 12, 18. **Compilers:** A.G. Untawale, G.V. Deshmukhe, V.K. Dhargalkar, V.V. Agadi.

8. *Dichotomosiphon salina* Untawale, Jagtap, Dhargalkar — CR (B1, 2b, 2c, 2d) — **Family:** Codiaceae. **Taxonomic status:** Species. **Habit:** Coenocytic, branched. **Habitat:** Mangrove swamp. **Global Distribution:** ENDEMIC to western coast of India. **Current Regional Distribution:** Goa. **-Range (sq. km):** < 100. **-Area Occupied (sq. km):** < 10. **-Number of location**: 1 (Orda mangroves). **Population Trends - % change: -% Decline:** 10%. **-Time / Rate (Yrs or gens):** 20 yrs. **-No of Mature Individuals:** Not known. **Global Population:** Not known. **Data Quality:** General field studies (Untawale *et al.*,1978-94 in Orissa, Goa). **Recent Field Studies:** None. **Threats:** Human interference. **Status: -IUCN: CRITICALLY ENDANGERED. DATA DEFICIENT (Globally). -Criteria based on: B1, 2b, 2c, 2d** (Restricted distribution, continuing decline observed in area of occupancy and/or extent of occurrence, quality of habitat and number of locations or subpopulations). **-CITES:** No. **-IWPA(1972;91):** No. **-RDB National (1994):** No. **-RDB International (1996):** No. **Recommendations: -Research management:** Survey; Taxonomic and morphological genetic studies; Life history studies. **-PHVA:** Pending. **Cultivation Program Recommendations: -Cultivation:** No. **-Level of difficulty:** Not known. **Existing Cultivation:** None. **-Names of facilities:** --. **Sourcers (Refer Appendix):** 21. **Compilers:** A.G. Untawale, G.V. Deshmukhe, V.K. Dhargalkar, V.V. Agadi.

9. *Dictyota indica* Sonder — EN/N (B1, 2a) — **Family:** Dictyotaceae. **Taxonomic status:** Species. **Habit:** Thalloid branched. **Habitat:** Mangrove swamps. **Global Distribution:** East Africa, Indo-malayasia. **Current Regional Distribution:** West coast, Andaman & Nicobar Islands. **-Range (sq. km):** < 5,000. **-Area Occupied (sq. km):** < 500. **-Number of location**: +/- 15 (Karnataka, Goa, Andaman); Fragmented.Population Trends - % change. -% Decline: 10 %. **-Time / Rate (Yrs or gens):** 20 yrs. **-No of Mature Individuals:** Not known. **Global Population:** Not known. **Regional Population:** Biomass 1.00 kg/m^2 (wet wt.). Continuing decline observed. **Data Quality:** General field studies (Jagtap, 1983-85 in Andaman and Maharashtra; Untawale *et al.,*1983-88 in Maharashtra, Goa, Karnataka). **Recent Field Studies:** Muthuvelam, 1993-95 in Andaman & Nicobar. **Threats:** Human interference; Loss of habitat. **Trade:** No. **Other Comments: --. Status: -IUCN: ENDANGERED (Nationally). DATA DEFICIENT (Globally). -Criteria based on: B1, 2a** (Restricted distribution, severely fragmented, continuing decline observed in extent of occurrence). **-CITES:** No. **-IWPA(1972;91):** No. **-RDB National (1994):** No. **-RDB International (1996):** No. **Recommendations: -Research management:** Survey; Monitoring; Taxonomic and morphological genetic studies; Life history studies. **-PHVA:** Pending. **Cultivation Program**

Recommendations: -Cultivation: No. **-Level of difficulty:** Not known. **Existing Cultivation:** None. **-Names of facilities:** --. **Sourcers (Refer Appendix):** 12, 16, 23. **Compilers:** A.G. Untawale, G.V. Deshmukhe, V.K. Dhargalkar, V.V. Agadi.

10. *Enteromorpha clathrata* (Roth) J.Ag. — LRlc/N — **Family:** Ulvaceae. **Taxonomic status:** Species. **Habit:** Thalloid (branched). **Habitat:** Mangrove swamps - (ground, pneumatophores). **Global Distribution:** West and East America, West and East Africa, Indo-malaysia. **Current Regional Distribution:** West and East coast. **-Range (sq. km):** < 20,000. **-Area Occupied (sq. km):** < 2,000. **-Number of location**: Many. **Population Trends - % change: -% Decline:** Not known. **-Time / Rate (Yrs or gens):** Not known. **-No of Mature Individuals:** Not known. **Global Population:** Not known. **Regional Population:** Average biomass 2.3 kg/m^2. Trends not known. **Data Quality:** General field studies (Agadi and Untawale, 1978 in Karnataka; Balkrishnan *et al.*, 1982 in Kerala; Boergesen, 1930-35 in Mumbai; Chauhan, 1978 in Maharashtra, Gujarat; Joshi and Krishnamurthy, 1971 in Gujarat; Krishnamurthy and Joshi, 1970 in Gujarat). **Recent Field Studies:** None . **Threats:** No. **Trade:** No. **Other Comments:** --. **Status: -IUCN: LOWER RISK - LEAST CONCERN (Nationally). DATA DEFICIENT (Globally). -Criteria based on:** —. **-CITES:** No. **-IWPA(1972;91):** No. **-RDB National (1994):** No. - RDB International (1996): No. **Recommendations: -Research management:** Taxonomic and morphological genetic studies; Survey; Life history studies. **-PHVA:** Pending. **Cultivation Program Recommendations: -Cultivation:** No. **-Level of difficulty:** Not known. **Existing Cultivation:** None. **-Names of facilities:** --. **Sourcers (Refer Appendix):** 1, 2, 3, 4, 5, 13, 14, 22. **Compilers:** A.G. Untawale, G.V. Deshmukhe, V.K. Dhargalkar, V.V. Agadi.

11. *Enteromorpha intestinalis* (L.) Link — LRnt/N — **Family:** Ulvaceae. **Taxonomic status:** Species. **Habit:** Thalloid, branched. **Habitat:** Mangrove swamps. **Global Distribution:** West and East America, West and East Africa, Indo-malasia, Australasia. **Current Regional Distribution:** East and West coast of India. **-Range (sq. km):** < 20,000. **-Area Occupied (sq. km):** < 2,000. **-Number of location**: Many. **Population Trends - % change: -% Decline:** No change. **-Time / Rate (Yrs or gens):** Not known. **-No of Mature Individuals:** Not known. **Global Population:** Not known. **Regional Population:** Biomass - 3.5 kg/m^2 . No change in Population Trends - % change. **Data Quality:** General field studies (Krishnamurthy and Joshi, 1969 in Gujarat; Oza *et al.*, 1972-74 in Gujarat; Untawale 1985-86 in Goa, Maharashtra, Karnataka). **Recent Field Studies:** None. **Threats:** Loss of habitat. **Trade:** No. **Other Comments:** Highly nutritious. **Status: -IUCN: LOWER RISK - NEAR THREATENED (Nationally). DATA DEFICIENT (Globally). -Criteria based on:** —. **-CITES:** No. **-IWPA(1972;91):** No. **-RDB National (1994):** No. **-RDB International (1996):** No. **Recommendations: -Research management:** Survey; Monitoring. -PHVA: No.**Cultivation Program Recommendations: -Cultivation:** Level 3. **-Level of difficulty:** Moderate difficult. **Existing Cultivation:** None. **-Names of facilities:** --. **Sourcers (Refer Appendix):** 13, 14, 18, 23. **Compilers:** A.G. Untawale, G.V. Deshmukhe, V.K. Dhargalkar, V.V. Agadi.

12. *Gracilaria verrucosa* (Huds.) Papen. — EN/N (B1, 2b, 2c) — **Family:** Gracilariaceae. **Taxonomic status:** Species. **Habit:** Branched, thalloid. **Habitat:** Mangrove swamps, brackish water. **Global Distribution:** Indo-malaysia, Australasia. **Current Regional Distribution:** East and West coast. **-Range (sq. km):** < 5,000. **-Area Occupied (sq. km):** < 500. **-Number of location**: 11(Karli, Achara in Maharashtra, Banastari, Terekhol, Galjibag in Goa, Kali, Honavar); Fragmented. **Population Trends - % change: -% Decline:** 10-15 %. **-Time / Rate (Yrs or gens):** 10 yrs. **-No of Mature Individuals:** Not known. **Global Population:** Not known. **Regional Population:** Continuing decline observed. Biomass 3.1 kg/m^2 wet weight (average). **Data Quality:** General field studies (Chauhan, 1978 in Maharashtra; Joshi and Krishnamurthy1970 in Gujarat; Untawale *et al.*, 1988 in Maharashtra, Goa; Dhargalkhar *et al.*, 1980 in Goa; Umamaheswar Rao 1970-75 in Tamil Nadu). **Recent Field Studies:** None. **Threats:** Human interference; Loss of habitat; Overexploitation; Trade . **Trade:** Commercial (Agar industry - as raw material). **Other Comments:** --. Status. - IUCN**ENDANGERED (Nationally). DATA DEFICIENT (Globally). -Criteria based on: B1, 2b, 2c** (Restricted distribution observed in area of occupancy and/or extent of occurrence and quality of habitat). **-CITES:** No. **-IWPA(1972;91):** No. **-RDB National (1994):** No. **-RDB International (1996):** No. **Recommendations: -Research management:** Taxonomic and morphological genetic studies; Survey; Life history studies. **-PHVA:** Pending. **Cultivation Program Recommendations: -Cultivation:** Level 4. **-Level of difficulty:** Moderately difficult. **Existing Cultivation:** . **-Names of facilities:** CMFRI, Cochin for *Gracilaria edulis*. **Sourcers (Refer Appendix):** 5, 13, 23. **Compilers:** A.G. Untawale, G.V. Deshmukhe, V.K. Dhargalkar, V.V. Agadi.

13. *Hypnea musciformis* (Wulf) Lamour — LRnt/N — **Family:** Hypneaceae. **Taxonomic status:** Species. **Habit:** Thalloid branced. **Habitat:** Mangrove swamps and intertidal zone. **Global Distribution:** West and east America, West and east Africa, Indo-malaysia, Australasia. **Current Regional Distribution:** East and west coast including islands. -Range (km^2)< 20,000. **-Area Occupied (sq. km):** < 2,000. **-Number of location**: +/- 30. **Population Trends - % change: -% Decline:** 15-20 %. **-Time / Rate (Yrs or gens):** 10 yrs. **-No of Mature Individuals:** Not known. **Global Population:** Not known. **Regional Population:** Biomass 2.8 kg/m^2 wet weight. Continuing decline observed. **Data Quality:** General field studies (Untawale *et al*., 1978-79; Krishnamurthy and Joshi, 1968-69; Untawale *et al.*, 1985- 87; Jagtap, 1983-85; Jagtap, 1983-85 in Andaman; Untawale *et al.*, 1983-85 in Maharashtra.Krishnamurthy and Joshi, 1968-69 in Gujarat). **Recent Field Studies:** Santra, 1994 in Sunderbans; . **Threats:** Loss of habitat; Overexploitation; Human interference; Trade. **Trade:** Commercial, Local. **Other Comments:** In some parts of Maharashtra - used as fertilizer for coconut plantation. Even distribution in the mangrove swamps is fragmenting. It is abundantly found in the open coast. **Status: -IUCN: LOWER RISK - NEAR THREATENED (Nationally). DATA DEFICIENT (Globally). -Criteria based on:** —. **-CITES:** No. **-IWPA(1972;91):** No. **-RDB National (1994):** No. **-RDB International (1996):** No. **Recommendations: -Research management:** Survey; Genetic management; Monitoring. **-PHVA:** Pending. **Cultivation Program Recommendations: -Cultivation:** Level 4. **-Level of difficulty:** Moderately difficult. **Existing Cultivation:** None. **-Names of facilities:** --. **Sourcers (Refer Appendix):** 12, 13, 18, 23. **Compilers:** A.G. Untawale, G.V. Deshmukhe, V.K. Dhargalkar, V.V. Agadi.

14. *Monostroma oxyspermum* Doty — EN/N (B1, 2c) — **Family:** Monostromataceae. **Taxonomic status:** Species. **Habit:** Thalloid (unbranched). **Habitat:** Mangrove swamps (on the grounds).**Global Distribution:** Tropical marshes. West and East America, East Africa, Indo-malaysia.Other areas not known. **Current Regional Distribution:** West coast of India. **-Range (sq. km):** < 5,000. **-Area Occupied (sq. km):** < 500. **-Number of location**: 5 (Karli, Achara in Maharashtra,

Terekhol in Goa, Kali and Kundapur in Karnataka, Estuaries); Fragmented. **Population Trends - % change: -% Decline:** Not known. **-Time / Rate (Yrs or gens):** Not known. **-No of Mature Individuals:** Not known. **Global Population:** Not known. **Regional Population:** Average biomass 1.2kg/m^2 wet weight. **Data Quality:** General field studies (Dhargalkar *et al*., 1979 in Goa; Jagtap, 1984 in Karnataka; Untawale *et al*., 1986-87 in Maharashtra). **Recent Field Studies:** Deshmukhe *et al.*, 1995-96 Achara in Maharashtra. **Threats:** Cattle grazing; Loss of habitat; Human interference. **Trade:** No. **Other Comments:** Nutritional values: Protein 12.8 carbohydrates -27.8; C: N 16.6 Calorific value : 725.46 (Cal/g). **Status: -IUCN: ENDANGERED (Nationally). DATA DEFICIENT (Globally). -Criteria based on: B1, 2c** (Restricted distribution, limited location, severely fragmented, continuing decline observed in extent of occurrence, area of occupancy and/or quality of habitat). **-CITES:** No. **-IWPA(1972;91):** No. **-RDB National (1994):** No. **-RDB International (1996):** No. **Recommendations: -Research management:** Survey; Monitoring. **-PHVA:** Pending. **Cultivation Program Recommendations: -Cultivation:** Level 4. **-Level of difficulty:** Moderately difficult. **Existing Cultivation:** None. **-Names of facilities:** --. **Sourcers (Refer Appendix):** 7, 10, 20, 23. **Compilers:** A.G. Untawale, G.V. Deshmukhe, V.K. Dhargalkar, V.V. Agadi.

15. *Padina tetrastromatica* Hauck — LRnt/N — **Family:** Dictyotaceae. **Taxonomic status:** Species. **Habit:** Thalloid. **Habitat:** Mangrove swamps (attached to mud)/intertidal. **Global Distribution:** West and East America, West and East Africa, Indo-malaysia. **Current Regional Distribution:** East and West coast including islands. **-Range (sq. km):** < 20,000. **-Area Occupied (sq. km):** < 2,000. **-Number of location**: Many. **Population Trends - % change: -% Decline:** 5-10 %. **-Time / Rate (Yrs or gens):** 20 yrs. **-No of Mature Individuals:** Not known. **Global Population:** Not known. **Regional Population:** Average biomass 1.2 kg/m^2 wet weight. Continuing decline observed. **Data Quality:** General field studies (Jagtap, 1983-85 in Andaman & Nicobar; Untawale *et al.*, 1983-88 in Maharashtra, Goa, Karnataka; Borgensen, 1930, 37 in Bombay; Misra, 1966 in Mahabalipuram, Tuticorin (T.N.)). **Recent Field Studies:** None. **Threats:** Loss of habitat; Human interference. **Trade:** No. **Other Comments:** Preliminary screenings of this species has shown some bioactivity. **Status: -IUCN: LOWER RISK - NEAR THREATENED (Nationally). DATA DEFICIENT (Globally). -Criteria based on:** —. **-CITES:** No. **-IWPA(1972;91):** No. **-RDB National (1994):** No. **-RDB International (1996):** No. **Recommendations: -Research management:** Monitoring. **-PHVA:** Pending. **Cultivation Program Recommendations: -Cultivation:** Level 4. **-Level of difficulty:** Very difficult. **Existing Cultivation:** None. **-Names of facilities:** --. **Sourcers (Refer Appendix):** 12, 23. **Compilers:** A.G. Untawale, G.V. Deshmukhe, V.K. Dhargalkar, V.V. Agadi.

16. *Rhizoclonium ciperium* (Roth) Harvey — EN/N (B1, 2c) — **Family:** Rhizocloniaceae. **Taxonomic status:** Species. **Habit:** Filamentous, unbranched. **Habitat:** Mangrove swamps, Brackish waters. **Global Distribution:** Indo-malaysia, Australasia. **Current Regional Distribution:** East and West coast including islands. **-Range (sq. km):** < 5,000. **-Area Occupied (sq. km):** < 500. **-Number of location**: < 5 (Sunderbans, Mahanadi in Orissa, Andhra Pradesh, Goa); Fragmented. **Population Trends - % change: -% Decline:** Not known. **-Time / Rate (Yrs or gens):** Not known. **-No of Mature Individuals:** Not known. **Global Population:** Not known. **Regional Population:** Trends not known. Negligible biomass. **Data Quality:** General field studies (Krishnamurthy Joshi, 1969-70; Santra, 1988-87 in Sunderbans; Jagtap, 1975 in Andaman). **Recent Field Studies:** Mandal, 1993-95. **Threats:** Loss of habitat. **Trade:** No. **Other Comments: --. Status: -IUCN: ENDANGERED (Nationally). DATA DEFICIENT (Globally). -Criteria based on: B1, 2c** (Restricted distribution, limited location, severly fragmented, continuing decline observed in extent of occurrence, area of occupancy and/or quality of habitat). **-CITES:** No. **-IWPA(1972;91):** No. **-RDB National (1994):** No. **-RDB International (1996):** No. **Recommendations: -Research management:** Survey; Taxonomic and morphological genetic studies; Life history studies. **-PHVA:** Pending. **Cultivation Program Recommendations: -Cultivation:** No. **-Level of difficulty:** Not known. **Existing Cultivation:** None. **-Names of facilities:** --. **Sourcers (Refer Appendix):** 12, 13, 18. **Compilers:** A.G. Untawale, G.V. Deshmukhe, V.K. Dhargalkar, V.V. Agadi.

17. *Rhizoclonium kerneri* Stockm — LRnt/N — **Family:** Rhizocloniaceae. **Taxonomic status:** Species. **Habit:** Filamentous branched. **Habitat:** Mangrove swamps, brackish water. **Global Distribution:** Indo-malaysia, Australasia. **Current Regional Distribution:** West and east coasts including islands. **-Range (sq. km):** < 5,000. **-Area Occupied (sq. km):** < 500. **-Number of location**: Many. **Population Trends - % change: -% Decline:** 5-10 %. **-Time / Rate (Yrs or gens):** 20 yrs. **-No of Mature Individuals:** Not known. **Global Population:** Not known. **Regional Population:** Negligible biomass. Continuing decline observed. **Data Quality:** General field studies (Jagtap, 1984-85 in Andaman; Untawale *et al.*, 1978-79 in Maharashtra, Goa; Krishnamurthy, 1954 in Chennai; Santra, 1987 in Sunderbans; Krishnamurthy and Joshi, 1969-70). **Recent Field Studies:** Santra, 1994-95 in Sunderbans; Mandal, 1993-95 . **Threats:** Loss of habitat. **Trade:** No. **Other Comments: --. Status: -IUCN: LOWER RISK - NEAR THREATENED (Nationally). DATA DEFICIENT (Globally). -Criteria based on:** —. **-CITES:** No. **-IWPA(1972;91):** No. **-RDB National (1994):** No. **-RDB International (1996):** No. **Recommendations: -Research management:** Survey; Taxonomic and morphological genetic studies; Life history studies. **-PHVA:** Pending. **Cultivation Program Recommendations: -Cultivation:** No. **-Level of difficulty:** Not known. **Existing Cultivation:** None. **-Names of facilities:** --. **Sourcers (Refer Appendix):** 12, 13, 18. **Compilers:** A.G. Untawale, G.V. Deshmukhe, V.K. Dhargalkar, V.V. Agadi.

18. *Rhizoclonium kochianum* Kützz — LRnt/N — **Family:** Rhizocloniaceae. **Taxonomic status:** Species. **Habit:** Filamentous, unbranched. **Habitat:** Mangrove swamps, brackish water. **Global Distribution:** Indo-malaysia, Australasia. **Current Regional Distribution:** East and West coast of India. **-Range (sq. km):** < 5,000. **-Area Occupied (sq. km):** < 500. **-Number of location**: Many. **Population Trends - % change: -% Decline:** 15-20 %. **-Time / Rate (Yrs or gens):** 20 yrs. **-No of Mature Individuals:** Not known. **Global Population:** Not known. **Regional Population:** Negligible biomass. Continuing decline observed. **Data Quality:** General field studies (Jagtap, 1984-85 in Andaman; Untawale *et al*., 1978-79in Maharashtra; Santra, 1987; Borgensen, 1935 in Mumbai). **Recent Field Studies:** Santra, 1994 in Sunderbans; R. Mandal, 1993-95 . **Threats:** Loss of habitat. **Trade:** No. **Other Comments: --. Status: -IUCN: LOWER RISK - NEAR THREATENED (Nationally). DATA DEFICIENT (Globally). -Criteria based on:** —. **-CITES:** No. **-IWPA(1972;91):** No. **-RDB National (1994):** No. **-RDB International (1996):** No. **Recommendations: -Research management:** Survey; Taxonomic and morphological genetic studies; Life history studies. **-PHVA:** Pending. **Cultivation Program Recommendations: -Cultivation:** No. **-Level of**

difficulty: Not known. **Existing Cultivation:** None. **-Names of facilities:** --. **Sourcers (Refer Appendix):** 12, 13, 15, 17, 18. **(Refer Appendix) . Compilers:** A.G. Untawale, G.V. Deshmukhe, V.K. Dhargalkar, V.V. Agadi.

19. *Sargassum ilicifolium* (Turn) J. Ag. — LRnt/N — **Family:** Sargassaceae. **Taxonomic status:** Species. **Habit:** Thalloid, thallus evolved in leaf, stem like structures. **Habitat:** Mangrove swamp, intertidal in open coast. **Global Distribution:** Indo-Malaysia, Australasia. **Current Regional Distribution:** East and West coast of India including Islands. **-Range (sq. km):** < 20,000. **-Area Occupied (sq. km):** < 2,000. **-Number of location**: +/- 20. **Population Trends - % change: -% Decline:** 15-20 %. **-Time / Rate (Yrs or gens):** 10 yrs. **-No of Mature Individuals:** Not known. **Global Population:** Not known. **Regional Population:** Average biomass 6.5 kg/m^2 wet weight Continuing decline observed. **Data Quality:** General field studies (Chauhan, 1975-77 in Gujarat; Untawale, 1977-78 in Maharashtra, Goa; Jagtap, 1984-85 in Andaman; Chauhan, 1980 in Maharashtra.Untawale *et al*., 1985-87 in Maharashtra, Goa, Karnataka; Chennubhotla *et al*., 1982 in Mandapam (Tamil Nadu). **Recent Field Studies:** None. **Threats:** Human interference; Loss of habitat; Overexploitation; Trade. **Trade:** Local. **Other Comments:** Used as raw material for Alginic acid extraction. Though the range is given for total distribution here the star represents biomass distribution in mangrove area only. **Status: -IUCN: LOWER RISK - NEAR THREATENED (Nationally). DATA DEFICIENT (Globally). -Criteria based on:** —. **-CITES:** No. **-IWPA(1972;91):** No. **-RDB National (1994):** No. **-RDB International (1996):** No. **Recommendations: -Research management:** Survey; Genetic management; Monitoring. **-PHVA:** Pending. **Cultivation Program Recommendations: -Cultivation:** Level 4. **-Level of difficulty:** Moderately difficult. **Existing Cultivation:** None. **-Names of facilities:** —. **Sourcers (Refer Appendix):** 5, 6, 9, 12, 13, 23. Compilers : A.G. Untawale, G.V. Deshmukhe, V.K. Dhargalkar, V.V. Agadi.

20. *Spatoglossum asperum* J. Ag. — LRnt/N — **Family:** Dictyotaceae. **Taxonomic status:** Species. **Habit:** Thalloid, branched. **Habitat:** Mangrove swamps/intertidal - muddy substratum. **Global Distribution:** West and East America; West and East Africa; Indo-malaysia; Australasia. **Current Regional Distribution:** West coast. **-Range (sq. km):** < 20,000. **-Area Occupied (sq. km):** < 2,000. **-Number of location**: Many. **Population Trends - % change: -% Decline:** 5-10 %. **-Time / Rate (Yrs or gens):** 20 yrs. **-No of Mature Individuals:** Not known. **Global Population:** Not known. **Regional Population:** Continuing decline observed. **Data Quality:** General field studies (Jagtap, 1983-85)**. Recent Field Studies:** None. **Threats:** Loss of habitat. **Trade:** No. **Other Comments:** Potential candidate for bioactive studies. **Status: -IUCN: LOWER RISK - NEAR THREATENED (Nationally). DATA DEFICIENT (Globally). -Criteria based on:** —. **-CITES:** No. **-IWPA(1972;91):** No. **-RDB National (1994):** No. **-RDB International (1996):** No. **Recommendations: -Research management:** Survey; Monitoring. **-PHVA:** Pending. **Cultivation Program Recommendations: -Cultivation:** No. **-Level of difficulty:** Not known. **Existing Cultivation:** None. **-Names of facilities:** --. **Sourcers (Refer Appendix):** 12. **Compilers:** A.G. Untawale, G.V. Deshmukhe, V.K. Dhargalkar, V.V. Agadi.

