Editors' Note: The introductory material for every BCPP CAMP Report is the same. Therefore we have given it in a smaller typestyle to fit in one page. Readers who are familiar with these Reports can go directly to the section on the following page which deals specifically with Reptiles.

Convention on Biological Diversity

The Convention on Biological Diversity adopted in Nairobi in its provisions are expressed as g 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 oals 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 micro-organisms.

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 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 Workshops 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 mammals

Mammals are clearly the most charismatic organisms on the planet with larger forms being perceived by the general public practically as synonomous with biodiversity and conservation. Interest in higher mammals is evident even from the abundance of studies conducted all over the world as compared with other forms. Mammals serve as "umbrella" or "flagship" species for wildlife conservation, with the most recent and obvious example being the tiger. Saving mammals, particularly the flagship species, is equated with saving everything -- wildlife, ecosystem, habitat, biodiversity. However realistic this view may be, it is definitely an indicator of the popularity of mammals and their ability to evoke interest in the problems of the natural world.

Scientists are not immune to the charm of mammals, particularly large mammals. The majority of Specialist Groups (more than 100) of the Species Survival Commission of the World Conservation Union are devoted to mammals, either single mammal specialist groups (e.g. Asian Elephant S.G.) or mammal orders or families (e.g. Cat S.G., Cervid S.G., etc.).

Ironically, the large bodied animals occupy a small niche in the mammal group. A rough division of the different families into "small" and "large" bodied mammals is revealing. The "small-bodied" mammal groups are Chiroptera, or bats, as the largest with more than 100 species in 7 families, followed by Rodents (rats, shrews, squirrels, etc., with more than 100 species in four families). Bats and rats then make up more than 50% of all Indian mammals already! The remainder are Insectivora (30 species in 3 families), Primates (15 species in 3 families), Lagomorpha (11 species in 2 families), Scandentia (3 species in 1 family), and Pholidota (2 species in 1 family). There are no species which could be considered as "large bodied " mammals in these groups.

The remaining groups contain large-bodied animals, but not exclusively. In the felids, there are very small cats such as leopard cat, rusty spotted cat, etc. in canids, foxes, jackals, etc. and in Artiodactyla the Mouse deer. The large-bodied mammal groups are Carnivora or felids, canids, etc. (61 species in 7 families), Artiodactyla (36 species in 6 families), Cetaceae (31 species in 7 families), Persiodactyla (8 species in 2 families) and Sirennia and Proboscidea each with 1 species in 1 family each. This is a total of 138 species, of which some are not truly large. It is probably safe to say that only one fourth of mammals are large bodied but they claim nearly all the public attention.

This focus or fascination for "charismatic megavertebrates" has its advantages in garnering support for wildlife conservation from lay persons who admire their beauty, intelligence, ferocity and -- perhaps most of all – size. The disadvantage is that the lion's share of mammals, that is the ¾ which are not big are in danger of being neglected – in studies, in conservation planning, in conservation action. People do not give a great deal of thought to the small bodied mammals in terms of conservation, with the exception of primates which are – possibly because of the characteristics they share with human beings – the most popular and charismatic small bodied mammals. The CAMP Workshop held in Bangalore, by attempting to assess the entire spectrum of mammals, has demonstrated that some mammal species in all families are under threat and many of them are small, dull-coloured, ... kind of uninteresting if not actually unattractive to most people. Yet, these are also part of biodiversity and potentially as useful and necessary to man and the ecosystem as the other.

The 1996 Red List of Threatened Animals lists 4649 mammal species of the world. Of these, 1096 species have been categorised as "threatened" under one of the three IUCN Red List threatened categories, Critically Endangered, Endangered and Vulnerable. The remaining 3553 mammals have been categorised either as non-threatened under one of the Lower risk categories, or are Extinct, Data Deficient or Not Evaluated. Of these 4649 listed mammal species, 315 of them have been listed as occurring in India and 75 of those have been listed in a threatened category.

India has many endemic species of plants and animals. The 1996 Red List (Bailie & Groombridge, 1996) lists 44 species of mammals as endemic to India. Five endemic mammal species of conservation significance occur in the Western Ghats. They are *Macaca silenus, Trachypithecus johnii, Paradoxurus jerdoni, Viverra civettina* and *Hemitragus hylocrius*. The IUCN Red Data Book also lists 587 subspecies in the world of which 24 are in India. Further, the Indian Red Data Book of 1994 by the Zoological Survey of India assessed 75 species of mammals; 57 of those as being threatened, 16 insufficiently known and 2 extinct. Table 1. Shows the evaluations by different agencies.

Mammals in India are under threat for many different reasons, one of the most well known being trade. Trade brings to mind species such as tiger, rhinoceros, desert fox, etc., which are more commonly known to be in trade. However, some species from almost all families of Indian mammals are in trade at some level. Trade is not the only reason for their decline, although it may be a primary reason if it is unsustainable. Other common threats that affect mammal populations are habitat loss and human influence.

Many of the Indian mammals, which are, as a whole, probably the most well studied of all the groups of organisms in India, still lack ba. information with respect to population studies or trends, which hinders status assessment. This is not only true of mammals such as marine dolphins and whales that occur in the seas with a wide distribution are very poorly studied due to the prohibitive expense of carrying out oceanic surveys but also of more easily studied land species such as rodents and bats.

In preparing for the workshop, a major task was to locate the most complete and current checklist of mammals, which was not so straightforward as one might expect for the most well studied Indian animal group. Over the centuries there have been several books and lists of Indian mammals. Probably the first systematic attempt to list the mammalian fauna of India is a little-known one. In 1801, Arthur Wellesley, a brilliant albeit tactless, Governor General of Bengal, wanted to set up a Natural History Institute in a special college which would cater to English babus who were to serve in India. Wellesley desired to give them a firm grounding in Indian language and culture before sending them to the districts, but his Board of Governors did not agree. They did, however, grant permission and a modest budget for the Indian Natural History Project, probably the most amphibious official project of its type to that date. Wellesley engaged Sir Frances Buchanan-Hamilton, a surgeon naturalist, to serve as Director of the Project. The project was ill fated and did not survive long, but during the three or fours years that it lasted, some nearly 200 species of mammals, birds and reptiles were listed, described and drawn. This work was never published and is currently being edited and annotated by one of the editors of this Report (Walker, work in progress). Hamilton-Buchanan has the credit of describing innumerable plants and fishes in India.

According to Nameer (in press), the Golden Age of Indian Mammology was during second quarter of the 19th century, led by Brian Houghton Hodgson (Wroughton, 1918). Before Hodgson, with the exception of Buchanan, collecting and study was sporadic. T.C. Jerdon's *The Mammals of India*, published in 1867, may have been the first published listing with 242 species. Robert A. Sterndale's *Natural History of the Mammalia of India & Ceylon*, 1884, described 482 species of mammals from India and much of what we call south Asia today, e.g., Nepal, Pakistan and Sri Lanka. In 1888 and 1891 W.T. Blanford published the first part of *The Fauna of British India, Mammalia*, in which 400 and odd species were listed and described. This work is said to be the first authoritative account on Indian mammals. Two decades later BNHS began a *Mammal Survey of India*, which continued till 1923 with results being published in their

journal between 1912 and 1930. Following the BNHS Mammal Survey, a second edition of the *Mammalia of the Fauna of British India* series was published in 1939 (primates), in 1941(carnivora) by R.I. Pocock, and 1961 (rodents) by J.R. Ellerman. *A Checklist of Palearctic & Indian Mammals* was published by Ellerman and Morrison-Scott in 1951. The most popular reference on mammals in recent years is S.H. Prater's *Book of Indian Animals*, first published in 1948 then updated and reprinted several times since. Wildlife Institute of India developed a database of mammals in protected areas with common names as well as scientific names.

With all of these works in existence, the organisers of this workshop were still hard pressed to find a genuine checklist of Indian mammals with any degree of real currency. Finally it was learned that P.O. Nameer of Kerala Agricultural University, Thrissur with the help of Dr. Lawrence Heaney of the Field Museum, Chicago had compiled a comprehensive checklist based on the latest nomenclature as published by Corbett and Hill. This checklist was indeed the most comprehensive and current and finally taken as the basis of the CAMP Workshop with the consensus of participants.

Despite this, there is still confusion with regard to identification and taxonomy, especially of the smaller mammals as indicated in the BCPP CAMP workshop. Though mammals are a relatively wellstudied group, there are anomalies in validity of subspecies and of nomenclature even in the higher forms. This was revealed by varied opinions of researchers working on the same animal in different parts of its distribution. An example of this confusion is the Indian dhole, which was assessed as a single species by the group, some of whom had surveyed the species, but later divided by the authority on dhole into 4 subspecies. Other examples either of name change or confusion in identification include the Himalayan ibex, musk deer, yak, wild buffalo, and other large mammals, as well as the numerous and smaller rodents and bats. There is a clear lack of communication and ccordination among Indian mammal specialists. Some of the common misunderstandings in taxonomy, identification, field techniques, etc. could be resolved through networking which would promote more communication and cooperation and therefore coordination of information.

The CAMP workshop was conducted with a view to bring together as many of the country's current as well as retired mammal field biologists, so that the full depth of knowledge regarding population trends and status of India mammals could be fully utilised. This exercise may be the first time that a systematic effort has made to assess the status of a country's mammalian fauna using IUCN threat criteria and a large group of biologists. The BCPP CAMP workshops on amphibians and reptiles before this exercise provided a model example in conducting a countrywide assessment for any single group of organisms.

Objectives of the BCPP Mammal CAMP

1. To create a complete list of those species which should be considered the mammalian fauna of India with the aim of an inventory of Indian mammalian biodiversity.
2. To assess each species (and where appropriate each subspecies), according to the revised IUCN Red List criteria using the CAMP workshop process with the aim of prioritising species for conservation (In the case of species not represented by an acknowledged expert, to name an expert and refer the appropriate species questionaire to them for up-to-date information).
3. To create a set of "survey, search and find" recommendations for the species that clearly lack information (DD species).
4. To create a set of conservation recommendations for species that are threatened.
5. To list the problems working groups had in applying the revised IUCN Red List criteria to species for forwarding to the Task Force which is to be set up to review the application of the revised criteria so far.
6. To produce a Draft Report of the work done to be sent for correction to participants and then a Report to organisations and individuals relevant to conservation of Indian mammals.

Results and Discussion

Red List categories have been in use since the 1960s with few revisions made until 1990. The criteria on which these categories are based and – for the most part – their intended application were based on mammals. However, since 1991, the IUCN Red List Categories have undergone a series of revisions to enhance their applicability to organisms other than mammals and to reflect the development of the new conservation sciences, population dynamics and conservation biology of the last two decades. The current version of the IUCN Red List Criteria is the version that was ratified in December 1994 by the IUCN General Assembly. This version has far more objective criteria for assessment as well as detailed guidelines on how to use the criteria in deriving the category of threat status. Therefore mammal evaluation, as well as other organisms, has benefited from the revisions. The categories can be divided into 5 divisions as illustrated in the list and figure below

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

Methodology

In the past global species evaluation and even Red Data Books 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 the compiler's perception of the status as understood from the compiled literature. Later, this exercise was broadened to include some range country representatives from different continental regions if the exercise was global in scope, such as the IUCN Red Data Books. In India national level exercises such as the Indian Red Data Books relied a similar method of one or two people compiling information and from some specialists from the different regions of the country.

In international and national exercises of this type, specialists were asked to participate in providing information on a taxon, information that was gathered by post and evaluated by the coordinator at a central office. Within this format are 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). Although different organisations use somewhat different methods of evaluating and deriving status, the fact of following the IUCN Red List categories for a Red Data Book or other species review has been common.

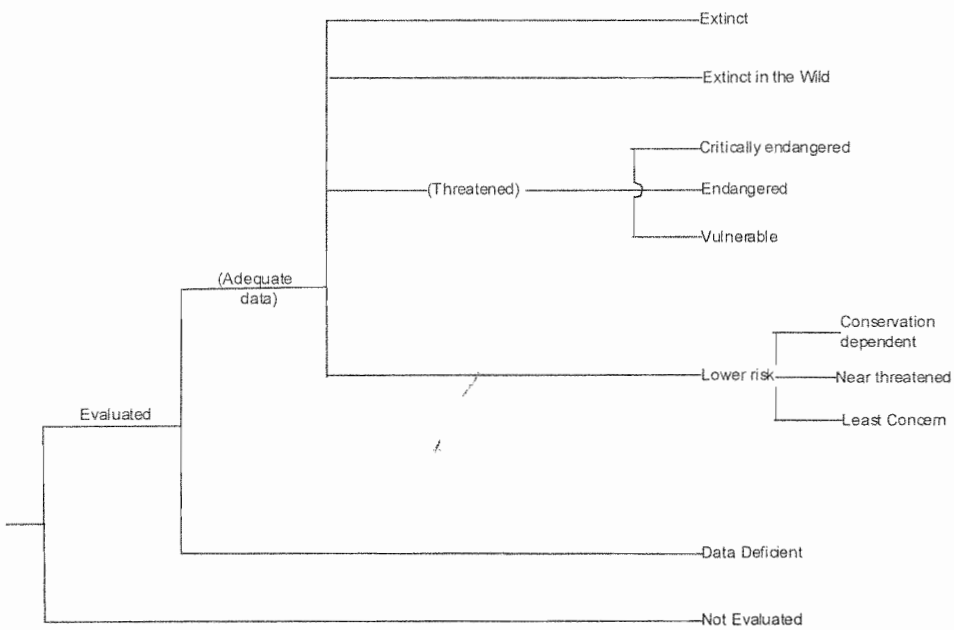
The methodology for assessment of threat adopted in India at the Conservation Assessment and Management Plan workshops also used the IUCN Red List categories (Revised, 1994) but differs in its unqualified dependence on face-to face interaction between specialists. The objective of assembling data is the same but in a CAMP Workshop every attempt is made to gather 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 and in an interactive process of small working groups, this information and the personal field experience of participants is discussed extensively until the group reaches a consensus on every fact. A questionnaire called a 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.

