

PRIORITISATION OF ENDANGERED SPECIES

PROJECT REPORT SUBMITTED TO

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EXECUTIVE SUMMARY

INTRODUCTION

Species are the fundamental independent building blocks of bio-diversity to which laymen and scientists easily relate. The traditional systems of conservation have by and large evolved around species that are of practical use. In contrast, till recently conservation policies of Governments have evolved around species that are charismatic or are of scientific interest. Our concern for the survival of species has been a major driving force in conservation, whether traditional or governmental, and would continue to be so. Even the simplest of ecosystems are species rich. In contrast, the resources in terms of area, funds and personnel that can be set apart for conservation of these species are always very limited. The need to prioritise species for allocation of such resources is therefore obvious. Conservation attempts by traditional societies and governments often reflect such prioritisation, directly or indirectly.

Previous Prioritisation

The most widely published prioritisation of species for conservation action has been the Red List Categories of the IUCN, now World Conservation Union. In the 30 years since its definition, the Red List categories have focussed our attention on species at higher extinction risks, and have guided policy and management decisions. Red Lists have also guided international species trade policies through CITES. In recent Indian history, the most effective prioritisation of species for conservation has been through the Wildlife (Protection) Act 1972 (with its amendments), which afforded varying degrees of protection to a whole range of animal and plant species. This prioritisation of species, as reflected in their allocation to different schedules, has attracted a lot of criticism. The ratification of CITES in 1976 extended protection from trade and related activities to species that were thought to be under threat. Other attempts at prioritisation of Indian species are; (a) Red Data List of Indian animals by the Zoological Survey of India, and the Endangered Indian plants by the Botanical Survey of India (Nayar & Sastry 1987, 1988), both following the old IUCN categorisation; (b) A Red List of Indian birds for conservation being prepared by the Salim Ali Centre for Ornithology and Natural History (Vijayan 1995); (c) Prioritisation of many medicinal plants in south India, using revised IUCN criteria, through three CAMP workshops co-ordinated by the Federation for Revitalisation of Local Health Traditions (FRLHT) during 1995-97; and (d) an assessment of conservation status of birds of Nicobar Islands using the new IUCN categories by Sankaran (1996).

Endangered Species Prioritisation in BCPP

Prioritisation of species is an important goal of BCPP. The Project Design Workshop divided the species component into three groups for prioritisation; wild relatives of cultivated plants, medicinal plants, and endangered species. As far as the endangered species was concerned, the Working group suggested that conservation status be the primary criterion in prioritising them. Other values could be used to further prioritise the endangered species. The Group also recommended that the revised IUCN criteria and categories be applied to evaluate the conservation status of species, since they have been widely used and understood. Conservation Assessment and Management Planning (CAMP) workshops were suggested as the process by which such an assessment could be made. CAMP workshops allow rapid application of the revised IUCN criteria, while ensuring the best use of the most recent

published and unpublished information, and participation of the relevant experts.

The number of species in the taxa, prior or ongoing attempts at similar assessments, information availability, and constraints of time were considered while selecting the taxa for assessment. Mammals, reptiles, amphibians and freshwater fishes were selected during the Project Design Workshop itself. Soil and aquatic invertebrates, and mangrove organisms were also selected later following discussion among the resource persons. Among plants, medicinal plants of central and northeast India, and northwest Himalaya were chosen, as this allowed a comparison of results from two methods, and also because it complemented the assessment of medicinal plants of south India by FRLHT.

The objectives of the project were to: a) Provide an assessment of the conservation status of Indian species in selected taxa that is based on the best information that is available, published and unpublished; b) Provide information on the threats faced by each assessed taxa that form the reasons for their conservation status; c) Provide complete documentation of the information that form the basis of the assessment; d) Provide information on threatened species that is necessary for prioritisation of sites; and e) Provide an assessment of the lessons learnt during this rapid assessment of conservation status and of the reliability of the methods and process.

