# PART I

# 2. THE TRINIDAD REPORT: IDENTIFICATION OF KEY SPECIES FOR CONSERVATION AND SOCIO-ECONOMIC DEVELOPMENT

## 2.1 Introduction

As emphasised in the World Conservation Strategy (Anon. 1980), the preservation of biological diversity is of paramount importance to the future welfare of mankind. As such, it requires urgent and co-ordinated action from both developing and developed countries. In the face of spreading environmental degradation and increasing species loss, one urgent priority is for us to identify, for immediate protection, monitoring, and potential application, those species (hereafter called 'key species') that are most critical

a) as keystone species to maintain the ecological integrity of ecosystems, and
b) as life-support species to ensure human survival under environmental stress (e.g. drought, water pollution, soil pollution, etc.).

In spite of their far-reaching potential, key species as a whole have never been systematically studied. Three key areas of study are:

a) identification and monitoring;
b) preparation of inventories; and
c) application in native environment and the potential for introduction to new environments to promote national socio-economic goals.

To prepare the necessary groundwork, a workshop was organised jointly by IUCN and CSC in which 20 leading international experts on the subject were invited from the respective networks of both organisations (Species Survival Commission for IUCN; Network on Biodiversity and Genetic Resources for CSC).

The workshop objective was to examine and develop guidelines and methodologies, so as

a) to develop systematic analysis of key species which play a controlling influence on biotic communities (including human) especially in terms of stability, resistance and resilience through their important linkages;
b) to identify and develop priority action on those species which present life-support value to rural people (especially in tropical environments);
c) to develop the application of information for use in the identification mechanisms and processes underlying occurrence, maintenance and survival of these key species by initiating co-ordinating research on (1) theoretical/predictive approaches, (2) experimental approaches and (3) socio-economic relevance/ interface approaches; and

*Identification of Key Species for Conservation and Socio-Economic Development*
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d) to develop specific research programmes for terrestrial (forests, agro-ecosystems, etc.) and aquatic environments with emphasis on problems of (1) drought, (2) emergency, (3) flooding, (4) toxicity of soil, (5) water and soil pollution, etc.

## 2.2 Background

### 2.2.1 *Keystone species*

In most ecosystems, certain species exert a controlling influence out of proportion to their density or biomass over the overall diversity and long-term stability of their ecological communities. Identifying those critical species is one major objective of the IUCN Conservation Science Programme for the next triennium.

Unfortunately, keystone species are difficult to identify: they are not usually the most abundant, the most striking or the most glamorous members of the community. Further, they do not belong to a particular ecological type: in a given ecosystem, the keystone species might include top carnivores, decomposers, herbivores, pollinators, some of the plants or even microbes. Up to now, except for a few celebrated experiments, keystone species have been discovered accidentally, following their removal – via harvesting or replacement by an introduced species – from the habitat.

The workshop was organised to examine how to undertake a systematic analysis of all such cases, to decipher the underlying mechanisms at play so that it would allow us to predict, within reliable limits, the potential keystone species in the major biomes and habitats. A likely spin-off of this effort is the development of a co-ordinated research programme, based on controlled experimental perturbation, to verify such predictions in an integrated programme worldwide.

### 2.2.2 *Life-support species*

Many plant species display distinct adaptations to environmental extremes, as they are able to grow and reproduce under such conditions as drought and desertification, flood, water pollution, soil toxicity and high salinity. Among such species a number can provide sources of food, materials and energy to humans, livestock and other animals, and so are of considerable potential benefit to people. Those species are referred to as life-support species. As such, they naturally include keystone species since these hold the key to the integrity of landscapes which include both the diversity of living biota and the human communities.

The potential value of life-support species is only now beginning to be appreciated, and has still to receive proper recognition by agroforesters, aquaculturalists, and more generally from ecological and environmental scientists. For example, of a global total of some 80 000 edible terrestrial plants, only about 150 species have ever been cultivated on a large scale, and over 90% of the world's food is produced from less than 20 species.

As highlighted in a regional workshop of the Commonwealth Science Council (New Delhi, April 1987), there are no integrated inventories and studies available worldwide to allow for the use of life-support species. There is therefore a need to

develop a strategy for action to collect information, and focus research priorities, on key species.