The advantages of being able to have interactive discussions on the information provided by various publications and active field biologists as

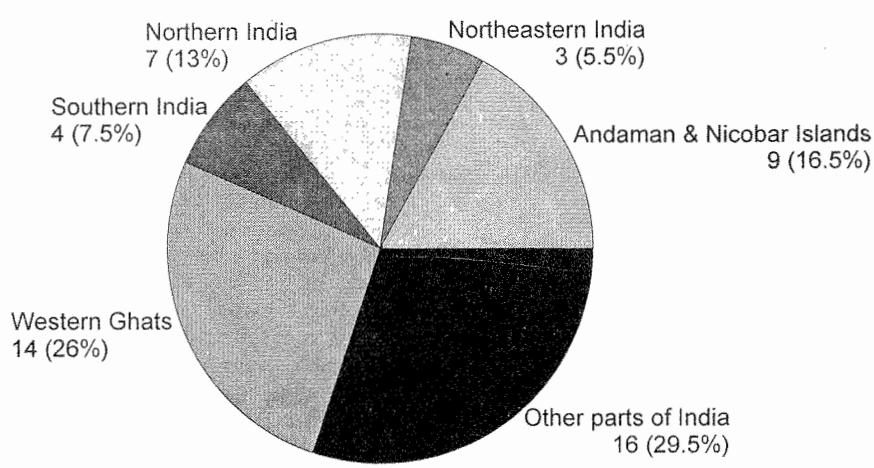
Table 1. The evalutions by different agencies

Evaluation	Total evaluated	Threatened	Non-Threatened & DD	Extinct	Not Evaluated	Indian Endemic	Non-endemic	Sub species
IUCN RDB (1996) Global mammals	4649	1096	3553	86	36	--	--	587
IUCN RDB (1996) Indian mammals	315	75	240	0	2	44	271	24
ZSI Red Data Book (1994)	75	57	16	1	--	10	65	15
CAMP (1997)	372 of 404	118	254	3	>30	54	318	26

Structure of the Categories



Distribution of endemic mammals in India



Number of Indian endemics = 54
Extinct endemic taxon = 1

Table 2. Basis of criteria for assessing endemic and non-endemic mammals of India

Species	IUCN	Distribution in India	Threatened due to	Criteria
INDIAN ENDEMICS				
Alticola albicauda	DD	North	--	--
Anathana ellioti	LR-nt	East, west, central, south	--	--
Atherurus macrourus assamensis	EN	Northeast	Restricted distribution	B1, 2c, 2b, 2d
Biswamoyopterus biswasi	CR	Northeast	Restricted distribution	B1, 2c
Bubalus arnee	EN	Central, northeast	Restricted distribution	B1, 2c
Cervus duvauceli branderi	CR	Central, east	Population estimates	C2b
Cervus elaphus hanglu	CR	North	Restricted distribution Population estimates	B1, 2c, 3d; C2b
Cervus eldii eldii	CR	Northeast	Restricted distribution Population estimates	B1, 2c C2b
Cremnomys cutchicus	LR-lc	North, west, east, south	--	--
Cremnomys elvira	VU	South	Restricted population	D2
Crocidura andamanensis	DD	Andaman & Nicobar	--	--
Crocidura hispida	EN	Andaman & nicobar	Restricted distribution	B1, 2c
Crocidura jenkinsi	DD	Andaman & Nicobar	--	--
Crocidura nicobarica	DD	Andaman & Nicobar	--	--
Cuon alpinus dekhanensis	LR-nt	Peninsular India	--	--
Cuon alpinus laniger	CR	North	Population estimates	C2b
Eptesicus nilssoni	DD	North	--	--
Eptesicus tatei	DD	East	--	--
Funambulus tristriatus	LR-nt	Western Ghats	--	--
Harpiocephalus harpia	DD	East, south	--	--
Hemitragus hylocrius	EN	Western Ghats	Restricted distribution Population estimates	B1, 2a, 2c, 2d; C2a
Herpestes fuscus fuscus	VU	Western Ghats	Restricted distribution	B1, 2a, 2b, 2c
Herpestes palustris	EN	East, north	Restricted distribution	B1, 2a,2b,2c,2d
Hipposideros schistaceus	DD	South	--	--
Latidens salimalii	EN	Western Ghats	Restricted distribution Population estimates	B1, 2a; C2a
Macaca radiata	LR-lc	Peninsular India	--	--
Macaca silenus	EN	Western Ghats	Restricted distribution Population estimates	B1, 2c; C2a
Martes gwatkinsi	VU	Western Ghats	Restricted distribution	B1, 2c, 2b
Millardia kondana	VU	West	Restricted population	D2
Murina grisea	VU	North	Restricted population	D2
Mus famulus	EN	South, Andaman&Nicobar	Restricted distribution	B1, 2c
Mus phillipsi	LR-lc	South, central, west	--	--
Mus platythrix	LR-lc	Peninsular, east	--	--
Otomops wroughtoni	CR	Western Ghats	Restricted distribution	B1, 2c
Ovis vignei vignei	EN	North	Population estimates	C2a
Panthera leo persica	CR	West	Population estimates	C2b
Paradoxurus jerdoni	VU	Western Ghats	Restricted distribution	B1, 2b, 2c
Paraechinus micropus nudiventris	VU	South	Restricted population	D2
Petinomys fuscocapillus fuscocapillus	VU	Southern Western Ghats	Restricted distribution	B1, 2b, 2c
Plantacanthomys lasiurus	LR-lc	Western Ghats	--	--
Pteropus faunulus	VU	Andaman & Nicobar	Restricted distribution	B1, 2c, 2d
Rattus palmarum	DD	Andaman & Nicobar	--	--
Rattus ranjiniae	VU	South	Restricted population	D2
Rattus stoicus	VU	Andaman & Nicobar	Restricted population	D2
Ratufa indica centralis	VU	Central, east	Population reduction	A1c
Ratufa indica dealbata	EX			

Species	IUCN	Distribution in India	Threatened due to	Criteria
Ratufa indica indica	VU	Southern Western Ghats	Population reduction Population estimates	A1a, 1c; C1a
Ratufa indica maxima	VU	Southern Western Ghats	Restricted distribution Population estimates	B1, 2c; C1a
Rhinolophus cognatus	DD	Andaman & Nicobar	--	--
Rhinolophus mitratus	VU	East	Restricted population	D2
Suncus dayi	VU	Western Ghats	Restricted distribution	B1, 2b
Trachypithecus johnii	VU	Western Ghats	Restricted distribution Population estimates	B1, B2; C1a
Tupaia nicobarica	EN	Andaman & Nicobar	Restricted distribution	B1, 2c
Viverra civettina	CR	Western Ghats	Population reduction	A1b, 1c
NON ENDEMIC				
Acinonyx jubatus venaticus	EX			
Ailurus fulgens fulgens	VU	Indian Himalaya	Restricted distribution	B1, 2a, 2b, 2c
Alticola montosa	DD	North	--	--
Alticola roylei	DD	North	--	--
Alticola stoliczkanus	DD	North, East	--	--
Anourosorex squamipes	VU	Northeast	Restricted distribution	B1, 2c
Antilope cervicapra	LR-lc	Not known	--	--
Apodemus draco	VU	Northeast	Restricted population	D2
Apodemus sylvaticus	DD	Indian Himalaya	--	--
Arctictis binturong albifrons	DD	East, northeast	--	--
Arctogalidia trivirgata	VU	Northeast	Restricted distribution Restricted population	B1, 2c; D2
Arctonyx collaris	DD	East & Himalaya	--	--
Axis axis	LR-lc	India	--	--
Axis porcinus	LR-nt	North, Northeast	--	--
Balaenoptera acutorostrata	LR-nt	East, west coast	--	--
Balaenoptera borealis	LR-nt	East, west coast	--	--
Balaenoptera edeni	LR-nt	East, west coast	--	--
Balaenoptera musculus	CR	East, west coast	Population reduction	A1b, 1d
Balaenoptera physalus	LR-nt	East, west coast	--	--
Bandicota bengalensis	LR-lc	India	--	--
Bandicota indica	LR-nt	India	--	--
Barbastella leucomelas	DD	East, north, northeast	--	--
Belomys pearsonii	LR-nt	Northeast, east	--	--
Berylmys bowersi	EN	Northeast	Restricted distribution	B1, 2c
Berylmys mackenziei	LR-lc	Northeast	--	--
Berylmys manipulus	DD	Northeast	--	--
Bos gaurus	VU	Central, east, west	Population estimates	C2a
Bos grunniens	CR	East	Population estimates	C2a
Boselaphus tragocamelus	LR-lc	Central, North, Northeast, Northwest	--	--
Callosciurus erythraeus	LR-nt	East, northeast	--	--
Callosciurus pygerythrus	LR-nt	East, northeast	--	--
Canis aureus	LR-lc	India	--	--
Canis lupus palipus	LR-nt	India	---	--
Cannomys badius	LR-lc	Northeast	--	--
Capra falconeri falconeri	CR	North	Population estimates	C2b
Capra falconeri kashmeriensis	CR	North	Population estimates	C2b
Capra ibex	VU	North	Restricted distribution	B1, 2c
Caracal caracal	LR-nt	Central, north, west	--	--
Cervus duvauceli duvauceli	EN	East, North, Northeast	Population estimates	C2a
Cervus unicolor	LR-lc	India	--	--
Chaerephon plicata	DD	India	--	--
Chimarrogale himalayica	LR-nt	North, east	--	--
Chiropodomys gliroides	VU	Northeast	Restricted population	D2
Coelops frithi	DD	East, northeast	--	--
Cremnomys blanfordi	LR-nt	Peninsular India	--	--
Cricetulus alticola	VU	North	Restricted distribution	B1, 2c

Species	IUCN	Distribution in India	Threatened due to	Criteria
Cricetulus migratorius	EN	North	Restricted distribution	B1, 2c
Crocidura attenuata	LR-lc	North, east, northeast	--	--
Crocidura fuliginosa	DD	Northeast	--	--
Crocidura horsfieldi	DD	North, sourth	--	--
Crocidura leucodon	DD	North	--	--
Crocidura pergrisea	EN	North	Restricted distribution	B1, 2c
Crocidura pullata	DD	North	--	--
Cuon alpinus adjustes	CR	Northeast	Population estimates	C2b
Cuon alpinus primaevus	VU	East, north, northeast	Restricted population	D1
Cynopterus brachyotis	LR-lc	Southwest, Andaman & Nicobar	--	--
Cynopterus sphinx	LR-lc	India	--	--
Dacnomys millardi	VU	East, northeast	Restricted population	D2
Delphinus delphis	LR-nt		--	--
Dicerorhinus sumatrensis	CR	Northeast	Restricted population	D
Diomys crumpi	EN	Northeast	Restricted distribution	B1, 2c
Dremomys lokriah	LR-nt	East, northeast	--	--
Dugong dugon	CR	Coastal waters	Population reduction Restricted distribution	A1a, 1c, 1d; D
Elephas maximus	VU	Central, north, northeast, south	Population reduction	A1a, 1c, 1d
Eonycteris spelaea	VU	Southwest, Northeast, Andaman & Nicobar	Restricted population	D2
Eothenomys melanogastor	DD	Northeast	--	--
Eptesicus pachyotis	DD	Northeast	--	--
Eptesicus serotinus	DD	North	--	--
Equus kiang	VU	East, north	Restricted distribution Restricted population	B1, 2c; D2
Eubalaena glacialis	EN	Coastal waters	Population estimates	C1, C2b
Eupetaurus cinereus	LR-nt	North, east	--	--
Felis chaus	LR-nt	India	--	--
Felis silvestris ornata	LR-nt	Central, west	--	--
Feroculus feroculus	VU	South	Restricted distribution Restricted population	B1, 2c; D2
Funambulus layardi	DD	Western Ghats	--	--
Funambulus palmarum	LR-lc	Peninsular India	--	--
Funambulus pennantii	LR-lc	India	--	--
Funambulus sublineatus	DD	Western Ghats	--	--
Gazella bennettii	LR-lc	India	--	--
Gerbillus gleadowi	LR-lc	West	--	--
Gerbillus nanus	LR-nt	West	--	--
Globicephala macrorhynchus	LR-nt	Coastal waters	--	--
Golunda ellioti	LR-lc	Throughout India	--	--
Grampus griseus	LR-nt	Indian waters	--	--
Hadromys humei	DD	Unknown	--	--
Helarctos malayanus	DD	Northeast	--	--
Hemiechinus collaris	LR-lc	Northwest, west	--	--
Hemitragus jemlahicus	LR-nt	Indian Himalaya	--	--
Herpestes edwardsii	LR-lc	Himalayan foothills	--	--
Herpestes javanicus	LR-lc	East, north, northeast	--	--
Herpestes smithii smithii	LR-lc	Peninsular India	--	--
Herpestes urva	VU	Northeast	Restricted distribution	B1, 2a, 2c
Herpestes vitticollis	LR-nt	Western Ghats	--	--
Hesperoptenus tickelli	DD	India	--	--
Hipposideros armiger	LR-nt	Northeast	--	--
Hipposideros ater	LR-nt	India	--	--
Hipposideros cineraceus	DD	Central, north	--	--
Hipposideros fulvus	LR-nt	India	--	--
Hipposideros galeritus	DD	India	--	--
Hipposideros lankadiva	VU	India	Restricted distribution	B1, 2c
Hipposideros larvatus	DD	Northeast	--	--
Hipposideros pomona	DD	South, east, northeast	--	--

Species	IUCN	Distribution in India	Threatened due to	Criteria
Hipposideros speoris	LR-nt	Central, north, south	--	--
Hyaena hyaena	LR-nt	India	--	--
Hylobates hoolock	EN	Northeast	Population estimates	C2a
Hylopetes alboniger	VU	East, northeast	Restricted distribution	B1, 2a, 2b, 2c
Hylopetes barberi	DD	Unknown	--	--
Hylopetes fimbriatus	LR-nt	North	--	--
Hyperacrius fertilis	DD	North	--	--
Hyperacrius wynnei	VU	North	Restricted population	D2
Hystrix brachyura	VU	Central, northeast	Restricted distribution Restricted population	B1, 2b, 2d; D2
Hystrix indica	LR-lc	India	--	--
Ia io	EN	Northeast	Restricted distribution	B1, 2c
Kerivoula papillosa	DD	Northeast	--	--
Kerivoula hardwickii	DD	India	--	--
Kerivoula picta	LR-nt	India	--	--
Kogia breviceps	LR-nt	Indian waters	--	--
Kogia simus	LR-nt	Indian waters	--	--
Leopoldamys edwardsi	DD	East, northeast	--	-
Lepus capensis	DD	Unknown	--	--
Lepus nigricollis	LR-lc	India	--	--
Lepus iostolus	DD	North, east	--	--
Loris tardigradus	LR-nt	South	--	--
Lynx lynx isabelina	EN	North	Restricted distribution	B1, 2b, 2c
Macaca arctoides	LR-nt	Northeast	--	--
Macaca assamensis	LR-nt	Northeast	--	--
Macaca fascicularis umbrosa	CR	Andaman & Nicobar	Population estimates	C2a
Macaca mulatta	LR-lc	East, North	--	--
Macaca nemestrina	DD	Northeast	--	--
Manis crassicaudata	LR-nt	India	--	--
Manis pentadactyla	LR-nt	Northeast	--	--
Marcoglossus sobrinus	DD	Northeast	--	--
Marmota bobak	EN	North	Restricted distribution	B1, 2a, 2b, 2c & 3a, 3b
Marmota caudata	VU	North	Restricted distribution	B1, 2a, 2b, 2c
Martes flavigula	LR-lc	North, northeast	--	-
Martes foina	DD	East, north	--	--
Megaderma lyra	LR-lc	India	--	--
Megaderma spasma	DD	India	--	--
Megaptera novaeangliae	LR-nt	East, west coasts	--	--
Megarops niphanae	DD	Northeast	--	--
Mellivora capensis	LR-nt	India	--	--
Melogale moschata	EN	Northeast	Restricted distribution	B1, 2c
Melogale personata	VU	Northeast	Restricted distribution	B1, 2c
Melursus ursinus	VU	India	Population estimates	C2a
Meriones hurriane	LR-lc	West	--	--
Micromys minutus	VU	Northeast	Restricted population	D2
Microtus leusurus	DD	North	--	-
Microtus sikimensis	LR-lc	East	--	--
Millardia gleadowi	LR-nt	Northwest, west	--	--
Millardia meltada	LR-lc	Peninsular India, Punjab	--	--
Miniopterus pusillus	DD	South, Andaman & Nicobar	--	--
Miniopterus schreibersi	LR-lc	India	--	--
Moschiola meminna	LR-nt	Peninsular India	--	--
Moschus chrysogaster	CR	Indian Himalaya	Population reduction	A1d
Muntiacus muntjak	LR-lc	Not known	--	--
Murina aurata	DD	Northeast	--	--
Murina cyclotis	DD	South, northeast	--	--
Murina huttoni	DD	Northwest, north	--	--
Murina leucogaster	DD	Northeast	--	--
Murina tubinaris	VU	North, northeast	Restricted distribution Restricted population	B1, 2c; D2
Mus booduga	LR-lc	Throughout India	--	--