The Revised IUCN Categories and Criteria

The new system recognises three categories of risk; Critically Endangered, Endangered, or Vulnerable, together called Threatened. Other categories resulting from the assessment are Data Deficient, Conservation Dependent, Low Risk, Extinct in the Wild, Extinct, and Not Evaluated. The categorisation is done applying five quantitative criteria (and several subcriteria) that aim at detecting risk factors across a broad range of organisms and the diverse life histories they exhibit. The five criteria are (a) Population decline; (b) Extent or Area of Occurrence; (c) Small population; (d) Highly restricted range or population; and (e) Estimated probability of extinction. In the assessments under this project, most species have been assessed nationally and a few regionally, regardless of whether populations of these species occur outside India and whether populations outside India are contiguous with those in India. Generally, such assessments would increase the threat status of the species when it occurs outside the area of assessment, compared to global assessment.

The CAMP Process

The Conservation and Management Planning (CAMP) workshops enabled a rapid compilation of the vast amount of largely unpublished information that was relevant to the assessment. Each workshop, lasting for five days, was attended by 30-40 resource persons from 20 to 25 organisations. After being familiarised with the revised IUCN categories and criteria, the participants in subgroups filled up a taxon data sheet for each species that was assessed. The taxon data sheet sought information on the criteria and subcriteria needed to assign the species to one of the categories, threats, recommendations for management and research, and relevant references. The species to be assessed were selected by the participants, out of a list that had already been prepared for each workshop. A CAMP Reference Manual describing the revised IUCN categories and criteria, and a Briefing Book with relevant published papers were provided to each participant. Other important reference materials such as the Flora and Fauna of India and maps were also available at the venue. All taxon data

sheets and the categories assigned to species were reviewed by the whole group during plenary sessions. There were also special working group sessions when issues raised by the participants were discussed. The discussion and consensus among the participants during the process ensured that the assessment was owned by the participants as a group rather than any individual. A draft copy of all taxon data sheets was sent to the participants after the workshop for final corrections. A final report for each workshop that includes the taxon data sheets for all the assessed taxa, and detailed analysis of the data that they contain would be distributed to all participants, as well as to others.

We conducted six CAMP workshops, on medicinal plants in Lucknow; soil and aquatic invertebrates in Chennai; Amphibians in Bhubaneswar; Reptiles in Coimbatore; mangrove organisms in Goa; and mammals in Bangalore. The first workshop was held in January 1997, and the last one in August, 1997. The preparatory work for the workshop on freshwater fishes was done under this project, but due to the lack of funds in the project, the workshop was held by the National Bureau of Fish Genetic Resources (NBFGR), Lucknow. During the six workshops held under BCPP we covered a total of 1391 species. In addition, information is also available on 323 species of freshwater fishes assessed by the NBFGR. The results are summarised in the Table below. About 300 resource persons, from more than 100 organisations, participated in the assessment made under the BCPP.

MEDICINAL PLANTS

The participants selected 77 species for assessment, and completed 75 of these; 37 species were from northwest Himalaya, and 20 each were from central India and northeast India, two being common to the latter two areas. The species were selected because they were thought to be under threat, therefore, the assessment is not an indicator of the threat status of medicinal plants in general in the area.

In total, 69 species (92%) were categorised as threatened, 33 (44%) being Critically Endangered, 19 (22.7%) Endangered and 16 (21.3%) Vulnerable. Nearly 70% of the threatened species were categorised based on criterion A alone, population decline during the last decade. Only 23% had restricted distribution, population fragmentation, and decline in habitat quality (criterion B). Therefore, the high threatened status of medicinal plants is due to population decline, with over harvesting of the wild population being the major reason. Nearly 89% of the taxa assessed were under threat from trade. Of the medicinal plants assessed in the south by FRLHT 74.4% were Threatened. More species were Critically Endangered (45.3%) in the north than in the south (12.8%), reflecting the greater pressure the northern, especially Himalayan, species are facing from harvesting.

Among the recommendations for management and research that were made were habitat management, periodic monitoring, and cultivation programme for all threatened taxa. Techniques for cultivation are yet to be developed for most species, especially the Critically Endangered. The Ministry of Environment and Forests has adopted the assessment by the CAMP workshops and proposed a revision of the negative list of exports to include the critically endangered and endangered species, and the cultivation of many of these species to meet trade demands.