## 2.3 Sixteen critical points for the preparation of an action plan

**1** Along with the degradation of ecosystems worldwide, thousands of species and even more genetic variants, are being lost. The main causes of this destruction are rapid growth in human population, unsustainable levels of resource consumption by the relatively affluent, and the impact of the increasing numbers of people struggling to survive.

**2** Some of the species (or species groups) under threat possess special economic or cultural significance, and are essential for the survival of the ecosystems and landscapes in which they occur. They are therefore regarded as 'key' species.

**3** Conservation and integrated development strategies are needed to halt the biological impoverishment of the planet. Unless human numbers are stabilised and consumption levels are brought into balance with environmental capacities any conservation strategies will be ineffective.

**4** Conservation efforts to save species and maintain ecosystems have expanded in recent years. Historically these efforts have tended to focus on rare and beautiful species. Today, there is increasing concern for species having particular ecological, economic and cultural significance. Although conservation priorities are recognised for species of obvious economic importance, such as rice, eucalyptus, cows or catfish, many other species of key ecological and socio-economic importance will be lost unless action is taken urgently, within the next decade.

**5** The objectives of the workshop were considered in the following three ways:

a) to begin to identify such species;
b) to define the most urgent research priorities; and
c) to identify priorities for conservation/development action.

**6** A small, but unknown, fraction of the world's plant species has a disproportionately important role in the ecological processes that maintain the totality of life on this planet. It is important to relate human life and biological diversity to the sustainable ecological and social systems of the Earth. The species that do this are called 'ecological key species' (or 'amplifier species').

**7** Similarly, another unknown fraction of the world's species, used by people for food or for their culture, makes a disproportionate contribution to people's social and economic well-being. Such species are called 'socio-economic key species' (or 'service species').

**8** Both ecological and socio-economic key species can be 'Life-Support Species'. Conservation of these key species will result in the conservation of many other species and assists in the long-term survival of human communities.

**9** Ecological key species and species groups are key with respect to certain major natural processes, particularly:

a) organic production,
b) nutrient accumulation,
c) habitat structuring,
d) colonisation,
e) herbivory,
f) pollination,
g) seed dispersal,
h) decomposition,
i) predation, and
k) defence against parasites and predators.

**10** Socio-economic key species and species groups are key with respect to certain categories of use, particularly

a) commodities (important economic products such as foods, animal feed, fibre and medicines),
b) genetic resources (source of new domesticates and of improvements to established domesticates, and of potential value in biotechnology),
c) cultural value (significant contribution to the spiritual, emotional, and/or psychological lives of people), and
d) environmental management (use by people to modify, stabilise or rehabilitate environments).

**11** Certain species and species groups are key both ecologically and socio-economically (and some ecological and socio-economic key species are important in more than one of the categories listed in (9) and (10) above).

**12** Key species and species groups are usually specific to particular ecological, cultural and economic circumstances. In other words there are few, if any, universally key species. Likewise, one cannot anticipate which species, or which genetic variants, might become significant in the future. In other words, species not considered important today may become key tomorrow.

**13** Although we know of a large number of socio-economic species, knowledge of key species among them is highly fragmented and often limited to their immediate users. We know much less about ecological key species and can identify only a few. Improving our knowledge of key species is essential; the starting point is in their recognition.

As a preliminary step examples of key species that are thought to have ecological

and socio-economic importance are given in Appendix 2.1. In Part II, Appendices A-E focus on some of the key species of five countries around the world.

**14** Because of the rapid loss of species and reduction of genetic variability, direct conservation action is needed now, not next year or sometime in the future. At the same time international research co-ordination to identify key species is called for. The sooner the results of research can guide action, the better it will be for the sustainability of human life on this planet.

**15** A strategy for conservation and sustainable use of key species and species groups should include the following six points

a) Management and protection of those areas where key species and species groups, occur should ensure their long-term survival, at the same time recognising the needs and rights of the local human population.
b) Conservation plans to identify and maintain migratory key species should be developed.
c) In human-modified ecosystems the contribution of agriculture, silviculture and aquaculture to the maintenance and genetic improvement of socio-economic key species should be encouraged.
d) In degraded lands restoration through the use of key species and species groups, particularly nutrient accumulators and ecosystem engineers, should be promoted.
e) The most efficient and best adapted species (and genetic variants of such species and other species) should be identified.
f) Native species and genetic variants of native species should be investigated and tested before using exotic species.