21. *Ulva patengansis* Salam and Khan — CR/N (B1, 2c) — **Family:** Ulvaceae. **Taxonomic status:** Species. **Habit:** Thalloid, unbranched. **Habitat:** Epiphytic on mangrove roots. **Global Distribution:** Indo-malaysia. **Current Regional Distribution:** East coast. **-Range (sq. km):** < 100. **-Area Occupied (sq. km):** < 10. **-Number of location**: 1 (Sunderbans). **Population Trends - % change: -% Decline:** Not known. **-Time / Rate (Yrs or gens):** Not known. **-No of Mature Individuals:** Not known. **Global Population:** Not known. **Regional Population:** Single location in India. Trends not known. **Data Quality:** General field studies (Santra and Pal, 1987). **Recent Field Studies:** Mandal, 1995. **Threats:** Loss of habitat. **Trade:** No. **Other Comments: --. Status: -IUCN: CRITICALLY ENDANGERED (Nationally). DATA DEFICIENT (Globally). -Criteria based on: B1, 2c** (Restricted distribution, single location, continuing decline observed in extent of occurrence, area of occupancy and/or quality of habitat). **-CITES:** No. **-IWPA(1972;91):** No. **-RDB National (1994):** No. **-RDB International (1996):** No. **Recommendations: -Research management:** Survey; Taxonomic and morphological genetic studies; Monitoring. **-PHVA:** Not known. **Cultivation Program Recommendations: -Cultivation:** No. **-Level of difficulty:** Not known. **Existing Cultivation:** None. **-Names of facilities:** --. **Sourcers (Refer Appendix):** 15, 17. **Compilers:** A.G. Untawale, G.V. Deshmukhe, V.K. Dhargalkar, V.V. Agadi.

22. *Ulva reticulata* Forsskal — EN/N (B1, 2c) — **Family:** Ulvaceae. **Taxonomic status:** Species. **Habit:** Thalloid (unbranched). **Habitat:** Mangrove swamps, intertidal zone (open coast). **Global Distribution:** West and East America, West and East Africa, Indo-malaysia, Australasia. **Current Regional Distribution:** West and East coast. **-Range (sq. km):** < 20,000. **-Area Occupied (sq. km):** < 500. **-Number of location**: 4 (Karli in Maharashtra, Therekhol in Goa, Chapora in Goa, Kali in Karnataka);. Fragmented. **Population Trends - % change: -% Decline:** 15-20 %. **-Time / Rate (Yrs or gens):** 20 years.- No. of Mature individuals: Not known. **Global Population:** Not known. **Regional Population:** Average biomass. Continuing decline observed. **Data Quality:** General field studies (Dhargalkar, 1976-78 in Chapora, Goa; Untawale and Dhargalkar 1986 in Chapora, Goa; Krishnamurthy and Joshi, 1969 in Diu, Gujarat).**Recent Field Studies:** Dhargalkar and Deshmukhe, 1994-95 in Chapora, Goa. **Threats:** Loss of habitat; Predation (Molluscs); Human interference. **Trade:** No. **Other Comments:** According to local people from Chapora the decline (extinction) of *Ulva reticulata* has resulted in reduction in fishery (clams). **Status: -IUCN: ENDANGERED (Nationally). DATA DEFICIENT (Globally). -Criteria based on: B1, 2c** (Restricted distribution, limited location, severely fragmented, continuing decline observed in extent of occurrence, area of occupancy and quality of habitat). **-CITES:** No. **-IWPA(1972;91):** No. **-RDB National (1994):** No. **-RDB International (1996):** No. **Recommendations: -Research management:** Taxonomic and morphological genetic studies; Survey; Monitoring; Life history studies. **-PHVA:** Pending. **Cultivation Program Recommendations: -Cultivation:** No. **-Level of difficulty:** Not known. **Existing Cultivation:** None. **-Names of facilities:** --. **Sourcers (Refer Appendix):** 8, 19. **Compilers:** A.G. Untawale, G.V. Deshmukhe, V.K. Dhargalkar, V.V. Agadi.

23. *Vaucheria prescottii* — EN/N (B1, 2c) — **Family:** Vaucheriaceae. **Taxonomic status:** Species. **Habit:** Filamentose, coenocytic. **Habitat:** Attached to muddy substance (marshy).**Global Distribution:** Indo-malayasia, Australasia. **Current Regional Distribution:** East coast. **-Range (sq. km):** < 5,000. **-Area Occupied (sq. km):** < 500. **-Number of location**: 5 (Sunderbans, Andhra Pradesh, Orissa); Fragmented. **Population Trends - % change: -% Decline:** Not known. **-Time / Rate (Yrs or gens):** Not known. **-No of Mature Individuals:** Not known. **Global Population:** Not known. **Regional**

Population: Trends not known. **Data Quality:** General field studies (Santra and Pal, 1985-87 in Sunderbans). **Recent Field Studies:** Mandal, 1993-96 in Andhra Pradesh. **Threats:** Loss of habitat. **Trade:** No. **Other Comments: --. Status: -IUCN: ENDANGERED (Nationally). DATA DEFICIENT (Globally). -Criteria based on: B1, 2c** (Restricted distribution, limited location, severely fragmented, continuing decline observed in extent of occurrence, area of occupancy and/or quality of habitat). **-CITES:** No. **-IWPA(1972;91):** No. **-RDB National (1994):** No. **-RDB International (1996):** No. **Recommendations: -Research management:** Survey; Taxonomic and morphological genetic studies; Life history studies. **-PHVA:** Pending. **Cultivation Program Recommendations: -Cultivation:** No. **-Level of difficulty:** Not known. **Existing Cultivation:** None. **-Names of facilities:** --. **Sourcers (Refer Appendix):** 15, 17. **Compilers:** A.G. Untawale, G.V. Deshmukhe, V.K. Dhargalkar, V.V. Agadi.

Marine fishes

1. *Alectis indicus* (Ruppell) — LRnt/N — **Family:** Carangidae. **Taxonomic status:** Species. **Habit:** Demersal. **Habitat:** Coastal and inshore waters. **Global Distribution:** Indo-west Pacific regions. **Current Regional Distribution:** East and West coastal waters of India. **-Range (sq. km):** > 20,000. **-Area Occupied (sq. km):** > 2,000. **-Number of location**: Many. **Population Trends - % change: -% Decline:** Not known. **-Time / Rate (Yrs or gens):** Not known. **-No of Mature Individuals:** Not known. **Global Population:** Not known. **Regional Population:** Not known. **Data Quality:** Informal field sightings; Indirect information (Annual report of CMFRI, Cochin 1986-1990) . **Recent Field Studies:** None**. Threats:** Fishing; Pollution; Trade . **Trade:** Local. **Other Comments:** --. **Status: -IUCN: LOWER RISK - NEAR THREATENED (Nationally). DATA DEFICIENT (Globally). -Criteria based on:** —. **-CITES:** No. **-IWPA(1972;91):** No. **-RDB National (1994):** No. **-RDB International (1996):** No. **Recommendations: -Research management:** Monitoring; Habitat management. **-PHVA:** No. **Captive Breeding Recommendations: -Captive breeding:** No. **-Level of difficulty:** Not known. **Existing Captive Programs:** Nil. **-Names of facilities:** —. **Sourcers (Refer Appendix):** 1, 23, 49 (Pp. 435)**. Compilers:** N. Rajendran, V. Palaniselvam, D.A. Ramesh, A. Kumar, P. Nammalwar, R.S. Lalmohan, A.H. Parulekar, M. Borkar.

2. *Ambassis commersoni* (Cuvier) — LRnt/N — **Family:** Ambassidae. **Taxonomic status:** Species. **Habit:** Epibenthic. **Habitat:** Estuaries, Mangroves and nearshore regions. **Global Distribution:** Indo-west Pacific. **Current Regional Distribution:** East and west coast of India. **-Range (sq. km):** > 20,000. **-Area Occupied (sq. km):** > 2,000. **-Number of location**: Many. **Population Trends - % change: -% Decline:** Declining. **-Time / Rate (Yrs or gens):** Not known. **-No of Mature Individuals:** Not known. **Global Population:** Not known. **Regional Population:** Continuing decline. **Data Quality:** General field studies (R.S. Lalmohan, 1980-82). **Recent Field Studies:** None. **Threats:** Loss of habitat; Pollution. **Trade:** No. **Other Comments: --. Status: -IUCN: LOWER RISK - NEAR THREATENED (Nationally). DATA DEFICIENT (Globally). -Criteria based on:** —. **-CITES:** No. **-IWPA(1972;91):** No. **-RDB National (1994):** No. **-RDB International (1996):** No. **Recommendations: -Research management:** Monitoring. **-PHVA:** No. **Captive Breeding Recommendations: -Captive breeding:** No. **-Level of difficulty:** Not known. **Existing Captive Programs:** None. **-Names of facilities:** —. **Sourcers (Refer Appendix):** 4 (Pp. 52), 49 (Pp. 361)**. Compilers:** N. Rajendran, V. Palaniselvam, D.A. Ramesh, A. Kumar, P. Nammalwar, R.S. Lalmohan, A.H. Parulekar, M. Borkar.

3. *Anguilla bicolar* McClelland — LRnt/N — **Family:** Anguillidae. **Taxonomic status:** Species. **Habit:** Esturine, Larvae ascends rivers. **Habitat:** Mangroves and Inshore waters. **Global Distribution:** Indo-west Pacific. **Current Regional Distribution:** East and west coast. **-Range (sq. km):** > 20,000. **-Area Occupied (sq. km):** > 2,000. **-Number of location**: Many. **Population Trends - % change: -% Decline:** Not known . **-Time / Rate (Yrs or gens):** Not known. **-No of Mature Individuals:** Not known. **Global Population:** Not known. **Regional Population:** Not known. **Data Quality:** Informal field sightings. **Recent Field Studies:** K. Dorairaj, 1975-80 in Mandapam. **Threats:** Damming; Loss of habitat; Pollution; Trade . **Trade:** Domestic. **Other Comments: --. Status: -IUCN: LOWER RISK - NEAR THREATENED (Nationally). DATA DEFICIENT (Globally). -Criteria based on:** —. **-CITES:** No. **-IWPA(1972;91):** No. **-RDB National (1994):** No. **-RDB International (1996):** No. **Recommendations: -Research management:** Monitoring; Habitat management; Life history research. **-PHVA:** Not known. **Captive Breeding Recommendations: -Captive breeding:** Level 3. **-Level of difficulty:** Moderately difficult. **Existing Captive Programs:** None. **-Names of facilities:** Experimental tank culture. **Sourcers (Refer Appendix):** 49 (Pp. 216). **Compilers:** N. Rajendran, V. Palaniselvam, D.A. Ramesh, A. Kumar, P. Nammalwar, R.S. Lalmohan, A.H. Parulekar, M. Borkar.

4. *Anodentestoma chacunda* (Ham. -Buch.) — LRnt/N — **Family:** Clupidae. **Taxonomic status:** Species. **Habit:** Pelagic. **Habitat:** Coastal inshore waters/pelagic. **Global Distribution:** Indo-pacific. **Current Regional Distribution:** West and east coastal water. **-Range (sq. km):** > 20,000. **-Area Occupied (sq. km):** > 2,000. **-Number of location**: Many. **Population Trends - % change: -% Decline:** Not known . **-Time / Rate (Yrs or gens):** Not known. **-No of Mature Individuals:** Not known. **Global Population:** Not known. **Regional Population:** Not known. **Data Quality:** Informal field sightings; Indirect information (Annual report of CMFRI, 1984-90). **Recent Field Studies:** None. **Threats:** Fishing; Loss of habitat; Trade. **Trade:** Local. **Other Comments: --. Status: -IUCN: LOWER RISK - NEAR THREATENED (Nationally). DATA DEFICIENT (Globally). -Criteria based on:** —. **-CITES:** No. **-IWPA(1972;91):** No. **-RDB National (1994):** No. **-RDB International (1996):** No. Recommendations: . -Research management: Monitoring; Habitat management. **-PHVA:** No. Captive Breeding Recommendations: . -Captive breeding: No. **-Level of difficulty:** Not known. **Existing Captive Programs:** Nil. **-Names of facilities:** —. **Sourcers (Refer Appendix):** 1, 33. **Compilers:** N. Rajendran, V. Palaniselvam, D.A. Ramesh, A. Kumar, P. Nammalwar, R.S. Lalmohan, A.H. Parulekar, M. Borkar.

5. *Arius subrostratus* Valenciennes — VU/N (A1a, 1c, 1d) — **Family:** Ariidae. **Taxonomic status:** Species. **Habit:** Demersal, estuarine, inshore. **Habitat:** Muddy bottom.**Global Distribution:** Indo-pacific. **Current Regional Distribution:** Coastal waters of India. **-Range (sq. km):** > 20,000. **-Area Occupied (sq. km):** > 2,000. **-Number of location**: Numerous. **Population Trends - % change: -% Decline:** 20 %. **-Time / Rate (Yrs or gens):** 10 yrs. **-No of Mature Individuals:** Not known. **Global Population:** Not known. **Regional Population:** Continuing decline noticed in fishing (catches). **Data Quality:** Informal field sightings; Indirect information (Annual report of CMFRI, Cochi, 1985-90). **Recent Field Studies:** None. **Threats:** Loss of habitat; Overexploitation; Pollution; Trade. **Trade:** Local; Domestic; Commercial. **Other Comments:** Rate of decline projected to be greater due high levels of exploitation of mature male having eggs. **Status: -IUCN: VULNERABLE (Nationally). DATA DEFICIENT (Globally). -Criteria based on: A1a, 1c, 1d** (Population reduction observed due to actual or potential levels of exploitation and due to decline in extent of occurrence, area of occupancy and/or quality of habitat). **-CITES:** —. **-IWPA(1972;91):** No. **-RDB National (1994):** No. **-RDB International (1996):** No. **Recommendations: -Research management:** Monitoring. **-PHVA:** Not known. **Captive Breeding Recommendations: -Captive breeding:** No. **-Level of difficulty:** Not known. **Existing Captive Programs:** None. **-Names of facilities:** —. **Sourcers (Refer Appendix):** 1, 5 (Pp. 461), 12, 49**. Compilers:** N. Rajendran, V. Palaniselvam, D.A. Ramesh, A. Kumar, P. Nammalwar, R.S. Lalmohan, A.H. Parulekar, M. Borkar.

6. *Boleophthalmus boddari* Cuvier — VU/N (A1a, 1c, 2c) — **Family:** Gobiidae. **Taxonomic status:** Species. **Habit:** Mangroves and Mudflats. **Habitat:** Epibenthic, Burrowing. **Global Distribution:** Coastal estuaries of India. Myanmar and Malay Archipelago. **Current Regional Distribution:** East and west coast. **-Range (sq. km):** > 20,000. **-Area Occupied (sq. km):** < 2,000. **-Number of location**: Many; Fragmented. **Population Trends - % change: -% Decline:** 20 %. **-Time / Rate (Yrs or gens):** 10 yrs. **-No of Mature Individuals:** Not known. **Global Population:** Not known. **Regional Population:** Continuing decline observed and projected. **Data Quality:** Informal field sightings (R.S. Lal Mohan, 1967 in Gujarat; R.S. Lal Mohan, 1980-85 in Pitchavaram, Rameswaram). **Recent Field Studies:** None . **Threats:** Loss of habitat; Pollution. **Trade:** No. **Other Comments: --. Status: -IUCN: VULNERBALE (Nationally). DATA DEFICIENT (Globally). -Criteria based on: A1a, 1c, 2c** (Population reduction observed due to decline in extent of occurrence, area of occupancy and/or quality of habitat and projected decline due to extent of occurrence, area of occupancy and/or quality of habitat). **-CITES:** —. **-IWPA(1972;91):** No. **-RDB National (1994):** No. **-RDB International (1996):** No. **Recommendations: -Research management:** Monitoring; Life history studies; Survey. **-PHVA:** No. **Captive Breeding Recommendations: -Captive breeding:** Not known. **-Level of difficulty:** Not known. **Existing Captive Programs:** None. **-Names of facilities:** —. **Sourcers (Refer Appendix):** 3, 5(307), 42**. Compilers:** N. Rajendran, V. Palaniselvam, D.A. Ramesh, A. Kumar, P. Nammalwar, R.S. Lalmohan, A.H. Parulekar, M. Borkar, Jayseelan.

7. *Boleophthalmus dussumieri* Cuv. Val. — EN/N (B1, 2c) — **Family:** Gobiidae. **Taxonomic status:** Species. **Habit:** Mangroves, Mudflats and nearshore regions. **Habitat:** Epibenthic, Burrowing. **Global Distribution:** India, Pakistan, Myanmar coasts. **Current Regional Distribution:** In India only north of Bombay and Kutchch coast. **-Range (sq. km):** < 5000. **-Area Occupied (sq. km):** < 2,000. **-Number of location**: Many; Fragmented. **Population Trends - % change: -% Decline:** 20%. **-Time / Rate (Yrs or gens):** 10 yrs. **-No of Mature Individuals:** Not known. **Global Population:** Not known. **Regional Population:** Continuing decline observed and projected. **Data Quality:** General field studies (Lal Mohan, 1963 in Gulf of Kutchch); Informal field sightings. **Recent Field Studies:** None**. Threats:** Loss of habitat; Pollution. **Trade:** No. **Other Comments: --. Status: -IUCN: ENDANGERED (Nationally). DATA DEFICIENT (Globally). -Criteria based on: B1, 2c** (Restricted distribution, severely fragmented, continuring decline observed due to extent of occurrence, area of occupancy and/or quality of habitat). **-CITES:** No. **-IWPA(1972;91):** No. **-RDB National (1994):** No. **-RDB International (1996):** No. **Recommendations: -Research management:** Monitoring; Survey; Life history studies. **-PHVA:** Not known. **Captive Breeding Recommendations: -Captive breeding:** Not known. **-Level of difficulty:** Not known. **Existing Captive Programs:** None. **-Names of facilities:** —. **Sourcers (Refer Appendix):** 3, 4 (Pp.305), 42**. Compilers:** N. Rajendran, V. Palaniselvam, D.A. Ramesh, A. Kumar, P. Nammalwar, R.S. Lalmohan, A.H. Parulekar, M. Borkar.

8. *Carangoides ciliarius* Gunther — LRnt/N — **Family:** Carangidae. **Taxonomic status:** Species. **Habit:** Benthic. **Habitat:** Mangroves. **Global Distribution:** Indo-Malaya Archipelago. **Current Regional Distribution:** Eastern and western coastal waters of India. **-Range (sq. km):** > 20,000. **-Area Occupied (sq. km):** > 2,000. **-Number of location**: Many. **Population Trends - % change: -% Decline:** Declining. **-Time / Rate (Yrs or gens):** Not known. **-No of Mature Individuals:** Not known. **Global Population:** Not known. **Regional Population:** Continuing decline. **Data Quality:** Informal field sightings; Indirect information (Fish landing data of CMFRI). **Recent Field Studies:** Annual report of CMFRI, Cochin, 1992-96 . **Threats:** Loss of habitat; Overexploitation; Pollution; Trade. **Trade:** Domestic; Commercial. **Other Comments: --. Status: -IUCN: LOWER RISK - NEAR THREATENED (Nationally). DATA DEFICIENT (Globally). -Criteria based on:** —. **-CITES:** No. **-IWPA(1972;91):** Not known. **-RDB National (1994):** Not known. **-RDB International (1996):** Not known. **Recommendations: -Research management:** Monitoring; Habitat management; Limiting factor research; Life history studies. **-PHVA:** No. **Captive Breeding Recommendations: -Captive breeding:** Level 4. **-Level of difficulty:** Not known. **Existing Captive Programs:** None. **-Names of facilities:** —. **Sourcers (Refer Appendix):** 1, 2, 5 **. Compilers:** N. Rajendran, V. Palaniselvam, D.A. Ramesh, A. Kumar, P. Nammalwar, R.S. Lalmohan, A.H. Parulekar, M. Borkar, Jayseelan.

9. *Caranx ignobilis* (Forsskal) — LRnt/N — **Family:** Carangidae. **Taxonomic status:** Species. **Habit:** Demersal. **Habitat:** Mangrove and Inshore waters.**Global Distribution:** Indo-west Pacific. **Current Regional Distribution:** East and West coastal waters of India. **-Range (sq. km):** > 20,000. **-Area Occupied (sq. km):** > 2,000. **-Number of location**: Many. **Population Trends - % change: -% Decline:** Not known . **-Time / Rate (Yrs or gens):** Not known. **-No of Mature Individuals:** Not known. **Global Population:** Not known. **Regional Population:** Not known. **Data Quality:** Informal field sightings; Indirect information (Annual report of CMFRI, 1985-90). **Recent Field Studies:** Annual report of CMFRI, Cochin, 1991-95. **Threats:** Fishing; Loss of habitat; Trade. **Trade:** Local. **Other Comments: --. Status: -IUCN: LOWER RISK - NEAR THREATENED (Nationally). DATA DEFICIENT (Globally). -Criteria based on:** —. **-CITES:** No. **-IWPA(1972;91):** No. **-RDB National (1994):** No. **-RDB International (1996):** No. **Recommendations: -Research management:** Monitoring. **-PHVA:** No. **Captive Breeding Recommendations: -Captive breeding:** No. **-Level of difficulty:** Not known. **Existing Captive Programs:** Nil. **-Names of facilities:** —. **Sourcers (Refer Appendix):** 1, 28, 49 (Pp. 461)**. Compilers:** N. Rajendran, V. Palaniselvam, D.A. Ramesh, A. Kumar, P. Nammalwar, R.S. Lalmohan, A.H. Parulekar, M. Borkar.

10. Caranx sexfasciates L. — LRnt/N — *C. hippos* L. — **Family:** Carangidae. **Taxonomic status:** Species. **Habit:** Inshore Demersal. **Habitat:** Ascending estuaries. **Global Distribution:** Indo-west Pacific. **Current Regional Distribution:** Coastal waters of India. **-Range (sq. km):** > 20,000. **-Area Occupied (sq. km):** > 2,000. **-Number of location**: Many. **Population Trends - % change: -% Decline:** Not known . **-Time / Rate (Yrs or gens):** Not known. **-No of Mature Individuals:** Not known. **Global Population:** Widely distributed. **Regional Population:** Not known. **Data Quality:** Informal field sightings; Indirect information (Annual report of CMFRI, 1985-90). **Recent Field Studies:** Annual report of CMFRI, 1990-95; P. Nammalwar, 1982-84 in Mandapam**. Threats:** Overexploitation; Trade. **Trade:** Local; International. **Other Comments: --. Status: -IUCN: LOWER RISK - NEAR THREATENED (Nationally). DATA DEFICIENT (Globally). -Criteria based on:** —. **-CITES:** No. **-IWPA(1972;91):** No. **-RDB National (1994):** No. **-RDB International (1996):** No. **Recommendations: -Research management:** Monitoring. **-PHVA:** Not known. **Captive Breeding Recommendations: -Captive breeding:** No. **-Level of difficulty:** Not known. **Existing Captive Programs:** Nil. **-Names of facilities:** —. **Sourcers (Refer Appendix):** 1, 5

(Pp. 216), 13, 49 (Pp. 464)**. Compilers:** N. Rajendran, V. Palaniselvam, D.A. Ramesh, A. Kumar, P. Nammalwar, R.S. Lalmohan, A.H. Parulekar, M. Borkar.

11. *Chanes chanes* (Forsskal) — LRnt/N — **Family:** Chanidae. **Taxonomic status:** Species. **Habit:** Coastal, inshore waters. **Habitat:** Mangrove (Juveniles). **Global Distribution:** Indo-west Pacific. **Current Regional Distribution:** East and west coastal waters of India. **-Range (sq. km):** > 20,000. **-Area Occupied (sq. km):** > 2,000. **-Number of location**: Many. **Population Trends - % change: -% Decline:** Declining. **-Time / Rate (Yrs or gens):** Not known. **-No of Mature Individuals:** Not known. **Global Population:** Not known. **Regional Population:** Continuing decline observed in catches. **Data Quality:** Informal field sightings; Indirect information .**Recent Field Studies:** Annual report of CMFRI, Cochi, 1985-95; R.S. Lalmohan, 1990. P. Nammalwar, 1984-90 in Chennai. **Threats:** Fishing; Loss of habitat; Overexploitation; Trade. **Trade:** Local. **Other Comments:** Less of mangrove habitat and over exploitation of juveniles. **Status: -IUCN: LOWER RISK - NEAR THREATENED (Nationally). DATA DEFICIENT (Globally). -Criteria based on:** —. **-CITES:** No. **-IWPA(1972;91):** No. **-RDB National (1994):** No. **-RDB International (1996):** No. **Recommendations: -Research management:** Monitoring; Life history studies; Habitat management. **-PHVA:** No. **Captive Breeding Recommendations: -Captive breeding:** No. **-Level of difficulty:** Not known. **Existing Captive Programs:** None. **-Names of facilities:** Aquaculture farms along the Ramanathapuram coast in Tamil Nadu and, Narrakkul in Kerala coast. **Sourcers (Refer Appendix):** 1, 34, 49 (Pp. 250)**. Compilers:** N. Rajendran, V. Palaniselvam, D.A. Ramesh, A. Kumar, P. Nammalwar, R.S. Lalmohan, A.H. Parulekar, M. Borkar, Jayseelan.