Summary of Conservation Assessment of Species under BCPP: The number of species under different Red List categories (CR-Critically Endangered; EN-Endangered; VU-Vulnerable; LR-nt- Low Risk near threatened; LR-lc- Low Risk least concern; DD-Data Deficient; NE-Not Evaluated).

Order	CR	EN	VU	LR-nt	LR-lc	DD	NE	Total
Medicinal Plants	35	16	15	7	-	2	-	75
Soil Invertebrates	18	23	16	13	14	10	1	95
Amphibians	10	42	46	57	8	39	5	207
Reptiles	34	54	80	100	64	134	30	466
Mangrove Plants	12	41	4	1	1	-	1	60
Algae	2	12	-	8	1	-	-	23
Invertebrates	1	5	4	17	14	-	1	41
Fishes	-	-	10	41	-	-	-	51
Mammals	22	33	60	76	64	115	21	373
Freshwater fish	45	91	81	66	16	26	-	323

SOIL AND AQUATIC INVERTEBRATES OF SOUTH INDIA

With more than 75,000 species in India and one million species world wide, invertebrates are the most species rich taxa, forming more than 95% of the fauna. This very high species richness itself is a deterrent to a species based conservation assessment. Since butterflies, the taxa that is best studied, are already receiving some protection under Wildlife Protection Act, the expert group that discussed the matter, selected soil and aquatic invertebrates of South India for assessment. This was an ecologically important group of animals on many of which we had sufficient expertise to make an assessment. A rapid compilation of soil invertebrates in South India consisted of 824 species such as earthworms, centipedes, millipedes, grasshoppers, termites, ants, wasps, bugs, scorpions, and land molluscs.

A total of 79 species were assessed in total, consisting of 8 ants, 8 termites, 5 grasshoppers, 3 flies, 2 water fleas, 20 molluscs, 5 crabs, 10 seed shrimps, 6 millipedes, 8 scorpions and 4 earthworms. None of the very common species were selected for assessment. Of the 79 species that were assessed, 47 (59.5%) were categorised as threatened; of these 10 (12.6%) were Critically Endangered, 21 (26.6%) were Endangered and 16 (20.2%) were Vulnerable. While 28 species were endemic to southern India, 13 were endemic to India. We also attempted to rapidly prioritise invertebrate species on which we need to generate more information in order to make an assessment. A total of 559 species were assessed of which 381 were grouped as 'study most urgently needed'.

Among the important concerns of the participants and their recommendations were (a) lack of standard methods for survey and monitoring invertebrates; (b) lack of taxonomic expertise for many taxa; (c) lack of easily accessible reference collections and poor curation standards; (d) lack of education materials; and (e) lack of funds for invertebrate studies, especially taxonomy.

AMPHIBIANS

Out of the 207 species that were considered, 40 species were Data Deficient and four more were Not Evaluated. Out of the 163 species that were evaluated, 93 (57.1%) were categorised as threatened, 10 (6.1%) being Critically Endangered, 42 (25.8%) Endangered, and 41 (25.1%) Vulnerable. The endemics are more likely to be threatened than non-endemics. As expected, the major centres of threatened species are the Western Ghats, northeast India and Himalaya. Andean and Nicobar Islands have five threatened species.

Criterion B was the most frequently used while assessing amphibians, forming more than 50% of the assessments as the single criterion used and a further 30% in combination with other criteria. The most frequently reported threats were population fragmentation, for almost all the species that occur in the Western Ghats and northeast, and reduction in habitat quality.

The major concerns and recommendations were; (a) a comprehensive survey, focussed on the data deficient species and those with very restricted distribution; (b) studies on micro habitat preferences, population densities and life history; (c) periodic monitoring of populations; (d) taxonomic studies on some groups; (d) need for better taxonomic expertise and curation standards; and (e) need for habitat management and protection.