**16** Particular attention should be paid to three groups of key species, namely

a) species that serve as both ecological and socio-economic key species,
b) threatened ecological and socio-economic key species, and
c) key species with known, yet unfulfilled, socio-economic potential.

## 2.4 The twelve recommended actions

### 2.4.1 *For Governments and Government Agencies*

**1** Governments should promote the identification of both ecological and socio-economic key species, and assess their ecological and socio-economic contribution, within their own countries.

**2** Governments should support those local socio-economic systems that are actually, or potentially, compatible with the maintenance of key species, and explore with the local people involved ways of supporting such systems sustainably.

**3** Governments should determine which key species are adequately maintained in the protected area system of their country, and should as a matter priority make adequate provision for the conservation of those species that are not adequately protected.

**4** Governments should ensure that the germplasm of key species is properly collected, conserved and made available including, where appropriate, through captive breeding programmes.

**5** Regardless of their socio-economic importance, species should not be translocated to new bio-geographic provinces (whether marine or continental) without stringent evaluation of the likely ecological consequences.

### 2.4.2 *For International Agencies*

**6** The relevant agencies should promote the international co-ordination of research programmes and information systems concerning key species.

### 2.4.3 *For Non-Governmental Organisations (NGOs)*

**7** National and international NGOs should consider and advocate the most effective way to promote the conservation of key species.

**8** NGOs should promote the information gathering process on, and the conservation of, key species at the local community level with particular emphasis on the perceptions and practices of indigenous peoples, recognising especially the contribution that women make in this process.

### 2.4.4 *For the research and technology sector*

**9** A major research effort is required to identify ecological key species in natural and semi-natural ecosystems. A much better understanding is needed of how key species influence the diversity and the structure of major ecosystems.

**10** Research should be carried out on ways of using native key species, exploiting their fullest genetic variability, for socio-economic development activities such as in silviculture, cyclical agriculture, aquaculture and land rehabilitation.

**11** The range of genetic diversity in key species be assessed for its potential use and should be conserved in perpetuity, incorporating modern developments in biotechnology as appropriate.

**12** Research on the ecological implications of global change must be closely integrated with research on key species and their conservation in a changing environment.

## 2.5 Motion of Thanks

The participants in the workshop (listed in Appendix 2.2) express their profound gratitude to the Government of Trinidad & Tobago for its generous hospitality, and in particular the Minister of Agriculture, Dr Brinsley Samaroo; and to NIHERST, especially its President (Mr Frank Rampersad), Chairman (Professor Courtney Bartholomew) and staff (Christiane Francois, Lisa McShine, Clayt La Motte, Denyse Singh and Lauren Chang) for their assistance in making the meeting such a success.

## 2.6 Reference

**Anon.** (1980). *World Conservation Strategy: Living Resources Conservation for Sustainable Development.* International Union for the Conservation of Nature and Natural Resources (IUCN), United Nations Environment Programme (UNEP) and World Wildlife Fund (WWF).

## APPENDIX 2.1

**Illustrative examples of key species having both ecological and socio-economic importance (N.B. This list is by no means exhaustive)**

| Plant Species (Common name in parentheses) | Region (where important) | ECOLOGICAL FUNCTIONS | | | | SOCIO-ECONOMIC FUNCTIONS | | | | Reasons for inclusion |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Primary Production | Nutrient Accumulation | Habitat Structure | Colonisation | Commodity | Genetic Resource | Cultural | Environmental Management | |
| **TROPICAL** | | | | | | | | | | |
| TREES | | | | | | | | | | |
| *Azadirachta indica* (Neem) | S.E. Asia | X | X | X | | X | | X | | Outstanding multi-purpose tree |
| *Bertholletia excelsa* (Brazil nut) | Brazil | X | | X | | X | | X | | Nuts harvested from wild only, now threatened |
| *Dalbergia* species (Rosewoods) | Worldwide | X | X | X | | X | | | | Grossly overexploited high value timber |
| *Mora excelsa* | N.S. America | X | X | X | X | X | | | X | High value timber, vigorous, very localised distribution |
| *Parkia roxburgii* | S.E. Asia | X | X | | | X | | | X | Edible seed harvested from wild |
| *Shorea* species (Meranti) | S.E. Asia | X | X | X | | X | | X | X | High value timber, some species have edible nuts |
| *Butyrospermum paradoxum* (Butter nut) | Africa | X | | X | | X | | X | | Provides important source of income for women |
| PALMS | | | | | | | | | | |
| *Bactris* species | Latin America | X | | X | X | X | | X | | Important for fruit and construction |
| *Borassus* species (Palmyrahs) | Africa, Asia | X | X | X | X | X | | X | X | Many different uses (alleged > 700) |