12. *Dasyatis uarnak* (Forsskal) — VU/N (B1, 2e) — **Family:** Trygonidae. **Taxonomic status:** Species. **Habit:** Benthic. **Habitat:** Mangroves. **Global Distribution:** Red Sea, Indo-Malay Archipelago, China. **Current Regional Distribution:** East and west coastal waters of India. **-Range (sq. km):** < 20,000. **-Area Occupied (sq. km):** > 2,000. **-Number of location**: 8; Fragmented. **Population Trends - % change: -% Decline:** Declining. **-Time / Rate (Yrs or gens):** Not known. **-No of Mature Individuals:** Not known. **Global Population:** Not known. **Regional Population:** Continuing decline observed. **Data Quality:** Informal field sightings; Indirect information (Fish landing data of CMFRI). **Recent Field Studies:** Annual report of CMFRI, Cochin, 1992-96. **Threats:** Fishing; Human interference; Trade. **Trade:** Local. **Other Comments: --. Status: -IUCN: VULNERABLE (Nationally). DATA DEFICIENT (Globally). -Criteria based on: B1, 2e** (Restricted distribution, limited location, severely fragmented, continuing decline observed in number of mature individuals). **-CITES:** No. **-IWPA(1972;91):** No. **-RDB National (1994):** No. **-RDB International (1996):** No. **Recommendations: -Research management:** Monitoring; Survey. **-PHVA:** Not known. **Captive Breeding Recommendations: -Captive breeding:** No. **-Level of difficulty:** Least difficult. **Existing Captive Programs:** None. **-Names of facilities:** —. **Sourcers (Refer Appendix):** 1, 2, 5, 9**. Compilers:** N. Rajendran, V. Palaniselvam, D.A. Ramesh, A. Kumar, P. Nammalwar, R.S. Lalmohan, A.H. Parulekar, M. Borkar, Jayseelan.

13. *Elops machnata* (Forsskal) — VU/N (A1a, 1c, 1d) — **Family:** Elopidae. **Taxonomic status:** Species. **Habit:** Pelagic. **Habitat:** Mangroves, Inshore. **Global Distribution:** Indo West Pacific, Malaya, Archipelago. **Current Regional Distribution:** Coastal water of India. **-Range (sq. km):** > 20,000. **-Area Occupied (sq. km):** < 2,000. **-Number of location**: Many. **Population Trends - % change: -% Decline:** 50 %. **-Time / Rate (Yrs or gens):** 20 yrs. **-No of Mature Individuals:** Not known. **Global Population:** Not known. **Regional Population:** Continuing decline observed. **Data Quality:** General field studies. **Recent Field Studies:** None . **Threats:** Fishing; Loss of habitat; Pollution; Trade. **Trade:** Local. **Other Comments: --. Status: -IUCN: VULNERABLE (Nationally). DATA DEFICIENT (Globally). -Criteria based on: A1a, 1c, 1d** (Population reduction observed due to decline in extent of occurrence, area occupancy and/or quality of habitat and in number of locations or subpopulations). **-CITES:** —. **-IWPA(1972;91):** No. **-RDB National (1994):** No. **-RDB International (1996):** No. **Recommendations: -Research management:** Monitoring; Habitat management. **-PHVA:** Not known. **Captive Breeding Recommendations: -Captive breeding:** No. **-Level of difficulty:** Not known. **Existing Captive Programs:** None. **-Names of facilities:** —. **Sourcers (Refer Appendix):** 29, 48, 49 (Pp. 449)**. Compilers:** N. Rajendran, V. Palaniselvam, D.A. Ramesh, A. Kumar, P. Nammalwar, R.S. Lalmohan, A.H. Parulekar, M. Borkar, Jayseelan.

14. *Epinephelus tauvina* (Forsskal) — LRnt/N — **Family:** Serranidae. **Taxonomic status:** Species. **Habit:** Demersal/Bottom. **Habitat:** Mangrove and inshore waters. **Global Distribution:** Red Sea, the Gulf, Tropical eastern Indian Ocean and western central Pacific. **Current Regional Distribution:** East and west coastal waters of India. **-Range (sq. km):** > 20,000. **-Area Occupied (sq. km):** > 2,000. **-Number of location**: Many. **Population Trends - % change: -% Decline:** Declining. **-Time / Rate (Yrs or gens):** Not known. **-No of Mature Individuals:** Not known. **Global Population:** Not known. **Regional Population:** Continuing decline observed. **Data Quality:** Informal field sightings; Indirect information (Fish landing data CMFRI; Annual report of CMFRI, Cochin, 1989-90). **Recent Field Studies:** P. Nammalwar, 1994-96 in Mandapam and Chennai; Annual report of CMFRI, Cochin 1995-96. **Threats:** Loss of habitat; Overexploitation; Trade. **Trade:** Local; International. **Other Comments:** Local consumption of live grouper fingerlings and export of adults. **Status: -IUCN: LOWER RISK - NEAR THREATENED (Nationally). DATA DEFICIENT (Globally). -Criteria based on:** —. **-CITES:** No. **-IWPA(1972;91):** No. **-RDB National (1994):** No. **-RDB International (1996):** No. **Recommendations: -Research management:** Monitoring; Limiting factor research; Habitat management; Life history studies. **-PHVA:** No. **Captive Breeding Recommendations: -Captive breeding:** Level 1. **-Level of difficulty:** Moderately difficult. **Existing Captive Programs:** None. **-Names of facilities:** Floating netcage for culture and fish ponds along the Tamil Nadu coasts. **Sourcers (Refer Appendix):** 1, 2, 4 (Pp. 9), 15, 49 (Pp. 396) **. Compilers:** N. Rajendran, V. Palaniselvam, D.A. Ramesh, A. Kumar, P. Nammalwar, R.S. Lalmohan, A.H. Parulekar, M. Borkar, Jayseelan.

15. *Etroplus suratensis* Bloch. — LRnt/N — **Family:** Chichillidae. **Taxonomic status:** Species. **Habit:** Mangroves/inshore waters. **Habitat:** Mangroves/insore waters. **Global Distribution:** Indo-Pacific. **Current Regional Distribution:** Coastal waters of India ascending to rivers. **-Range (sq. km):** > 20,000. **-Area Occupied (sq. km):** > 2,000. **-Number of location**: Many. **Population Trends - % change: -% Decline:** Not known. **-Time / Rate (Yrs or gens):** Not known. **-No of Mature Individuals:** Not known. **Global Population:** Not known. **Regional Population:** Continuing decline observed. **Data Quality:** Informal field sightings (Prasadam, 1971 in Chennai). **Recent Field Studies:** None . **Threats:** Loss of habitat; Overexploitation; Trade. **Trade:** Local. **Other Comments:** --. **Status: -IUCN: LOWER RISK -NEAR THREATENED**

(Nationally). DATA DEFICIENT (Globally). -Criteria based on: —. **-CITES:** No. **-IWPA(1972;91):** No. **-RDB National (1994):** No. **-RDB International (1996):** No. **Recommendations: -Research management:** Monitoring; Habitat management. **-PHVA:** No. **Captive Breeding Recommendations: -Captive breeding:** No. **-Level of difficulty:** Not known. **Existing Captive Programs:** None. **-Names of facilities:** Agriculture tanks. **Sourcers (Refer Appendix):** 5 (Pp. 415), 47**. Compilers:** .N. Rajendran, V. Palaniselvam, D.A. Ramesh, A. Kumar, P. Nammalwar, R.S. Lalmohan, A.H. Parulekar, M. Borkar.

16. *Glassogobius giurus* (Hamilton-Buchanan) — LRnt/N — **Family:** Gobiidae. **Taxonomic status:** Species. **Habit:** Demersal. **Habitat:** Freshwater and brackish water (incl. mangroves), Marine. **Global Distribution:** India, Ceylon, Indo-malayan Archipelago, East coast of Africa. **Current Regional Distribution:** Coastal waters of India. **-Range (sq. km):** > 20,000. **-Area Occupied (sq. km):** > 2,000. **-Number of location**: Many. **Population Trends - % change: -% Decline:** 20 %. **-Time / Rate (Yrs or gens):** 20 yrs. **-No of Mature Individuals:** Not known. **Global Population:** Not known. **Regional Population:** Continuing decline. **Data Quality:** Informal field sightings. **Recent Field Studies:** R.S. Lalmohan, 1995-97. **Threats:** Damming; Loss of habitat; Trade. **Trade:** Domestic. **Other Comments:** It can serve as indicator species in Aquaculture ponds to note the water quality - oxygen depletion. Demographic pressure and the consequent utility of freshwater make the brackish bodies. Eggs attached in substratum - similar condition to be created. **Status: -IUCN: LOWER RISK - NEAR THREATENED (Nationally). DATA DEFICIENT (Globally). -Criteria based on:** —. **-CITES:** No. **-IWPA(1972;91):** No. **-RDB National (1994):** No. **-RDB International (1996):** No. **Recommendations: -Research management:** Monitoring; Habitat management. **-PHVA:** No. **Captive Breeding Recommendations: -Captive breeding:** No. **-Level of difficulty:** Not known. **Existing Captive Programs:** None. **-Names of facilities:** —. **Sourcers (Refer Appendix):** 37**. Compilers:** N. Rajendran, V. Palaniselvam, D.A. Ramesh, A. Kumar, P. Nammalwar, R.S. Lalmohan, A.H. Parulekar, M. Borkar, Jayseelan.

17. *Hilsa kelee* (Cuvier) — LRnt/N — **Family:** Clupeidae. **Taxonomic status:** Species. **Habit:** Pelagic. **Habitat:** Mangroves and inshore waters. **Global Distribution:** Eastward to Southeast Asia. **Current Regional Distribution:** East and west coastal waters of India. **-Range (sq. km):** > 20,000. **-Area Occupied (sq. km):** > 2,000. **-Number of location**: Many. **Population Trends - % change: -% Decline:** 10 %. **-Time / Rate (Yrs or gens):** 10 yrs. **-No of Mature Individuals:** Not known. **Global Population:** Not known. **Regional Population:** Continuing decline observed. **Data Quality:** Informal field sightings. **Recent Field Studies:** None . **Threats:** Damming; Loss of habitat; Overexploitation; Pollution; Trade. **Trade:** Local. **Other Comments:** Undersize fishing in mangroves. **Status: -IUCN: LOWER RISK - NEAR THREATENED (Nationally). DATA DEFICIENT (Globally). -Criteria based on:** —. **-CITES:** No. **-IWPA(1972;91):** No. **-RDB National (1994):** No. **-RDB International (1996):** No. **Recommendations: -Research management:** Monitoring; Habitat management. **-PHVA:** No. **Captive Breeding Recommendations: -Captive breeding:** No. **-Level of difficulty:** Not known. **Existing Captive Programs:** None. **-Names of facilities:** —. **Sourcers (Refer Appendix):** 21, 49 (Pp. 165)**. Compilers:** N. Rajendran, V. Palaniselvam, D.A. Ramesh, A. Kumar, P. Nammalwar, R.S. Lalmohan, A.H. Parulekar, M. Borkar, Jayseelan.

18. *Lates calcarifer* (Bloch) — LRnt/N — **Family:** Centropomidae. **Taxonomic status:** Species. **Habit:** Demersal. **Habitat:** Coastal waters ascending estuary section of the river. **Global Distribution:** Indo-pacific region. **Current Regional Distribution:** Core Southeast coastal waters. -Elevation: . **-Range (sq. km):** > 20,000. **-Area Occupied (sq. km):** > 2,000. **-Number of location**: Many (Mangalore, Calicut, Cochin, Trivandrum, Tuticorin, Kakinada, Mandapam, Point Calimer, Portonova, Madras, Puligat Lake, Andaman Islands, Sunderbans;.Chilka Lake). **Population Trends - % change: -% Decline:** Declining. **-Time / Rate (Yrs or gens):** Not known. **-No of Mature Individuals:** Not known. **Global Population:** Not known. **Regional Population:** Continuing decline observed. **Data Quality:** Informal field sightings (P.S.B.R. James and R. Marichamy, 1987, Aquaculture production experiments in ponds, CMFRI). **Recent Field Studies:** P. Nammalar, 1990-94 in Mandapam. **Threats:** Fishing; Loss of habitat; Trade. **Trade:** Local; International. **Other Comments: --. Status: -IUCN: LOWER RISK - NEAR THREATENED (Nationally). DATA DEFICIENT (Globally). -Criteria based on:** —. **-CITES:** No. **-IWPA(1972;91):** No. **-RDB National (1994):** No. **-RDB International (1996):** No. **Recommendations: -Research management:** Monitoring; Habitat management; Life history studies. **-PHVA:** No. **Captive Breeding Recommendations: -Captive breeding:** Level 4. **-Level of difficulty:** Very difficult . **Existing Captive Programs:** None. **-Names of facilities:** Fish farm in Tuticorin, Mandapam.**Sourcers (Refer Appendix):** 11, 39**. Compilers:** N. Rajendran, V. Palaniselvam, D.A. Ramesh, A. Kumar, P. Nammalwar, R.S. Lalmohan, A.H. Parulekar, M. Borkar, Jayseelan.

19. *Leiognathus splendens* (Cuvier) — VU/N (A1b, 2b) — **Family:** Leiognathidae. **Taxonomic status:** Species. **Habit:** West coast and Southeast coast, enters estuaries, Demersal. **Habitat:** Inhabits Shallow waters, found in schools predominantly near bottom.**Global Distribution:** Red Sea, Seas of India to the Malay Arhipelago. **Current Regional Distribution:** Coastal waters of India. **-Range (sq. km):** > 20,000. **-Area Occupied (sq. km):** > 2,000. **-Number of location**: Many. **Population Trends - % change: -% Decline:** 20 %. **-Time / Rate (Yrs or gens):** 10 yrs. **-No of Mature Individuals:** Not known. **Global Population:** Not known. **Regional Population:** Continuing decline in catches. **Data Quality:** Informal field sightings; Indirect information. **Recent Field Studies:** Annual report of CMFRI, Cochin, 1981-95. **Threats:** Overexploitation; Trade. **Trade:** Local. **Other Comments:** Core area Gulf of Mannar and Palk Bay trawling ground. **Status: -IUCN: VULNERABLE (Nationally). DATA DEFICIENT (Globally). -Criteria based on: A1b, 2b** (Population reduction due to decline in abundance and population reduction predicted due to future decline in abundance). **-CITES:** —. **-IWPA(1972;91):** No. **-RDB National (1994):** No. **-RDB International (1996):** No. **Recommendations: -Research management:** Monitoring; Mesh size regulation reduction of effort (units). **-PHVA:** No. **Captive Breeding Recommendations: -Captive breeding:** No. **-Level of difficulty:** Not known. **Existing Captive Programs:** None. **-Names of facilities:** —. **Sourcers (Refer Appendix):** 1, 5 (Pp. 239), 20**. Compilers:** N. Rajendran, V. Palaniselvam, D.A. Ramesh, A. Kumar, P. Nammalwar, R.S. Lalmohan, A.H. Parulekar, M. Borkar.

20. *Lethrenus nebulosus* (Forsskal) — LRnt/N — **Family:** Lethrenidae. **Taxonomic status:** Species. **Habit:** Demersal. **Habitat:** Mangroves/inshore waters/demersal. **Global Distribution:** Red sea, Gulf Madagascar, Seychille West and South coast of India, Sri Lanka, Western central Pacific, Eastern Indian Ocean, Northern Australia. **Current Regional**

Distribution: East and west coast of India. **-Range (sq. km):** > 20,000. **-Area Occupied (sq. km):** > 2,000. **-Number of location**: Many. **Population Trends - % change: -% Decline:** Not known . **-Time / Rate (Yrs or gens):** Not known. **-No of Mature Individuals:** Not known. **Global Population:** Not known. **Regional Population:** Not known. **Data Quality:** Informal field sightings; Indirect information. **Recent Field Studies:** Annual report of CMFRI, Cochin, 1990-96. **Threats:** Loss of habitat; Overexploitation; Trade. **Trade:** Local; International. **Other Comments: --. Status: -IUCN: LOWER RISK - NEAR THREATENED (Nationally). DATA DEFICIENT (Globally). -Criteria based on:** —. **-CITES:** No. **-IWPA(1972;91):** No. **-RDB National (1994):** No. **-RDB International (1996):** No. **Recommendations: -Research management:** Monitoring; Habitat management. **-PHVA:** Not known. **Captive Breeding Recommendations: -Captive breeding:** Level 3. **-Level of difficulty:** Moderately difficult. **Existing Captive Programs:** . **-Names of facilities:** Aquaculture farms and netcages for culture in the coastal waters. **Sourcers (Refer Appendix):** 1, 4 (Pp. 136), 30. **Compilers:** N. Rajendran, V. Palaniselvam, D.A. Ramesh, A. Kumar, P. Nammalwar, R.S. Lalmohan, A.H. Parulekar, M. Borkar.

21. *Liza dussumieri* (Valenciennes) — LRnt/N — ***L. subviridis*** — **Family:** Mugilidae. **Taxonomic status:** Species. **Habit:** Benthic. **Habitat:** Mangroves, inshore waters.**Global Distribution:** Seas and estuaries of Indo-Malayan. **Current Regional Distribution:** Eastern and western coast of India. **-Range (sq. km):** > 20,000. **-Area Occupied (sq. km):** > 2,000. **-Number of location**: Many; Continuous (Both east and west coast of India). **Population Trends - % change: -% Decline:** Declining. **-Time / Rate (Yrs or gens):** Not known. **-No of Mature Individuals:** Not known. **Global Population:** Not known. **Regional Population:** Continuing decline as per the fishing data. **Data Quality:** Informal field sightings; Indirect information (Fish landing data of CMFRI, 1985-90). **Recent Field Studies:** None . **Threats:** Loss of habitat; Overexploitation; Pollution; Siltation; Trade. **Trade:** Local. **Other Comments:** --. **Status: -IUCN: LOWER RISK - NEAR THREATENED (Nationally). DATA DEFICIENT (Globally). -Criteria based on:** —. **-CITES:** No. **-IWPA(1972;91):** No. **-RDB National (1994):** No. **-RDB International (1996):** No. **Recommendations: -Research management:** Monitoring; Habitat management. **-PHVA:** No. **Captive Breeding Recommendations: -Captive breeding:** Level 4. **-Level of difficulty:** Least difficult. **Existing Captive Programs:** None. **-Names of facilities:** Aquaculture farms. **Sourcers (Refer Appendix):** 1, 2, 5, 10**. Compilers:** N. Rajendran, V. Palaniselvam, D.A. Ramesh, A. Kumar, P. Nammalwar, R.S. Lalmohan, A.H. Parulekar, M. Borkar, Jayseelan.

22. *Liza macrolepis* (Smith) — LRnt/N — **Family:** Mugilidae. **Taxonomic status:** Species. **Habit:** Benthic. **Habitat:** Mangroves and all the inshore water. **Global Distribution:** Sea and Estuaries of India-Malayan. **Current Regional Distribution:** Eastern and western coastal waters of India. **-Range (sq. km):** > 20,000. **-Area Occupied (sq. km):** > 2,000. **-Number of location**: Many. **Population Trends - % change: -% Decline:** Declining. **-Time / Rate (Yrs or gens):** Not known. **-No of Mature Individuals:** Not known. **Global Population:** Not known. **Regional Population:** Continuing decline as infered from fishing data. **Data Quality:** Informal field sightings (Alikunhi, 1971 in Mumbai; P.S.B.R. James, 1981-82 in Mandapam); Indirect information (Fish landing data of CMFRI, 1985-90). . **Recent Field Studies:** Annual report of CMFRI, Cochin, 1992-96 . **Threats:** Loss of habitat; Overexploitation; Pollution; Trade. **Trade:** Local. **Other Comments:** Population decreasing due to altering the mangroves. **Status: -IUCN: LOWER RISK - NEAR THREATENED (Nationally). DATA DEFICIENT (Globally). -Criteria based on:** —. **-CITES:** No. **-IWPA(1972;91):** No. **-RDB National (1994):** No. **-RDB International (1996):** No. **Recommendations: -Research management:** Monitoring; Life history studies; Habitat management. **-PHVA:** No. **Captive Breeding Recommendations: -Captive breeding:** Level 4. **-Level of difficulty:** Moderately difficult. **Existing Captive Programs:** None. **-Names of facilities:** Aquaculture farms along the coast. **Sourcers (Refer Appendix):** 1, 2, 4, 9**. Compilers:** N. Rajendran, V. Palaniselvam, D.A. Ramesh, A. Kumar, P. Nammalwar, R.S. Lalmohan, A.H. Parulekar, M. Borkar, Jayseelan.

23. *Liza parsia (*Ham.-Buch.) — LRnt/N — **Family:** Mugilidae. **Taxonomic status:** Species. **Habit:** Benthic. **Habitat:** Mangroves, near shore, estuarine. **Global Distribution:** Seas and estuaries of India and Malayan mainly Southeast coast of India. **Current Regional Distribution:** Eastern and western coastal waters of India. **-Range (sq. km):** > 20,000. **-Area Occupied (sq. km):** > 2,000. **-Number of location**: Many. **Population Trends - % change: -% Decline:** Not known . **-Time / Rate (Yrs or gens):** Not known. **-No of Mature Individuals:** Not known. **Global Population:** Not known. **Regional Population:** Continuing decline noticeable (due to reduction in catch) but data not available. **Data Quality:** Reliable census or population monitoring; Indirect information (Fish landing data of CMFRI). **Recent Field Studies:** Annual report of CMFRI, Cochin, 1992-96. **Threats:** Loss of habitat; Overexploitation; Pollution; Siltation; Trade. **Trade:** Local. **Other Comments:** Due to loss of mangrove habitat the Juvenile population has declined. **Status: -IUCN: LOWER RISK - NEAR THREATENED (Nationally). DATA DEFICIENT (Globally). -Criteria based on:** —. **-CITES:** No. **-IWPA(1972;91):** No. **-RDB National (1994):** No. **-RDB International (1996):** No. **Recommendations: -Research management:** Monitoring; Life history studies. **-PHVA:** No. **Captive Breeding Recommendations: -Captive breeding:** Level 4. **-Level of difficulty:** Least difficult. **Existing Captive Programs:** None. **-Names of facilities:** Aquaculture farms along the coast. **Sourcers (Refer Appendix):** 1, 2, 4, 14**. Compilers:** N. Rajendran, V. Palaniselvam, D.A. Ramesh, A. Kumar, P. Nammalwar, R.S. Lalmohan, A.H. Parulekar, M. Borkar, Jayseelan.

24. *Lobotes surinamensis* (Bloch) — LRnt/N — **Family:** Lobotidae. **Taxonomic status:** Species. **Habit:** Muddy bottom. **Habitat:** Mangroves and Inland water. **Global Distribution:** Worldwide in tropical and subtropical waters. **Current Regional Distribution:** East and West coastal waters of India. **-Range (sq. km):** > 20,000. **-Area Occupied (sq. km):** > 2,000. **-Number of location**: Many. **Population Trends - % change: -% Decline:** Not known. **-Time / Rate (Yrs or gens):** Not known. **-No of Mature Individuals:** Not known. **Global Population:** Not known. **Regional Population:** Not known. **Data Quality:** Indirect information. **Recent Field Studies:** None. **Threats:** Loss of habitat; Overexploitation; Trade. **Trade:** Local. **Other Comments: --. Status: -IUCN: LOWER RISK - NEAR THREATENED (Nationally). DATA DEFICIENT (Globally). -Criteria based on:** —. **-CITES:** No. **-IWPA(1972;91):** No. **-RDB National (1994):** No. **-RDB International (1996):** No. **Recommendations: -Research management:** Monitoring. **-PHVA:** No. **Captive Breeding Recommendations: -Captive breeding:** No. **-Level of difficulty:** Not known. **Existing Captive Programs:** Nil. **-Names of facilities:** —. **Sourcers (Refer**

Appendix): 18, 49 (Pp. 576)**. Compilers:** N. Rajendran, V. Palaniselvam, D.A. Ramesh, A. Kumar, P. Nammalwar, R.S. Lalmohan, A.H. Parulekar, M. Borkar.

25. *Lutjanus argentimaculatus* (Forsskal) — LRnt/N — **Family:** Lutjanidae. **Taxonomic status:** Species. **Habit:** Benthic. **Habitat:** Mangroves and Estuaries, Rocky shore. **Global Distribution:** Eastern India and western Pacific. **Current Regional Distribution:** East and west coastal waters of India. **-Range (sq. km):** > 20,000. **-Area Occupied (sq. km):** > 2,000. **-Number of location**: Many. **Population Trends - % change: -% Decline:** Declining. **-Time / Rate (Yrs or gens):** Not known. **-No of Mature Individuals:** Not known. **Global Population:** Not known. **Regional Population:** Continuing decline observed. **Data Quality:** Informal field sightings; Indirect information (Fish landing data of CMFRI, Cochin). **Recent Field Studies:** Annual report of CMFRI, 1992-96 . **Threats:** Loss of habitat; Overexploitation; Trade. **Trade:** Local; International. **Other Comments:** --. **Status: -IUCN: LOWER RISK - NEAR THREATENED (Nationally). DATA DEFICIENT (Globally). -Criteria based on:** —. **-CITES:** No. **-IWPA(1972;91):** No. **-RDB National (1994):** No. **-RDB International (1996):** No. **Recommendations: -Research management:** Monitoring; Habitat management; Limiting factor research. **-PHVA:** No. **Captive Breeding Recommendations: -Captive breeding:** Level 4. **-Level of difficulty:** Moderately difficult. **Existing Captive Programs:** None. **-Names of facilities:** —. **Sourcers (Refer Appendix):** 31, 49 (Pp. 533), 1, 2**. Compilers:** N. Rajendran, V. Palaniselvam, D.A. Ramesh, A. Kumar, P. Nammalwar, R.S. Lalmohan, A.H. Parulekar, M. Borkar, Jayseelan.