Species	IUCN	Distribution in India	Threatened due to	Criteria
Mus cervicolor	LR-lc	North, northeast, Andaman & Nicobar	--	--
Mus cookii	LR-nt	Northeast, south	--	--
Mus musculus	LR-lc	India	--	--
Mus pahari	DD	East, northeast	--	--
Mus saxicola	LR-lc	North, east, west, south	--	--
Mustela altaica	DD	Indian Himalaya	--	--
Mustela erminea ferghanae	DD	North	--	--
Mustela kathiah	DD	India	--	--
Mustela putorius larvatus	DD	North	--	--
Mustela sibirica	LR-nt	India	--	--
Mustela strigidorsa	DD	Northeast	--	--
Myotis annectans	DD	Northeast	--	--
Myotis blythii	DD	North, west	--	--
Myotis daubentoni	DD	Northeast	--	--
Myotis formosus	LR-nt	North, northeast	--	--
Myotis hasseltii	DD	Northeast	--	--
Myotis horsfieldii	LR-nt	Central, south, Andaman & Nicobar	--	--
Myotis longipes	EN	North, northeast	Restricted distribution	B1, 2c
Myotis montivagus	DD	South	--	--
Myotis muricola	DD	North	--	--
Myotis mystacinus	DD	North, northeast	--	--
Myotis sicarius	VU	East	Restricted population	D2
Myotis siligorensis	DD	North, northeast	--	--
Naemorhedus sumatraensis	VU	Northeast	Restricted population	D1
Nectogale elegans	VU	Northeast Himalaya, east	Restricted population	D2
Neofelis nebulosa	LR-nt	Northeast	--	--
Neophocaena phocaenoides	LR-nt	East, west coast, Andaman & Nicobar	--	--
Nesokia indica	LR-lc	East, northwest	--	--
Niviventer brahma	EN	North	Restricted distribution	B1, 2c
Niviventer eha	VU	East	Restricted distribution Restricted population	B1, 2c; D2
Niviventer fulvescens	LR-lc	Northeast	--	--
Niviventer langbianis	DD	Northeast	--	--
Niviventer niviventer	DD	Northeast	--	--
Niviventer tenaster	DD	Northeast	--	--
Nyctalus leisleri	DD	North	--	--
Nyctalus montanus	DD	North	--	--
Nyctalus noctula	DD	North	--	--
Nycticebus coucang	LR-nt	Northeast	--	--
Ochotona curzoniae	EN	East	Restricted distribution	B1, 2a, 2b
Ochotona forresti	LR-nt	Norteast Himalaya	--	--
Ochotona ladacensis	DD	Unknown	--	--
Ochotona macrotis	DD	North	--	--
Ochotona nubrica	DD	Unknown	--	--
Ochotona roylei	LR-nt	Northeast, east Indian Himalaya	--	--
Ochotona thibetana	LR-nt	Sikkim Himalaya	--	--
Orcaella brevirostris	EN	Northeastern Indian coast	Restricted distribution	B1, 2c
Orcinus orca	LR-nt	Coastal waters of India	--	--
Otonycteris hemprichii	VU	North	Restricted population	D2
Ovis ammon	CR	Northeast, east	Population estimates	C2a
Ovis orientalis	EN	North	Restricted distribution	B1, 2c
Paguma larvata	LR-lc	Central, east, west, northeast, Andaman & Nicobar	--	--
Panthera pardus	VU	India	Population estimates	C2a
Panthera tigris	EN	India	Population estimates	C2a
Pantholops hodgsoni	CR	North	Population estimates	C2b
Paradoxurus hermaphroditus	LR-lc	Peninsular India	--	--

Species	IUCN	Distribution in India	Threatened due to	Criteria
Paraechinus micropus	LR-lc	Northwest, west	--	--
Pardofelis marmorata	LR-nt	Northeast	--	--
Peponocephala electra	LR-nt	Indian waters	--	--
Petaurista philippensis	LR-nt	Peninsular India	--	--
Physeter catodon	LR-nt	East, west coast	--	--
Pipistrellus affinis	DD	India	--	--
Pipistrellus cadornae	DD	Northeast	--	--
Pipistrellus ceylonicus	LR-lc	India	--	--
Pipistrellus coromandra	LR-nt	India	--	--
Pipistrellus dormeri	LR-nt	India	--	--
Pipistrellus kuhlii	DD	North	--	--
Pipistrellus paterculus	LR-nt	Northeast	--	--
Pipistrellus pipistrellus	VU	North	Restricted population	D2
Pipistrellus savii	DD	North	--	--
Pipistrellus tenuis	LR-lc	India	--	--
Platanista gangetica	CR	Peninsular India	Population reduction Population estimates	A1a, 1c, 1d; C1, C2a
Plecotus austriacus	DD	North	--	--
Plecotus auritus	DD	North, northeast	--	--
Prionailurus bengalensis	LR-nt	India	--	--
Prionailurus rubiginosus rubiginosus	LR-nt	Peninsular India	--	--
Prionailurus viverrinus	VU	East, north, northeast, south	Restricted distribution	B1, 2a, 2b, 2c
Prionodon pardicolor	VU	East, northeast	Restricted distribution	B2, 2a, 2c
Procapra picticaudata picticaudata	CR	North, east	Restricted population	D
Pseudois nayaur	LR-lc	Indian Himalaya	--	--
Psuedorca crassidens	LR-nt	Indian waters	--	--
Pteropus giganteus giganteus	LR-nt	India	--	--
Pteropus melanotus	DD	Andaman & Nicobar	--	--
Pteropus vampyrus	DD	Andaman & Nicobar	--	--
Rattus nitidus	DD	North, northeast	--	--
Rattus norvegicus	LR-lc	Throughout India	--	--
Rattus rattus	LR-lc	Throughout India	--	--
Rattus sikkimensis	DD	East, northeast	--	--
Rattus tiomanicus	VU	Andaman & Nicobar	Restricted population	D2
Rattus turkestanicus	DD	Indian Himalaya	--	--
Ratufa bicolor gigantea	VU	East, northeast	Population reduction	A1c
Ratufa macroura dandolena	EN	Southern Western Ghats	Restricted distribution Population estimates	B1, 2c; C1
Rhinoceros sondaicus	EX	--	--	--
Rhinoceros unicornis	EN	East, north, northeast	Restricted distribution	B1, 2d
Rhinolophus affinis	LR-nt	Northeast, Andaman & Nicobar	--	--
Rhinolophus ferrumequinum	VU	North, east	Restricted distribution Restricted population	B1, 2c; D2
Rhinolophus hipposideros	VU	North	Restricted population	D2
Rhinolophus lepidus	LR-nt	India	--	--
Rhinolophus pearsonii	LR-nt	Northeast	--	--
Rhinolophus pusillus	LR-nt	East, northeast	--	--
Rhinolophus rouxi	LR-nt	India	--	--
Rhinolophus subbadius	CR	Northeast	Restricted distribution	B1, 2c
Rhinolophus trifoliatus	DD	Northeast	--	--
Rhinolophus yunanensis	DD	Northeast	--	--
Rhinolopus luctus	DD	India	--	--
Rhinopoma hardwickii	LR-nt	India	--	--
Rhinopoma microphyllum	LR-nt	Central, northwest, north	--	--
Rhizomys pruinosus	LR-nt	Northeast	--	--
Rousettus leschenaulti	LR-lc	India	--	--
Saccolaimus saccolaimus	DD	India	--	--
Scotoecus pallidus	LR-nt	East, north	--	--
Scotomanes ornates	DD	Northeast	--	--

Species	IUCN	Distribution in India	Threatened due to	Criteria
Scotophilus heathi	LR-lc	India	--	--
Scotophilus kuhlii	LR-nt	India	--	--
Semnopithecus entellus	LR-lc	India	--	--
Sicista concolor	DD	North	--	--
Soriculus caudatus	VU	North, east, northeast	Restricted distribution	B1, 2c
Sorex minutus	VU	North	Restricted population	D2
Soriculus leucops	VU	Northeast	Restricted distribution Restricted population	B1, 2c; D2
Soriculus macrurus	VU	East	Restricted distribution Restricted population	B1, 2c; D2
Soriculus nigrescens	VU	Indian Himalaya	Restricted distribution	B1, 2c
Sousa chinensis	EN	Indian waters	Population reduction	A1a, 1c, 1d, 2b
Sphaerias blanfordi	DD	North, east	--	--
Stenella longirostris	LR-nt	Coastal waters of India	--	--
Suncus etruscus	LR-lc	Western Ghats	--	--
Suncus montanus	VU	Western Ghats	Restricted distribution	B1, 2b
Suncus murinus	LR-lc	India	--	--
Suncus stoliczkanus	LR-lc	Peninsular India	--	--
Sus salvanius	CR	Northeast	Population estimates	C2a
Sus scrofa	LR-lc	India	--	--
Tadarida aegyptiaca	LR-nt	India	--	--
Tadarida teniotis	DD	Northeast	--	--
Talpa leucura	VU	Northeast	Restricted distribution	B1, 2c
Talpa micrura	LR-lc	East, northeast	--	--
Tamiops macclellandi	LR-nt	North, northeast	--	--
Taphozous longimanus	LR-lc	Peninsular India	--	--
Taphozous melanopogan	LR-nt	Peninsular India, Andaman & Nicobar	--	--
Taphozous nudiventris	LR-nt	India	--	--
Taphozous perforatus	LR-nt	West	--	--
Taphozous theobaldi	DD	Central	--	--
Tatera indica	LR-lc	India except east	--	--
Tetracerus quadricornis	LR-nt	India	--	--
Trachypithecus geei	CR	Northeast	Population estimates	C2a
Trachypithecus phayrei	EN	Northeast	Population estimates	C1, 2a
Trachypithecus pileatus	LR-nt	Northeast	--	--
Tupaia belangeri	LR-lc	Northeast, East Himalaya	--	--
Tursiops truncatus	LR-nt	Coastal waters of India	--	--
Tylonycteri spachypus	LR-nt	east, south, north	--	--
Uncia uncia	EN	Indian Himalaya	Population estimates	C2a
Ursus arctos	LR-nt	Indian Himalaya	--	--
Ursus thibetanus	LR-lc	Indian Himalaya	--	--
Vandeleuria oleracea	LR-lc	Throughout India	--	--
Viverra zibetha	VU	Northeast	Population reduction	A1c
Viverricula indica	LR-nt	India	--	--
Vulpes bengalensis	LR-nt	India	--	--
Vulpes vulpes montana	LR-nt	Indian Himalaya	--	--
Vulpes vulpes pusilla	LR-nt	West	--	--
Ziphius cavirostris	LR-nt	Indian waters	--	--

opposed to one person compiling data in isolation 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 mammals was intended to cover all mammalian taxa of India. At the beginning of the workshop an interactive discussion was held in which workshop participants agreed on a strategy for the exercise and selected four working groups that would assess mammals according to families, with group members moving around from group to group depending on their experience and expertise. 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 mammalian status evaluation, it also provided mammal researchers an opportunity to discuss checklists and taxonomy with other mammal field biologists and taxonomists in India. Special Issue Working Groups on the Wildlife Protection Act, Marine Mammals, Data Deficient species, and IUCN Red List Criteria were formed, though many issues were discussed during the assessments also

Assessment

The checklist of Indian mammals compiled by P.O. Nameer gives the total number of mammalian species in India to be 404, however, this total did not include subspecies and included domestic mammals. At the workshop, a total of 372 mammal taxa (both species and subspecies) were evaluated. The group decided to assess only "wild" mammals and did not include domestic animals such as dog, cat, cow, etc.

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.

Results

A total of 372 taxa were assessed at the workshop – 54 endemics and 318 non-endemics. Of the assessed taxa, a total of 45 families are represented among Indian mammals of which families Muridae and Vespertelionidae are the most represented followed by Sciuridae and Soricidae. One taxon each represents families Ailuridae, Balaenidae, Caprinae, Dugongidae, Elephantidae, Equidae, Hyaenidae, Hylobatidae, Moschidae, Planistidae, Tragulidae and Ziphiidae (all non-endemics).

Endemic mammals constitute 14.5% (54 taxa) of the total mammalian fauna of India while non-endemics make up the other 85.5% (318 taxa). Western Ghats, the richest biogeographic region has 26% of the endemic mammals in India. Northeastern India, though rich with mammalian fauna, does not have many endemics because of the political limits of the country cutting through the eastern Himalayan biogeographic zone. Only 3 taxa are found within the Indian political limits in this region. Andaman and Nicobar Islands have 9 mammals restricted to the region. Seven mammals are endemic to northern India, while 4 are restricted within southern India. The figure below illustrates the distribution of endemic taxa assessed in India. Sixteen taxa are restricted to different parts of the country like northern, eastern, western, central, or a combination of any of those regions in the country.

Criteria for threat

Totally 118 taxa (31.7% of all Indian mammals) are threatened in India Of this number, 35 are endemic (65%) and 83 non-endemic (26%).

Most of the endemic mammals in India that are threatened are so because of restricted distribution. Forty-five endemics are found in less than 10 locations with 16 of those occuring in a single location. This high percentage (83%) of limited locations to which taxa are confined is the reason for a majority of the threatened endemic taxa to qualify for "Criterion B", for restricted distribution.

The same is observed even for non-endemics as 39 taxa (42%) qualify for criterion B. Twenty-one non-endemic mammals are found only in 1 location in India.

Because of limited locations in both endemic and non-endemic taxa, one-fourth of the threatened taxa are so categorised due to population restriction, "Criterion D". This criterion applies only to the category of Vulnerable where an assessed taxa is limited to either less than 5 locations or less than 100 square kilometres in area of occupancy. Five endemic and 27 non-endemic taxa are categorised as threatened because of restricted population.

A negligible number of taxa are assessed as threatened based on population reduction (Criterion A) since population trends are least understood for mammals.

Population estimation (Criterion C), on the other hand has been the basis for categorising 31 taxa of mammals (12 endemics and 19 non-endemics). This criterion takes into account both population numbers and fluctuation along with restricted distribution.

Threats

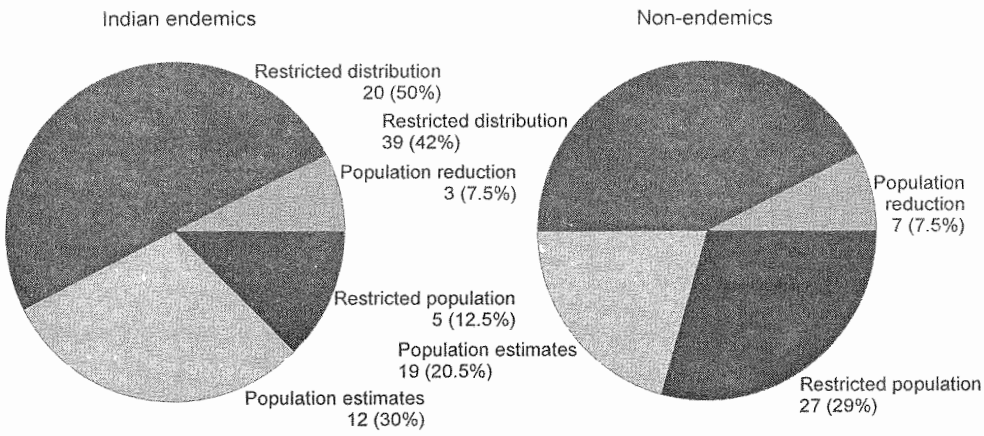
Loss of habitat and human interference are the two most common threats facing mammals in India with fragmentation of habitat also a significant factor. Lack of consistent studies on population dynamics for most of the species preclude confident statements or even inference of reduction in population. Therefore, population reduction criterion (Criterion A) has been used to determine status only for 11 taxa. For the most part, assessments have been made on the state of the habitat currently and knowledge of the habitat over years with respect to species distribution. Reduction in the extent of occurrence, area of occupancy or quality of habitat has been easier to determine because of the threats to the taxa. Hence, threats combined with limited locations for various taxa have been based on this.