| Plant Species (Common name in parentheses) | Region (where important) | ECOLOGICAL FUNCTIONS | | | | SOCIO-ECONOMIC FUNCTIONS | | | | Reasons for inclusion |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Primary Production | Nutrient Accumulation | Habitat Structure | Colonisation | Commodity | Genetic Resource | Cultural | Environmental Management | |
| **TROPICAL** | | | | | | | | | | |
| PALMS cont. | | | | | | | | | | |
| *Calamus* species (Cane palm) | S.E. Asia | X | | | X | X | | X | | Very important for handicraft industries |
| *Jessenia* | S. America | X | | X | | X | | X | | Source of food, oil, beverages and fibre |
| *Mauritia flexuosa* | S. America | X | | X | X | X | | X | | Source of oil and starch |
| *Raphia* species (Raffia) | Africa | X | | | | X | | X | | Major source of fibre |
| BAMBOOS | | | | | | | | | | |
| *Bambusa vulgaris* (Common bamboo) | Worldwide | X | X | X | X | X | | X | | Major source of construction material |
| *Dendrocalamus giganteus* (Giant bamboo) | S. Asia | X | X | X | X | X | | X | | Very fast growing, major source of construction material |
| HERBACEOUS LEGUMES | | | | | | | | | | |
| *Lespedeza* species | S. America/ E. Asia | X | X | | X | X | X | X | X | Important as tropical pasture legumes and in land restoration |
| *Psophocarpus tetragonolobus* (Winged bean) | S.E. Asia, New Guinea | X | X | | | X | | | | Edible tubers, pods and seeds (high protein content) |

| Plant Species (Common name in parentheses) | Region (where important) | ECOLOGICAL FUNCTIONS: Primary Production | Nutrient Accumulation | Habitat Structure | Colonisation | SOCIO-ECONOMIC FUNCTIONS: Commodity | Genetic Resource | Cultural | Environmental Management | Reasons for inclusion |
|---|---|---|---|---|---|---|---|---|---|---|
| GRASSES | | | | | | | | | | |
| *Cymbopogon* species (Lemon grass, etc.) | Old world tropics | X | X | | X | X | | | X | Wild species good coloniser, cultivated species source of essential oil |
| *Saccharum spontaneum* (Wild cane) | S.E. Asia | X | X | X | X | X | X | | X | Important for soil stability |
| *Vetiveria zizanioides* (Khus-khus) | Asia | X | X | X | | X | | X | X | Essential oil, roots for insecticide, handicrafts, good soil stabiliser |
| **MEDITERRANEAN** | | | | | | | | | | |
| TREES & SHRUBS | | | | | | | | | | |
| *Ceratonia siliqua* (Carob) | Mediterranean | X | X | X | X | X | | X | X | Multi-purpose |
| *Erica arborea* (Tree heath) | Mediterranean | X | | X | X | X | | | X | Ecologically important in Mediterranean subseral communities |
| *Juniperus phoenicea* (Juniper) | Mediterranean | | | X | X | X | | X | | Widespread resistant shrub |
| *Olea europaea* (Olive) | Mediterranean | X | | X | | X | X | X | | Major oil producer of social and cultural importance |
| *Pinus halepensis* (Aleppo pine) | Mediterranean | X | | X | X | X | X | | X | Widespread coloniser |
| *Quercus ilex* (Holm oak) | Mediterranean | X | | X | X | X | | X | | Used for wood, fuel and fodder |