26. *Lutjanus fulviflammus* (Forsskal) — LRnt/N — **Family:** Lutjanidae. **Taxonomic status:** Species. **Habit:** Benthic. **Habitat:** Mangroves, nearshore. **Global Distribution:** Indo-west Pacific, eastward to Polynesia. **Current Regional Distribution:** West and southeast coastal waters of India. **-Range (sq. km):** > 20,000. **-Area Occupied (sq. km):** > 2,000. **-Number of location**: Many (Southeast and west coast). **Population Trends - % change: -% Decline:** Declining . **-Time / Rate (Yrs or gens):** Not known. **-No of Mature Individuals:** Not known. **Global Population:** Not known. **Regional Population:** Continuing decline and population as seen in fishing. **Data Quality:** Informal field sightings, Indirect information (Fish landing data of CMFRI, 1985-90). **Recent Field Studies:** Annual report of CMFRI, Cochin, 1992-96 . **Threats:** Loss of habitat; Overexploitation; Siltation; Trade. **Trade:** Local; International. **Other Comments: --. Status: -IUCN: LOWER RISK - NEAR THREATENED (Nationally). DATA DEFICIENT (Globally). -Criteria based on:** —. **-CITES:** No. **-IWPA(1972;91):** No. **-RDB National (1994):** No. **-RDB International (1996):** No. **Recommendations: -Research management:** Monitoring. **-PHVA:** No. **Captive Breeding Recommendations: -Captive breeding:** Level 4. **-Level of difficulty:** Moderately difficult. **Existing Captive Programs:** None. **-Names of facilities:** —. **Sourcers (Refer Appendix):** 1, 2, 9, 49 **. Compilers:** N. Rajendran, V. Palaniselvam, D.A. Ramesh, A. Kumar, P. Nammalwar, R.S. Lalmohan, A.H. Parulekar, M. Borkar, Jayseelan.

27. *Lutjanus johni* Bleeker — LRnt/N — **Family:** Lutjanidae. **Taxonomic status:** Species. **Habit:** Shallow waters. **Habitat:** Mangroves, inshore waters. **Global Distribution:** India, Sri Lanka, Eastern Indian Ocean, Western Central Pacific. **Current Regional Distribution:** West and southeast coastal waters of India. **-Range (sq. km):** > 20,000. **-Area Occupied (sq. km):** > 2,000. **-Number of location**: Many. **Population Trends - % change: -% Decline:** Declining. **-Time / Rate (Yrs or gens):** Not known. **-No of Mature Individuals:** Not known. **Global Population:** Not known. **Regional Population:** Continuing decline observed. **Data Quality:** Informal field sightings; Indirect information (Rangarajan, 1970-73 in Andaman) (Fish landing data of CMFRI). **Recent Field Studies:** Annual Report of CMFRI, 1992-96. **Threats:** Loss of habitat; Overexploitation; Siltation; Trade. **Trade:** Local; International. **Other Comments:** --. **Status: -IUCN: LOWER RISK - NEAR THREATENED (Nationally). DATA DEFICIENT (Globally). -Criteria based on:** —. **-CITES:** No. **-IWPA(1972;91):** No. **-RDB National (1994):** No. **-RDB International (1996):** No. **Recommendations: -Research management:** Monitoring; Habitat management; Limiting factor research. **-PHVA:** No. **Captive Breeding Recommendations: -Captive breeding:** Level 4 . **-Level of difficulty:** Moderately difficult. **Existing Captive Programs:** None. **-Names of facilities:** —. **Sourcers (Refer Appendix):** 1, 2, 32, 45**. Compilers:** N. Rajendran, V. Palaniselvam, D.A. Ramesh, A. Kumar, P. Nammalwar, R.S. Lalmohan, A.H. Parulekar, M. Borkar, Jayseelan.

28. *Lutjanus russelli* (Bleeker) — LRnt/N — **Family:** Lutjanidae. **Taxonomic status:** Species. **Habit:** Benthic. **Habitat:** Mangroves. **Global Distribution:** Red Sea, Chagos Archipelago and Maldive Islands and Indo-west Pacific. **Current Regional Distribution:** East and west coastal waters of India. **-Range (sq. km):** > 20,000. **-Area Occupied (sq. km):** > 2,000. **-Number of location**: Many. **Population Trends - % change: -% Decline:** Declining . **-Time / Rate (Yrs or gens):** Not known. **-No of Mature Individuals:** Not known. **Global Population:** Decline. **Regional Population:** Continuing delcine observed. **Data Quality:** Informal field sightings; Indirect information (Fish landing data of CMFRI). **Recent Field Studies:** Annual report of CMFRI, Cochin, 1992-96. **Threats:** Loss of habitat; Overexploitation; Trade. **Trade:** Local; International. **Other Comments:** Loss of mangrove habitats. **Status: -IUCN: LOWER RISK - NEAR THREATENED (Nationally). DATA DEFICIENT (Globally). -Criteria based on:** —. **-CITES:** No. **-IWPA(1972;91):** No. **-RDB National (1994):** No. **-RDB International (1996):** No. **Recommendations: -Research management:** Monitoring; Limiting factor research; Habitat management. **-PHVA:** No. **Captive Breeding Recommendations: -Captive breeding:** Level 4 . **-Level of difficulty:** Moderately difficult. **Existing Captive Programs:** None. **-Names of facilities:** —. **Sourcers (Refer Appendix):** 1, 2, 10**. Compilers:** N. Rajendran, V. Palaniselvam, D.A. Ramesh, A. Kumar, P. Nammalwar, R.S. Lalmohan, A.H. Parulekar, M. Borkar, Jayseelan.

29. *Lutjanus sebae* (Cuvier) — LRnt/N — **Family:** Lutjanidae. **Taxonomic status:** Species. **Habit:** Demersal. **Habitat:** Mangrove (Juveniles only), Rocky shore. **Global Distribution:** India, Mauritius, Reunion and the Chagos Archipelago. **Current Regional Distribution:** West and southeast coastal water of; India. **-Range (sq. km):** > 20,000. **-Area Occupied (sq. km):** > 2,000. **-Number of location**: Many (East and west coast). **Population Trends - % change: -% Decline:** Declining . **-Time / Rate (Yrs or gens):** Not known. **-No of Mature Individuals:** Not known. **Global Population:** Not known. **Regional Population:** Continuing decline observed. **Data Quality:** Informal field sightings, Indirect information (Fish landing data of CMFRI). **Recent Field Studies:** Annual reports of CMFRI, Cochin, 1992-96 . **Threats:** Loss of habitat; Overexploitation; Trade. **Trade:** Local. **Other Comments:** --. **Status: -IUCN: LOWER RISK - NEAR THREATENED (Nationally). DATA DEFICIENT (Globally). -Criteria based on:** —. **-CITES:** No. **-IWPA(1972;91):** No. **-RDB National (1994):** No. **-RDB**

International (1996): No. **Recommendations: -Research management:** Monitoring; Habitat management. **-PHVA:** No. **Captive Breeding Recommendations: -Captive breeding:** Level 4 . **-Level of difficulty:** Moderately difficult. **Existing Captive Programs:** None. **-Names of facilities:** —. **Sourcers (Refer Appendix):** 1, 2, 49 (Pp. 551)**. Compilers:** N. Rajendran, V. Palaniselvam, D.A. Ramesh, A. Kumar, P. Nammalwar, R.S. Lalmohan, A.H. Parulekar, M. Borkar, Jayseelan.

30. ***Megalops cyprinoides*** **(Broussonet) — LRnt/N** — **Family:** Megalopidae. **Taxonomic status:** Species. **Habit:** Pelagic, Ascending the river. **Habitat:** Inshore water. **Global Distribution:** Indo-west Pacific. **Current Regional Distribution:** Coastal waters of India. **-Range (sq. km):** > 20,000. **-Area Occupied (sq. km):** > 2,000. **-Number of location**: Many. **Population Trends - % change: -% Decline:** Not known . **-Time / Rate (Yrs or gens):** Not known. **-No of Mature Individuals:** Not known. **Global Population:** Not known. **Regional Population:** May be declining. **Data Quality:** Informal field sightings. **Recent Field Studies:** None. **Threats:** Loss of habitat; Pesticides; Pollution; Siltation. **Trade:**. **Other Comments:** --. **Status: -IUCN: LOWER RISK - NEAR THREATENED (Nationally). DATA DEFICIENT (Globally). -Criteria based on:** —. **-CITES:** No. **-IWPA(1972;91):** No. **-RDB National (1994):** No. **-RDB International (1996):** No. **Recommendations: -Research management:** Monitoring; Habitat management. **-PHVA:** No. **Captive Breeding Recommendations: -Captive breeding:** No. **-Level of difficulty:** Not known. **Existing Captive Programs:** None. **-Names of facilities:** —. **Sourcers (Refer Appendix):** 26, 49 (Pp. 212)**. Compilers:** N. Rajendran, V. Palaniselvam, D.A. Ramesh, A. Kumar, P. Nammalwar, R.S. Lalmohan, A.H. Parulekar, M. Borkar.

31. ***Mugil cephalus*** **L. — LRnt/N** — **Family:** Mugilidae. **Taxonomic status:** Species. **Habit:** Benthic. **Habitat:** Mangrove (Juvenile) and Adult in coastal waters. **Global Distribution:** World wide in temperate and tropical; waters. **Current Regional Distribution:** East and west coastal waters. **-Range (sq. km):** > 20,000. **-Area Occupied (sq. km):** > 2,000. **-Number of location**: Many. **Population Trends - % change: -% Decline:** Declining. **-Time / Rate (Yrs or gens):** Not known. **-No of Mature Individuals:** Not known. **Global Population:** Decline. **Regional Population:** Continuing decline observed. **Data Quality:** Informal field sightings; Indirect information (Fish landing data of CMFRI, 1985-90). **Recent Field Studies:** Annual Report of CMFRI, Cochin, 1992-96. **Threats:** Loss of habitat; Overexploitation; Pollution; Siltation; Trade. **Trade:** Local; International. **Other Comments:** Loss of mangrove habitats which is mainly used by juveniles. **Status: -IUCN: LOWER RISK - NEAR THREATENED (Nationally). DATA DEFICIENT (Globally). -Criteria based on:** —. **-CITES:** No. **-IWPA(1972;91):** No. **-RDB National (1994):** No. **-RDB International (1996):** No. **Recommendations: -Research management:** Monitoring; Husbandry research; Habitat management. **-PHVA:** No. **Captive Breeding Recommendations: -Captive breeding:** Level 4 . **-Level of difficulty:** Least difficulty. **Existing Captive Programs:** None. **-Names of facilities:** Fish culture farms along the Indian coasts. **Sourcers (Refer Appendix):** 1, 2, 5, 49**. Compilers:** N. Rajendran, V. Palaniselvam, D.A. Ramesh, A. Kumar, P. Nammalwar, R.S. Lalmohan, A.H. Parulekar, M. Borkar, Jayseelan.

32. ***Muraena macrura*** **(Bleeker) — LRnt/N** — **Family:** Muraenidae. **Taxonomic status:** Species. **Habit:** Estuary, backwater and nearshore regions. **Habitat:** Not known. **Global Distribution:** Indo-west Pacific. **Current Regional Distribution:** East and West coastal waters. **-Range (sq. km):** > 20,000. **-Area Occupied (sq. km):** > 2,000. **-Number of location**: Many. **Population Trends - % change: -% Decline:** Not known . **-Time / Rate (Yrs or gens):** Not known. **-No of Mature Individuals:** Not known. **Global Population:** Not known. **Regional Population:** Population Trends not known. **Data Quality:** General field studies; Informal field sightings. **Recent Field Studies:** None. **Threats:** Loss of habitat; Pesticides; Pollution; Siltation; Trade. **Trade:** Local. **Other Comments:** --. **Status: -IUCN: LOWER RISK - NEAR THREATENED (Nationally). DATA DEFICIENT (Globally). -Criteria based on:** —. **-CITES:** No. **-IWPA(1972;91):** No. **-RDB National (1994):** No. **-RDB International (1996):** No. **Recommendations: -Research management:** Monitoring; Survey; Life history studies. **-PHVA:** No. **Captive Breeding Recommendations: -Captive breeding:** No. **-Level of difficulty:** Not known. **Existing Captive Programs:** Nil. **-Names of facilities:** —. **Sourcers (Refer Appendix):** 4 (Pp. 672), 16, 49 (Pp. 228)**. Compilers:** N. Rajendran, V. Palaniselvam, D.A. Ramesh, A. Kumar, P. Nammalwar, R.S. Lalmohan, A.H. Parulekar, M. Borkar.

33. ***Muraenesex cinereus*** **(Forsskal) — LRnt/N** — **Family:** Muraenidae. **Taxonomic status:** Species. **Habit:** Benthic, Rocky shores. **Habitat:** Mangrove, inshore coastal waters. **Global Distribution:** Indo-malaya Archipelago, Australia and Red Sea. **Current Regional Distribution:** East and west coastal waters. **-Range (sq. km):** > 20,000. **-Area Occupied (sq. km):** > 2,000. **-Number of location**: Many. **Population Trends - % change: -% Decline:** Not known . **-Time / Rate (Yrs or gens):** Not known. **-No of Mature Individuals:** Not known. **Global Population:** Not known. **Regional Population:** Not known. **Data Quality:** Informal field sightings; Hearsay/popular belief. **Recent Field Studies:** None. **Threats:** Loss of habitat. **Trade:** No. **Other Comments: --. Status: -IUCN: LOWER RISK - NEAR THREATENED (Nationally). DATA DEFICIENT (Globally). -Criteria based on:** —. **-CITES:** No. **-IWPA(1972;91):** No. **-RDB National (1994):** No. **-RDB International (1996):** No. **Recommendations: -Research management:** Survey; Monitoring; Habitat management; Limiting factor research. **-PHVA:** No. **Captive Breeding Recommendations: -Captive breeding:** Level 1; Level 2. **-Level of difficulty:** Very difficult. **Existing Captive Programs:** None. **-Names of facilities:** —. **Sourcers (Refer Appendix):** 5, 38**. Compilers:** N. Rajendran, V. Palaniselvam, D.A. Ramesh, A. Kumar, P. Nammalwar, R.S. Lalmohan, A.H. Parulekar, M. Borkar, Jayseelan.

34. ***Muraenichthys schultzei*** **(Bleeker) — VU/N (B1, 2c)** — **Family:** Muraenidae. **Taxonomic status:** Species. **Habit:** Benthic. **Habitat:** Estuaries, Mangroves and the inshore water. **Global Distribution:** Indian and Malay coast, Andaman Islands. **Current Regional Distribution:** Coastal waters. **-Range (sq. km):** > 20,000. **-Area Occupied (sq. km):** < 2,000. **-Number of location**: Many; Fragmented . **Population Trends - % change: -% Decline:** 20 %. **-Time / Rate (Yrs or gens):** 20 yrs. **-No of Mature Individuals:** Not known. **Global Population:** Not known. **Regional Population:** Continuing decline observed. **Data Quality:** Reliable census or population monitoring; General field studies (R.S. Lalmohan, 1961). **Recent Field Studies:** None. **Threats:** Loss of habitat; Pollution. **Trade:** No. **Other Comments:** Rare species. Coastal habital loss. **Status: -IUCN: VULNERABLE (Nationally). DATA DEFICIENT (Globally). -Criteria based on: B1, 2c** (Restricted distribution, severely fragmented, continuing decline 'observed in extent of occurrence, area of occupancy and/or quality of habitat). **-CITES:** No. **-IWPA(1972;91):** No. **-RDB National (1994):** No. **-RDB International (1996):** No. **Recommendations:**

-Research management: Monitoring; Life history studies; Survey. **-PHVA:** Not known. **Captive Breeding Recommendations: -Captive breeding:** Not known. **-Level of difficulty:** Not known. **Existing Captive Programs:** None. **-Names of facilities:** —. **Sourcers (Refer Appendix):** 4(Pp. 663), 40, 43**. Compilers:** N. Rajendran, V. Palaniselvam, D.A. Ramesh, A. Kumar, P. Nammalwar, R.S. Lalmohan, A.H. Parulekar, M. Borkar, Jayseelan.

35. *Nematalosa nasus* (Bloch) — LRnt/N — **Family:** Clupidae. **Taxonomic status:** Species. **Habit:** Inshore waters -Pelagic coastal waters. **Habitat:** Mangrove, lagoons, coastal waters. **Global Distribution:** Indo-malayan waters. **Current Regional Distribution:** East and west coastal waters of India. **-Range (sq. km):** < 20,000. **-Area Occupied (sq. km):** > 2,000. **-Number of location**: Many. **Population Trends - % change: -% Decline:** Not known. **-Time / Rate (Yrs or gens):** Not known. **-No of Mature Individuals:** Not known. **Global Population:** Not known. **Regional Population:** Continuing decline observed. **Data Quality:** Informal field sightings; Indirect information (Fish landing data of CMFRI, Cochin, 1980-95). **Recent Field Studies:** . **Threats:** Loss of habitat; Siltation; Trade. **Trade:** Local. **Other Comments:** --. **Status: -IUCN: LOWER RISK - NEAR THREATENED (Nationally). DATA DEFICIENT (Globally). -Criteria based on:** —. **-CITES:** No. **-IWPA(1972;91):** No. **-RDB National (1994):** No. **-RDB International (1996):** No. **Recommendations: -Research management:** Monitoring; Habitat management; Limiting factor research. **-PHVA:** No. **Captive Breeding Recommendations: -Captive breeding:** No. **-Level of difficulty:** Very difficult. **Existing Captive Programs:** None. **-Names of facilities:** —. **Sourcers (Refer Appendix):** 2, 4, 7, 49 (Pp.172)**. Compilers:** N. Rajendran, V. Palaniselvam, D.A. Ramesh, A. Kumar, P. Nammalwar, R.S. Lalmohan, A.H. Parulekar, M. Borkar, Jayseelan.

36. *Osteomugil cunensius* (Valenciennes) — LRnt/N — **Mugil cunensius — Valamugil cunensius** — **Family:** Mugilidae. **Taxonomic status:** Species. **Habit:** Benthic. **Habitat:** Mangroves. **Global Distribution:** Indo-Malaya Archipelago. **Current Regional Distribution:** Eastern and western Indian coastal waters. **-Range (sq. km):** > 20,000. **-Area Occupied (sq. km):** > 2,000. **-Number of location**: Many; Continuous. **Population Trends - % change: -% Decline:** Declining. **-Time / Rate (Yrs or gens):** Not known. **-No of Mature Individuals:** Not known. **Global Population:** Not known. **Regional Population:** Continuing decline observed. **Data Quality:** Informal field sightings; Indirect information (Fish landing data of CMFI, Cochin). **Recent Field Studies:** Annual report of CMFRI, Cochin, 1992-96. **Threats:** Loss of habitat; Overexploitation; Trade. **Trade:** Local consumption. **Other Comments: --. Status: -IUCN: LOWER RISK - NEAR THREATENED (Nationally). DATA DEFICIENT (Globally). -Criteria based on:** —. **-CITES:** No. **-IWPA(1972;91):** No. **-RDB National (1994):** No. **-RDB International (1996):** No. **Recommendations: -Research management:** Monitoring; Habitat management. **-PHVA:** No. **Captive Breeding Recommendations: -Captive breeding:** Level 4. **-Level of difficulty:** Not known. **Existing Captive Programs:** None. **-Names of facilities:** —. **Sourcers (Refer Appendix):** 1, 2, 4, 10**. Compilers:** N. Rajendran, V. Palaniselvam, D.A. Ramesh, A. Kumar, P. Nammalwar, R.S. Lalmohan, A.H. Parulekar, M. Borkar, Jayseelan.

37. *Otolithus ruber* (Schneider) — LRnt/N — **Family:** Sciaenidae. **Taxonomic status:** Species. **Habit:** Bathypelagic coastal waters (trawling ground). **Habitat:** Mangrove, coastal waters. **Global Distribution:** Indo-Australian Achipelago. **Current Regional Distribution:** East and west coastal waters. **-Range (sq. km):** < 20,000. **-Area Occupied (sq. km):** > 2,000. **-Number of location**: Many. **Population Trends - % change: -% Decline:** Not known. **-Time / Rate (Yrs or gens):** Not known. **-No of Mature Individuals:** Not known. **Global Population:** Not known. **Regional Population:** Not known. **Data Quality:** Informal field sightings; Indirect information (Fish landing data of CMFRI, Cochin). **Recent Field Studies:** Annual report of CMFRI, Cochin, 1992-96. **Threats:** Loss of habitat; Overexploitation; Trade. **Trade:** Local; International. **Other Comments: --. Status: -IUCN: LOWER RISK - NEAR THREATENED (Nationally). DATA DEFICIENT (Globally). -Criteria based on:** —. **-CITES:** No. **-IWPA(1972;91):** No. **-RDB National (1994):** No. **-RDB International (1996):** No. **Recommendations: -Research management:** Monitoring; Habitat management; Limiting factor research. **-PHVA:** No. **Captive Breeding Recommendations: -Captive breeding:** Level 4 . **-Level of difficulty:** Very difficult. **Existing Captive Programs:** None. **-Names of facilities:** —. **Sourcers (Refer Appendix):** 1, 2, 5, 22**. Compilers:** N. Rajendran, V. Palaniselvam, D.A. Ramesh, A. Kumar, P. Nammalwar, R.S. Lalmohan, A.H. Parulekar, M. Borkar, Jayseelan.

38. *Periophthalmus koelreuteri* Bl. Schn. — VU/N (A1a, 1c) — **Family:** Gobiidae. **Taxonomic status:** Species. **Habit:** Epibenthic, burrowing. **Habitat:** Mangroves and mudflats (swampy regions). **Global Distribution:** Coasts and estuaries of India, Myanmar to Malay Archipelago. **Current Regional Distribution:** Coastal and estuarine waters. **-Range (sq. km):** > 20,000. **-Area Occupied (sq. km):** > 2,000. **-Number of location**: Many. **Population Trends - % change: -% Decline:** 20 % . **-Time / Rate (Yrs or gens):** 10 yrs. **-No of Mature Individuals:** Not known. **Global Population:** Not known. **Regional Population:** Continuing decline observed. **Data Quality:** General field study. **Recent Field Studies:** None. **Threats:** Loss of habitat; Pollution. **Trade:** No. **Other Comments: --. Status: -IUCN: VULNERABLE (Nationally). DATA DEFICIENT (Globally). -Criteria based on: A1a, 1c** (Population reduction observed due to decline in extent of occurrence, area of occupancy and/or quality of habitat). **-CITES:** No. **-IWPA(1972;91):** No. **-RDB National (1994):** No. **-RDB International (1996):** No. **Recommendations: -Research management:** Monitoring; Life history studies, Survey, Habitat management. **-PHVA:** Not known. **Captive Breeding Recommendations: -Captive breeding:** Not known. **-Level of difficulty:** Not known. **Existing Captive Programs:** None. **-Names of facilities:** —. **Sourcers (Refer Appendix):** 5 (Pp. 303), 6**. Compilers:** N. Rajendran, V. Palaniselvam, D.A. Ramesh, A. Kumar, P. Nammalwar, R.S. Lalmohan, A.H. Parulekar, M. Borkar, Jayseelan.

39. *Plotosus canius* Ham. - Buch. — LRnt/N — **Family:** Plotosidae. **Taxonomic status:** Species. **Habit:** Bottom. **Habitat:** Mangroves/inshore coastal waters. **Global Distribution:** Indo-Australian Archipelago. **Current Regional Distribution:** West and Southeast coastal waters of India. **-Range (sq. km):** > 20,000. **-Area Occupied (sq. km):** > 2,000. **-Number of location**: Many. **Population Trends - % change: -% Decline:** Not known . **-Time / Rate (Yrs or gens):** Not known. **-No of Mature Individuals:** Not known. **Global Population:** Not known. **Regional Population:** May be declining, but no information (direct or indirect). **Data Quality:** Informal field sightings. **Recent Field Studies:** None. **Threats:** Loss of habitat; Pollution; Trade. **Trade:** Local. **Other Comments:** --. **Status: -IUCN: LOWER RISK - NEAR THREATENED (Nationally). DATA DEFICIENT (Globally). -Criteria based on:** —. **-CITES:** No. **-IWPA(1972;91):** No. **-RDB National (1994):** No. **-RDB International (1996):** No. **Recommendations: -Research management:** Survey; Monitoring. **-PHVA:** No. **Captive Breeding**

Recommendations: -Captive breeding: No. **-Level of difficulty:** Not known. **Existing Captive Programs:** None. **-Names of facilities:** —. **Sourcers (Refer Appendix):** 36**. Compilers:** .N. Rajendran, V. Palaniselvam, D.A. Ramesh, A. Kumar, P. Nammalwar, R.S. Lalmohan, A.H. Parulekar, M. Borkar, Jayseelan.