Human interference (man-made fires, lopping, grazing, etc.) has taken a large toll of mammal populations. Dramatic losses of habitat have taken place, which has led to reduction in areas of occupancy, distributional ranges and habitat structure. Pesticides and pollution are thought to be of concern to mammal survival but the effects are not yet well studied or documented. Threats to mammals are varied depending on the habit and habitat of the taxon. For example marine mammals are threatened with collision with ships and sound pollution, two threats that would not cause much harm to other mammals.

Trade

Quite a few mammals are in trade: they are hunted for food, medicine or for parts. Of the assessed taxa, 4 endemics are in trade while 61 of the non-endemics are in trade of some form. Trade is carried out at different levels, namely, local (community, village or localised area), domestic

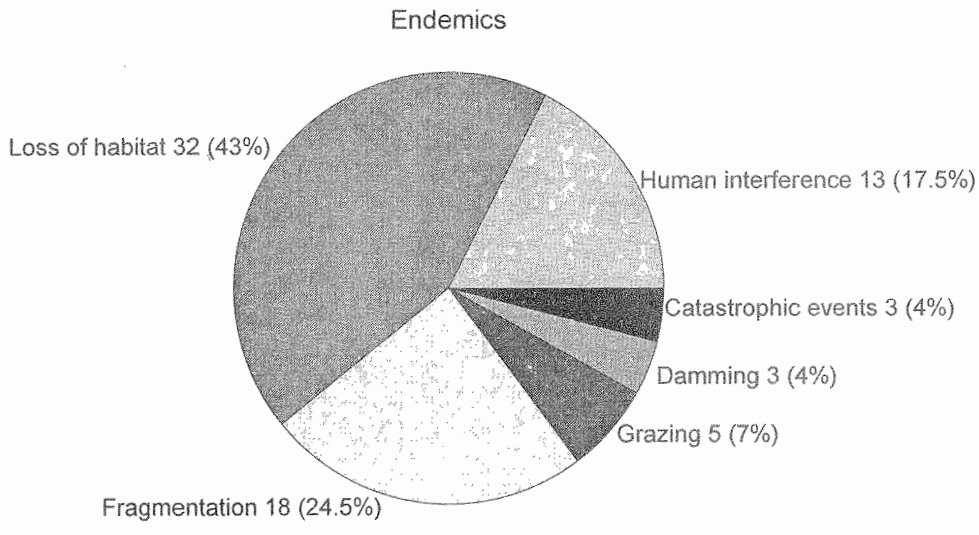
Criteria used for threat assessment



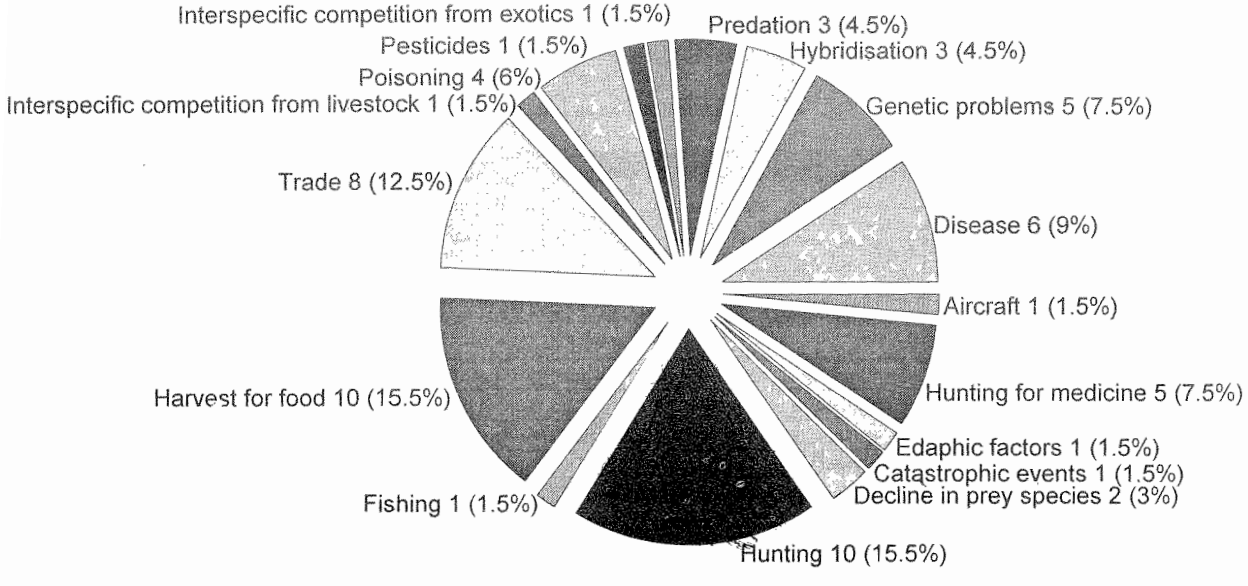
Number of endemics assessed = 54
Number of endemics threatened = 35

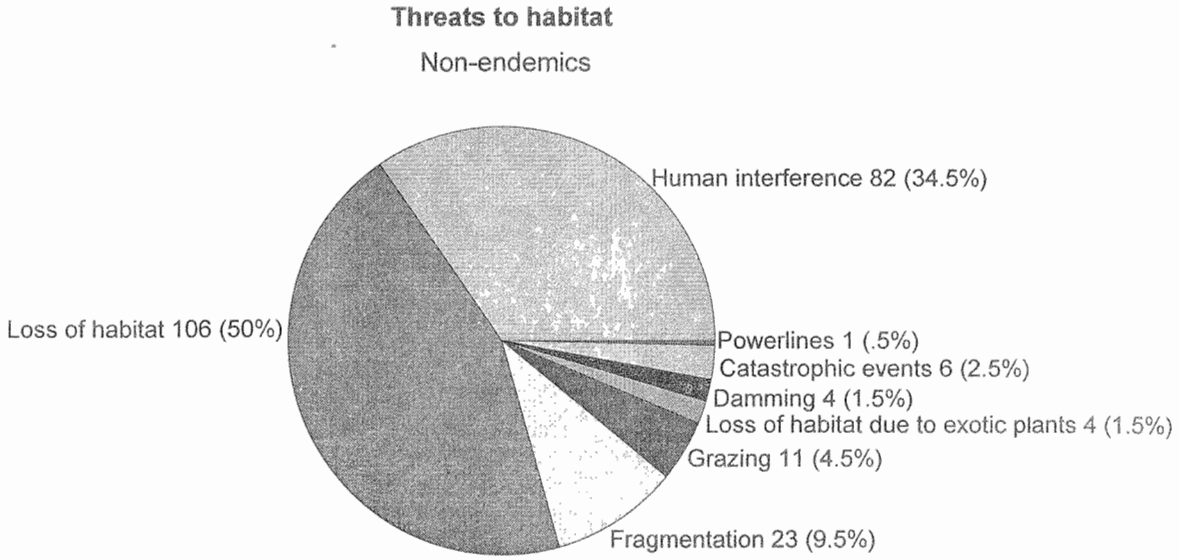
Number of non-endemics assessed = 318
Number of non-endemics threatened = 83

Threats to habitat



Threats to population





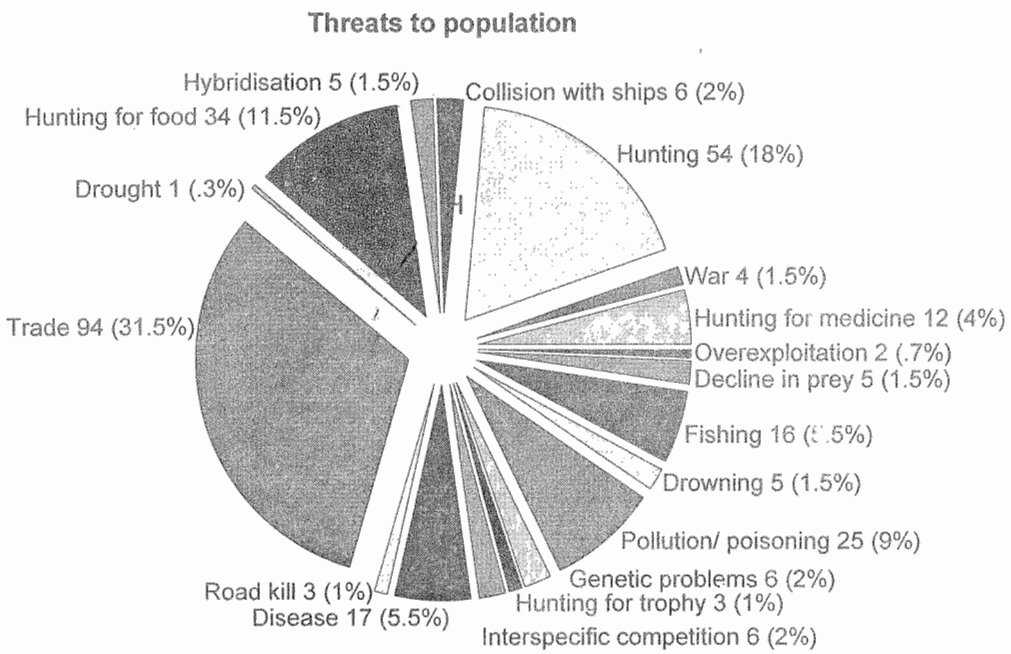


Table 3. Threats to mammals of India

Species	Threats	IUCN
INDIAN ENDEMICS		
Alticola albicauda	Unknown	DD
Anathana ellioti	Loss of habitat, Fragmentation	LR-nt
Atherurus macrourus assamensis	Loss of habitat	EN
Biswamoyopterus biswasi	Human interference, Loss of habitat	CR
Bubalus arnee	Cattle grazing, Disease, Genetic problem, Hybridization	EN
Cervus duvaucell branderi	Disease, Genetic problem, Interspecific competition from exotics, Predation	CR
Cervus elaphus hanglu	Cattle grazing, Disease, Fire, Genetic problem, Human interference, Hunting for food, Loss of habitat, Pesticides, Poisoning, Interspecific competition with domestic livestock	CR
Cervus eldii eldii	Cattle grazing, Damming, Fishing, Genetic problem, Human interference, Hunting, Loss of habitat, Siltation	CR
Cremnomys cutchicus	No	LR-lc

Species	Threats	IUCN
Cremnomys elvira	No	VU
Crocidura andamanensis	No	DD
Crocidura hispida	Fragmentation	EN
Crocidura jenkinsi	Unknown	DD
Crocidura nicobarica	No	DD
Cuon alpinus dekhanensis	Disease, Decline in prey species, Human interference, Hybridization, Loss of habitat, Fragmentation, Poisoning	LR-nt
Cuon alpinus laniger	Disease, Decline in prey species, Hybridization, Loss of habitat, Poisoning	CR
Eptesicus nilssoni	Unknown	DD
Eptesicus tatei	Unknown	DD
Funambulus tristriatus	Hunting, Hunting for food, Loss of habitat	LR-nt
Harpiocephalus harpia	Unknown	DD
Hemitragus hylocrius	Human interference, Hunting, Hunting for food, Loss of habitat	EN
Herpestes fuscus fuscus	Loss of habitat, Fragmentation	VU
Herpestes palustris	Catastrophic events, Edaphic factors, Human interference, Loss of habitat, Fragmentation	EN
Hipposideros schistaceus	Unknown	DD
Latidens salimalii	Loss of habitat, Fragmentation	EN
Macaca radiata	Loss of habitat, Predation	LR-lc
Macaca silenus	Loss of habitat, Hunting, Hunting for food, Hunting for medicine, Trade (Local)	EN
Martes gwatkinsi	Human interference, Hunting, Loss of habitat, Fragmentation	VU
Millardia kondana	Unknown	VU
Murina grisea	Unknown	VU
Mus famulus	Loss of habitat, Fragmentation, Human interference	EN
Mus phillipsi	Drowning, Fragmentation, Poisoning	LR-lc
Mus platythrix	No	LR-lc
Otomops wroughtoni	Human interference, Loss of habitat	CR
Ovis vignei vignei	Aircraft, Cattle grazing, Damming, Human interference, Hunting, Loss of habitat,	EN
Panthera leo persica	Cattle grazing, Disease, Genetic problem, Human interference, Loss of habitat	CR
Paradoxurus jerdoni	Hunting for food, Loss of habitat, Fragmentation	VU
Paraechinus micropus nudiventris	Loss of habitat, Fragmentation	VU
Petinomys fuscocapillus fuscocapillus	Loss of habitat, Fragmentation	VU
Plantacanthomys lasiurus	Loss of habitat, Human interference	LR-lc
Pteropus faunulus	Loss of habitat	VU
Rattus palmarum	Unknown	DD
Rattus ranjiniae	Unknown	VU
Rattus stoicus	Unknown	VU
Ratufa indica centralis	Hunting, Hunting for food, Hunting for medicine,, Loss of habitat, Fragmentation, Trade (Domestic, Commercial), Trade for parts,	VU
Ratufa indica dealbata	Human interference, Hunting, Hunting for food, Hunting for medicine, Loss of habitat, Fragmentation	EX
Ratufa indica indica	Hunting, Hunting for food, Hunting for medicine,, Loss of habitat, Fragmentation, Trade (Domestic, Commercial), Trade for parts	VU
Ratufa indica maxima	Damming, Hunting, Hunting for food, Loss of habitat, Fragmentation, Trade for parts	VU
Rhinolophus cognatus	Unknown	DD
Rhinolophus mitratus	Unknown	VU
Suncus dayi	Loss of habitat	VU
Trachypithecus johnii	Hunting for medicine,, Hunting, Hunting for food, Loss of habitat, Trade for parts, Trade (Local, Domestic)	VU
Tupaia nicobarica	Loss of habitat, Fragmentation	EN
Viverra civettina	Hunting, Loss of habitat, Fragmentation, Predation,	CR
NON-ENDEMICS		
Acinonyx jubatus venaticus	No	EX
Ailurus fulgens fulgens	Hunting, Loss of habitat, Fragmentation, Trade (International, Commercial)	VU
Alticola montosa	No	DD
Alticola roylei	Unknown	DD