| Plant Species (Common name in parentheses) | Region (where important) | ECOLOGICAL FUNCTIONS | | | | SOCIO-ECONOMIC FUNCTIONS | | | | Reasons for inclusion |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Primary Production | Nutrient Accumulation | Habitat Structure | Colonisation | Commodity | Genetic Resource | Cultural | Environmental Management | |
| **ARID** | | | | | | | | | | |
| SHRUBS | | | | | | | | | | |
| *Acacia senegal* (Senegal gum) | Africa | X | X | X | X | X | | X | X | Produces gum arabic |
| *Caesalpinia sappan* | Asia | X | X | X | X | X | | | X | Source of tannin, dye and fuel wood |
| *Capparis decidua* (Caper) | India | X | | X | X | X | | X | | Major source of fodder in arid areas; fruit edible |
| *Prosopis cineraria, P. nigra, P. tamarugo* | Latin America | X | X | X | X | X | | X | X | Important source of fodder, fuel and food in very arid areas |
| **TEMPERATE** | | | | | | | | | | |
| TREES | | | | | | | | | | |
| *Alnus nepalensis* (Nepalese alder) | Himalaya | X | X | X | X | X | | X | X | Coloniser and stabiliser of disturbed hill slopes, N-fixing non-legume |
| *Betula utilis* (Himalayan birch) | Himalaya | X | | X | X | X | | X | X | Major coloniser in cold areas, timber and bark valuable |
| *Nothofagus* species (Southern beech) | S. Hemisphere | X | | X | X | X | | | | Important trees in montane tropics and in lowland Australasia and S. America |
| *Populus* species (Poplar) | H. Hemisphere | X | X | X | X | X | | | X | Fast-growing timber species and wind break in agricultural land |
| *Pinus radiata* (Monterey pine) | W.N. America | X | | X | X | X | | | X | Vigorous soft wood, grows very well outside original habitat |
| *Salix* species (Willows) | N. temperate | X | X | X | X | X | X | X | X | Extraordinary complex of valuable species |

| Plant Species (Common name in parentheses) | Region (where important) | ECOLOGICAL FUNCTIONS: Primary Production | Nutrient Accumulation | Habitat Structure | Colonisation | SOCIO-ECONOMIC FUNCTIONS: Commodity | Genetic Resource | Cultural | Environmental Management | Reasons for inclusion |
|---|---|---|---|---|---|---|---|---|---|---|
| SHRUBS | | | | | | | | | | |
| *Calluna vulgaris* (Heather) | N. Europe | X | | X | X | X | | X | X | Widespread dominant of poor land; habitat for diverse wildlife |
| *Caragona pygmaea* | C. Asia | X | X | X | X | X | | | | Coloniser of moraines and hill slopes, primary source of fuel wood |
| *Hippophae rhamnoides* (Buckthorn) | C. Asia | X | X | X | X | X | X | | X | Vigorous, N-fixing non-legume |
| MOSSES | | | | | | | | | | |
| *Sphagnum* species (Bog moss) | Worldwide | | | X | X | X | | | X | Major habitat determinant in wet areas |
| HERBS | | | | | | | | | | |
| *Chenopodium quinoa* (Quinoa) | Andes | X | | | X | X | X | X | | Important subsistence grain crop in tribal areas |
| *Typha angustifolia* (Cat-tail) | Europe, America | X | X | X | X | X | | | X | Coloniser of shallow water and concentrates nutrients and toxic metals |
| *Brassica* species (eg. mustard, cabbage, rape, turnips) | Eurasia | X | | | X | X | X | X | | Important food materials |