40. *Polynemus indicus* Shaw — LRnt/N — **Family:** Polynemidae. **Taxonomic status:** Species. **Habit:** Benthic. **Habitat:** Mangrove -juveniles, adults in the open Sea. **Global Distribution:** Indo-Malay Archipelago and Australia. **Current Regional Distribution:** Eastern and west coastal water and Andaman. **-Range (sq. km):** > 20,000. **-Area Occupied (sq. km):** > 2,000. **-Number of location**: Many; continuous. **Population Trends - % change: -% Decline:** Declining . **-Time / Rate (Yrs or gens):** Not known. **-No of Mature Individuals:** Not known. **Global Population:** Decling. **Regional Population:** Continuing decline observed. **Data Quality:** Informal field sightings; Indirect information (Kagwade, 1965-75 in Mumbai) (Fish landing data of CMFRI, Cochin, 1985-90). **Recent Field Studies:** Annual report of CMFRI, Cochin, 1992-96. **Threats:** Loss of habitat; Overexploitation; Pollution; Siltation; Trade. **Trade:** Local; International . **Other Comments:** Loss of mangrove habits which is mainly used by Juveniles. **Status: -IUCN: LOWER RISK - NEAR THREATENED (Nationally). DATA DEFICIENT (Globally). -Criteria based on:** —. **-CITES:** No. **-IWPA(1972;91):** No. **-RDB National (1994):** No. **-RDB International (1996):** No. **Recommendations: -Research management:** Monitoring; Habitat management. **-PHVA:** No. **Captive Breeding Recommendations: -Captive breeding:** None. **-Level of difficulty:** Not known. **Existing Captive Programs:** None. **-Names of facilities:** —. **Sourcers (Refer Appendix):** 1, 2, 5, 9**. Compilers:** N. Rajendran, V. Palaniselvam, D.A. Ramesh, A. Kumar, P. Nammalwar, R.S. Lalmohan, A.H. Parulekar, M. Borkar, Jayseelan.

41. *Pomadasys hasta* Bloch — LRnt/N — **Family:** Pomadasydae. **Taxonomic status:** Species. **Habit:** Demersal. **Habitat:** Mangrove, Inshore waters. **Global Distribution:** Indo-west Pacific. **Current Regional Distribution:** East and west coastal waters of India. **-Range (sq. km):** > 20,000. **-Area Occupied (sq. km):** > 2,000. **-Number of location**: Many. **Population Trends - % change: -% Decline:** Declining. **-Time / Rate (Yrs or gens):** Not known. **-No of Mature Individuals:** Not known. **Global Population:** Not known. **Regional Population:** Continuing decline. **Data Quality:** Informal field sightings; Indirect information (P. Nammalwar, 1967-74 in Mumbai) (Annual reports of CMFRI, Cochin, 1985-90). **Recent Field Studies:** (Annual reports of CMFRI, Cochin, 1990-96). **Threats:** Fishing; Loss of habitat; Trade. **Trade:** Local. **Other Comments:** --. **Status: -IUCN: LOWER RISK - NEAR THREATENED (Nationally). DATA DEFICIENT (Globally). -Criteria based on:** —. **-CITES:** No. **-IWPA(1972;91):** No. **-RDB National (1994):** No. **-RDB International (1996):** No. **Recommendations: -Research management:** Monitoring; Habitat management. **-PHVA:** No. **Captive Breeding Recommendations: -Captive breeding:** Not known. **-Level of difficulty:** Not known. **Existing Captive Programs:** None. **-Names of facilities:** —. **Sourcers (Refer Appendix):** 1, 49 (Pp. 596)**. Compilers:** N. Rajendran, V. Palaniselvam, D.A. Ramesh, A. Kumar, P. Nammalwar, R.S. Lalmohan, A.H. Parulekar, M. Borkar, Jayseelan.
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42. *Psammaperca waigaensis* Cuvier — VU/N (A1a, 1c, 1d) — **Family:** Centropomidae. **Taxonomic status:** Species. **Habit:** Demersal/Benthic. **Habitat:** Mangroves. **Global Distribution:** Indo-Pacific, Australia. **Current Regional Distribution:** Palk Bay, Gulf of Mannar, East and West Coasts. **-Range (sq. km):** > 20,000. **-Area Occupied (sq. km):** < 2,000. **-Number of location**: Many. **Population Trends - % change: -% Decline:** 50 %. **-Time / Rate (Yrs or gens):** 20 yrs. **-No of Mature Individuals:** Not known. **Global Population:** Not known. **Regional Population:** Continuing decline observed. **Data Quality:** General field studies; Informal field sightings (Pai, 1955-65 in Mandapam). **Recent Field Studies:** None. **Threats:** Fishing; Loss of habitat; Pollution; Trade. **Trade:** Local. **Other Comments:** Core areas Palk Bay and Gulf of Mannar disappeared in Catch Nursery grounds degraded . **Status: -IUCN: VULNERABLE (Nationally). DATA DEFICIENT (Globally). -Criteria based on: A1a, 1c, 1d** (Observed population reduction due to decline in extent of occurrence, area of occupancy and/or quality of habitat and due to actual or potential levels of exploitation). **-CITES:** —. **-IWPA(1972;91):** No. **-RDB National (1994):** No. **-RDB International (1996):** No. **Recommendations: -Research management:** Monitoring. **-PHVA:** Not known. **Captive Breeding Recommendations: -Captive breeding:** Not known. **-Level of difficulty:** Not known. **Existing Captive Programs:** None. **-Names of facilities:** —. **Sourcers (Refer Appendix):** 35, 44, 49 (Pp. 357)**. Compilers:** N. Rajendran, V. Palaniselvam, D.A. Ramesh, A. Kumar, P. Nammalwar, R.S. Lalmohan, A.H. Parulekar, M. Borkar, Jayseelan.

43. *Scartelaos viridis* Ham. -Buch. —EN/N (A1a, 1c; B1, 2c) — *Boleopthalmus viridis* — **Family:** Gobiidae. **Taxonomic status:** Species. **Habit:** Benthic -burrowing. **Habitat:** Mangroves -intertidal mudflats.**Global Distribution:** Indo-Malay Archipelago. **Current Regional Distribution:** East and West coastal waters of India. **-Range (sq. km):** < 5,000. **-Area Occupied (sq. km):** < 2,000. **-Number of location**: 15; Fragmented. **Population Trends - % change: -% Decline:** 50 %. **-Time / Rate (Yrs or gens):** 10 yrs. **-No of Mature Individuals:** Not known. **Global Population:** Not known. **Regional Population:** Continuing drastic decline. **Data Quality:** General field study. **Recent Field Studies:** Jeyseelam, Pichavam coast, creek and Mangrove; R.S. Lalmohan, Gujarat. **Threats:** Loss of habitat. **Trade:** No. **Other Comments: --. Status: -IUCN: ENDANGERED (Nationally). DATA DEFICIENT (Globally). -Criteria based on: A1a,1c** (Observed population reduction due to decline in extent of occurrence, area of occupancy and/or quality of habitat); **B1, 2c** (Restricted distribution, severely fragmented, continuing decline observed in extent of occurrence, area of occupancy and/or quality of habitat). **-CITES:** No. **-IWPA(1972;91):** No. **-RDB National (1994):** No. **-RDB International (1996):** No. **Recommendations: -Research management:** Monitoring. **-PHVA:** Not known. **Captive Breeding Recommendations: -Captive breeding:** No. **-Level of difficulty:** Not known. **Existing Captive Programs:** None. **-Names of facilities:** —. **Sourcers (Refer Appendix): . Compilers:** N. Rajendran, V. Palaniselvam, D.A. Ramesh, A. Kumar, P. Nammalwar, R.S. Lalmohan, A.H. Parulekar, M. Borkar, Jayseelan.

44. *Secutor ruconius* Ham. and Buch. — VU/N (A1a, 2b) — **Family:** Leiognathidae. **Taxonomic status:** Species. **Habit:** Demersal, East coast, West Coast. **Habitat:** Shallow water, Schooling fish enters estuaries. **Global Distribution:** Southern east coast of Africa, Madagascar, Mauritius, Red Sea, along coasts of India, off Sri Lanka. Also eastern Indian ocean and western, Central pacific to Southern China and Australia. **Current Regional Distribution:** Coastal

waters. **-Range (sq. km):** > 20,000. **-Area Occupied (sq. km):** > 2,000. **-Number of location**: Many. **Population Trends - % change: -% Decline:** 20 %. **-Time / Rate (Yrs or gens):** 10 yrs. **-No of Mature Individuals:** Not known. **Global Population:** Not known. **Regional Population:** Continuing decline observed. **Data Quality:** Informal field sightings, Records. **Recent Field Studies:** Annual reports of CMFRI, Cochin, 1981-95. **Threats:** Overexploitation. **Trade:** No. **Other Comments:** Core area Gulf of Mannar and Palk Bay trawling ground. **Status: -IUCN: VULNERABLE (Nationally). DATA DEFICIENT (Globally). -Criteria based on: A1a, 2b** (Observed population reduction due to decline in abundance). **-CITES:** No. **-IWPA(1972;91):** No. **-RDB National (1994):** No. **-RDB International (1996):** No. **Recommendations: -Research management:** Monitoring. **-PHVA:** No. **Captive Breeding Recommendations: -Captive breeding:** No. **-Level of difficulty:** Not known. **Existing Captive Programs:** Nil. **-Names of facilities:** —. **Sourcers (Refer Appendix):** 2, 37. **Compilers:** N. Rajendran, V. Palaniselvam, D.A. Ramesh, A. Kumar, P. Nammalwar, R.S. Lalmohan, A.H. Parulekar, M. Borkar.

45. *Siganus canaliculatus* (Linnaeus) — LRnt/N — **Family:** Siganidae. **Taxonomic status:** Species. **Habit:** Benthic. **Habitat:** Mangrove (Juveniles) and Adults in Coastal waters. **Global Distribution:** East and west coastal waters. **Current Regional Distribution:** East and west coastal waters. **-Range (sq. km):** > 20,000. **-Area Occupied (sq. km):** > 2,000. **-Number of location**: Many. **Population Trends - % change: -% Decline:** Declining. **-Time / Rate (Yrs or gens):** Not known. **-No of Mature Individuals:** Not known. **Global Population:** Not known. **Regional Population:** Continuing decline. **Data Quality:** Informal field sightings; Indirect information (Mohanraj, 1978-82 in Mandapam) (Fish landing data of CMFRI, Cochin). **Recent Field Studies:** Annual report of CMFRI, Cochin, 1992-96. **Threats:** Loss of habitat; Overexploitation; Siltation. **Trade:**. **Other Comments:** Bar mouth of estuaries closed during most part of the year. **Status: -IUCN: LOWER RISK - NEAR THREATENED (Nationally). DATA DEFICIENT (Globally). -Criteria based on:** —. **-CITES:** No. **-IWPA(1972;91):** No. **-RDB National (1994):** No. **-RDB International (1996):** No. **Recommendations: -Research management:** Monitoring; Habitat management. **-PHVA:** No. **Captive Breeding Recommendations: -Captive breeding:** Level 4 . **-Level of difficulty:** Least difficult. **Existing Captive Programs:** None . **-Names of facilities:** Net cage culture facilities in Palk Bay region along the Indian Coast.**Sourcers (Refer Appendix):** 4, 49**. Compilers:** N. Rajendran, V. Palaniselvam, D.A. Ramesh, A. Kumar, P. Nammalwar, R.S. Lalmohan, A.H. Parulekar, M. Borkar, Jayseelan.

46. *Siganus javus* (Linnaeus) — LRnt/N — **Family:** Siganidae. **Taxonomic status:** Species. **Habit:** Benthic. **Habitat:** Coastal waters, coral reefs, brackishwater, freshwater. **Global Distribution:** Arabian Gulf, India, Pakistan and Andaman Islands (Indo-malya Archipelago). **Current Regional Distribution:** East and west coastal waters of India. **-Range (sq. km):** > 20,000. **-Area Occupied (sq. km):** > 2,000. **-Number of location**: Many. **Population Trends - % change: -% Decline:** Decline. **-Time / Rate (Yrs or gens):** Not known. **-No of Mature Individuals:** Not known. **Global Population:** Not known. **Regional Population:** Continuing decline observed. **Data Quality:** Informal field sightings, Indirect information (Fish landing data of CMFRI, Cochin). **Recent Field Studies:** Annual report of CMFRI, Cochin, 1990-96 . **Threats:** Loss of habitat; Siltation; Trade. **Trade:** Local consumption. **Other Comments:** Bar mouth of estuaries closed during most of the year. **Status: -IUCN: LOWER RISK - NEAR THREATENED (Nationally). DATA DEFICIENT (Globally). -Criteria based on:** —. **-CITES:** No. **-IWPA(1972;91):** No. **-RDB National (1994):** No. **-RDB International (1996):** No. **Recommendations: -Research management:** Monitoring; Habitat management; Life history studies. **-PHVA:** No. **Captive Breeding Recommendations: -Captive breeding:** No. **-Level of difficulty:** Not known. **Existing Captive Programs:** None. **-Names of facilities:** Netcages along the coastal waters. **Sourcers (Refer Appendix):** 1, 2, 4 (Pp. 165), 24, 49 (Pp. 777)**. Compilers:** N. Rajendran, V. Palaniselvam, D.A. Ramesh, A. Kumar, P. Nammalwar, R.S. Lalmohan, A.H. Parulekar, M. Borkar, Jayseelan.

47. *Sillago sihama* (Forsskal) — LRnt/N — **Family:** Sillaginidae. **Taxonomic status:** Species. **Habit:** Benthic. **Habitat:** Mangrove coastal, inshore waters, ascending of estuarine waters. **Global Distribution:** Indo-west Pacific and South-North Australia. **Current Regional Distribution:** East and west coastal waters of India. **-Range (sq. km):** > 20,000. **-Area Occupied (sq. km):** > 2,000. **-Number of location**: Many. **Population Trends - % change: -% Decline:** Declining . **-Time / Rate (Yrs or gens):** Not known. **-No of Mature Individuals:** Not known. **Global Population:** Not known. **Regional Population:** Continuing decline observed. **Data Quality:** Informal field sightings; Indirect information (N. Radhakrishnan, 1957 in Mandapam; M. Kaliyamurthy, 1985 in Chennai). Annual report of CMFRI, Cochin 1985-95. **Recent Field Studies:** None . **Threats:** Loss of habitat; Overexploitation; Trade. **Trade:** Local. **Other Comments:** --. **Status: -IUCN: LOWER RISK - NEAR THREATENED (Nationally). DATA DEFICIENT (Globally). -Criteria based on:** —. **-CITES:** No. **-IWPA(1972;91):** No. **-RDB National (1994):** No. **-RDB International (1996):** No. **Recommendations: -Research management:** Monitoring, Limiting factor research; Life history studies. **-PHVA:** No. **Captive Breeding Recommendations: -Captive breeding:** Level 4. **-Level of difficulty:** Moderate difficulty. **Existing Captive Programs:** None. **-Names of facilities:** Aquaculture ponds along the Indian coast. **Sourcers (Refer Appendix):** 5 (Pp. 265), 8, 45, 46, 49 (Pp. 425)**. Compilers:** N. Rajendran, V. Palaniselvam, D.A. Ramesh, A. Kumar, P. Nammalwar, R.S. Lalmohan, A.H. Parulekar, M. Borkar, Jayseelan.

48. *Sphyraena barracuda* Walbaum — LRnt/N — **Family:** Sphyraenidae. **Taxonomic status:** Species. **Habit:** Pelagic, inshore, coastal waters. **Habitat:** Mangroves, Inshore coastal waters. **Global Distribution:** Indo-west Pacific, Eastern and western Atlantic. **Current Regional Distribution:** East and west coast waters of India. **-Range (sq. km):** > 20,000. **-Area Occupied (sq. km):** > 2,000. **-Number of location**: Many. **Population Trends - % change: -% Decline:** Not known . **-Time / Rate (Yrs or gens):** Not known. **-No of Mature Individuals:** Not known. **Global Population:** Not known. **Regional Population:** Continuing gradual decline in catch. **Data Quality:** Informal field sightings; Indirect information (Annual report of CMFRI, Cochin, 1980-89). **Recent Field Studies:** Annual report of CMFRI, Cochin, 1990-96 . **Threats:** Fishing; Loss of habitat; Pollution; Trade . **Trade:** Local. **Other Comments:** --. **Status: -IUCN: LOWER RISK - NEAR THREATENED (Nationally). DATA DEFICIENT (Globally). -Criteria based on:** —. **-CITES:** No. **-IWPA(1972;91):** No. **-RDB National (1994):** No. **-RDB International (1996):** No. **Recommendations: -Research management:** Monitoring; Habitat management. **-PHVA:** No. **Captive Breeding Recommendations: -Captive breeding:** No. **-Level of difficulty:** Very difficult. **Existing Captive Programs:** None. **-Names of facilities:** —.**Sourcers (Refer Appendix):** 1, 17, 49 (Pp. 737)**. Compilers:** N. Rajendran, V. Palaniselvam, D.A. Ramesh, A. Kumar, P. Nammalwar, R.S. Lalmohan, A.H. Parulekar, M. Borkar, Jayseelan.

49. *Tenualosa ilisha* Ham.- Buch. — LRnt/N — Hilsa ilisha Fowler — **Family:** Clupidae. **Taxonomic status:** Species. **Habit:** Pelagic. **Habitat:** Estuaries, inshore waters. **Global Distribution:** Indo-west Pacific. **Current Regional Distribution:** East and west coast. **-Range (sq. km):** > 20,000. **-Area Occupied (sq. km):** > 2,000. **-Number of location**: Fragmented. **Population Trends - % change: -% Decline:** Declining. **-Time / Rate (Yrs or gens):** Not known. **-No of Mature Individuals:** Not known. **Global Population:** Not known. **Regional Population:** Continuing decline observed. **Data Quality:** Informal field sightings; Indirect information (Central Fisheries Research Institute (1965-75)). **Recent Field Studies:** . **Threats:** Damming; Loss of habitat; Overexploitation; Pollution; Trade. **Trade:** Local. **Other Comments:** --. **Status: -IUCN: LOWER RISK - NEAR THREATENED (Nationally). DATA DEFICIENT (Globally). -Criteria based on:** —. **-CITES:** No. **-IWPA(1972;91):** No. **-RDB National (1994):** No. **-RDB International (1996):** No. **Recommendations: -Research management:** Monitoring; Habitat managment. **-PHVA:** No. **Captive Breeding Recommendations: -Captive breeding:** No. **-Level of difficulty:** Not known. **Existing Captive Programs:** Nil. **-Names of facilities:** —. **Sourcers (Refer Appendix):** 1, 27, 49 (Pp. 163)**. Compilers:** N. Rajendran, V. Palaniselvam, D.A. Ramesh, A. Kumar, P. Nammalwar, R.S. Lalmohan, A.H. Parulekar, M. Borkar.

50. *Therapon jarbua* (Forsskal) — LRnt/N — **Family:** Teraponidae. **Taxonomic status:** Species. **Habit:** Mangroves, Pelagic. **Habitat:** Inshore water, ascending troop, fresh waters also. **Global Distribution:** Indo-pacific. **Current Regional Distribution:** East and west coastal waters. **-Range (sq. km):** > 20,000. **-Area Occupied (sq. km):** > 2,000. **-Number of location**: Many. **Population Trends - % change: -% Decline:** Not known . **-Time / Rate (Yrs or gens):** Not known. **-No of Mature Individuals:** Not known. **Global Population:** Not known. **Regional Population:** Not known. **Data Quality:** Reliable census or population monitoring. **Recent Field Studies:** E.M. Vaidhya, 1966. **Threats:** Human interference; Loss of habitat;Trade. **Trade:** Local. **Other Comments:** --. **Status: -IUCN: LOWER RISK - NEAR THREATENED (Nationally). DATA DEFICIENT (Globally). -Criteria based on:** —. **-CITES:** No. **-IWPA(1972;91):** No. **-RDB National (1994):** No. **-RDB International (1996):** No. **Recommendations: -Research management:** Monitoring; Habitat management. **-PHVA:** No. **Captive Breeding Recommendations: -Captive breeding:** No. **-Level of difficulty:** Not known. **Existing Captive Programs:** None. **-Names of facilities:** —. **Sourcers (Refer Appendix):** 19, 50**. Compilers:** N. Rajendran, V. Palaniselvam, D.A. Ramesh, A. Kumar, P. Nammalwar, R.S. Lalmohan, A.H. Parulekar, M. Borkar, Jayseelan.

51. *Therapon puta* Cuvier — LRnt/N — **Family:** Teraponidae. **Taxonomic status:** Species. **Habit:** Benthic. **Habitat:** Inshore water ascending to fresh water.**Global Distribution:** Indo-west Pacific. **Current Regional Distribution:** East and west coastal waters of India. **-Range (sq. km):** > 20,000. **-Area Occupied (sq. km):** > 2,000. **-Number of location**: Many. **Population Trends - % change: -% Decline:** Declining . **-Time / Rate (Yrs or gens):** Not known. **-No of Mature Individuals:** Not known. **Global Population:** Not known. **Regional Population:** Continuing decline observed. **Data Quality:** Informal field sightings; Indirect information (Fish landing data of CMFRI, Cochin). **Recent Field Studies:** Annual report of CMFRI, Cochin, 1990-96. **Threats:** Fishing; Human interference; Loss of habitat; Trade. **Trade:** Local; Domestic. **Other Comments: --. Status: -IUCN: LOWER RISK - NEAR THREATENED (Nationally). DATA DEFICIENT (Globally). -Criteria based on:** —. **-CITES:** No. **-IWPA(1972;91):** No. **-RDB National (1994):** No. **-RDB International (1996):** No. **Recommendations: -Research management:** Monitoring; Life history studies; Habitat management. **-PHVA:** Not known. **Captive Breeding Recommendations: -Captive breeding:** No. **-Level of difficulty:** Least difficult. **Existing Captive Programs:** None. **-Names of facilities:** —. **Sourcers (Refer Appendix):** 1, 2, 19**. Compilers:** N. Rajendran, V. Palaniselvam, D.A. Ramesh, A. Kumar, P. Nammalwar, R.S. Lalmohan, A.H. Parulekar, M. Borkar, Jayseelan.

52. *Trypauchen vagina* (Bloch and Schneider) — LRnt/N — **Family:** Trypauchenidae. **Taxonomic status:** Species. **Habit:** Benthic. **Habitat:** Inshore and estuaries. **Global Distribution:** Coasts of India through Malay Archipelago to China. **Current Regional Distribution:** Coastal waters. **-Range (sq. km):** > 20,000. **-Area Occupied (sq. km):** > 2,000. **-Number of location**: Many. **Population Trends - % change: -% Decline:** 10 %. **-Time / Rate (Yrs or gens):** 10 yrs. **-No of Mature Individuals:** Not known. **Global Population:** Not known. **Regional Population:** Continuing decline observed. **Data Quality:** Informal field sightings. **Recent Field Studies: . Threats:** Fishing; Trade. **Trade:** Local. **Other Comments:** Caught in Trawlers along the coast - R.S. Lalmohan's personal observation. Plenty during monsoon -Borkar's personal observation. Specific data lacking. **Status: -IUCN: LOWER RISK - NEAR THREATENED (Nationally). DATA DEFICIENT (Globally). -Criteria based on:** —. **-CITES:** No. **-IWPA(1972;91):** No. **-RDB National (1994):** No. **-RDB International (1996):** No. **Recommendations: -Research management:** Monitoring. **-PHVA:** No. **Captive Breeding Recommendations: -Captive breeding:** Not known. **-Level of difficulty:** Not known. **Existing Captive Programs:** None. **-Names of facilities:** —. **Sourcers (Refer Appendix):** 5**. Compilers:** N. Rajendran, V. Palaniselvam, D.A. Ramesh, A. Kumar, P. Nammalwar, R.S. Lalmohan, A.H. Parulekar, M. Borkar, Jayseelan.

Mangrove invertebrates

1. *Atacira flaviluna* (Moth) — LRlc/N — **Family:** Noctuidae. **Taxonomic status:** Species. **Habit:** Nocturnal, Immature stages confined largely (if not exclusively) to mangroves. **Habitat:** Mangrove folliage. **Global Distribution:** India, Singapore and Borneo. **Current Regional Distribution:** Andaman & Nicobar Islands. **-Range (sq. km):** < 20,000. **-Area Occupied (sq. km):** < 2,000. **-Number of location**: Many (Andaman). **Population Trends - % change: -% Decline:** Not known. **-Time / Rate (Yrs or gens):** Not known. **-No of Mature Individuals:** Not known. **Global Population:** Not known. **Regional Population:** Trends not known. **Data Quality:** General field study.**Recent Field Studies:** K. Veenakumari and M. Prashant, 1992 -96**. Threats:** No. **Trade:** No. **Other Comments:** The larval host plants are *Bruguiera* and *Rhizophora* sp. **Status: -IUCN: LOWER RISK - LEAST CONCERN (Nationally). DATA DEFICIENT (Globally). -Criteria based on:** No. **-CITES:** No. **-IWPA(1972;91):** No. **-RDB National (1994):** No. **-RDB International (1996):** No. **Recommendations: -Research management:** Survey; Monitoring; Life-history studies. **-PHVA:** No. **Captive Breeding Recommendations: -Captive breeding:** Not known. **-Level of difficulty:** Not known. **Existing Captive Programs:** None. **-Names of facilities:** —. **Sourcers (Refer Appendix):** 31. **Compilers:** A.K. Das, S.N. Harkantra, B.S. Ingole, T.G. Jagtap, C.T. Achuthankutty, P. Mohanraj, R.M. Sharma .

2. *Attacus mcmulleni* (Watson) P. Eigler, 1989 — LRlc — (Wild Silk Moth) — **Family:** Saturniidae/Lepiodoptera. **Taxonomic status:** Species. **Habit:** Immature stages not confined to mangrove areas. **Habitat:** Forest dweller. **Global Distribution:** ENDEMIC to Andaman & Nicobar Islands. **Current Regional Distribution:** Andaman & Nicobar Islands. **-Range (sq. km):** < 20,000. **-Area Occupied (sq. km):** < 2,000. **-Number of location**: Many (Andaman). **Population Trends - % change: -% Decline:** Not known. **-Time / Rate (Yrs or gens):** Not known. **-No of Mature Individuals:** Not known. **Global Population:** Not known. **Data Quality:** General field study.**Recent Field Studies:** K. Veenakumari and M. Prashant, 1993. **Threats:** No. **Trade:** No. **Other Comments:** Its known larvel food plants *Rhizophora apiculata*, *R. mucronata, Vitex glabrata* and *Xantho xylum* species. **Status: -IUCN: LOWER RISK - LEAST CONCERN (Nationally). -Criteria based on:** —. **-CITES:** No. **-IWPA(1972;91):** No. **-RDB National (1994):** No. **-RDB International (1996):** No. **Recommendations: -Research management:** Survey; Monitoring. **-PHVA:** No. **Captive Breeding Recommendations: -Captive breeding:** Not known. **-Level of difficulty:** Not known. **Existing Captive Programs:** None. **-Names of facilities:** —. **Sourcers (Refer Appendix):** 21, 32. **Compilers:** A.K. Das, S.N. Harkantra, B.S. Ingole, T.G. Jagtap, C.T. Achuthankutty, P. Mohanraj, R.M. Sharma .