Species	Threats	IUCN
Alticola stoliczkanus	Unknown	DD
Anourosorex squamipes	Loss of habitat, Human interference, Fragmentation	VU
Antilope cervicapra	Hunting, Loss of habitat	LR-lc
Apodemus draco	Unknown	VU
Apodemus sylvaticus	Unknown	DD
Arctictis binturong albifrons	Hunting, Loss of habitat, Fragmentation, Trade (International)	DD
Arctogalidia trivirgata	Human interference, Loss of habitat	VU
Arctonyx collaris		DD
Axis axis	Cattle grazing, Disease, Human interference, Hunting for food, Loss of habitat due to exotic plants	LR-lc
Axis porcinus	Hunting for food, Loss of habitat	LR-nt
Balaenoptera acutorostrata	Colliasion with shipping, Pollution, Fishing, Trade (International)	LR-nt
Balaenoptera borealis	Hunting, Colliasion with shipping, Pollution, Trade (International)	LR-nt
Balaenoptera edeni	Hunting, Colliasion with shipping, Pollution	LR-nt
Balaenoptera musculus	Hunting, Pollution, Trade (International)	CR
Balaenoptera physalus	Hunting, Colliasion with shipping, Pollution	LR-nt
Bandicota bengalensis	No	LR-lc
Bandicota indica	Interspecific competition, Loss of habitat, Pesticides	LR-nt
Barbastella leucomelas	Unknown	DD
Belomys pearsonii	Disease, Human interference, Hunting, Loss of habitatandslide, Loss of habitat, Fragmentation	LR-nt
Berylmys bowersi	Human interference	EN
Berylmys mackenziei	No	LR-lc
Berylmys manipulus	Unknown	DD
Bos gaurus	Cattle grazing, Disease, Drowning, Human interference, Hunting, Hunting for food, Loss of habitat, Loss of habitat due to exoitc plants, Fragmentation, Trade (Domestic)	VU
Bos grunniens	Disease, Genetic problem, Hybridization	CR
Boselaphus tragocamelus	Disease, Hunting for food, Loss of habitat, Trade (Local, Domestic)	LR-lc
Callosciurus erythraeus	Hunting, Hunting for food, Loss of habitat	LR-nt
Callosciurus pygerythrus	Hunting, Hunting for food, Loss of habitat	LR-nt
Canis aureus	Hunting, Poisoning, Trade for parts,	LR-lc
Canis lupus palipus	Human interference, Hunting, Hybridization, Loss of habitat, Poisoning, Trade for parts, Trade (Commercial, International)	LR-nt
Cannomys badius	Loss of habitat	LR-lc
Capra falconeri falconeri	Disease, Hunting	CR
Capra falconeri kashmeriensis	Disease, Hunting	CR
Capra ibex	Cattle grazing, Damming, Human interference, Hunting, Hunting for food, Interspecific competition from exotics, Loss of habitat, War	VU
Caracal caracal	Human interference, Loss of habitat, Fragmentation, Trade (Domestic, Commercial, Local)	LR-nt
Cervus duvauceli duvauceli	Cattle grazing, Disease, Hunting, Loss of habitat	EN
Cervus unicolor	Cattle grazing, Disease, Human interference, Hunting for food, Loss of habitat, Trade (Domestic, Commercial, International)	LR-lc
Chaerephon plicata	Unknown	DD
Chimarrogale himalayica	Loss of habitat, Fragmentation	LR-nt
Chiropodomys gliroides	Unknown	VU
Coelops frithi	Unknown	DD
Cremnomys blanfordi	Human interference, Loss of habitat	LR-nt
Cricetulus alticola	Human interference	VU
Cricetulus migratorius	Human interference	EN
Crocidura attenuata	No	LR-lc
Crocidura fuliginosa	No	DD
Crocidura horsfieldi	No	DD
Crocidura leucodon	Unknown	DD
Crocidura pergrisea	Loss of habitat, Fragmentation	EN
Crocidura pullata	Unknown	DD
Cuon alpinus adjustes	Disease, Decline in prey species, Hybridization, Loss of habitat, Poisoning	CR
Cuon alpinus primaevus	Disease, Decline in prey species, Hybridization, Loss of habitat, Poisoning	VU
Cynopterus brachyotis	No	LR-lc

Species	Threats	IUCN
Cynopterus sphinx	No	LR-lc
Dacnomys millardi	Unknown	VU
Delphinus delphis	Fishing, Pollution	LR-nt
Dicerorhinus sumatrensis	Unknown	CR
Diomys crumpi	Human interference	EN
Dremomys lokriah	Hunting, Loss of habitat	LR-nt
Dugong dugon	Dynamite and destructive fishing, Fishing, Human interference, Huricane, Loss of habitat, Over exploitationer exploitation, Trade (Local)	CR
Elephas maximus	Disease, Drought, Genetic problem, Human interference, Hunting, Loss of habitat, Loss of habitat due to exoitc plants, Fragmentation, Powerlines, Road kills, Trade for parts, Trade (Domestic, International)	VU
Eonycteris spelaea	No	VU
Eothenomys melanogastor	Unknown	DD
Eptesicus pachyotis	Unknown	DD
Eptesicus serotinus	Unknown	DD
Equus kiang	Human interference	VU
Eubalaena glacialis	Hunting, Colliasion with shipping, Pollution, Fishing, Trade (International)	EN
Eupetaurus cinereus	Cattle grazing, Trade for parts, Trade (Domestic)	LR-nt
Felis chaus	Human interference, Hunting for food, Trade (International, Commercial)	LR-nt
Felis silvestris ornata	Hybridization, Loss of habitat, Loss of habitat due to exoitc plants, Trade for parts, Trade (International, Commercial)	LR-nt
Feroculus feroculus	Fragmentation	VU
Funambulus layardi	Unknown	DD
Funambulus palmarum	Trade (Domestic, Commercial)	LR-lc
Funambulus pennantii	Trade (Domestic, Commercial)	LR-lc
Funambulus sublineatus	No	DD
Gazella bennettii	Hunting for food	LR-lc
Gerbillus gleadowi	Human interference, Loss of habitat	LR-lc
Gerbillus nanus	Loss of habitat	LR-nt
Globicephala macrorhynchus	Fishing	LR-nt
Golunda ellioti	No	LR-lc
Grampus griseus	Fishing	LR-nt
Hadromys humei	Unknown	DD
Helarctos malayanus	Hunting, Hunting for medicine, Loss of habitat, Trade (Local)	DD
Hemiechinus collaris	No	LR-lc
Hemitragus jemlahicus	Human interference, Hunting for food, Loss of habitat, Trade (Local)	LR-nt
Herpestes edwardsii	Hunting trophies, Hunting for food, Hunting for medicine, Trade (Local, Domestic), Trade for parts,	LR-lc
Herpestes javanicus	Hunting trophies, Hunting for food, Pesticides, Road kills, Trade for parts, Trade (Domestic, Commercial, International)	LR-lc
Herpestes smithii smithii	Loss of habitat, Fragmentation, Trade for parts, Trade (Local, Commercial, Domestic)	LR-lc
Herpestes urva	Loss of habitat, Poisoning	VU
Herpestes vitticollis	Loss of habitat, Fragmentation	LR-nt
Hesperoptenus tickelli	Unknown	DD
Hipposideros armiger	Human interference, Loss of habitat	LR-nt
Hipposideros ater	Human interference, Loss of habitat	LR-nt
Hipposideros cineraceus	Unknown	DD
Hipposideros fulvus	Human interference, Loss of habitat	LR-nt
Hipposideros galeritus	Unknown	DD
Hipposideros lankadiva	Human interference, Loss of habitat	VU
Hipposideros larvatus	Unknown	DD
Hipposideros pomona	Unknown	DD
Hipposideros speoris	Human interference, Loss of habitat	LR-nt
Hyaena hyaena	Poisoning, Road kills, Trade (Local, Domestic, International)	LR-nt
Hylobates hoolock	Hunting, Hunting for food, Hunting for medicine,, Loss of habitat, Fragmentation, Trade for parts, Trade (Local, Domestic)	EN
Hylopetes alboniger	Human interference, Loss of habitat	VU
Hylopetes barberi	Unknown	DD
Hylopetes fimbriatus	Human interference, Loss of habitat	LR-nt
Hyperacrius fertilis		DD
Hyperacrius wynnei	No	VU

Species	Threats	IUCN
Hystrix brachyura	Loss of habitat, Fragmentation	VU
Hystrix indica	Hunting for food, Trade for parts, Trade (Domestic)	LR-lc
Ia io	Human interference	EN
Kerivoula papillosa	Unknown	DD
Kerivoula hardwickii	Unknown	DD
Kerivoula picta	Human interference	LR-nt
Kogia breviceps	Fishing	LR-nt
Kogia simus	Fishing	LR-nt
Leopoldamys edwardsi	Unknown	DD
Lepus capensis	Unknown	DD
Lepus nigricollis	Hunting, Loss of habitat, Pesticides, Poisoning	LR-lc
Lepus iostolus	Unknown	DD
Loris tardigradus	Hunting, Hunting for medicine, Trade (Local, Commercial)	LR-nt
Lynx lynx isabelina	Loss of habitat, Fragmentation	EN
Macaca arctoides	Hunting, Loss of habitat, Trade (Domestic)	LR-nt
Macaca assamensis	Human interference, Hunting for food, Loss of habitat	LR-nt
Macaca fascicularis umbrosa	Human interference, Loss of habitat, Predation	CR
Macaca mulatta	Trade (Domestic, Commercial)	LR-lc
Macaca nemestrina	Unknown	DD
Manis crassicaudata	Human interference, Hunting, Hunting for medicine, Trade for parts, Trade (Local, Domestic)	LR-nt
Manis pentadactyla	Human interference, Loss of habitat	LR-nt
Marcoglossus sobrinus	Unknown	DD
Marmota bobak	Human interference, Loss of habitat, War	EN
Marmota caudata	Human interference, Hunting, Hunting for food, Loss of habitat, War	VU
Martes flavigula	Hunting, Trade for parts	LR-lc
Martes foina	Unknown	DD
Megaderma lyra	No	LR-lc
Megaderma spasma	Unknown	DD
Megaptera novaeangliae	Colliasion with shipping, Fishing	LR-nt
Megarops niphanae	No	DD
Mellivora capensis	Human interference, Loss of habitat	LR-nt
Melogale moschata	Hunting for food, Loss of habitat, Trade (Local)	EN
Melogale personata	Loss of habitat	VU
Melursus ursinus	Hunting, Fragmentation, Poisoning, Trade for parts, Trade (Commercial International)	VU
Meriones hurriane	Loss of habitat, Pesticides	LR-lc
Micromys minutus	Unknown	VU
Microtus leusurus	Unknown	DD
Microtus sikimensis	No	LR-lc
Millardia gleadowi	Loss of habitat	LR-nt
Millardia meltada	Interspecific competition, Pesticides, Poisoning	LR-lc
Miniopterus pusillus	Unknown	DD
Miniopterus schreibersi	No	LR-lc
Moschiola meminna	Hunting, Hunting for food	LR-nt
Moschus chrysogaster	Hunting, Trade for parts, Trade (Commercial, International)	CR
Muntiacus muntjak	Hunting food	LR-lc
Murina aurata	Unknown	DD
Murina cyclotis	Unknown	DD
Murina huttoni	Unknown	DD
Murina leucogaster	Unknown	DD
Murina tubinaris	Human interference	VU
Mus booduga	Drowning, Pesticides, Poisoning,	LR-lc
Mus cervicolor	No	LR-lc
Mus cookii	Loss of habitat, Fragmentation	LR-nt
Mus musculus	Unknown	LR-lc
Mus pahari	Unknown	DD
Mus saxicola	Drowning, Poisoning	LR-lc
Mustela altaica	Unknown	DD
Mustela erminea ferghanae	Unknown	DD
Mustela kathiah	Unknown	DD
Mustela putorius larvatus	Unknown	DD

Species	Threats	IUCN
Mustela sibirica	Human interference, Fragmentation	LR-nt
Mustela strigidorsa	Unknown	DD
Myotis annectans	Unknown	DD
Myotis blythii	Unknown	DD
Myotis daubentoni	Unknown	DD
Myotis formosus	Human interference, Loss of habitat	LR-nt
Myotis hasseltii	Unknown	DD
Myotis horsfieldii	Human interference	LR-nt
Myotis longipes	Human interference	EN
Myotis montivagus	Unknown	DD
Myotis muricola	Unknown	DD
Myotis mystacinus	Unknown	DD
Myotis sicarius	Unknown	VU
Myotis siligorensis	Unknown	DD
Naemorhedus sumatraensis	Human interference, Hunting for food, Loss of habitat, Trade (Local)	VU
Nectogale elegans	Loss of habitat, Human interference	VU
Neofelis nebulosa	Decline in prey species, Hunting trophies, Hunting, Loss of habitat, Trade for parts, Trade (Commercial, International)	LR-nt
Neophocaena phocaenoides	Fishing	LR-nt
Nesokia indica	Drowning	LR-lc
Niviventer brahma	Human interference, Loss of habitat	EN
Niviventer eha	Human interference, Loss of habitat	VU
Niviventer fulvescens	No	LR-lc
Niviventer langbianis	Unknown	DD
Niviventer niviventer	Unknown	DD
Niviventer tenaster	Unknown	DD
Nyctalus leisleri	Unknown	DD
Nyctalus montanus	Unknown	DD
Nyctalus noctula	Unknown	DD
Nycticebus coucang	Hunting for medicine, Loss of habitat, Fragmentation, Trade (Commercial, International)	LR-nt
Ochotona curzoniae	Human interference, Loss of habitat, War	EN
Ochotona forresti	Human interference, Loss of habitat, Siltation	LR-nt
Ochotona ladacensis	Unknown	DD
Ochotona macrotis	Unknown	DD
Ochotona nubrica	Unknown	DD
Ochotona roylei	Human interference, Loss of habitat, War	LR-nt
Ochotona thibetana	Human interference, Loss of habitat	LR-nt
Orcaella brevirostris	Fishing, Siltation	EN
Orcinus orca	Fishing	LR-nt
Otonycteris hemprichii	Unknown	VU
Ovis ammon	Interspecific competition, Cattle grazing, Disease, Hunting, Hunting for food, Predation	CR
Ovis orientalis	Cattle grazing, Damming, Hunting	EN
Paguma larvata	Hunting, Loss of habitat, Trade (Local, International)	LR-lc
Panthera pardus	Hunting, Loss of habitat, Over exploitationer exploitation, Poisoning, Trade (Commercial, International)	VU
Panthera tigris	Decline in prey species, Hunting for medicine, Fragmentation, Poisoning, Trade for parts, Trade (Commercial, International)	EN
Pantholops hodgsoni	Disease, Hunting, Hunting for food, Trade for parts, Trade (Commercial, International)	CR
Paradoxurus hermaphroditus	Hunting, Hunting for food, Road kills, Trade for parts, Trade (Commercial, International)	LR-lc
Paraechinus micropus	Predation	LR-lc
Pardofelis marmorata	Hunting, Trade for parts, Trade (Commercial, International)	LR-nt
Peponocephala electra	Fishing	LR-nt
Petaurista philippensis	Human interference, Hunting, Hunting for food, Loss of habitat, Fragmentation, Trade (Domestic)	LR-nt
Physeter catodon	Hunting, Trade (Local)	LR-nt
Pipistrellus affinis	Unknown	DD
Pipistrellus cadornae	Unknown	DD
Pipistrellus ceylonicus	No	LR-lc