| Plant Species (Common name in parentheses) | Region (where important) | ECOLOGICAL FUNCTIONS | | | | SOCIO-ECONOMIC FUNCTIONS | | | | Reasons for inclusion |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Primary Production | Nutrient Accumulation | Habitat Structure | Colonisation | Commodity | Genetic Resource | Cultural | Environmental Management | |
| **COASTAL AND SUBTIDAL** | | | | | | | | | | |
| SHRUBS | | | | | | | | | | |
| *Halimione portulacoides* | Europe | | X | X | X | | | | X | Important coloniser and dominant of salt marsh |
| *Casuarina equisetifolia* | Australia | X | X | X | X | X | | | X | Vigorous stabiliser of sandy soils, important source of fuel wood |
| HERBS | | | | | | | | | | |
| *Salicornia* species (Glassworts) | Worldwide | X | | X | X | X | | | | Early coloniser and stabiliser of mud flats |
| *Spinifex littoreus* | Pan tropical | X | X | X | X | | | | X | Major coloniser and stabiliser of coastal sand in tropics |
| MANGROVE | | | | | | | | | | |
| *Avicennia* species (White mangrove) | Worldwide | X | | X | X | X | | X | X | Important in coastal protection, fisheries and wildlife |
| *Rhizophora* species (Red mangrove) | Worldwide | X | | X | X | X | | X | X | As above |

| Plant Species (Common name in parentheses) | Region (where important) | ECOLOGICAL FUNCTIONS: Primary Production | Nutrient Accumulation | Habitat Structure | Colonisation | SOCIO-ECONOMIC FUNCTIONS: Commodity | Genetic Resource | Cultural | Environmental Management | Reasons for inclusion |
|---|---|---|---|---|---|---|---|---|---|---|
| ALGAE | | | | | | | | | | |
| *Laminaria* species (Leaf kelp) | N. temperate | X | | X | X | X | X | X | X | Forms large coastal beds, source of algin |
| *Macrocystis pyrifera* (Giant kelp) | Temperate | X | | X | X | X | | | X | Determines habitat structure, main source of algin, acts as a major breakwater |
| *Porphyra* species (Nori) | Worldwide | X | | | X | X | X | X | | Edible; basis for largescale aquaculture in the orient |
| *Rhodymenia palmata* (Dulse) | N. temperate | X | | | X | X | | X | | Widely used as food for 12 centuries (for humans, cattle and sheep) |
| *Sargassum* species (Sargasso weed) | Tropical Pacifica and Atlantic | X | X | X | X | X | | | X | Forms extensive intertidal beds, supporting many species |
| SEA GRASSES | | | | | | | | | | |
| *Posidonia* species (Sea grass) | Mediterranean | X | X | X | X | | | | X | Stabilises shallow sea bottoms, concentrates heavy metals |
| *Zostera* species (Eel grass) | Temperate | X | | X | X | | | | X | Stabilises mud flats, source of food for wild fowl |
| *Thalassia* species (Turtle grass) | Tropical | X | X | X | X | | | | X | Colonises shallow lagoon bottoms, food sources for many fish |

| Animal Taxa (Common name in parentheses) | Region (where important) | ECOLOGICAL FUNCTIONS | | | | | SOCIO-ECONOMIC FUNCTIONS | | | | | Reasons for inclusion |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Herbivory | Predation | Pollination | Dispersal | Decomposition | Secondary Production | Commodity | Genetic Resource | Cultural | Environmental Management | |
| **TERRESTRIAL** | | | | | | | | | | | | |
| *Loxodonta africana* (African elephant) | Africa | X | | | X | | | X | | X | X | Major habitat modifier, threatened by poaching and habitat restriction |
| *Bubalus mindorensis* (Tamaraw) | Philippines | X | | | | | | | X | X | | Local example of a genetic resource with high potential; highly endangered |
| *Trinervitermes* (Termites) | African savanna | X | | | | X | X | | | | | Important for soil fertility in arid areas |
| *Milsonias* (Earthworms) | Africa | | | | X | X | X | | | | | Major fertilizing role for African soils |
| *Apis mellifera* (Common honey bee) | Worldwide | | X | X | | | | X | | X | X | Very important for pollination, as well as honey |
| *Euglossini* (Orchid bees) | Neo tropical | | | X | | | | | | | | Essential for the survival of many orchid species |
| AQUATIC | | | | | | | | | | | | |
| *Trichechus* (Manatee) | Major river basins and adjacent coastal waters, E. America & W. Africa | X | | | | | | | | | X | Controls water hyacinth and other water weeds |
| *Enhydra lutris* (Sea otter) | N.E. Pacific | | X | | | | | | | X | X | Maintains diversity in kelp beds, cultural value to Indian populations |