REPTILES

Out of a list of 495 species, 362 species were assessed, of which 168 species (46.4%) were categorised as threatened, 34 (9.4%) being Critically Endangered, 54 (14.9%) Endangered and 80 (22.1%) Vulnerable. There were no major differences among the Families with regard to threatened status. In all families, the endemics had a higher percentage of threatened species (57% to 68%) than non-endemics (14% to 50%). The Western Ghats, northeast India and Himalaya (especially Eastern Himalaya) harbour the largest numbers of threatened reptiles, reflecting the high species richness in these areas. Other zones also have moderate numbers of threatened reptiles, largely because of the turtles, crocodiles and a few snakes that occur in these zones. Most species (135) were considered threatened due to their restricted distribution, fragmented population and declining habitat quality (criterion B). Population decline (criterion A) was the reason for the threatened status of 17 species.

The major recommendations made for the management and research of reptiles include: (a) surveys of data deficient and restricted range species, as in the case of amphibians; (b) Inclusion of some species in Schedules of Wildlife Protection Act that gives better protection; (c) Captive breeding for release into the wild for species that have been over harvested in the wild; (d) Periodic monitoring of species that have shown population decline (e) Better taxonomic and curation standards, as in the case of amphibians.

MANGROVE ORGANISMS

In total 176 species were assessed, 60 plants, 23 algae, 41 invertebrates, and 51 fishes. Within Indian political boundary, 57 (97%) out of 59 assessed plant species were threatened; of these 12 (20.3%) were Critically Endangered and 42 (71.1%) were Endangered. The extensive loss of mangrove along the west coast compared to the east coast was also reflected the distribution of species; 17 species occur only in the east coast compared to only 3

species reported only from the west coast within India. It is likely that 15 species might have become extinct from the west coast. Highly restricted and fragmented distribution of most species is considered the major threat. The decline in habitat quality due to pollution, siltation, timber harvesting, was the assessed subcriteria. However, over exploitation especially for timber and firewood is identified as a major threat in most of the species. Thus, mangroves have relatively few plant species but nearly all of these are threatened.

Out of 624 species of marine macro algae that occur along the Indian coast, 48 species have been reported from the mangrove. Out of the 23 species that were assessed 14 were threatened, two being Critically Endangered and 12 being Endangered. As in the case of plants, all assessed algae are widely distributed in the world. All 14 species were assessed threatened applying restricted and fragmented population in combination with declining habitat quality. However, many of these algae might also occur in the open sea and thus may not have a restricted range or fragmented population.

About 500 species of invertebrates occur in the Indian mangroves. The assessed species consisted of Mollusc (17 species), Crustacean, (mostly shrimps, 9 species), crabs (13 species), moths (3 species) and one butterfly. Among these only eight species were categorised as threatened, one being Critically Endangered, 4 Endangered and 3 Vulnerable. Only two of the threatened species were harvested (e.g. *Geloina crosa* and *Meretrix casta* both mangrove clams). Most of the assessed species were widely distributed in the world. Criterion B was again the most frequently used criterion (for 8 species). The major reason for only a few species to be threatened was that most of the assessed invertebrates also occurred outside the mangroves.

A total of 52 species of fishes of mangrove were assessed of; none was Critically Endangered, one was Endangered and 9 were Vulnerable. Excessive harvesting was a threat to six species. Criterion A was the most frequently used (for 8 species), the decline resulting from over harvesting. The only species that were assessed to be truly dependent on the mangrove forest were mudskippers (two species of *Boleophthalmus*).

MAMMALS

A total of 386 species were considered for assessment 4 were not evaluated. Four species were listed as Extinct, 18 (7.9%) as Critically Endangered, 30 (13.2%) as Endangered, 46 (20.2%) as Vulnerable. Thus, among the 228 species that were evaluated, 94 (41.2%) were threatened. The greater richness of threatened species in Himalaya (including Eastern Himalaya), northeast India and Western Ghats to a large extent reflects the greater species richness in these areas. Among threatened species, a greater proportion is either Critically Endangered or Endangered in the species poor zones, except for islands. Among the most speciose mammalian Orders (Chiroptera, Carnivora, Artiodactyla and Rodentia) 32 to 52% are threatened. The taxonomically unique Orders are more threatened. Among the most data deficient Orders are Chiroptera (55 out of 106), Cetacea (15 out of 23 species), Rodentia (18 out of 99) and Carnivora (18 out of 61).