3. *Bactronophorus thoracites* (Gould) — LRlc/N — (Ship worm) — **Family:** Teredenidae. **Taxonomic status:** Species. **Habit:** Marine wood borer. **Habitat:** Littoral. **Global Distribution:** India, Indo-west Pacific. **Current Regional Distribution:** East coast . **-Range (sq. km):** < 20,000. **-Area Occupied (sq. km):** < 2,000. **-Number of location**: Many (Sunderbans, Mahanadi Estuaries, Godavari; Pitchavaram, Bellar-coleroo estuarine, Goa, Andaman & Nicobar Islands). **Population Trends - % change: -% Decline:** Not known. **-Time / Rate (Yrs or gens):** Not known. **-No of Mature Individuals:** Not known. **Global Population:** Not known. **Regional Population:** Trends not known. **Data Quality:** General field studies (Roonwall, 1954 Sunderbans; N.V. Subbarao, 1968 Orissa;.M.V. Rao, 1986 Godavari; N.B. Nair and Dharmaraj, 1981 Tamil Nadu; L.N. Santhakumaran, 1985 Goa; A.K. Das and M.K. Dev Roy, 1989 Andaman and Nicobar). **Recent Field Studies:** None. **Threats:** No. **Trade:** No. **Other Comments:** This marine borer causes damage to wood in the mangrove ecosystem. **Status: -IUCN: LOWER RISK - LEAST CONCERN (Nationally). DATA DEFICIENT (Globally). -Criteria based on:** —. **-CITES:** No. **-IWPA(1972;91):** No. **-RDB National (1994):** No. **-RDB International (1996):** No. **Recommendations: -Research management:** Monitoring. **-PHVA:** No. **Captive Breeding Recommendations: -Captive breeding:** Not known. **-Level of difficulty:** Not known. **Existing Captive Programs:** None. **-Names of facilities:** —. **Sourcers (Refer Appendix):** 6, 25. **Compilers:** A.K. Das, S.N. Harkantra, B.S. Ingole, T.G. Jagtap, C.T. Achuthankutty, P. Mohanraj, R.M. Sharma .

4. *Balanus amphitrite* Darwin — LRlc/N — (Barnacles) — **Family:** Balanidae. **Taxonomic status:** Species. **Habit:** Epibenthic, Fowler. **Habitat:** Littoral. **Global Distribution:** India, Indo Pacific. **Current Regional Distribution:** East and west coast, Andaman & Nicobar Islands, Lakshadweep. **-Range (sq. km):** > 20,000. **-Area Occupied (sq. km):** > 2,000. **-Number of location**: Many. **Population Trends - % change: -% Decline:** No decline. **-Time / Rate (Yrs or gens):** Not known. **-No of Mature Individuals:** Not known. **Global Population:** Not known. **Regional Population:** Not known. **Data Quality:** General field studies (Harikanth, 1975 in Goa; A.K. Das, M.K. Devroy, 1986 in Andaman & Nicobar Islands). **Recent Field Studies:** None**. Threats:** No. **Trade:** No. **Other Comments: --. Status: -IUCN: LOWER RISK - LEAST CONCERN (Nationally). DATA DEFICIENT (Globally). -Criteria based on:** —. **-CITES:** No. **-IWPA(1972;91):** No. **-RDB National (1994):** No. **-RDB International (1996):** No. **Recommendations: -Research management:** Monitoring. **-PHVA:** No. **Captive Breeding Recommendations: -Captive breeding:** No. **-Level of difficulty:** Not known. **Existing Captive Programs:** None. **-Names of facilities:** —. **Sourcers (Refer Appendix):** 6, 11. **Compilers:** A.K. Das, S.N. Harkantra, B.S. Ingole, T.G. Jagtap, C.T. Achuthankutty, P. Mohanraj, R.M. Sharma .

5. *Bankia campanellata* Moll and Roch., — LRlc/N — (Shipworm/wood borer) — **Family:** Teredenidae. **Taxonomic status:** Species. **Habit:** Marine wood borer. **Habitat:** Littoral. **Global Distribution:** India, Indo-west Pacific. **Current Regional Distribution:** East and west coasts. **-Range (sq. km):** < 20,000. **-Area Occupied (sq. km):** < 2,000. **-Number of location**: Many (Sundarbans, Mahanadi and Godavari Estuaries, Pichavaram, Talapady Estuaries, Goa). **Population Trends - % change: -% Decline:** Not known. **-Time / Rate (Yrs or gens):** Not known. **-No of Mature Individuals:** Not known. **Global Population:** Not known. **Regional Population:** Trend not known. **Data Quality:** General field studies (A.S. Rajagopal, 1964 in Sunderbans, N.V. Subba Rao, 1968 in Mahanadi; N.B. Nair and K. Dharmaraj, 1980 in Tamil Nadu; M.V.L. Rao, 1986 in Godavari and Karnataka; L.N. Santhakumaran, 1985 in Goa. **Recent Field Studies:** None**. Threats:** No. **Trade:** No. **Other Comments:** It is a common molluscan wood borer in the mangrove ecosystem of mainland India. **Status: -IUCN: LOWER RISK - LEAST CONCERN (Nationally). DATA DEFICIENT (Globally). -Criteria based on:** —. **-CITES:** No. **-IWPA(1972;91):** No. **-RDB National (1994):** No. **-RDB International (1996):** No. **Recommendations: -Research management:** Monitoring. **-PHVA:** No. **Captive Breeding Recommendations: -Captive breeding:** No. **-Level of**

difficulty: Not known. **Existing Captive Programs:** None. **-Names of facilities:** —. **Sourcers (Refer Appendix):** 6, 25. **Compilers:** A.K. Das, S.N. Harkantra, B.S. Ingole, T.G. Jagtap, C.T. Achuthankutty, P. Mohanraj, R.M. Sharma .

6. ***Bankia carinata*** **(Gray) — LRlc/N —** (Shipworm/wood borer) — **Family:** Teredenidae. **Taxonomic status:** Species. **Habit:** Marine wood borer. **Habitat:** Littoral. **Global Distribution:** India, Indo-west Pacific. **Current Regional Distribution:** East and west coasts. **-Range (sq. km):** < 20,000. **-Area Occupied (sq. km):** < 2,000. **-Number of location**: Many (Mahanadi Estuaries, Godavari Estuaries, Pichavaram and Vellar Estuaries,Thalapady Estuaries, Goa). **Population Trends - % change: -% Decline:** Not known. **-Time / Rate (Yrs or gens):** Not known. **-No of Mature Individuals:** Not known. **Global Population:** Not known. **Regional Population:** Trends not known. **Data Quality:** General field studies (N.V. Subba Rao, 1968 in Mahanadi; N.B. Nair and Dharmaraj, 1980 in Tamil Nadu; M.V.L. Rao, 1986 in Godavari and Thalapady estuaries; L.N. Santhakumaran, 1985 in Goa. **Recent Field Studies:** None**. Threats:** No. **Trade:** No. **Other Comments:** It is a common molluscan wood borer in the mangrove ecosystem of India. **Status: -IUCN: LOWER RISK - LEAST CONCERN (Nationally). DATA DEFICIENT (Globally). -Criteria based on:** —. **-CITES:** No. **-IWPA(1972;91):** No. **-RDB National (1994):** No. **-RDB International (1996):** No. **Recommendations: -Research management:** Monitoring. **-PHVA:** No. **Captive Breeding Recommendations: -Captive breeding:** Not known. **-Level of difficulty:** Not known. **Existing Captive Programs:** None. **-Names of facilities:** —. **Sourcers (Refer Appendix):** 6, 25. **Compilers:** A.K. Das, S.N. Harkantra, B.S. Ingole, T.G. Jagtap, C.T. Achuthankutty, P. Mohanraj, R.M. Sharma .

7. ***Bankia rochi*** **(Moll) — LRlc/N** — (Shipworm/wood borer) — **Family:** Teredenidae. **Taxonomic status:** Species. **Habit:** Marine wood borer. **Habitat:** Littoral. **Global Distribution:** India, Indo-west Pacific. **Current Regional Distribution:** East and west coasts, Andaman & Nicobar Islands. **-Range (sq. km):** < 20,000. **-Area Occupied (sq. km):** < 2,000. **-Number of location**: Many (Sundarbans, Mahanadi Estuaries, Godavari Estuaries, Talapady Estuaries, Goa, Mangrove near Bombay Harbor, Andaman Islands). **Population Trends - % change: -% Decline:** Not known. **-Time / Rate (Yrs or gens):** Not known. **-No of Mature Individuals:** Not known. **Global Population:** Not known. **Regional Population:** Trends not known. **Data Quality:** General field studies (A.S. Rajagopal, 1966 in Sunderbans; N.V. Subba Rao, 1968 in Mahanadi, M.V.L. Rao, 1986 in Godavari and Talapady; L.N. Santhakumaran, 1985 in Goa; L.N. Santhakumaran and S.R.N. Pillai, 1974 in Bombay; A.K. Das and M.K. Dev Roy, 1989 in Andaman Islands. **Recent Field Studies:** None**. Threats:** No. **Trade:** No. **Other Comments:** This molluscan wood borer has been reported from the majority of the mangrove areas of India including Andaman & Nicobar islands. **Status: -IUCN: LOWER RISK - LEAST CONCERN (Nationally). DATA DEFICIENT (Globally). -Criteria based on:** —. **-CITES:** No. **-IWPA(1972;91):** No. **-RDB National (1994):** No. **-RDB International (1996):** No. **Recommendations: -Research management:** Monitoring. **-PHVA:** Not known. **Captive Breeding Recommendations: -Captive breeding:** No. **-Level of difficulty:** Not known. **Existing Captive Programs:** None. **-Names of facilities:** —. **Sourcers (Refer Appendix):** 6, 25. **Compilers:** A.K. Das, S.N. Harkantra, B.S. Ingole, T.G. Jagtap, C.T. Achuthankutty, P. Mohanraj, R.M. Sharma .

8. ***Cardisoma carnifex*** **(Herbst) — CR/N (A1c)** — (Castle Building Crab) — **Family:** Gecarcinidae. **Taxonomic status:** Species. **Habit:** Burrowing. **Habitat:** Upper to supra littoral. **Global Distribution:** India, Indo-west Pacific. **Current Regional Distribution:** East coast , Andaman & Nicobar Islands. **-Range (sq. km):** < 20,000. **-Area Occupied (sq. km):** < 2,000. **-Number of location**: 3; Fragmented (Mayabunder, Carbyn's Cove and Coramandal). **Population Trends - % change: -% Decline:** > 80% (inferred). **-Time / Rate (Yrs or gens):** 10 yrs. **-No of Mature Individuals:** Not known. **Global Population:** Not known. **Regional Population:** Continuing rapid decline. **Data Quality:** General field studies (E.G. Silas and C. Sankarankutty, 1960 in Andaman; A.K. Das and M.V. Dev Roy, 1980, 1987 in Andaman) ; Records. **Recent Field Studies: . Threats:** Loss of habitat. **Trade:** No. **Other Comments:** After 1960 only two specimens -one each from Carbyn's Cove, S. Andaman and Mayabunder N. Andaman were collected with sighting of one castle build by the species in 1980. This indicates a sharp decline of occupancy and extent of occurrence. **Status: -IUCN: CRITICALLY ENDANGERED (Nationally). DATA DEFICIENT (Globally). -Criteria based on: A1c** (Population reduction due to decline in extent of occurrence, area of occupancy and/or quality of habitat). **-CITES:** No. **-IWPA(1972;91):** No. **-RDB National (1994):** No. **-RDB International (1996):** No. **Recommendations: -Research management:** Survey; Monitoring; Life-history studies. **-PHVA:** Pending. **Captive Breeding Recommendations: -Captive breeding:** No. **-Level of difficulty:** Not known. **Existing Captive Programs:** None. **-Names of facilities:** —. **Sourcers (Refer Appendix):** 6, 26. **Compilers:** A.K. Das, S.N. Harkantra, B.S. Ingole, T.G. Jagtap, C.T. Achuthankutty, P. Mohanraj, R.M. Sharma .

9. ***Crassostrea gryphoides*** **(Schlotheium) (Mollusca) — LRnt/N** — **Family:** Ostreidae. **Taxonomic status:** Species. **Habit:** Mudflat (including Eastuarine Mudflat). **Habitat:** Littoral (Intertidal). **Global Distribution:** India and unknown elsewhere. **Current Regional Distribution:** East and west coast, Andaman & Nicobar Islands. **-Range (sq. km):** < 20,000. **-Area Occupied (sq. km):** < 2,000. **-Number of location**: Many. **Population Trends - % change: -% Decline:** Not known. **-Time / Rate (Yrs or gens):** Not known. **-No of Mature Individuals:** Not known. **Global Population:** Not known. **Regional Population:** Trends Not known. **Data Quality:** General field studies (A.H. Parulekar, 1986 in Goa; A. Ranade in Ratnagiri, A. Chatterjee, 1986 in Goa).**Recent Field Studies:** A. Kanti, 1991-96 . **Threats:** Harvest for food; Trade. **Trade:** Local. **Other Comments:** Techniques for commercial cultivation is available in India as in widely practiced. **Status: -IUCN: LOWER RISK - NEAR THREATENED (Nationally). DATA DEFICIENT (Globally). -Criteria based on:** —. **-CITES:** No. **-IWPA(1972;91):** No. **-RDB National (1994):** No. **-RDB International (1996):** No. **Recommendations: -Research management:** Genetic management; Husbandry research. **-PHVA:** No. **Captive Breeding Recommendations: -Captive breeding:** Level 4. **-Level of difficulty:** Level 1. **Existing Captive Programs:** None. **-Names of facilities:** —. **Sourcers (Refer Appendix):** 15. **Compilers:** A.K. Das, S.N. Harkantra, B.S. Ingole, T.G. Jagtap, C.T. Achuthankutty, P. Mohanraj, R.M. Sharma .

10. ***Dicyathifer manni*** **(Wright) — LRlc/N —** (Wood borer) — **Family:** Teredinidae. **Taxonomic status:** Species. **Habit:** Marine wood borer. **Habitat:** Littoral. **Global Distribution:** India, Indo-west Pacific. **Current Regional Distribution:** East and west coast, Andaman & Nicobar Islands. **-Range (sq. km):** < 20,000. **-Area Occupied (sq. km):** < 2,000. **-Number of location**: Many (Sunderbans, Mahanadi Estuaries, Godavary Estuaries, Thalapady Estuaries, Goa, Mangroves near

Bombay, Harbari, Andaman & Nicobar Islands). **Population Trends - % change: -% Decline:** Not known . **-Time / Rate (Yrs or gens):** Not known. **-No of Mature Individuals:** Not known. **Global Population:** Not known. **Regional Population:** Trends not known. **Data Quality:** General field studies (A.S. Rajagopal, 1964 in Sunderbans; N.V. Subba Rao, 1968 in Mahanadi estuaries; M.V.L. Rao, 1986 in Godavari; M.V.L. Rao, 1986 in Karnataka; L.N. Santhakumaran, 1986 in Goa; L.N. Santhkumaran and S.R.M. Pillai, 1974 in Bombay; A.K. Das and M.K. Dev Roy, 1989 in Andaman & Nicobar Islands). **Recent Field Studies:** None **. Threats:** No. **Trade:** No. **Other Comments:** It is a major marine wood borer which causes severe damage to wood in the mangrove ecosystem. **Status: -IUCN: LOWER RISK - LEAST CONCERN (Nationally). DATA DEFICIENT (Globally). -Criteria based on:** —. **-CITES:** No. **-IWPA(1972;91):** No. **-RDB National (1994):** No. **-RDB International (1996):** No. **Recommendations: -Research management:** Monitoring. **-PHVA:** No. **Captive Breeding Recommendations: -Captive breeding:** Not known. **-Level of difficulty:** Not known. **Existing Captive Programs:** None. **-Names of facilities:** —. **Sourcers (Refer Appendix):** 6, 25. **Compilers:** A.K. Das, S.N. Harkantra, B.S. Ingole, T.G. Jagtap, C.T. Achuthankutty, P. Mohanraj, R.M. Sharma .

11. *Dotilla myctiroides* (H. Milne Edward, 1852) Stimpson, 1858 (Crab) — LRnt/N — *Doto myctiroides* H. Milne Edwards, 1852

— (Solider Crab) — **Family:** Ocypodidae. **Taxonomic status:** Species. **Habit:** Burrowing, diurnal. **Habitat:** Upper littoral region. **Global Distribution:** India, Indo-west Pacific. **Current Regional Distribution:** East and west coast, Andaman & Nicobar Islands. **-Range (sq. km):** < 20,000. **-Area Occupied (sq. km):** < 2,000. **-Number of location**: Many (Sunderbans, Chilka, Egmore, Palk Bay; Gulf of Mannar, West coast in Bombay, Goa, Karnataka, Kerala, S. Andaman and North Andaman). **Population Trends - % change: -% Decline:** Not known. **-Time / Rate (Yrs or gens):** Not known. **-No of Mature Individuals:** Not known. **Global Population:** Not known. **Regional Population:** Not known. **Data Quality:** General field studies (S.N. Harkantra, 1982-83 in Goa; A.K. Das and M.K. Dev Roy, 1982-87 in Andaman). **Recent Field Studies:** B.S. Ingole, 1992 in Goa. **Threats:** Human interference; Pollution. **Trade:** No. **Other Comments:** The population more or less stable in undisturbed habitat. **Status: -IUCN: LOWER RISK - NEAR THREATENED (Nationally). DATA DEFICIENT (Globally). -Criteria based on:** —. **-CITES:** No. **-IWPA(1972;91):** No. **-RDB National (1994):** No. **-RDB International (1996):** No. **Recommendations: -Research management:** Survey; Monitoring. **-PHVA:** No. **Captive Breeding Recommendations: -Captive breeding:** No. **-Level of difficulty:** Not known. **Existing Captive Programs:** None. **-Names of facilities:** —. **Sourcers (Refer Appendix):** 6, 10, 12, 13. **Compilers:** A.K. Das, S.N. Harkantra, B.S. Ingole, T.G. Jagtap, C.T. Achuthankutty, P. Mohanraj, R.M. Sharma .

12. *Geloina erosa* (Solander, 1786) — EN/N (B1, 2c)

— (Mangrove clam) — **Family:** Geloindae. **Taxonomic status:** Species. **Habit:** Burrowing. **Habitat:** Mangrove swamp. **Global Distribution:** India, Indo-west Pacific region. **Current Regional Distribution:** East and west coasts. **-Range (sq. km):** < 20,000. **-Area Occupied (sq. km):** < 500. **-Number of location**: 4; Fragmented (Chilka, Chorao, Therecol in Goa, Ratnagir, Malay,Archipelago). **Population Trends - % change: -% Decline:** Not known. **-Time / Rate (Yrs or gens):** Not known. **-No of Mature Individuals:** Not known. **Global Population:** Not known. **Regional Population:** May be affected by threats. **Data Quality:** General field studies.**Recent Field Studies:** B.S. Ingole *et al*., 1994 in Goa. **Threats:** Harvest for food; Loss of habitat; Trade. **Trade:** Local. **Other Comments:** The species has a potential for human consumption. Therefore more effort should be made for commercial cultivation. **Status: -IUCN: ENDANGERED (Nationally). DATA DEFICIENT (Globally). -Criteria based on: B1, 2c** (Restricted distribution, limited locations, severely fragmented, continuing decline observed in extent of occurrence, area of occupancy and/or quality of habitat). **-CITES:** No. **-IWPA(1972;91):** No. **-RDB National (1994):** No. **-RDB International (1996):** No. **Recommendations: -Research management:** Survey; Monitoring; Husbandry research. **-PHVA:** No. **Captive Breeding Recommendations: -Captive breeding:** Level 4. **-Level of difficulty:** Very difficult. **Existing Captive Programs:** None. **-Names of facilities:** —. **Sourcers (Refer Appendix):** 14. **Compilers:** A.K. Das, S.N. Harkantra, B.S. Ingole, T.G. Jagtap, C.T. Achuthankutty, P. Mohanraj, R.M. Sharma .

13. *Gonodontis clelia* (Moth) — LRlc/N

— **Family:** Geometridae (Lepidoptera). **Taxonomic status:** Species. **Habit:** Nocturnal, Immature stages confined largely (if not exclusively) to mangroves. **Habitat:** Mangrove folliage. **Global Distribution:** India; Southeast Asia. **Current Regional Distribution:** Andaman & Nicobar Islands. **-Range (sq. km):** < 20,000. **-Area Occupied (sq. km):** < 2,000. **-Number of location**: Many (Andaman). **Population Trends - % change: -% Decline:** Not known. **-Time / Rate (Yrs or gens):** Not known. **-No of Mature Individuals:** Not known. **Global Population:** Not known. **Regional Population:** Population Trends - % change not known. **Data Quality:** General field study (K. Veenakumari and M. Prashanth, 1992-96 in Andaman Islands. **Recent Field Studies:** None . **Threats:** No. **Trade:** No. **Other Comments:** The larval host plants are Ceriops, Excoecaria, Rhizophora. **Status: -IUCN: LOWER RISK - LEAST CONCERN (Nationally). DATA DEFICIENT (Globally). -Criteria based on:** —. **-CITES:** No. **-IWPA(1972;91):** No. **-RDB National (1994):** No. **-RDB International (1996):** No. **Recommendations: -Research management:** Survey; Monitoring; Life-history studies. **-PHVA:** No. **Captive Breeding Recommendations: -Captive breeding:** Not known. **-Level of difficulty:** Not known. **Existing Captive Programs:** None. **-Names of facilities:** —. **Sourcers (Refer Appendix):** 31. **Compilers:** A.K. Das, S.N. Harkantra, B.S. Ingole, T.G. Jagtap, C.T. Achuthankutty, P. Mohanraj, R.M. Sharma .

14. *Lyrodus pedicellatus* (Quatrefages) — LRlc/N

— (Shipworm/wood borer) — **Family:** Teredenidae. **Taxonomic status:** Species. **Habit:** Marine wood borer. **Habitat:** Littoral. **Global Distribution:** India, Indo-west Pacific. **Current Regional Distribution:** East and west coasts, Andaman & Nicobar Islands. **-Range (sq. km):** < 20,000. **-Area Occupied (sq. km):** < 2,000. **-Number of location**: Many (Mahanadi Estuaries, Godavari Estuaries, Pichavaram Estuaries, Talapady .Estuaries, Goa, Andaman & Nicobar Islands). **Population Trends - % change: -% Decline:** Not known. **-Time / Rate (Yrs or gens):** Not known. **-No of Mature Individuals:** Not known. **Global Population:** Not known. **Regional Population:** Trends not known. **Data Quality:** General field studies (N.V. Subba Rao, 1968 in Mahanadi; M.V.L. Rao, 1986 in Godavari and Talapady; N.B. Nair and Dharmaraj, 1980 in Tamil Nadu; L.N. Santhakumaran, 1985 in Goa; A.K. Das and M.K. Dev Roy, 1989 in Andaman and Nicobar Islands. **Recent Field Studies:** None**. Threats:** No. **Trade:** No. **Other Comments:** This Molluscan wood borer has been reported from the majority of the mangrove areas of India including Andaman & Nicobar Islands. **Status: -IUCN: LOWER RISK - LEAST CONCERN (Nationally). DATA DEFICIENT (Globally). -Criteria based on:** —. **-CITES:** No. **-IWPA(1972;91):** No. **-RDB National (1994):** No. **-RDB International (1996):** No. **Recommendations: -**

Research management: Monitoring. **-PHVA:** No. **Captive Breeding Recommendations: -Captive breeding:** No. **-Level of difficulty:** Not known. **Existing Captive Programs:** None. **-Names of facilities:** —. **Sourcers (Refer Appendix):** 6, 25. **Compilers:** A.K. Das, S.N. Harkantra, B.S. Ingole, T.G. Jagtap, C.T. Achuthankutty, P. Mohanraj, R.M. Sharma .