| Animal Taxa (Common name in parentheses) | Region (where important) | ECOLOGICAL FUNCTIONS | | | | | SOCIO-ECONOMIC FUNCTIONS | | | | | Reasons for inclusion |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Herbivory | Predation | Pollination | Dispersal | Decomposition | Secondary Production | Commodity | Genetic Resource | Cultural | Environmental Management | |
| AQUATIC cont. | | | | | | | | | | | | |
| *Salmo salar* (Salmon) | Atlantic | | X | | | | X | X | X | X | | Major fishery species, wild populations depleted |
| *Homarus americanus; Panulirus argus* (Lobsters) | N. Atlantic, Caribbean | | X | | | X | X | X | X | X | | As above and major retainers of diversity |
| *Strombus gigas* (Queen conch) | Caribbean | | X | | | X | X | X | X | X | X | As above |
| *Crassostrea gigas* (Oyster) | Estuaries, lagoons, Far East origin | | | | | | X | X | X | X | X | Excellent coloniser, substituted for European oyster |
| *Euphausia superba* (Krill) | Antarctic | X | | | | | X | X | | | | Critical food for other animals, exploited by man |
| *Lobodon carcinophagus* (Crabeater seal) | Southern oceans | | X | | | | X | X | | | | Major food web determinant |
| *Eubalaenidae* (Rorquals) | All oceans | | X | | | | X | X | | X | | Major ecosystem determinant, immense cultural importance |
| *Scleractinia* (True corals) | All warm seas | X | X | | | | X | X | | | X | Essential in reef construction, supports nearshore fisheries |

APPENDIX 2.2

# LIST OF PARTICIPANTS
## IUCN/CSC Workshop on Key Species
## Port-of-Spain, Trinidad & Tobago, 15-19 March 1989

Prof. Balasubramaniam
Head, Department of Botany
University of Peradeniya
**SRI LANKA**

Prof. François Bourlière
Honorary President, INTECOL
15 avenue de Tourville
75007 Paris
**FRANCE**

Prof. A. D. Bradshaw
Dept. of Environmental Biology
University of Liverpool
Liverpool L69 3BX
**UK**

Dr Frédéric Briand
Director, Ecology Programmes
IUCN- The World Conservation Union
1196 Gland
**SWITZERLAND**

Dr James Davie
Senior Research Officer
Queensland National Parks and
Wildlife Service
Central Region, PO Box 1395
Rockhampton 4700
**AUSTRALIA**

Prof. François Doumenge
Directeur, Musée
Océanographique
Avenue Saint Martin
98000 Monaco Ville
**MONACO**

Dr Stephen Edwards
Director, Species Survival Programmes
IUCN –
The World Conservation Union
1196 Gland
**SWITZERLAND**

Prof. Vernon Heywood
Director, Botanic Gardens
Conservation Secretariat
53 The Green
Kew
Richmond
Surrey TW9 3AA
**UK**

Dr Wayne Hunte
Director, The Bellairs Research
Institute of McGill University
St James
Barbados
**WEST INDIES**

Dr Promila Kapoor-Vijay
Coordinator, Biodiversity and Genetic
Resources Network
Commonwealth Science Council
Marlborough House, Pall Mall
London SW1Y 5HX
**UK**

Dr Virendra Kumar
Department of Botany
Zakir Hussain College
University of Delhi
New Delhi
**INDIA**

Prof. John Lawton
Department of Biology
University of York
York YO1 5DD
**UK**

Dr R. Prescott-Allen
627 Aquarius Road
RR2
Victoria
British Columbia
**CANADA** V9B 5B4

Dr Alison McCusker
Head, Research Programme
IBPGR/FAO
Via delle Terme di Caracalla
00100 Rome
**ITALY**

Prof. P. S. Ramakrishnan
Department of Biology
Jawaharlal Nehru University
New Delhi 110067
**INDIA**

Dr Gene Pollard
Department of Plant Science and Biochemistry
University of the West Indies
St Augustine
**TRINIDAD**

Prof. John Spence
Department of Plant Science and Biochemistry
University of the West Indies
St Augustine
**TRINIDAD**

Dr M. B. Usher
Department of Biology
University of York
York YO1 5DD
**UK**