The major reason for the threatened status of mammals are highly restricted distribution (for most of small mammals such as shrews, bats and rodents), small distribution, both fragmented or declining population, and habitat degradation (for most carnivores) and small declining population size (for most artiodactyls). Trade (including animal parts) was reported to be a major factor only in 21 species; 7 of these are carnivores, and 4 each are cetaceans and

rodents (squirrels). Hunting was a major factor in 29 species; especially in artiodactyls (13 species), carnivores (9 species) and rodents (6 species or subspecies of large squirrels).

The recommendations include (a) comprehensive surveys of data deficient and restricted distribution species; (b) periodic monitoring of threatened species; (c) the need to promote community studies

FRESH WATER FISHES

The CAMP workshop on freshwater fishes was initially to have been conducted under the BCPP. The initial preparations were also done. However, due to lack of funds it was conducted by the National Bureau of Fish Genetic Resources, and the credit goes entirely to NBFGR. Among those assessed, 217 species (70.2%) were categorised as threatened, 14.6% being Critically Endangered, 29.4% Endangered, and 26.2% being Vulnerable. As in the case of other taxa, criterion B was the most used on fresh water fishes also. Criterion A was also used for many species, especially those in the plains. Thus, the very high percentage of threatened fresh water fishes is primarily due to the restricted distribution, population fragmentation and decline in habitat quality (mostly for hill stream fishes), and population decline in the fishes of the plains. The decline in habitat quality has been mostly due to damming, siltation, pollution, poisoning *etc.* Population decline has been due to over harvesting. The taxon data on assessed species has not been finalised.

The recommendations include (a) a wider debate on the proposed Fisheries Act; (b) creation of sanctuaries for conservation of genetic variability and breeding grounds of fishes; (c) greater enforcement power at local levels; (d) redefinition of fishes as wild animal in the Wildlife Protection Act; (e) incorporation of CAMP workshop results into the Wildlife Protection Act; (f) regulation of the import of exotic fishes; (g) regular stock assessment of major river systems using standardised methods; and (g) captive breeding and restocking of over harvested species; (h) development of taxonomic expertise and knowledge; (i) examination of native species for aquaculture.

WHICH ARE THE PRIORITY SPECIES?

In this project we have made special efforts to cover the lower vertebrates and a few of the invertebrates which have not been covered in the past. Most of the remaining lower taxa might face equally high or higher extinction risks, given their restricted distribution and habitat specificity. A species based assessment has inherent limitations, given the sheer number of species that exist or might exist. This project has made an assessment of more than 80% of the inland vertebrate taxa of India over such a short period of time, which is a major achievement. And a modest beginning has been made in the case of invertebrates.

The prioritisation has used the threat status, as indicated by the revised IUCN categories, as the only criteria. However, information on use values at various levels has been recorded for the species that we assessed. Integration of biological and use values with threat status in order to further prioritise threatened species poses several methodological and conceptual problems. These include incomplete knowledge of direct use values and biological values. Moreover, restricted distribution, habitat fragmentation, and decline in habitat quality are the

major threats that make most species endangered. These have to be addressed at habitat level, rather than at the species level. The assessment has identified such habitats and their broad distribution. For species assessed on the basis of population decline, the conservation action that need to be taken may be single-species oriented, such as inclusion in Wildlife Protection Act, and captive breeding and restocking. It is among those species that inclusion of use and other values may help further prioritisation meaningfully. In research also the focus should be species assemblages, especially those that are data deficient or have restricted distribution. Thus, it is best that conservation status be the only criteria that are used for prioritisation of species at present. ***Critically Endangered is the highest priority species, and Endangered the next priority.***

WHERE ARE THE THREATENED SPECIES?