Species	Threats	IUCN
Pipistrellus coromandra	Human interference, Loss of habitat	LR-nt
Pipistrellus dormeri	Human interference, Loss of habitat	LR-nt
Pipistrellus kuhlii	Unknown	DD
Pipistrellus paterculus	Human interference, Loss of habitat	LR-nt
Pipistrellus pipistrellus	Unknown	VU
Pipistrellus savii	Unknown	DD
Pipistrellus tenuis	No	LR-lc
Platanista gangetica	Decline in prey species, Dynamite and destructive fishing, Fishing, Hunting for food, Loss of habitat, Fragmentation, Pollution, Siltation, Trade for parts, Trade (Domestic)	CR
Plecotus austriacus	Unknown	DD
Plecotus auritus	Unknown	DD
Prionailurus bengalensis	Human interference, Loss of habitat, Trade (Commercial, Loss of habitatocal)	LR-nt
Prionailurus rubiginosus rubiginosus	Hybridization, Road kills	LR-nt
Prionailurus viverrinus	Dynamite and destructive fishing, Human interference, Loss of habitat, Trade for parts, Trade (International, Commercial)	VU
Prionodon pardicolor	Hunting, Loss of habitat	VU
Procapra picticaudata picticaudata	Loss of habitat, Human interference	CR
Pseudois nayaur	Cattle grazing, Disease, Hunting	LR-lc
Psuedorca crassidens	Fishing	LR-nt
Pteropus giganteus giganteus	Human interference, Hunting, Hunting for food, Hunting for medicine, Loss of habitat	LR-nt
Pteropus melanotus	Unknown	DD
Pteropus vampyrus	Unknown	DD
Rattus nitidus	Unknown	DD
Rattus norvegicus	Interspecific competition	LR-lc
Rattus rattus	Interspecific competition	LR-lc
Rattus sikkimensis	Loss of habitat	DD
Rattus tiomanicus	No	VU
Rattus turkestanicus	Unknown	DD
Ratufa bicolor gigantea	Hunting, Hunting for food, Hunting for medicine,, Loss of habitat, Fragmentation, Trade (Domestic, Commercial, International), Trade for parts	VU
Ratufa macroura dandolena	Damming, Siltation, Genetic problem, Hunting, Hunting for food, Loss of habitat, Fragmentation	EN
Rhinoceros sondaicus	Loss of habitat	EX
Rhinoceros unicornis	Cattle grazing, Disease, Drowning, E, Genetic problem, Hunting, Loss of habitat, Loss of habitat due to exoitc plants, Powerlines, Trade for parts, Interspecific competition with domestic livestock, Trade (Commercial, International)	EN
Rhinolophus affinis	Human interference, Loss of habitat	LR-nt
Rhinolophus ferrumequinum	Loss of habitat, Human interference	VU
Rhinolophus hipposideros	Unknown	VU
Rhinolophus lepidus	Human interference, Loss of habitat	LR-nt
Rhinolophus pearsonii	Human interference, Loss of habitat	LR-nt
Rhinolophus pusillus	Human interference	LR-nt
Rhinolophus rouxi	Human interference, Loss of habitat	LR-nt
Rhinolophus subbadius	Human interference	CR
Rhinolophus trifoliatus	No	DD
Rhinolophus yunanensis	Unknown	DD
Rhinolopus luctus	Unknown	DD
Rhinopoma hardwickii	Genetic problem, Human interference, Loss of habitat	LR-nt
Rhinopoma microphyllum	Genetic problem, Human interference, Loss of habitat	LR-nt
Rhizomys pruinosus	Hunting for food, Loss of habitat	LR-nt
Rousettus leschenaulti	No	LR-lc
Saccolaimus saccolaimus	Unknown	DD
Scotoecus pallidus	Human interence	LR-nt
Scotomanes ornates	Unknown	DD
Scotophilus heathi	No	LR-lc

Species	Threats	IUCN
Scotophilus kuhlii	Human interence	LR-nt
Semnopithecus entellus	No	LR-lc
Sicista concolor	Unknown	DD
Soriculus caudatus	Loss of habitat, Human interence	VU
Sorex minutus	No	VU
Soriculus leucops	Loss of habitat, Fragmentation	VU
Soriculus macrurus	Loss of habitat, Fragmentation	VU
Soriculus nigrescens	Loss of habitat, Human interence	VU
Sousa chinensis	Siltation, Fishing	EN
Sphaerias blanfordi	Unknown	DD
Stenella longirostris	Fishing, Trade (Local)	LR-nt
Suncus etruscus	No	LR-lc
Suncus montanus	Human interference, Loss of habitat	VU
Suncus murinus	No	LR-lc
Suncus stoliczkanus	Unknown	LR-lc
Sus salvanius	Hunting for food, Loss of habitat	CR
Sus scrofa	Damming	LR-lc
Tadarida aegyptiaca	Human interence	LR-nt
Tadarida teniotis	Unknown	DD
Talpa leucura	Fragmentation	VU
Talpa micrura	No	LR-lc
Tamiops macclellandi	Loss of habitat	LR-nt
Taphozous longimanus	No	LR-lc
Taphozous melanopogan	Human interference, Hunting	LR-nt
Taphozous nudiventris	Human interence	LR-nt
Taphozous perforatus	Human interference, Loss of habitat	LR-nt
Taphozous theobaldi	Unknown	DD
Tatera indica	Pesticides	LR-lc
Tetracerus quadricornis	Cattle grazing, Hunting, Loss of habitat, Trade (Domestic)	LR-nt
Trachypithecus geei	Hunting, Trade (Local, Domestic)	CR
Trachypithecus phayrei	Human interference, Interspecific competition from exotics, Loss of habitat,	EN
Trachypithecus pileatus	Hunting, Loss of habitat, Trade for parts, Trade (Domestic, Commercial, International)	LR-nt
Tupaia belangeri	Hunting for food, Predation	LR-lc
Tursiops truncatus	Fishing	LR-nt
Tylonycteri spachypus	Human interference, Loss of habitat,	LR-nt
Uncia uncia	Trade for parts, Trade (Commercial, International)	EN
Ursus arctos	Decline in prey species, Hunting, Hunting for medicine,, Trade for parts, Trade (Commercial, International)	LR-nt
Ursus thibetanus	Human interference. Trade for parts. Trade (Commercial, International)	LR-lc
Vandeleuria oleracea	No	LR-lc
Viverra zibetha	Hunting, Hunting for food, Hunting for medicine,, Loss of habitat, Trade for parts, Human interference, Trade (Domestic, International)	VU
Viverricula indica	Human interference, Hunting, Hunting for medicine,, Loss of habitat, Trade for parts, Trade (Local, Commercial)	LR-nt
Vulpes bengalensis	Human interference, Hunting, Trade for parts, Poisoning, Trade (Commercial, International)	LR-nt
Vulpes vulpes montanna	Human interference, Trade for parts, Trade (Commercial, International, Domestic)	LR-nt
Vulpes vulpes pusilla	Human interference. Hunting for food, Trade for parts. Trade (Commercial, International)	LR-nt
Ziphius cavirostris	Fishing	LR-nt

(between communities, villages or close by areas), commercial (wider regional or national) and international (between countries). Much of this trade is illegal.

The Indian Wildlife Protection Act of 1972 (amended 1991) bans the trade of 76 species and 1 family of mammals for commercial purposes. A total of 123 species and 9 families of mammals are listed under the various schedules of the Act. However, since there is a lack of strong enforcement of anti-wildlife trade and since much of the trade is at the local and domestic level, trade in mammals or their parts is extremely difficult to curb. Combined with the various other factors affecting the wild populations of mammals, trade assumes significant importance as a threat to mammals in India.

Three groups of mammals, viz. rats, bats and mice are included in Schedule V, which means they are classified as vermin. However, as the CAMP results show, 10 rats, 14 bats and 4 mice are threatened in the wild, while less than 10 of a total of 149 taxa are known to be pests. This therefore calls for a revision of the schedules of the Wildlife Protection Act.

Data quality

There is a tendency among scientists to be very conservative in their approach unless a very systematic study has been done and the results published. Initially, it was feared that it would not be possible to assess many of the Indian mammals as a result. It was felt that not much was known on smaller Indian mammals because of lack of extensive monitoring or field studies. However, most of the assessments could be based primarily on the habitat structure and enough information was available. This was due to studies conducted in those areas either for mammals or for other taxa. Therefore, participants based 26% of assessments for endemics and 32% for non-endemics on General field studies. Informal field sightings contributed to the assessments in 13.5% of the endemics and 14% of the non-endemics.

In almost all of the remaining assessments for mammals, particularly where no records of the species were available after its first description or was last sighted many years back, information was obtained from records and literature (32% for endemics and 34.5% for non-endemics).

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)."

An exercise to determine the status of any taxon, particularly in the first instant, should not be hindered by lack of hard information. Thorough, all-encompassing hard data is almost impossible to gather for even a single taxon. The time required to gather such detailed information could in fact delay conservation measures for threatened taxa. For many groups of organisms there is not even a complete checklist, so any effort to put together what is known by ALL people studying these groups is a valid starting point from which other, more complete and accurate, exercises can be planned.

The combination of elements which make up a CAMP workshop such as group effort of researchers and associated specialists, a neutral environment, objective facilitation, good faith and good intentions can provide informed advice for conservation action planning. The results of this workshop are the outcomes 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 concerns conservation action to insure the survival of the taxa in the long term, as well as their habitat. Conservation action can take many forms, of which keeping the habitat inviolate may be the best way of insuring survival of taxa. However, for some species habitat protection alone may not be sufficient. Constant pressure on habitat and individual taxa has forced many taxa into small, isolated or fragmented populations, which can result in a steady decline in numbers, genetic viability and general fitness, or what is called an "extinction vortex". To overcome these complications and avoid extinction, corrective actions need to be taken up intensively and aggresively.

Table 4 summarises the various conservation actions recommended for mammal taxa evaluated in the BCPP CAMP Workshop.

Field surveys -- for specific mammal taxa was recommended by participants more than any other conservation action – for 83 % of all the mammals assessed in the workshop. Participants felt that current knowledge of species distribution is not adequate and more studies are required. With respect to the taxa for which extent of occurrence far exceeded the area of occupancy, participants recommended more surveys within the range as to identify other possible areas of distribution. Monitoring -- of populations was also strongly recommended by participants. Detailed population studies are required to evaluate trends in mammal populations and provide a basis for monitoring. For many taxa such studies had not been done at all and for too many others, only recently or sketchily. Taxonomic and genetic studies are required and were recommended for 14.5% of mammalian taxa. Confusion and inconsistency in taxonomy and identification prevails among mammalian biologists for several species. Moreover, many taxa have not been recorded since their initial discovery years before (even decades or a century), and there are not proper types available for comparative studies.

Other conservation actions recommended were habitat management, limited factor research, life history studies, genetic management, husbandry research and population and habitat viability assessment studies.

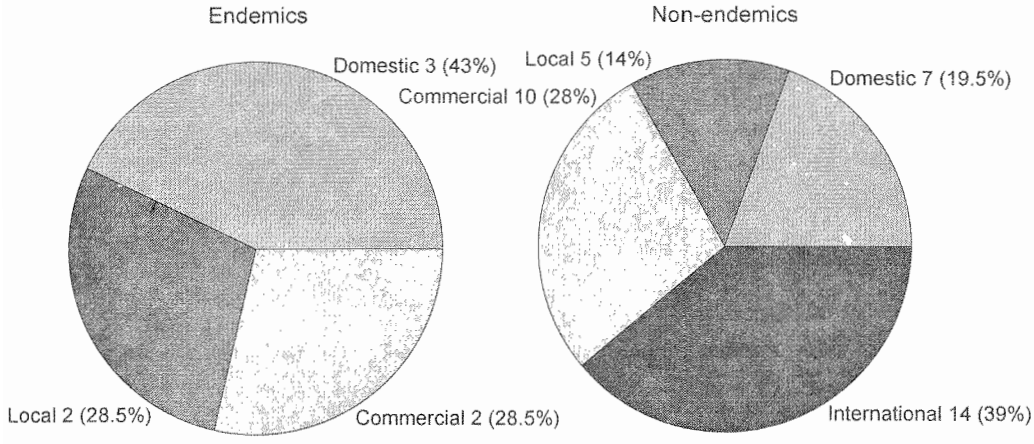
Captive breeding and the level of difficulty

Most of the more than 300 zoos in India maintain mammals, in fact mammals are the most abundantly represented animal group in Indian zoos. The percentage of mammals in Indian zoos which are of genuine conservation value (that is, which could be used in conservation programmes), however, is very small. There are many reasons for this, the most important of them being:

1. Conservation breeding is a complex discipline that requires knowledge and application of genetic and demographic principles for every species taken up for such breeding in the initial stages. By and large Indian zoo personnel either do not have this knowledge of genetic and demographic principles, or are unable to apply it effectively for reasons that are quite beyond their control. These reasons are administrative, political and even – in some instances – personal, and as such have proved almost completely impervious to change.

Breeding technology, husbandry and health technology are very much within the purvue of abilities or learning of Indian zoo personnel. It is of no value whatsoever to conservation, however, unless the problems affecting the ability of Indian zoos to participate in the coordinated and

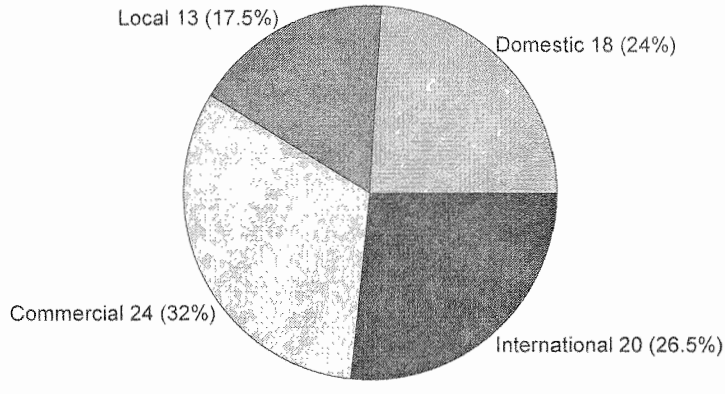
Trade in threatened mammals



Number of threatened endemics in trade = 4

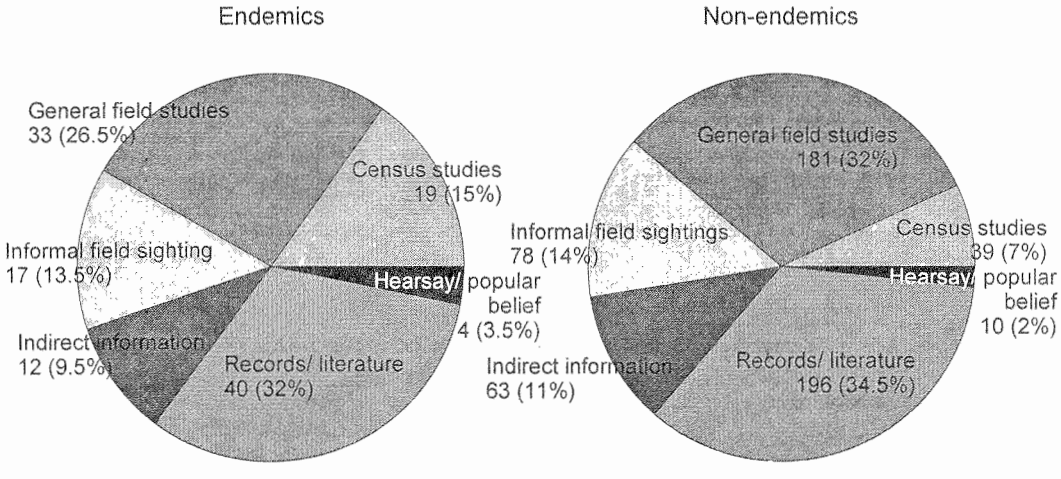
Number of threatened non-endemics in trade = 19

Trade in non-threatened mammals



Number of non-threatened mammals in trade = 42

Data Quality



Number of endemics assessed = 54

Number of non-endemics assessed = 318

cooperative programmes required for genetic and demographic management of captive wild animals can be solved.