15. Macrophthalmus convexus Stimpson 1858 — EN/N (B1, 2c) — (Crab) — **Family:** Ocypodidae. **Taxonomic status:** Species. **Habit:** Burrowing. **Habitat:** Littoral. **Global Distribution:** India, Indo-west Pacific. **Current Regional Distribution:** East and west coast, Andaman & Nicobar Islands. **-Range (sq. km):** < 5,000. **-Area Occupied (sq. km):** < 500. **-Number of location**: 2; Fragmented (S. Andaman in North Bay and Chidyatapu, Tamil Nadu in Palk Bay and Gulf of Mannar). **Population Trends - % change: -% Decline:** Not known. **-Time / Rate (Yrs or gens):** Not known. **-No of Mature Individuals:** Not known. **Global Population:** Not known. **Regional Population:** May be affected by threats. **Data Quality:** General field studies (A.K. Das and M.K. Dev Roy, 1980-81 in Andaman); Records. **Recent Field Studies:** None**. Threats:** Loss of habitat. **Trade:** No. **Other Comments:** This species is widely distributed in Indo-west Pacific but within the Indian limits it is reported so far from Tamil Nadu and S. Andaman Islands. **Status: -IUCN: ENDANGERED (Nationally). DATA DEFICIENT (Globally). -Criteria based on: B1, 2c** (Restricted distribution, limited location, severely fragmented, continuing decline in extent of occurrence, area of occupancy and/or quality of habitat). **-CITES:** No. **-IWPA(1972;91):** No. **-RDB National (1994):** No. **-RDB International (1996):** No. **Recommendations: -Research management:** Survey; Monitoring. **-PHVA:** No. **Captive Breeding Recommendations: -Captive breeding:** No. **-Level of difficulty:** Not known. **Existing Captive Programs:** None. **-Names of facilities:** —. **Sourcers (Refer Appendix):** 6. **Compilers:** A.K. Das, S.N. Harkantra, B.S. Ingole, T.G. Jagtap, C.T. Achuthankutty, P. Mohanraj, R.M. Sharma .

16. *Macrophthalmus depressus* Ruppell, 1830 — LRnt/N — (Crab) — **Family:** Ocypodidae. **Taxonomic status:** Species. **Habit:** Burrowing. **Habitat:** Littoral. **Global Distribution:** India, Indo-west Pacific. **Current Regional Distribution:** East and west coast, Andaman & Nicobar Islands. **-Range (sq. km):** < 20,000. **-Area Occupied (sq. km):** < 2,000. **-Number of location**: Many (Palk Bay; Gulf of Mannar; Pondicherry; Maharashtra; Goa and Karnataka; Middle and South Andaman). **Population Trends - % change: -% Decline:** Not known. **-Time / Rate (Yrs or gens):** Not known. **-No of Mature Individuals:** Not known. **Global Population:** Not known. **Regional Population:** Trends Not known. **Data Quality:** General field studies (A.K. Das and M.K. Dev Roy, 1980-87 in Andaman); Records.**Recent Field Studies:** None**. Threats:** Loss of habitat. **Trade:** No. **Other Comments:** Loss of habitat due to destruction of mangrove. **Status: -IUCN: LOWER RISK - NEAR THREATENED (Nationally). DATA DEFICIENT (Globally). -Criteria based on:** —. **-CITES:** No. **-IWPA(1972;91):** No. **-RDB National (1994):** No. **-RDB International (1996):** No. **Recommendations: -Research management:** Survey; Monitoring. **-PHVA:** No. **Captive Breeding Recommendations: -Captive breeding:** No. **-Level of difficulty:** Not known. **Existing Captive Programs:** None. **-Names of facilities:** —. **Sourcers (Refer Appendix):** 6. **Compilers:** A.K. Das, S.N. Harkantra, B.S. Ingole, T.G. Jagtap, C.T. Achuthankutty, P. Mohanraj, R.M. Sharma .

17. *Martesia striata* (Linnaeus) — LRlc/N — (Piddocks/wood borer) — **Family:** Pholadidae. **Taxonomic status:** Species. **Habit:** Marine wood borer. **Habitat:** Littoral. **Global Distribution:** India, Indo-west Pacific. **Current Regional Distribution:** East and west coasts, Andaman & Nicobar Islands. **-Range (sq. km):** < 20,000. **-Area Occupied (sq. km):** < 2,000. **-Number of location**: Many (Mahanadi Estuaries, Gaodavari Estuaries, Pichavaram Estuaries; Talapady Estuaries, Goa, Andaman & Nicobar Islands). **Population Trends - % change: -% Decline:** Not known. **-Time / Rate (Yrs or gens):** Not known. **-No of Mature Individuals:** Not known. **Global Population:** Not known. **Regional Population:** Not known. **Data Quality:** General field studies (N.V. Subba Rao, 1968 in Mahanadi; M.V.L. Rao, 1986 in Godavari and Talapady; N.B. Nair and Dharmaraj, 1980 in Tamil Nadu; L.N. Santhakumaran, 1985 in Goa; A.K. Das and M.K. Dev Roy, 1989 in Andaman and Nicobar Islands. **Recent Field Studies:** None**. Threats:** No. **Trade:** No. **Other Comments:** This species has been reported from a majority of the mangrove areas of India including Andaman & Nicobar Islands. **Status: -IUCN: LOWER RISK - LEAST CONCERN (Nationally). DATA DEFICIENT (Globally). -Criteria based on:** —. **-CITES:** No. **-IWPA(1972;91):** No. **-RDB National (1994):** No. **-RDB International (1996):** No. **Recommendations: -Research management:** Monitoring. **-PHVA:** No. **Captive Breeding Recommendations: -Captive breeding:** No. **-Level of difficulty:** Not known. **Existing Captive Programs:** None. **-Names of facilities:** —. **Sourcers (Refer Appendix):** 6, 25. **Compilers:** A.K. Das, S.N. Harkantra, B.S. Ingole, T.G. Jagtap, C.T. Achuthankutty, P. Mohanraj, R.M. Sharma .

18. *Meretrix casta* (Chemnitz) — VU (A1c, 1d) — (Clam) — **Family:** Veneridae. **Taxonomic status:** Species. **Habit:** Benthic. **Habitat:** Sub-tidal. **Global Distribution:** ENDEMIC to India. **Current Regional Distribution:** East and west coasts. **-Range (sq. km):** < 5,000. **-Area Occupied (sq. km):** < 2,000. **-Number of location**: Many (Goa, Karnataka, Tamil Nadu, Kerala, South of Mahrashtra). **Population Trends - % change: -% Decline:** 20 -25 %. **-Time / Rate (Yrs or gens):** 10 yrs. **-No of Mature Individuals:** Not known. **Global Population:** Not known. **Regional Population:** Continuing decline inferred from collections. **Data Quality:** Reliable census or population monitoring (S.N. Harkantra, 1974 in Karwar); General field studies; Informal field sightings.**Recent Field Studies:** None**. Threats:** Loss of habitat; Overexploitation; Trade. **Trade:** Local; Domestic; Commercial. **Other Comments:** It is a commercially important species. This is commercially exploited for food, shell. Loss of habitat is mainly due to removal of a huge quantity of shell for the lime industry. There is a predictable decline in the past 10 years of about 20%. Efforts should be made to develop cultivation techniques as it is extremely difficult to cultivate. **Status: -IUCN: VULNERABLE . -Criteria based on: A1c, 1d** (Population reduction due to decline in extent of occurrence, area of occupancy, quality of habitat and number of mature individuals). **-CITES:** No. **-IWPA(1972;91):** No. **-RDB National (1994):** No. **-RDB International (1996):** No. **Recommendations: -Research management:** Husbandry research; Habitat management. **-PHVA:** No. **Captive Breeding Recommendations: -Captive breeding:** Level 4. **-Level of difficulty:** Very difficult. **Existing Captive Programs:** None. **-Names of facilities:** —. **Sourcers (Refer Appendix):** 9. **Compilers:** A.K. Das, S.N. Harkantra, B.S. Ingole, T.G. Jagtap, C.T. Achuthankutty, P. Mohanraj, R.M. Sharma .

19. Metapenaeus dobsoni (Miers, 1878) — LRnt/N — (Poovalan Chemmeen) — **Family:** Palaemonidae. **Taxonomic status:** Species. **Habit:** Not known. **Habitat:** Not known. **Global Distribution:** Indo-west Pacific. **Current Regional Distribution:** East and West coast, Andaman & Nicobar Islands. **-Range (sq. km):** > 20,000. **-Area Occupied (sq.**

km): > 2,000. **-Number of location**: Many. **Population Trends - % change: -% Decline:** No change. **-Time / Rate (Yrs or gens):** Not known. **-No of Mature Individuals:** Not known. **Global Population:** Not known. **Regional Population:** No change in trends. **Data Quality:** Reliable census or population monitoring (CMFRI, 1975); General field studies (C.T. Achuthankutty, 1980 in Goa).**Recent Field Studies:** A.H. Parulekar; B.S. Ingole. **Threats:** Overexploitation; Trade. **Trade:** Local; International. **Other Comments:** This species is very abundant along the West coast and forms major prawn fishing. This is a traditional Estuarine fishary. Traditional cultivation is in practice. **Status: -IUCN: LOWER RISK - NEAR THREATENED (Nationally). DATA DEFICIENT (Globally). -Criteria based on:** —. **-CITES:** No. **-IWPA(1972;91):** No. **-RDB National (1994):** No. **-RDB International (1996):** No. **Recommendations: -Research management:** Husbandry research. **-PHVA:** No. **Captive Breeding Recommendations: -Captive breeding:** No. **-Level of difficulty:** Not known. **Existing Captive Programs:** None. **-Names of facilities:** —. **Sourcers (Refer Appendix):** 3, 5. **Compilers:** A.K. Das, S.N. Harkantra, B.S. Ingole, T.G. Jagtap, C.T. Achuthankutty, P. Mohanraj, R.M. Sharma .

20. *Modiolus striatulus* (Hanley) — LRnt/N — (Wearing mussel/Brown mussel) — **Family:** Mytilidae. **Taxonomic status:** Species. **Habit:** Epibenthic. **Habitat:** Upper littoral. **Global Distribution:** India, Indo-west Pacific. **Current Regional Distribution:** East and west coast, Andaman & Nicobar Islands. **-Range (sq. km):** < 20,000. **-Area Occupied (sq. km):** < 2,000. **-Number of location**: Many. **Population Trends - % change: -% Decline:** Not known. **-Time / Rate (Yrs or gens):** Not known. **-No of Mature Individuals:** Not known. **Global Population:** Not knwon. **Regional Population:** Not known. **Data Quality:** General field studies (A.K. Das and M.K. Dev Roy, 1980-87 in Andaman; A.H. Parulekar et al., in Goa); Records.**Recent Field Studies:** None**. Threats:** Human interference; Loss of habitat. **Trade:** No. **Other Comments: --. Status: -IUCN: LOWER RISK - NEAR THREATENED (Nationally). DATA DEFICIENT (Globally). -Criteria based on:** —. **-CITES:** No. **-IWPA(1972;91):** No. **-RDB National (1994):** No. **-RDB International (1996):** No. **Recommendations: -Research management:** Monitoring. **-PHVA:** No. **Captive Breeding Recommendations: -Captive breeding:** No. **-Level of difficulty:** Not known. **Existing Captive Programs:** None. **-Names of facilities:** —. **Sourcers (Refer Appendix):** 6, 16, 20. **Compilers:** A.K. Das, S.N. Harkantra, B.S. Ingole, T.G. Jagtap, C.T. Achuthankutty, P. Mohanraj, R.M. Sharma .

21. *Nausitora dunlopei* Wright — LRlc/N — (Wood borer) — **Family:** Teredinidae. **Taxonomic status:** Species. **Habit:** Marine wood borer. **Habitat:** Littoral. **Global Distribution:** India, Indo-west Pacific. **Current Regional Distribution:** East and west coast and Andaman & Nicobar Islands. **-Range (sq. km):** < 20,000. **-Area Occupied (sq. km):** < 2,000. **-Number of location**: Many (Sunderbans, Mahanadi Estuaries, Godavary Estuaries, Goa, Andaman & Nicobar Islands). **Population Trends - % change: -% Decline:** Not known . **-Time / Rate (Yrs or gens):** Not known. **-No of Mature Individuals:** Not known. **Global Population:** Not known. **Regional Population:** Trends not known. **Data Quality:** General field studies (A.S. Rajagopal, 1964 Sunderbans; N.V. Subba Rao, 1968Mahanadi; M.V.L. Rao, 1986 Godavari Estuaries; L.N. Santhakumaran, 1985 Goa.A.K. Das and M.K. Dev Roy, 1989 Andaman & Nicobar Islands). **Recent Field Studies:** None. **Threats:** No. **Trade:**. **Other Comments:** This is a common wood borer in the Mangrove areas of low salinity. **Status: -IUCN: LOWER RISK - LEAST CONCERN (Nationally). DATA DEFICIENT (Globally). -Criteria based on:** —. **-CITES:** No. **-IWPA(1972;91):** No. **-RDB National (1994):** No. **-RDB International (1996):** No. **Recommendations: -Research management:** Monitoring. **-PHVA:** No. **Captive Breeding Recommendations: -Captive breeding:** Not known. **-Level of difficulty:** Not known. **Existing Captive Programs:** None. **-Names of facilities:** —. **Sourcers (Refer Appendix):** 6, 26. **Compilers:** A.K. Das, S.N. Harkantra, B.S. Ingole, T.G. Jagtap, C.T. Achuthankutty, P. Mohanraj, R.M. Sharma .

22. *Nausitora hedleyi* Schepman — LRlc/N — (Wood borer shipworm) — **Family:** Teredenidae. **Taxonomic status:** Species. **Habit:** Marine wood borer. **Habitat:** Littoral. **Global Distribution:** India, Indo-west Pacific. **Current Regional Distribution:** East and west coast, Andaman & Nicobar Islands. **-Range (sq. km):** < 20,000. **-Area Occupied (sq. km):** < 2,000. **-Number of location**: Many (Mahanadi Estuaries, Pichavaram, Vellar Estuaries, Goa,Talapady Estuaries, Andaman & Nicobar Islands). **Population Trends - % change: -% Decline:** Not known. **-Time / Rate (Yrs or gens):** Not known. **-No of Mature Individuals:** Not known. **Global Population:** Not known. **Regional Population:** Trends not known. **Data Quality:** General field studies (N.V. Subba Rao, 1968 in Orissa; N.B. Nair and Dharmaraj, 1980 in Tamil Nadu; M.V.L. Rao, 1986 in Karnataka; L.N. Santhakumaran, 1985 in Goa; A.K. Das and M.K. Dev Roy, 1989 in Andaman & Nicobar Islands. **Recent Field Studies:** None**. Threats:** No. **Trade:** No. **Other Comments:** Common wood borer in the mangrove ecosystem of high salinity. **Status: -IUCN: LOWER RISK - LEAST CONCERN (Nationally). DATA DEFICIENT (Globally). -Criteria based on:** —. **-CITES:** No. **-IWPA(1972;91):** No. **-RDB National (1994):** No. **-RDB International (1996):** No. **Recommendations: -Research management:** Monitoring. **-PHVA:** No. **Captive Breeding Recommendations: -Captive breeding:** No. **-Level of difficulty:** Not known. **Existing Captive Programs:** None. **-Names of facilities:** —. **Sourcers (Refer Appendix):** 6, 25. **Compilers:** A.K. Das, S.N. Harkantra, B.S. Ingole, T.G. Jagtap, C.T. Achuthankutty, P. Mohanraj, R.M. Sharma .

23. *Ocypode ceratophthalma* (Pallas, 1772) Fabricius 1798 — LRnt/N — (Ghost Crab) **— *Cancer ceratophthalmus*** — **Family:** Ocypoidae. **Taxonomic status:** Species. **Habit:** Burrowing, nocturnal. **Habitat:** Sandy/Muddy - upper littoral area. **Global Distribution:** India, Indo-west Pacific. **Current Regional Distribution:** East and West coast, Andaman & Nicobar Islands, Lakshadweep. **-Range (sq. km):** < 20,000. **-Area Occupied (sq. km):** < 2,000. **-Number of location**: Many. **Population Trends - % change: -% Decline:** Not known. **-Time / Rate (Yrs or gens):** Not known. **-No of Mature Individuals:** Not known. **Global Population:** Not known. **Regional Population:** Not known. **Data Quality:** General field studies.**Recent Field Studies: . Threats:** Human interference; Pollution. **Trade:** No. **Other Comments: --. Status: -IUCN: LOWER RISK - NEAR THREATENED (Nationally). DATA DEFICIENT (Globally). -Criteria based on:** —. **-CITES:** No. **-IWPA(1972;91):** No. **-RDB National (1994):** No. **-RDB International (1996):** No. **Recommendations: -Research management:** Survey; Monitoring. **-PHVA:** No. **Captive Breeding Recommendations: -Captive breeding:** No. **-Level of difficulty:** Not known. **Existing Captive Programs:** None. **-Names of facilities:** —. **Sourcers (Refer Appendix):** 6. **Compilers:** A.K. Das, S.N. Harkantra, B.S. Ingole, T.G. Jagtap, C.T. Achuthankutty, P. Mohanraj, R.M. Sharma .

24. *Penaeus caniliculatus* (Oliver, 1811) — VU/N (B1, 2c) — (Witch Prawn) — **Family:** Palaemonidae. **Taxonomic status:** Species. **Habit:** Young -Estuary; Adult -Marine, Epibenthic. **Habitat:** Marine. **Global Distribution:** India,

Indo-west Pacific. **Current Regional Distribution:** East and west coast . **-Range (sq. km):** < 20,000. **-Area Occupied (sq. km):** < 2,000. **-Number of location**: 4 (Chennai, Tamil Nadu, Bombay, Gulf of Kutch, Kerala, Goa, Karwar; Cochin). **Population Trends - % change: -% Decline:** Not known. **-Time / Rate (Yrs or gens):** Not known. **-No of Mature Individuals:** Not known. **Global Population:** Not known. **Regional Population:** Trends not known. **Data Quality:** General field studies (C. Suseelan *et al*., 1982 Kerala).**Recent Field Studies:** C.T. Achuthankutty and S. Nair, 1993 in Goa. **Threats:** Climate. **Trade:** No. **Other Comments:** This is a minor prawn fishery. This species is in the deeper area and monsoon dependent. It is recommended that more efforts should be made to collect data on fishery management. **Status: -IUCN: VULNERABLE (Nationally). DATA DEFICIENT (Globally). -Criteria based on: B1, 2c** (Restricted distribution, limited location, severely fragmented, continuing decline in extent of occurrence, area of occupancy and/or quality of habitat). **-CITES:** No. **-IWPA(1972;91):** No. **-RDB National (1994):** No. **-RDB International (1996):** No. **Recommendations: -Research management:** Survey; Monitoring; Husbandry research. **-PHVA:** No. Captive Breeding Recommendation. -Captive breeding: Level 4. **-Level of difficulty:** Least difficult. **Existing Captive Programs:** None. **-Names of facilities:** —. **Sourcers (Refer Appendix):** 2, 27. **Compilers:** A.K. Das, S.N. Harkantra, B.S. Ingole, T.G. Jagtap, C.T. Achuthankutty, P. Mohanraj, R.M. Sharma .

25. *Penaeus indicus* (H. Milne - Edwards, 1837) — LRnt/N — (White Prawn) — **Family:** Palaemonidae. **Taxonomic status:** Species. **Habit:** Not known. **Habitat:** Bottom mud/sand. **Global Distribution:** India, Indo-west Pacific. **Current Regional Distribution:** Andaman & Nicobar Islands. **-Range (sq. km):** > 20,000. **-Area Occupied (sq. km):** > 2,000. **-Number of location**: Many. **Population Trends - % change: -% Decline:** Not known. **-Time / Rate (Yrs or gens):** Not known. **-No of Mature Individuals:** Not known. **Global Population:** Not known. **Regional Population:** Trends not known. **Data Quality:** General field studies (Jones, 1967)**.Recent Field Studies:** None. **Threats:** Overexploitation; Trade. **Trade:** Local; International. **Other Comments:** This is a cultivable species. Juvenile fishery taking place in the Estuary traditionally. **Status: -IUCN: LOWER RISK - NEAR THREATENED (Nationally). DATA DEFICIENT (Globally). -Criteria based on:** —. **-CITES:** No. **-IWPA(1972;91):** No. **-RDB National (1994):** No. **-RDB International (1996):** No. **Recommendations: -Research management:** Husbandry research; Genetic management. **-PHVA:** No. **Captive Breeding Recommendations: -Captive breeding:** No. **-Level of difficulty:** Not known. **Existing Captive Programs:** None. **-Names of facilities:** --. **Sourcers (Refer Appendix):** --. **Compilers:** A.K. Das, S.N. Harkantra, B.S. Ingole, T.G. Jagtap, C.T. Achuthankutty, P. Mohanraj, R.M. Sharma .

26. *Penaeus japonicus Bate*, 1888. — VU/N (B1, 2c) — (Kuruma Prawn) — **Family:** Palaemonidae. **Taxonomic status:** Species. **Habit:** Juvenile -Estuary; Adult -Marine. **Habitat:** Epibenthic. **Global Distribution:** India, Indo-west Pacific. **Current Regional Distribution:** East and west coasts. **-Range (sq. km):** < 20,000. **-Area Occupied (sq. km):** < 2,000. **-Number of location**: 3 (Bombay, Tamil Nadu, Goa, Karwar); Fragmented. **Population Trends - % change: -% Decline:** Not known. **-Time / Rate (Yrs or gens):** Not known. **-No of Mature Individuals:** Not known. **Global Population:** Not known. **Regional Population:** Trends Not known. **Data Quality:** General field studies (Aravindapshan and J.D. Karvari, 1983 in Bombay).**Recent Field Studies:** C.T. Achuthankutty and Nair, 1991-92 in Goa. **Threats:** Climate. **Trade:** No. **Other Comments:** This is a minor prawn fishery. This species may be in the deeper area. It is monsoon dependent. It is recommended that more efforts should be made to collect data on fishery management. **Status: -IUCN: VULNERABLE (Nationally). DATA DEFICIENT (Globally). -Criteria based on: B1, 2c** (Restricted distribution, limited location, severely fragmented, continuing decline observed in extent of occurrence, area of occupancy and/or quality of habitat). **-CITES:** No. **-IWPA(1972;91):** No. **-RDB National (1994):** No. **-RDB International (1996):** No. **Recommendations: -Research management:** Survey; Life-history studies; Husbandry research. **-PHVA:** No. **Captive Breeding Recommendations: -Captive breeding:** Level 4. **-Level of difficulty:** Moderate difficult. **Existing Captive Programs:** None. **-Names of facilities:** —. **Sourcers (Refer Appendix):** --. **Compilers:** A.K. Das, S.N. Harkantra, B.S. Ingole, T.G. Jagtap, C.T. Achuthankutty, P. Mohanraj, R.M. Sharma .

27. *Penaeus merguiensis* de Man 1888 — LRnt/N — (Banana Prawn) — **Family:** Palaemonidae. **Taxonomic status:** Species. **Habit:** Not known. **Habitat:** 10-45 m. depth. **Global Distribution:** India, Indo-west Pacific. **Current Regional Distribution:** West coast, Andaman & Nicobar Islands. **-Range (sq. km):** < 5,000. **-Area Occupied (sq. km):** > 2,000. **-Number of location**: Many (Gujarat to Karwar). **Population Trends - % change: -% Decline:** No change. **-Time / Rate (Yrs or gens):** Not known. **-No of Mature Individuals:** Not known. **Global Population:** Not known. **Regional Population:** No change in populations. **Data Quality:** General field studies (C.T. Achuthankutty, 1983)**. Recent Field Studies:** None**. Threats:** Overexploitation; Trade. **Trade:** Local; International. **Other Comments:** The efforts are being made for aquaculture. Traditional estuarine fishery is in practiced along Central West Coast. **Status: -IUCN: LOWER RISK - NEAR THREATENED (Nationally). DATA DEFICIENT (Globally). -Criteria based on:** —. **-CITES:** No. **-IWPA(1972;91):** No. **-RDB National (1994):** No. **-RDB International (1996):** No. **Recommendations: -Research management:** Survey; Monitoring; Husbandry research. **-PHVA:** No. **Captive Breeding Recommendations: -Captive breeding:** No. **-Level of difficulty:** Not known. **Existing Captive Programs:** None. **-Names of facilities:** —. **Sourcers (Refer Appendix):** 1. **Compilers:** A.K. Das, S.N. Harkantra, B.S. Ingole, T.G. Jagtap, C.T. Achuthankutty, P. Mohanraj, R.M. Sharma .

28. *Penaeus monodom* Fabricius 1798 — LRnt/N — (Tiger Prawn) — **Family:** Palaemonidae. **Taxonomic status:** Species. **Habit:** Young ones -Estuaries; Adult -Marine. **Habitat:** Epibenthic. **Global Distribution:** India, Indo-west Pacific. **Current Regional Distribution:** Indian Ocean (East and west coast, Andaman & Nicobar Islands). **-Range (sq. km):** > 20,000. **-Area Occupied (sq. km):** > 2,000. **-Number of location**: Many. **Population Trends - % change: -% Decline:** No change. **-Time / Rate (Yrs or gens):** Not known. **-No of Mature Individuals:** Not known. **Global Population:** Not known. **Regional Population:** No change in population. **Data Quality:** General field studies; Records (K.H. Mohamad, 1967 Bombay)**.Recent Field Studies:** K.H. Mohamad, 1991. **Threats:** Disease; Overexploitation; Trade. **Trade:** Local; International. **Other Comments:** Extensive aquaculture practices are being conducted in India. Over exploitation is in the coastal region is there. In the aquaculture area there are disease problem in certain localized area. Juvenile fishery has been taking place in the estuary traditionally. **Status: -IUCN: LOWER RISK - NEAR THREATENED (Nationally). DATA DEFICIENT (Globally). -**

Criteria based on: —. **-CITES:** No. **-IWPA(1972;91):** No. **-RDB National (1994):** No. **-RDB International (1996):** No. **Recommendations: -Research management:** Husbandry research; Genetic management. **-PHVA:** No. **Captive Breeding Recommendations: -Captive breeding:** Level 4. **-Level of difficulty:** Least difficult. **Existing Captive Programs:** . **-Names of facilities:** Techniques of commercial cultivation are available with different Private agencies MPEDA, NIO, CMFRI, Private fisheries cooperative. **Sourcers (Refer Appendix):** 17. **Compilers:** A.K. Das, S.N. Harkantra, B.S. Ingole, T.G. Jagtap, C.T. Achuthankutty, P. Mohanraj, R.M. Sharma .