As the number of species that are threatened increasing geometrically, a species based conservation action is a daunting, if not an unnecessary, task. The most appropriate would be site based conservation actions. Extension of protected area network to cover areas with high overlap in the distribution of threatened taxa, and specific habitat management are the required actions. As expected, the areas of importance as far as the number of threatened species are concerned, are the biogeographic zones of Western Ghats, northeast, and Himalaya, particularly Eastern Himalaya. This is because; a) these are the areas of high species richness; b) many of the lower vertebrates and invertebrates that occur there have patchy or restricted distribution, even within the zones; c) there have been extensive fragmentation of the habitat; d) the species in these zones are often highly sensitive to changes in habitat quality (not loss). Other biogeographic zones are important for some threatened species, even though these are few. The distribution of threatened species in different biogeographic zones has been given separately for each taxon.

ACHIEVEMENTS AND RECOMMENDATIONS

1. The objective of the project was to make the best possible use of data that was currently available, in order to make an assessment of the conservation status of taxa, which had never been systematically assessed before. That we have been able to assess nearly 1500 species, which includes most of the vertebrates other than birds, within a period of one year is a unique achievement. It is also unique that nearly 400 resource persons from about 100 organisations have actively participated in the assessment.

2. Conservation policies and actions in India to date have been based on large animals, especially mammals. As the results from this assessment show, species in the lower taxa are at greater extinction risk (50 to 72%, for lower vertebrates), than mammals (41%), due to the former's restricted distribution and greater sensitivity to habitat changes. Conservation of large mammals (and a few large reptiles) is thus no guarantee to the survival of the smaller animals. An assessment of their conservation status based on however little data has made us aware of the nature and magnitude of the problem.

3. The list of species under various degrees of threat, the categories of threat faced by them and conservation actions suggested would facilitate appropriate action being taken. These actions pertain to greater protection of the species *per se*, captive breeding, inclusion of critical habitats in protected area net work, better protection and management of habitat, pollution control, negative list of exports, *etc.* Threats shared by several taxa and its geographical

distribution would lead to broader policy decisions.

4. The basic information on the distribution, habitat, population *etc.*, of the species that has been documented would lead to a better understanding of the geographic distribution of these species and the factors governing their distribution, especially in relation to various disturbances.

5. Contrary to popular belief, mammals in India have been less well studied than the lower vertebrates, because most of the mammalian studies in India have been on a few large mammals at the expense of the smaller mammals, especially rodents and bats that form more than 50% of the mammalian species in India. On the other hand, most of the studies on the lower vertebrates and the limited studies on the invertebrates have all been community studies. The utility of community studies in conservation assessment is thus obvious.

6. In general, the assessment brought to light the need for data that is appropriate for an assessment to be made, even for the relatively well-known taxa. Based on these information gaps the research needs has been identified for each taxa. It is hoped that this would direct research interest as well as funding in the coming years.

7. All the participants felt that monitoring biodiversity is a national responsibility best entrusted with national institutions (*e.g.* ZSI, BSI). The data need to be collected within a framework that allows systematic monitoring and evaluation, perhaps using the IUCN revised criteria.

8. All participants expressed great concern over the rapidly declining standards in taxonomic expertise and curation, as a result of which our taxonomic expertise on most taxa would soon be irrevocably lost.

9. The major problems that were identified while applying the revised IUCN criteria included (a) applicability of same criteria and thresholds to taxa with diverse life histories; (b) applicability of tropical taxa; (c) definition of some of the terms such as area of occupancy, generation time, and population fragmentation; (d) differential impact of habitat changes on species while applying criterion B; (e) categorisation not agreeing with perception; (f) unsuitability of most of the available data; and (f) difficulties in the application of criterion D, separating Low Risk-nt from Low Risk-1c, and identification of Conservation Dependent species.

10. Even with the constraints mentioned above, the revised categories provide the best indicator that can be used to periodically monitor the conservation status of species. We also found that the CAMP workshops provide the best way of rapidly making an assessment of several species, while also ensuring the active participation of most resource persons.

11. By generating a better understanding of the revised IUCN categories and the CAMP process among the various resource persons, this project has initiated the process of systematic assessment of the conservation status of Indian species. Several CAMP workshops are already scheduled to assess other taxa.