2. Indian zoos are over-run with common and hybrid species, the keeping and care of which use up zoo space and resources which might be utilised for breeding endangered species. The Table and Chart below illustrates the very high percentage of Lower risk species, which are kept in zoos and the relatively low percentage of threatened species.

Moreover, these common species continue to proliferate because the zoos, for a variety of reasons, have not applied population control measures to these species.

Further, Indian zoos are burdened by unwanted animals from confiscations, substandard zoo enclosures, unwanted "gifts", etc. Many of these animals which come to a zoo in this fashion are ill, unfit (both psychologically and physically), old, unbreedable, of uncertain genetic makeup, etc. In order to have an effective conservation breeding programme, zoos need the freedom and flexibility to plan their breeding strategy and acquire animals which fit their conservation policy and mission statement.

3. Indian zoos are, or believe themselves to be, at the mercy of the public, politicians and uninformed policy makers. They are, or believe themselves to be, constrained to exhibit popular, large-bodied animals of varying conservation potential, rather than concentrate on animals which are of lesser attractiveness but far higher feasibility for meaningful conservation action, such as threatened small mammals, for example.

4. Indian wildlife experts and enthusiasts connected to zoos become unduly fascinated with spectacular or unusual mammal forms, such as white tigers, black leopards, albino sloth bears, etc. Ironically, coordinated scientific breeding technology with careful observation of genetic (if not demographic) factors has been brought to a successful conclusion only in the instance of the white tiger after years of inbreeding threatened to wipe them out in captivity itself, whereas it has not been taken seriously with any other species. White tigers had enormous economic and exhibition value, which may have been factors in this success. Fascination with these kinds of anomalies in the animal world detracts from a focus towards species specific projects of genuine conservation value.

5. The Indian conservation community, both official and non-official, has a contentious attitude towards zoos and captive breeding. Knowledgeable and experienced representatives from the zoo community are infrequently consulted (and that too often at a much later stage than is optimal for conservation projects involving captive born stock (example, Indian rhinoceros, Manipur brow-antlered deer, Barasingha reintroduction programmes). The entire process of reintroduction or supplementation to strengthen or supplement wild populations or to introduce endangered species to an alternative habitat is very poorly understood and, as a result, condemned to making mistakes which would doom the project to failure.

Thus, while it is on paper that zoos are an integral part of the country's conservation scenario, in reality the subject is not taken seriously in any sense by the wildlife community, or even, from a genuine conservation perspective, by themselves.

6. Zoos have not prioritised their animals according to any systematic methodology. It is hoped that this CAMP Workshop output will provide a guide for prioritisation of species relative to captive breeding.

It is unfortunate that captive breeding is so poorly known and misunderstood. As illustrated by earlier discussions, most Indian mammals are small and, for the most part, completely harmless to man Some of the small mammals are easy or relatively easy to maintain and breed in captivity and are inexpensive as well. They are a group of organisms for which reintroduction could be a real possibility without most of the problems which confront some of the large mammals such as carnivores. Considering the rapidity and scope of small mammal decline and the percentage of threatened bats, squirrels, rats and shrews, captive breeding could provide a degree of security with minimal cost and danger. either to animal or man.

Captive breeding recommendations are at 5 levels, Level 1, 2, 3, 4 and 5 (see detailed definition in the Appendices at the end of this report). 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 meant for immediate conservation action but only for husbandry, research (development of breeding technique, etc.) and education to be implemented at some later time for conservation if the taxon declines and has to be taken to a higher threat category. Level 4 is for commercial and sustainable utilisation. Level 5 and sub-levels apply to management in order to limit or reduce captive stocks.

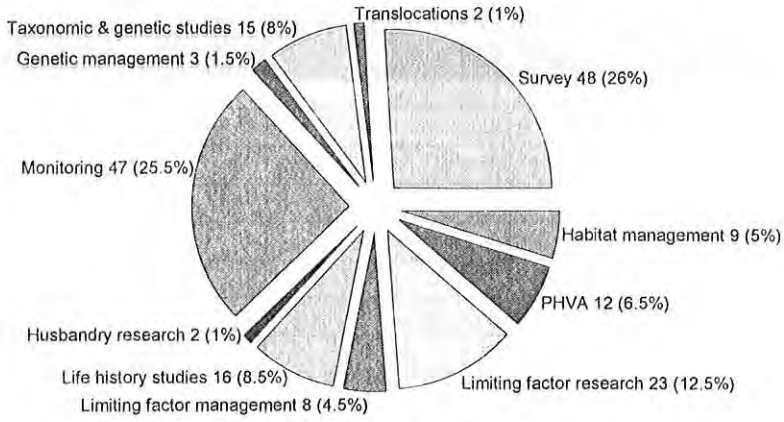
In this CAMP Workshop a different strategy for dealing with the subject of captive breeding was employed. Participants did not have much experience or knowledge of captive collections. Also time was a constraint in the five-day workshop to assess 400 species of mammals. Participants agreed that Workshop Facilitators would fill in the captive breeding information with recent data from the Central Zoo Authority Mammal Inventory, 1997 and records of the world's zoos from the International Species Information System. This has been done and many species for which it was thought there were none in captivity have a reasonable population, either in Indian zoos or in abroad zoos or both.

Regarding recommendations in the Captive Breeding Section, a uniform standard has been applied according to a scientific format and by consulting the IUCN Policy Statement on Captive Breeding. The essence of the Policy Statement which guided recommendations for captive breeding is "Habitat protection alone is not sufficient if the expressed goal of the World Conservation Strategy, the maintenance of biotic diversity, is to be achieved. Establishment of self-sustaining captive populations and other supportive intervention will be needed to avoid the loss of many species, especially those at high risk in greatly reduced, highly fragmented, and disturbed habitats. Captive breeding programmes need to be established before species are reduced to critically low numbers, and thereafter need to be coordinated according to sound biological principles, with a view to the maintaining or re-establishment of viable populations in the wild." (IUCN, 1987)

The Policy Statement also includes this comment: "The vulnerability of small populations has been consistently under-estimated. This has erroneously shifted the timing of establishment of captive populations to the last moment, when the crisis is enormous and when extinction is probable. Therefore, timely recognition of such situations is critical, and is dependent on information on wild population status." The CAMP workshop reported here provides the necessary information on wild mammal populations for zoos to prioritise species and begin effective conservation breeding.

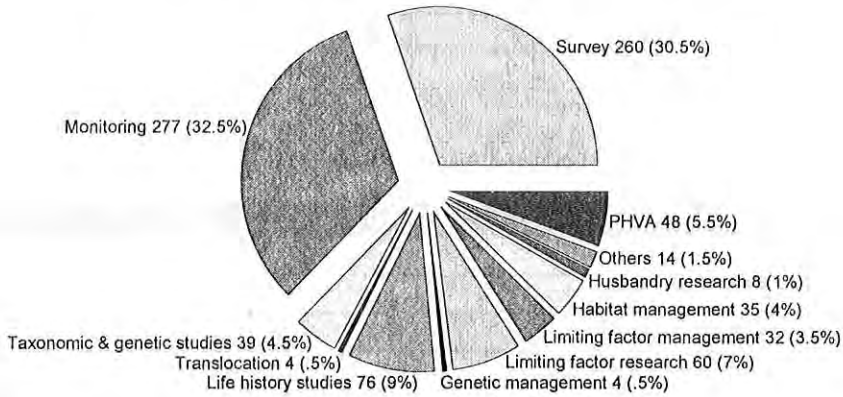
The standard used for captive breeding recommendation is:
- Threatened species (CR, EN, VU) have been (with exception of whales) recommended for captive breeding. Most of these have been recommended for Level 1 captive breeding which involves genetic and demographic management to retain 90% genetic diversity for 100 years so that taxa can be interactively managed to strengthen or supplement wild populations. Only a few special cases have been recommended for Level 2 in which captive populations are to be infused with fresh genetic material

Research and management recommendations for endemic mammals



Number of endemics assessed = 54

Research and management recommendations for non-endemic mammals



Number of non-endemic mammals assessed = 318

Table 4. Research recommendations as suggested for the assessed mammalian taxa

	T	Tl	S	M	G	H	Hm	Lm	Lr	Lh	P	O
INDIAN ENDEMICS												
CR	1	1	6	7	2	0	4	1	7	1	5	0
EN	4	1	9	9	1	2	1	3	5	4	2	0
VU	2	0	15	17	0	0	3	4	7	8	3	0
LR-nt	1	0	2	3	0	0	1	0	3	2	1	0
LR-lc	7	0	10	7	0	0	0	0	0	1	1	0
DD	0	0	5	4	0	0	0	0	1	0	0	0
EX	0	0	1	0	0	0	0	0	0	0	0	0
NON-ENDEMICS												
CR	4	0	15	15	1	2	3	3	7	6	13	1
EN	4	2	17	22	1	1	7	8	10	5	7	1
VU	8	0	41	43	1	2	8	6	9	14	9	4
LR-nt	6	0	68	84	0	3	14	12	25	32	11	4
LR-lc	5	2	35	41	1	0	3	3	9	12	0	4
DD	12	0	84	72	0	0	0	0	0	7	8	0

Table 5. Captive breeding recommendations for mammals

	Level 1	Level 2	Level 3	Level 4	Level 5	Level 5.1	Level 5.2	Pend.	No
INDIAN ENDEMICS									
CR	7	2	0	0	0	0	0	0	0
EN	10	0	0	0	0	0	0	0	0
VU	15	0	1	0	0	0	0	1	0
LRnt	0	0	3	0	0	0	0	0	0
LRlc	0	0	0	0	0	0	1	0	4
DD	0	0	0	0	0	0	0	10	0
Ex	0	0	0	0	0	0	0	0	0
NON-ENDEMICS									
CR	13	2	0	0	0	0	0	1	0
EN	19	0	0	0	0	0	0	1	1
VU	30	1	7	0	0	0	0	4	0
LRnt	4	0	64	0	0	0	0	17	3
LRlc	1	0	2	0	2	1	4	0	48
DD	1	0	0	0	0	0	0	85	4
EX	1	0	0	0	0	0	0	0	0

Table 6. Level of difficulty in breeding mammals in captivity

Level of difficulty	Level 1	Level 2	Level 3	Unknown
INDIAN ENDEMICS				
CR	4	1	0	3
EN	1	1	0	8
VU	1	2	0	14
LRnt	0	1	0	2
LRlc	1	0	0	4
DD	0	0	0	10
EX	0	0	0	1
NON-ENDEMICS				
CR	2	6	5	3
EN	2	1	7	11
VU	3	5	2	11
LRnt	10	7	19	33
LRlc	12	3	1	56
DD	1	1	1	42
EX	0	1	0	86

from the wild so as to retain sufficient diversity for future use if required at Level 1. This is in keeping with the IUCN Policy Statement: "Conservation over the long term will require management to reduce risk, including *ex situ* populations which could support and interact demographically and genetically with wild populations."

- Lower risk-near threatened (LR-nt) species all have been recommended for captive breeding at Level 3 or for education, husbandry and research. This is in keeping with the IUCN recommendation that "Management to best reduce the risk of extinction requires the establishment of support-ing captive populations much earlier, preferably when the wild population is still in the thousands."

- Lower risk-least concern (LR-lc) species have been given a "No" captive breeding recommendation without exception. Some participants had suggested that these species also be recommended for education, husbandry and research. It is a certainty that they will continue to be kept regardless of recommendations, due to cultural and administrative reasons. A recommendation based on scientific principles rather than on sentiment or convenience should go on record. The table below illustrates how certain common species are proliferating without limit in zoos. The World Zoo Conservation Strategy comments on the issue of common species: "(Zoo) space is very limited and careful choice of species for ex situ conservation support is required. ... the conservation community should determine which species would benefit most from support by *ex situ* programmes."

Further, we have created an additional Level 5 which recommends that specific measures be taken to reduce growth of certain captive populations and even reduce current numbers by some means. Indian zoos are overwhelmed with common species which take up space and resources which could be devoted to breeding endangered species more systematically and scientifically. There are, for example, more than 6000 spotted deer in Indian zoos while certain Critically Endangered species are so few that they do even make up pairs in zoos, much less viable breeding populations. Indian zoo managers may derive some moral and political support from the workshop recommending that they reduce the number of common species in their zoo. This has been and is a major problem for zoo managers.

Data deficient species and Not evaluated species have all been given a "Pending" recommendation as no decision can be made until the category is known.

This subject of species prioritisation for captive breeding is not simple. Many species, which have been recommended in this document according to their conservation status alone, could not be maintained at the present level of zoo management in this country and, in the case of some delicate and difficult species such as bats, in any country. In this regard it is the act of stating that a Critically Endangered species requires man management which is important in a scenario where captive breeding is neither completely understood or given the importance it deserves.

Of the threatened taxa, a total of 115 taxa (36 endemic taxa and 79 non-endemic taxa) were recommended for conservation breeding. Conservation breeding was recommended for 59% of endemic species as compared with 21.5% of taxa not endemic to India. For the latter (non-endemic species) there were more recommendations for keeping them for education, research and husbandry. No taxon was recommended for sustainable or commercial harvest. Twenty-five percent of mammals which are currently kept in Indian zoos were recommended for population control or phasing out of the captive population.

Participants could identify only 37 (7 endemic and 30 non-endemic) out of 372 taxa for which captive breeding technology was well known. Of these 37, some of the knowledge exists outside the country and has never been successfully assimilated and applied in India.

Special issue working groups

Special working groups were formed at the workshop to discuss issues of importance in the context of assessing and conserving mammals. Four groups were formed fthe following subjects 1. Marine mammals, 2. Indian Wildlife Protection Act, 3. Data Deficient species and 4. IUCN Red List criteria. At the end of the workshop, participants agreed to work towards mammal conservation by making personal commitments. The working group reports and the commitments are presented below.

Marine Mammal Working Group

Members: Lal Mohan and P.O. Nameer

A. Taxon sheets

a. Instead of elevation, depth would be better
b. For range and area occupied - the limits need to be increased
c. Latitude and longitude need to be included
d. Number of locations can be made only from strandings and sightings

B. IUCN criteria (revised)

a. No modifications need to be made for cetaceans.
b. Threats to be added
    i. Collision with ships need to be included
    ii. Noise / sound pollution (low frequency sound) and underwater explosion
    iii. Stranding / washed ashore may be included
    iv. Capture for entertainment

Indian Wildlife Protection Act Working Group

Members: S. Paulraj, G. Marimuthu, G. Ramaswamy, P. Padmanaban

A. Objectives

1. To find out the species of mammals not found in the Indian Wildlife Protection Act (1972, 1991)
2. To reassess the status of a few species of mammals listed in the Act with reference to workshop categories

B. Group discussion

The following groups of mammals are to be included in the Indian Wildlife (Protection) Act

1. Much concern are the 90 - odd microchiropterans of which Otomops (137 spp) is categorised Critically endangered and and 2 species as Endangered.
2. Shrews (25) and tree shrews (3)
3. Out of the 3 species of hedge hog, 2 species are to be listed.
4. Both the 2 species of moles are to be listed
5. Generally fruit bats are listed under Schedule V as vermin. Since 12 species are present the category should be species specific.
6. A few squirrel species are to find a place. The Namdapha flying squirrel, which is assessed as Critically Endangered in the workshop, should be kept in Schedule I.
7. (Lower risk) Other category in family level
8. Data Deficient species to be treated with caution as it is not known whether they are common or critically endangered.
9. A copy of the workshop IUCN categorisation can be forwarded to the Government for information and appropriate action.
10. A copy of the Workshop identified IUCN categorisation can be forwarded to the Government for us while revising the Indian Wildlife Protection Act so that due attention is to be given to them.