29. *Penaeus semisulcatus* de Mann, 1844. — LRnt/N — (Green Tiger Prawn) — **Family:** Palaemonidae. **Taxonomic status:** Species. **Habit:** Juvenile -Estuary; Adult -Marine. **Habitat:** Epibenthic. **Global Distribution:** Indo-west Pacific, India. **Current Regional Distribution:** All along the coastal area of India. **-Range (sq. km):** < 20,000. **-Area Occupied (sq. km):** < 2,000. **-Number of location**: Many. **Population Trends - % change: -% Decline:** Stable. **-Time / Rate (Yrs or gens):** Not known. **-No of Mature Individuals:** Not known. **Global Population:** Not known. **Regional Population:** Not known. **Data Quality:** General field studies (M. M. Thomas, 1974 in South east coast); Records (CMFRI).**Recent Field Studies:** None**. Threats:** Overexploitation; Trade. **Trade:** Local. **Other Comments:** It is widely distributed in India but more common in South east coast (Tuticorin - Mandapam region). Cultivation is recommended in the East coast where the brood sport is more available. **Status: -IUCN: LOWER RISK - NEAR THREATENED (Nationally). DATA DEFICIENT (Globally). -Criteria based on:** —. **-CITES:** No. **-IWPA(1972;91):** No. **-RDB National (1994):** No. **-RDB International (1996):** No. **Recommendations: -Research management:** Monitoring; Husbandry research. **-PHVA:** No. **Captive Breeding Recommendations: -Captive breeding:** Level 4. **-Level of difficulty:** Moderate difficult. **Existing Captive Programs:** None. **-Names of facilities:** —. **Sourcers (Refer Appendix):** 5, 28. **Compilers:** A.K. Das, S.N. Harkantra, B.S. Ingole, T.G. Jagtap, C.T. Achuthankutty, P. Mohanraj, R.M. Sharma .

30. *Perna viridis* (Linnaeus) — LRnt/N — (Green Mussel) — **Mytilus viridis L.** — **Family:** Mytilidae. **Taxonomic status:** Species. **Habit:** Sedentary. **Habitat:** Rocky shore also available in Mangrove. **Global Distribution:** India, Indo-west Pacific. **Current Regional Distribution:** East and west coast, Andaman & Nicobar Islands. **-Range (sq. km):** < 20,000. **-Area Occupied (sq. km):** < 2,000. **-Number of location**: Many. **Population Trends - % change: -% Decline:** Not known. **-Time / Rate (Yrs or gens):** Not known. **-No of Mature Individuals:** Not known. **Global Population:** Not known. **Regional Population:** Trends Not known. **Data Quality:** General field studies (S.Z. Qasin *et al*., 1977 Goa). **Recent Field Studies:** C.U. Rivonkar, 1988-91 Goa. **Threats:** Harvest for food; Pollution; Trade. **Trade:** Local. **Other Comments:** This species forms major molluscan fishery along west coast of India. Being exploited from intertidal and subtidal waters. **Status: -IUCN: LOWER RISK - NEAR THREATENED (Nationally). DATA DEFICIENT (Globally). -Criteria based on:** —. **-CITES:** No. **-IWPA(1972;91):** No. **-RDB National (1994):** No. **-RDB International (1996):** No. **Recommendations: -Research management:** Genetic management; Husbandry research. **-PHVA:** No. **Captive Breeding Recommendations: -Captive breeding:** Level 4. **-Level of difficulty:** Least difficult. **Existing Captive Programs:** Yes. **-Names of facilities:** NIO; CMFRI, Cochin. **Sourcers (Refer Appendix):** 22, 23. **Compilers:** A.K. Das, S.N. Harkantra, B.S. Ingole, T.G. Jagtap, C.T. Achuthankutty, P. Mohanraj, R.M. Sharma .

31. *Pilodius nigrocrinitus* Stimpson, 1858 — EN/N (B1, 2c) — (Crab) — **Family:** Xanthidae. **Taxonomic status:** Species. **Habit:** Burrowing, diurnal. **Habitat:** Littoral. **Global Distribution:** India, Malay Peninsula, Indonesia, Thailand, Phillipines, Japan, New Guinea, Australia, New Coredonia, New Zealand, Fiji, Karmadic Islands. **Current Regional Distribution:** East coast, Andaman & Nicobar Islands. **-Range (sq. km):** < 20,000. **-Area Occupied (sq. km):** < 500. **-Number of location**: > 4; Fragmented (Yereta jetty in middle Andaman, Peel Islands and Havelock Islands in South Andaman). **Population Trends - % change: -% Decline:** Not known. **-Time / Rate (Yrs or gens):** Not known. **-No of Mature Individuals:** Not known. **Global Population:** Not known. **Regional Population:** May be affected by threats. **Data Quality:** General field studies (A.K. Das and M.K. Dev Roy, 1980 in Peel Islands; A.K. Das and M.K. Dev Roy, 1987 in Yerata jetty and Havelock Islands); Records. **Recent Field Studies: . Threats:** Human interference; Loss of habitat. **Trade:** No. **Other Comments:** Exact locations in East coast are not available. **Status: -IUCN: ENDANGERED (Nationally). DATA DEFICIENT (Globally). -Criteria based on: B1, 2c** (Restricted distribution, limited location, severely fragmented, continuing decline observed in extent of occurrence, area of occupancy and/or quality of habitat). **-CITES:** No. **-IWPA(1972;91):** No. **-RDB National (1994):** No. **-RDB International (1996):** No. **Recommendations: -Research management:** Survey; Monitoring; Life-history studies. **-PHVA:** Pending. **Captive Breeding Recommendations: -Captive breeding:** Pending. **-Level of difficulty:** Not known. **Existing Captive Programs:** None. **-Names of facilities:** —. **Sourcers (Refer Appendix):** 6. **Compilers:** A.K. Das, S.N. Harkantra, B.S. Ingole, T.G. Jagtap, C.T. Achuthankutty, P. Mohanraj, R.M. Sharma .

32. *Polyura schreiber* (Godarc) ssp. nov. Smiles, 1982 — NE — (The Andaman Blue Nawab) — **Family:** Nymphalidae. **Taxonomic status:** Sub species. **Habit:** Larvae feed on Rhizophora and Bruguiera. **Habitat:** Canopy of Mangrove; Adults and immature stages confined largely to mangroves. **Global Distribution:** ENDEMIC to Andaman . **Current Regional Distribution:** S. Andaman. **-Range (sq. km):** < 5,000. **-Area Occupied (sq. km):** < 500. **-Number of location**: 3 (Manjeri, Sipighat, Chiriyatapu). **Population Trends - % change: -% Decline:** Not known. **-Time / Rate (Yrs or gens):** Not known. **-No of Mature Individuals:** Not known. **Global Population:** Not known. **Data Quality:** General field studies (M.L. Ferrar, 1923 in Andaman); Informal field sightings; Museum. **Recent Field Studies:** K. Veenakumari and P. Mohanraj, 1992 ongoing in Andaman; Veenakumari and P. Mohanraj, 1996 in Andaman. **Threats:** Loss of habitat. **Trade:** No. **Other Comments:** Declining of the host plant is the major threat. This sub species is deposited in NHM (London) only with the right half of the specimen. Recently (1992, 1996) K. Veenakumari and P. Mohanraj sighted 6 adults and reared a few specimens. But no collection of this specimen is available. Photographs of immature stages are, however, available. Since no publication on new observations has been made and no adult specimen is preserved the status of the species could not be evaluated. **Status: -IUCN: NOT EVALUATED . -Criteria based on:** No. **-CITES:** Sch. I, Part IV. **-IWPA(1972;91):** No. **-RDB National (1994):** No. **-RDB International (1996):** No. **Recommendations: -Research management:** Taxonomic and morphological genetic studies; Survey; Monitoring; .Life-history studies. **-PHVA:** Yes. **Captive Breeding Recommendations: -Captive breeding:** Not known. **-Level of difficulty:** Not known. **Existing Captive Programs:** None. **-Names of facilities:** —.

Sourcers (Refer Appendix): 7, 8, 30, 31. **Compilers:** A.K. Das, S.N. Harkantra, B.S. Ingole, T.G. Jagtap, C.T. Achuthankutty, P. Mohanraj, R.M. Sharma .

33. *Saccostrea cucullata* (Born) — LRnt/N — (Oyster) — **Family:** Ostreidae. **Taxonomic status:** Species. **Habit:** Epibenthic and Benthic. **Habitat:** Littoral. **Global Distribution:** India, Indo-west Pacific. **Current Regional Distribution:** East and west coast, Andaman & Nicobar Islands. **-Range (sq. km):** < 20,000. **-Area Occupied (sq. km):** < 2,000. **-Number of location**: Many. **Population Trends - % change: -% Decline:** Not known. **-Time / Rate (Yrs or gens):** Not known. **-No of Mature Individuals:** Not known. **Global Population:** Not known. **Regional Population:** Trends not known. **Data Quality:** General field studies. **Recent Field Studies:** None. **Threats:** Harvest for food; Trade. **Trade:** Local. **Other Comments:** It is exploited for food and shell for lime industry. **Status: -IUCN: LOWER RISK - NEAR THREATENED (Nationally). DATA DEFICIENT (Globally). -Criteria based on:** —. **-CITES:** No. **-IWPA(1972;91):** No. **-RDB National (1994):** No. **-RDB International (1996):** No. **Recommendations: -Research management:** Monitoring; Husbandry research. **-PHVA:** No. **Captive Breeding Recommendations: -Captive breeding:** Level 1. **-Level of difficulty:** Moderate difficult. **Existing Captive Programs:** None. **-Names of facilities:** —. **Sourcers (Refer Appendix):** 6, 16, 19. **Compilers:** A.K. Das, S.N. Harkantra, B.S. Ingole, T.G. Jagtap, C.T. Achuthankutty, P. Mohanraj, R.M. Sharma .

34. Scylla serrata (Forsskal, 1775) — LRnt/N — Cancer serrata Forsskal, 1775 — **Family:** Portunidae. **Taxonomic status:** Species. **Habit:** Burrowing, diurnal. **Habitat:** Littoral. **Global Distribution:** India, Indo-west Pacific. **Current Regional Distribution:** East and west coast, Andaman. **-Range (sq. km):** < 20,000. **-Area Occupied (sq. km):** < 2,000. **-Number of location**: Many (Sundarbans; Chilka; Kakinada Bay; Chennai; Pulicut lake; Palk Bay; Gulf of Kutch; Kerala; Karnataka; Kerala; Maharashtra; Goa; North middle and S. Andaman). **Population Trends - % change: -% Decline:** Not known. **-Time / Rate (Yrs or gens):** Not known. **-No of Mature Individuals:** Not known. **Global Population:** Not knwon. **Regional Population:** Not known. **Data Quality:** General field studies (A.K. Das and M.K. Dev Roy, 1978-87 in Andaman; N.C. Nandi and S.K. Pramani, 1982-85 in Sunderbans). **Recent Field Studies:** CMFRI . **Threats:** Harvest for food; Loss of habitat; Pollution; Trade. **Trade:** Local; Commercial; Domestic; International. **Other Comments:** Destruction of mangrove and alteration of estuarine habitat are also threats. **Status: -IUCN: LOWER RISK - NEAR THREATENED (Nationally). DATA DEFICIENT (Globally). -Criteria based on:** —. **-CITES:** No. **-IWPA(1972;91):** No. **-RDB National (1994):** No. **-RDB International (1996):** No. **Recommendations: -Research management:** Survey; Monitoring; Husbandry research. **-PHVA:** No. **Captive Breeding Recommendations: -Captive breeding:** Level 4. **-Level of difficulty:** Very difficult. **Existing Captive Programs:** None. **-Names of facilities:** —. **Sourcers (Refer Appendix):** 4, 6, 18. **Compilers:** A.K. Das, S.N. Harkantra, B.S. Ingole, T.G. Jagtap, C.T. Achuthankutty, P. Mohanraj, R.M. Sharma .

35. *Sesarma taeniolata — VU/N (B1, 2c)* — (White Crab) — **Family:** Grpsidae. **Taxonomic status:** Species. **Habit:** Benthic. **Habitat:** Littoral. **Global Distribution:** India, Indo-west Pacific. **Current Regional Distribution:** East and west coast, Andaman & Nicobar Islands . **-Range (sq. km):** < 20,000. **-Area Occupied (sq. km):** < 2,000. **-Number of location**: 4 (Sunderbans, Ratnagiri, Wright, Myo, Carbyn's Cove). **Population Trends - % change: -% Decline:** Not known. **-Time / Rate (Yrs or gens):** Not known. **-No of Mature Individuals:** Not known. **Global Population:** Not known. **Regional Population:** Trends not known but may be affected by threats. **Data Quality:** General field studies (A.K. Das and M.K Dev Roy, 1986 in Andaman; A.K. Das and M.K. Dev Roy; M.K. Dev Roy, 1986 Andaman). **Recent Field Studies:** A.K. Das and M.K. Dev Roy. **Threats:** Human interference; Loss of habitat. **Trade:** No. **Other Comments:** This species is usually distributed in the upper littoral zones of mangrove and adjacent areas in India. Although published reports are available only from four locations mentioned above. **Status: -IUCN: VULNERABLE (Nationally). DATA DEFICIENT (Globally). -Criteria based on: B1, 2c** (Restricted distribution, limited location, severely fragmented, continuing decline observed in extent of occurrence, area of occupancy and/or quality of habitat). **-CITES:** No. **-IWPA(1972;91):** No. **-RDB National (1994):** No. **-RDB International (1996):** No. **Recommendations: -Research management:** Survey; Monitoring. **-PHVA:** Not known. **Captive Breeding Recommendations: -Captive breeding:** Not known. **-Level of difficulty:** Not known. **Existing Captive Programs:** None. **-Names of facilities:** —. **Sourcers (Refer Appendix):** 4, 6. **Compilers:** A.K. Das, S.N. Harkantra, B.S. Ingole, T.G. Jagtap, C.T. Achuthankutty, P. Mohanraj, R.M. Sharma .

36. *Sphaeroma terebrans — LRlc/N* — (Pill Bugs) — **Family:** Sphagomidae. **Taxonomic status:** Species. **Habit:** Wood borer. **Habitat:** Littorial. **Global Distribution:** India, Indo-west Pacific. **Current Regional Distribution:** East and west coasts, Andaman & Nicobar Islands. **-Range (sq. km):** < 20,000. **-Area Occupied (sq. km):** < 2,000. **-Number of location**: Many (Godavari Estuaries, Pichavaram, Vellar Estuaries, Talapady Estuaries; Goa; Andaman & Nicobar Islands). **Population Trends - % change: -% Decline:** Not known. **-Time / Rate (Yrs or gens):** Not known. **-No of Mature Individuals:** Not known. **Global Population:** Not known. **Regional Population:** Not known. **Data Quality:** General field studies (M.V.L. Rao, 1986 in Godavary, Talapady estuaries; M.B. Nair and K. Dharmaraj, 1980 in Tamil Nadu; L.N. Santhakumaran, 1986 in Goa; A.K. Das and M.V. Dev Roy, 1989 in Andaman & Nicobar Islands. **Recent Field Studies:** None**. Threats:** No. **Trade:** No. **Other Comments:** This is a common borer in majority of mangrove areas of Andaman & Nicobar Islands. **Status: -IUCN: LOWER RISK - LEAST CONCERN (Nationally). DATA DEFICIENT (Globally). -Criteria based on:** —. **-CITES:** No. **-IWPA(1972;91):** No. **-RDB National (1994):** No. **-RDB International (1996):** No. **Recommendations: -Research management:** Monitoring. **-PHVA:** No. **Captive Breeding Recommendations: -Captive breeding:** Not known. **-Level of difficulty:** Not known. **Existing Captive Programs:** None. **-Names of facilities:** —. **Sourcers (Refer Appendix):** 6, 25. **Compilers:** A.K. Das, S.N. Harkantra, B.S. Ingole, T.G. Jagtap, C.T. Achuthankutty, P. Mohanraj, R.M. Sharma .

37. *Thalassina anomala* (Herbst) — LRnt/N — (Mud-Lobster/Scorpion Shrimp) — **Family:** Thalassinidae. **Taxonomic status:** Species. **Habit:** Burrowing. **Habitat:** Mangrove swamp. **Global Distribution:** India, Malaysia, Philippines, Africa. **Current Regional Distribution:** East and west coast, Andaman & Nicobar Islands. **-Range (sq. km):** < 20,000. **-Area Occupied (sq. km):** < 2,000. **-Number of location**: Many (Bombay; Rathnagiri; Goa; Andaman; Karnataka; Kerala; Orissa; Chilka). **Population Trends - % change: -% Decline:** Not known. **-Time / Rate (Yrs or gens):** Not known. **-No of Mature Individuals:** Not known. **Global Population:** Not known. **Regional Population:** May be affected by threats. **Data Quality:**

General field studies (Sankoli, 1963 in Ratnagiri; A.K. Das and M.K. Dev Roy, 1982 in Andaman). **Recent Field Studies:** B.S. Ingole, 1992 in Goa. **Threats:** Human interference; Loss of habitat. **Trade:** No. **Other Comments:** People are destroying habitat and population mainly for aquaculture and .related activity. **Status: -IUCN: LOWER RISK - NEAR THREATENED (Nationally). DATA DEFICIENT (Globally). -Criteria based on:** —. **-CITES:** Not known. **-IWPA(1972;91):** No. **-RDB National (1994):** Not known. **-RDB International (1996):** Not known. **Recommendations: -Research management:** Survey; Monitoring. **-PHVA:** No. **Captive Breeding Recommendations: -Captive breeding:** No. **-Level of difficulty:** No. **Existing Captive Programs:** None. **-Names of facilities:** —. **Sourcers (Refer Appendix):** 6, 24, 29. **Compilers:** A.K. Das, S.N. Harkantra, B.S. Ingole, T.G. Jagtap, C.T. Achuthankutty, P. Mohanraj, R.M. Sharma .

38. *Uca dussumieri* (H. Milne Edwards, 1852) Ortmann — LRnt/N — *Gelasimus dussumieri* H. milne Edwards, 1852

— (Fiddler Crab) — **Family:** Ocypodidae. **Taxonomic status:** Species. **Habit:** Burrowing, diurnal. **Habitat:** Littoral. **Global Distribution:** India, Indo-west Pacific. **Current Regional Distribution:** East coast . **-Range (sq. km):** < 20,000. **-Area Occupied (sq. km):** < 2,000. **-Number of location**: Many (Sundarbans, Orissa, Andhra Pradesh, West coast in Gulf of Kutch, Maharashtra, Goa, Andaman & Nicobar Islands). **Population Trends - % change: -% Decline:** Not known. **-Time / Rate (Yrs or gens):** Not known. **-No of Mature Individuals:** Not known. **Global Population:** Not known. **Regional Population:** Trends not known. **Data Quality:** General field studies (A. K. Das, 1978-79 Andaman)**. Recent Field Studies:** None**. Threats:** Loss of habitat. **Trade:** No. **Other Comments:** In Andaman it is very common in Mangrove areas of North, middle and South, Little Andaman and in Goa. **Status: -IUCN: LOWER RISK - NEAR THREATENED (Nationally). DATA DEFICIENT (Globally). -Criteria based on:** —. **-CITES:** No. **-IWPA(1972;91):** No. **-RDB National (1994):** No. **-RDB International (1996):** No. **Recommendations: -Research management:** Monitoring. **-PHVA:** No. **Captive Breeding Recommendations: -Captive breeding:** No. **-Level of difficulty:** Not known. **Existing Captive Programs:** None. **-Names of facilities:** —. **Sourcers (Refer Appendix):** 6. **Compilers:** A.K. Das, S.N. Harkantra, B.S. Ingole, T.G. Jagtap, C.T. Achuthankutty, P. Mohanraj, R.M. Sharma .

39. *Uca lactea* (De Hann, 1835) Ortmann, 1897 — LRnt/N — *Ocypode* (*Gelasimus*) *lacteus* De Haan, 1835 —

(Fiddler Crab) — **Family:** Ocypodidae. **Taxonomic status:** Species. **Habit:** Burrowing, diurnal. **Habitat:** Littoral. **Global Distribution:** India, Indo-west Pacific. **Current Regional Distribution:** East and west coasts, Andaman Islands. **-Range (sq. km):** < 20,000. **-Area Occupied (sq. km):** < 2,000. **-Number of location**: Many. **Population Trends - % change: -% Decline:** Not known. **-Time / Rate (Yrs or gens):** Not known. **-No of Mature Individuals:** Not known. **Global Population:** Not known. **Regional Population:** Not known. **Data Quality:** General field studies (A.K. Das and M.K. Dev Roy, 1978-87 in Andaman); Records (A.K. Das and M.K. Dev Roy).**Recent Field Studies: . Threats:** Loss of habitat. **Trade:** No. **Other Comments:** It is common in Mangrove areas of Andaman area. **Status: -IUCN: LOWER RISK - NEAR THREATENED (Nationally). DATA DEFICIENT (Globally). -Criteria based on:** —. **-CITES:** No. **-IWPA(1972;91):** No. **-RDB National (1994):** No. **-RDB International (1996):** No. **Recommendations: -Research management:** Monitoring. **-PHVA:** No. **Captive Breeding Recommendations: -Captive breeding:** No. **-Level of difficulty:** Not known. **Existing Captive Programs:** None. **-Names of facilities:** —. **Sourcers (Refer Appendix):** 6. **Compilers:** A.K. Das, S.N. Harkantra, B.S. Ingole, T.G. Jagtap, C.T. Achuthankutty, P. Mohanraj, R.M. Sharma .

40. *Uca tetragonon* (Herbst, 1790) Lanchester, 1900 — EN/N (B1, 2c) — *Cancer tetragonon*, Herbst 1790

— **Family:** Ocypodidae. **Taxonomic status:** Species. **Habit:** Burrowing, Diurnal. **Habitat:** Littoral. **Global Distribution:** India, Indo-west Pacific. **Current Regional Distribution:** Andaman Islands. **-Range (sq. km):** < 5,000. **-Area Occupied (sq. km):** < 500. **-Number of location**: 5; Fragmented (North Andaman - Aerial Bay, Stewart Is., S. Andaman - Manjeri, Chiclyatapu, Neil Islands). **Population Trends - % change: -% Decline:** Not known . **-Time / Rate (Yrs or gens):** Not known. **-No of Mature Individuals:** Not known. **Global Population:** Not known. **Regional Population:** Trends Not known. May be affected by threats. **Data Quality:** General field studies, (A.K. Das and M.K. Dev Roy, 1981-87 in Andaman).**Recent Field Studies:** None**. Threats:** Human interference; Loss of habitat. **Trade:** No. **Other Comments:** This species although having wide distribution in Indo-west Pacific .is known so far from North and South Andaman only within Indian Limits. **Status: -IUCN: ENDANGERED (Nationally). DATA DEFICIENT (Globally). -Criteria based on: B1, 2c**. **-CITES:** No. **-IWPA(1972;91):** No. **-RDB National (1994):** No. **-RDB International (1996):** No. **Recommendations: -Research management:** Survey; Monitoring. **-PHVA:** No. **Captive Breeding Recommendations: -Captive breeding:** No. **-Level of difficulty:** Not known. **Existing Captive Programs:** None. **-Names of facilities:** —. **Sourcers (Refer Appendix):** 6. **Compilers:** A.K. Das, S.N. Harkantra, B.S. Ingole, T.G. Jagtap, C.T. Achuthankutty, P. Mohanraj, R.M. Sharma .

41. *Uca vocans* (Linnaeus, 1758) Lanchester, 1900 — LRnt/N — *Cancer vocans*, Linnaeus, 1758 —

(Fiddler Crab) — **Family:** Ocypodidae. **Taxonomic status:** Species. **Habit:** Burrowing, diurnal. **Habitat:** Littoral. **Global Distribution:** India, Indo-west Pacific. **Current Regional Distribution:** East coast, Andaman & Nicobar Islands . **-Range (sq. km):** < 20,000. **-Area Occupied (sq. km):** < 2,000. **-Number of location**: Many (Gulf of Mannar; West coast Mumbai; North, Middle and S. Andaman). **Population Trends - % change: -% Decline:** Not known. **-Time / Rate (Yrs or gens):** Not known. **-No of Mature Individuals:** Not known. **Global Population:** Not known. **Regional Population:** Trends not known. **Data Quality:** General field studies (A.K. Das and M.K. Dev Roy, 1980-87 in Andaman); Records.**Recent Field Studies: . Threats:** Loss of habitat. **Trade:** No. **Other Comments:** It is very common in Mangrove areas of Andaman & Nicobar Islands. **Status: -IUCN: LOWER RISK - NEAR THREATENED (Nationally). DATA DEFICIENT (Globally). -Criteria based on:** —. **-CITES:** No. **-IWPA(1972;91):** No. **-RDB National (1994):** No. **-RDB International (1996):** No. **Recommendations: -Research management:** Survey; Monitoring. **-PHVA:** No. **Captive Breeding Recommendations: -Captive breeding:** No. **-Level of difficulty:** Not known. **Existing Captive Programs:** None. **-Names of facilities:** —. **Sourcers (Refer Appendix):** 6. **Compilers:** A.K. Das, S.N. Harkantra, B.S. Ingole, T.G. Jagtap, C.T. Achuthankutty, P. Mohanraj, R.M. Sharma.

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