Data Deficient Working Group

Members: Lal Mohan, S. Chakraborthy, M.S. Pradhan, M. Muni, K.A. Subramanian

A. Recommendations

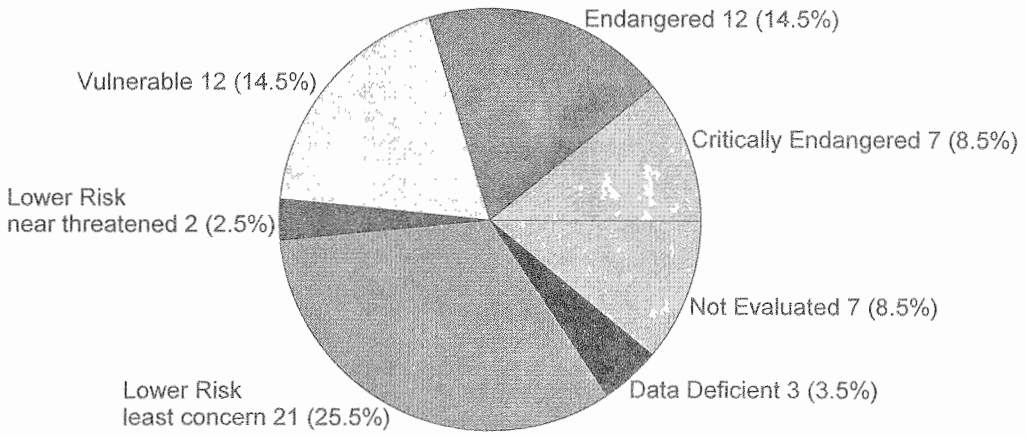
1. Identify the Data deficient species

Table 7. ABC List of Indian Mammals held in Indian zoos as per Central Zoo Authority

Common name	Scientific name	IUCN	No. of Zoos	No. of pairs	M. F. Unk	Total
Antelope, Four horned	*Tetracerus quadricornis*	LR-nt	20	7	30.34.21	85
Badger, Chinese ferret-	*Melogale moschata*	EN	1	1	1.1.0	2
Badger, Honey; Ratel	*Mellivora capensis*	LR-nt	11	4	15.5.3	23
Bear, Himalalyan black	*Ursus thibetanus*	LR-lc	39	30	73.67.10	150
Bear, Himalayan brown	*Ursus arctos*	LR-nt	5	2	6.2.0	8
Bear, Sloth	*Melursus ursinus*	VU	48	29	68.55.16	139
Bear, Sun	*Helarctos malayanus*	DD	3	0	0.2.3	5
Binturong	*Arctictis binturong albifrons*	DD	8	1	5.6.0	11
Black buck	*Antilope cervicapra*	LR-lc	78	49	262.30.290	854
Boar, Wild	*Sus scrofa*	LR-lc	23	18	73.139.118	330
Cat, Fishing	*Prionailurus viverrinus*	VU	5	2	6.5.0	11
Cat, Goldent	*Catopuma temmincki*	NE	2	0	2.0.0	2
Cat, Jungle	*Felis chaus*	LR-nt	24	5	20.10.10	40
Cat, Leopard	*Prionailurus bengalensis*	LR-nt	20	11	36.45.9	90
Civet, Common palm	*Paradoxurus hermaphroditus*	LR-lc	34	18	48.33.15	96
Civet, Himalayan palm	*Paguma larvata*	LR-lc	4	2	2.3.1	6
Civet, Large Indian	*Viverra zibetha*	VU	2	0	1.0.1	2
Civet, Small Indian	*Viverricula indica*	LR-nt	19	2	12.9.16	37
Deer, Barking	*Muntiacus muntjak*	LR-lc	54	33	115.154	424
Deer, hog	*Axis porcinus*	LR-nt	36	25	106.123.36	265
Deer, Manipur ; Sangai	*Cervus eldii eldii*	CR	14	9	41.76.7	124
Deer, Mouse	*Moschiola meminna*	LR-nt	4	1	4.1.1.	6
Deer, Musk	*Moschus chrysogaster*	CR	3	2	12.9.0	21
Deer, Sambar	*Cervus unicolor*	LR-lc	88	55	438.554.228	1220
Deer, Spotted	*Axis axis*	LR-lc	161	95	1793.2277.2294	6364
Deer, Swamp	*Cervus duvauceli duvauceli*	EN	8	6	33.45.2	80
Deer,Indian Red; Hangul	*Cervus elaphus hanglu*	CR	1	0	1.0.0	1
Dhole, Wild dog	*Cuon alpinus*	LR-nt	4	3	2.8.9	19
Elephant, Asian	*Elephas maximus*	VU	26	14	28.56.0	84
Flying fox	*Pteropus giganteus giganteus*	LR-nt	2	0	0.0.22	22
Fox, Common	*Vulpes bengalensis*	LR-nt	19	7	14.16.11	41
Gaur	*Bos gaurus*	VU	5	2	8.7.0	15
Gazelle, Indian; Chinkara	*Gazella bennettii*	LR-lc	24	13	48.69.40	154
Gibbon, Hoolock	*Hylobates hoolock*	EN	9	1	5.5.0	10
Goral	*Naemorhedus goral*	NE	7	4	13.11.7	31
Hare	*Lepus nigricollis*	LR-lc	7	5	29.28.47	104
Hedgehog, Long-eared	*Hemiechinus collaris*	LR-lc	2	1	1.2.4	4
Hyaena, Striped	*Hyaena hyaena*	LR-nt	45	32	61.59.21	141
Jackal	*Canis aureus*	LR-lc	44	22	64.56.33	1153
Langur, Capped	*Trachypithecus pileatus*	LR-nt	15	4	12.14.0	26
Langur, Golden	*Trachypithecus geei*	CR	10	4	9.8.0	17
Langur, Hanuman	*Semnopithecus entellus*	LR-lc	36	25	78.56.19	153
Langur, Nilgiri	*Trachypithecus johnii*	VU	9	4	13.9.4	26
Leopard, Clouded	*Neofelis nebulosa*	LR-nt	7	3	9.4.0	13
Leopard, Snow	*Uncia uncia*	EN	1	1	4.4.0	8
Lion, Asiatic	*Panthera leo persica*	CR	14	9	33.68.0	101
Loris, Slender	*Loris tardigradus*	LR-nt	3	1	1.5.3	9
Loris, Slow	*Nycticebus coucang*	LR-nt	11	6	16.13.3	32
Lynx	*Lynx lynx isabelina*	EN	1	0	2.0.0	2
Macaque, Assamese	*Macaca assamensis*	LR-nt	17	7	44.24.6	74
Macaque, Bonnet	*Macaca radiata*	LR-lc	44	32	152.94.186	432
Macaque, Crab - eating	*Macaca fascicularis umbrosa*	CR	1	1	10.7.0	17
Macaque, Lion tailed	*Macaca silenus*	EN	22	13	34.34.6	74
Macaque, Pig tailed	*Macaca nemestrina*	DD	9	5	9.1.0	10
Macaque, Rhesus	*Macaca mulatta*	LR-lc	76	48	204.176.83	463
Macaque, Stump tailed	*Macaca arctoides*	LR-nt	14	8	23.18.0	41
Martin, Yellow throated	*Martes flavigula*	LR-lc	1	1	1.0.0	2
Mongoose, Common	*Herpestes edwardsii*	LR-lc	9	6	30.37.7	74
Mongoose, Crab eating	*Herpestes urva*	VU	1	0	1.0.0	1

Common name	Scientific name	IUCN	No. of Zoos	No. of pairs	M. F. Unk	Total
Nilgai	*Boselaphus tragocamelus*	LR-lc	57	39	199.240.92	531
Otter, Common	*Lutra lutra*	NE	13	5	17.10.4	31
Otter, Smooth Indian	*Lutrogale perspicillata*	NE	3	1	4.2.0	6
Panda, Red	*Ailurus fulgens fulgens*	VU	2	1	5.6.0	11
Pangoline, Indian	*Manis crassicaudata*	LR-nt	6	0	3.3.16	22
Panther	*Panthera pardus*	VU	58	43	152.13.28	310
Porcupine	*Hystrix indica*	LR-lc	53	30	73.73.105	251
Porcupine, Brush tailed	*Atherurus macrourus*	EN	2	1	2.1.0	3
Rhino, Indian	*Rhinoceros unicornis*	EN	12	6	23.12.0	35
Serow	*Naemorhedus sumatraensis*	VU	1	1	1.2.0	3
Sheep, Blue	*Pseudois nayaur*	LR-lc	1	0	1.0.0	1
Squirrel, 5-striped palm	*Funambulus pennantii*	LR-lc	2	1	2.1.0	3
Squirrel, Grizzled giant	*Ratufa macroura dandolena*	EN	6	1	3.5.2	10
Squirrel, Indian giant	*Ratufa indica indica*	VU	7	3	8.4.1	13
Squirrel, Malayan giant	*Ratufa bicolor gigantea*	VU	3	2	3.2.1	7
Tahr, Himalayan	*Hemitragus jemlahicus*	LR-nt	1	0	1.1.0	2
Tahr, Nilgiri	*Hemitragus hylocrius*	EN	1	0	2.0.0	2
Takin	*Budorcas taxicolor*	EN	1	0	1.0.0	1
Takin	*Budorcas taxicolor*	NE	1	0	1.0.0	1
Tiger, Bengal	*Panthera tigris*	EN	31	26	94.105.10	209
Wild ass, Indian	*Equus hemionus khur*	NE	5	1	4.7.0	11
Wolf, Indian	*Canis lupus pallipes*	LR-nt	16	7	21.20.11	52
Wolf, Tibetan	*Canis lupus chanco*	NE	1	1	10.5.0	15
Yak, wild	*Bos grunniens*	CR	5	1	4.2.0	6

Indian mammals in Indian zoos according to conservation status



Number of Indian mammal taxa in Indian zoos = 83

2. Identify specialists which have studied similar species
3. Publish in leading journals and wildlife magazines, college departments, etc. calling for information on various Data Deficient species.
4. Send data sheets to the specialists.
5. Find common and local names of the Data deficient species
6. Set up a task force for the work and provide funds for postage and office assistance
7. Keep a time limit for the information
8. Prepare a proforma for information required (attached - part B)
9. Reward the informer by sending some useful pamphlets or poster.
10. Review the status of the Data deficient species periodically and update the information
11. If the need is felt and no sufficient information is available the NGO's or government departments should be asked to develop expertise on this particular group.
12. Based on available data on the status of knowledge, the Data deficient species and the area of their occurance should be prioritised and the NGO's research organisation and interested individual should be informed and activated for the survey.
13. A data base should be developed for the Data deficient fauna
14. A list of prioritised Data deficient species should be provided to the government funding agencies to encourage or support work on DD species.
15. A short term training programme should be arranged with the held of specialists from Government and NGO's and experts (unattached). This could be done by the B.C.P.P.
16. A CAMP workshop could be organised on the Data deficient species when it is felt that sufficient additional work had been done to warrant an exercise.

B. Suggested Proforma
1. Specimen name (scientific name and common name)
2. Local name (vernacular names)
3. Specimens available (Museum, captivity, zoos)
4. Population number
5. Locality
6. Limit/ extent of area km2)
7. Maximum length / weight
8. Food habit
9. Brood strength
10. Number of brood
11. Threats (hunting, habitat loss)
12. Information on habit and habitat
13. Trade information
14. Any other information

IUCN Red List Criteria Working Group
Members: J.C. Daniel, D.K. Lahiri-Choudhary, S.W. Sunderaj, M.M. Mansoor, S.S. Ramchandran, R. Borges, Aramugam, G.K. Joseph, V. Menon, R. Sukumar, S. Chattopadhyay

1. Instead of considering generations of population data in the numerical (lacking in figures and status, many species in the Indian scenario, the criteria should consider recently available data for categorisation. Since previous population figures are completely lacking for many species.

2. For the category A of critically endangered (CR), there is no "bench mark" data to infer a reduction of 80% in the population. Therefore asking for such precise estimate is unrealistic.

3. The Category B for Critically Endangered (CR) does not apply for larger mammals. It may be applicable for smaller mammals.

4. The A1 category of Endangered (EN), an observed, estimated, inferred, or suspected reduction of at least 50% over the last 10 years or three generations is to precise a figure and requires a degree of knowledge which does not exist.

5. In the A 2 category of endangered (EN) the prophetic vision of seeing at least 50% reduction in next ten years is of little value and is not a useful criterion.

6. There is a requirement for a separate criteria which can be used to evaluate species having significant trade (commercial) in them.

7. Criteria for assessing each taxon group a regression / relationship is determined between body size and home range or population densities. Using this a correction factor could be obtained for the categories within extent of occurrence and area of occupancy, so that for each taxon group (e.g. small rodents) they upper and lower limits for each category can be scaled down or up accordingly.

8. the major threats like hunting, hunting for food, and habitat loss have got immediate and severe impact on the population. Therefore due weightage should be given to those threats and should also be considered as a criterion for categorisation.

Recommendations
1. Survey and monitoring of all species in Schedule I for population and existing habitats.
2. Survey and monitoring of all other species specifically Data deficient species
3. Families to be distributed between various research organisations
4. An annual survey fund to be established for survey and monitoring.
5. successive CAMP workshops on mammals are to be organised in order levels taking up a smaller number of species with more specialists in those orders, so that more realistic data inputs can be ensured and also that changes which occur in the status of the species can be monitored.

Comments on the IUCN criteria by J.C. Daniels
Care must be taken to assure that classification as Vulnerable does not affect status on Schedule of the Wildlife Protection Act.

Criteria for assinging species to CR, EN, VU are not applicable to indian species of mammals under existing status of knowledge
1. We do not have data for quantification
2. We do not have data to say that a species has had 80% reduction in population based on any of the qualifying clauses
3. No precise data exists on extent of distribution / occupancy
4. Population estimates do not exist for the majority of species and those which exist are suspect

Two major recommendations would be
1. Survey and monitoring of all species on Schedule I for population and existing habitats
2. Survey and monitoring of all other species specifically Data deficient species
3. Families to be distributed between various research organisations
4. A mammal survey fund to be established for this purpose

Comments by Renee Borges
Considering the paucity of data on the biology, particularly population biology, of most mammal species, a large proportion of species have been categorised into the IUCN criteria based on 1) extent of occurrence, and 2) area of occupancy.

The upper and lower limits of areas adequate to support viable populations or to indicate the degree of threat to the species, will vary between groups of taxa, e.g. insectivores v.s. primates v.s. elephants (mega herbivores). It is suggested that for each taxon group, a regression / relationship is determined between body size and home range (based on all available data sets) or population densities. Using this, a correction factor could be obtained for the categories (km2) within extent of occurrence, and area of occupancy, so that for each taxon group (e.g. small rodents), the

upper and lower limits for each category (km2) can be scaled down or up accordingly.

Additionally, this regression relationship will enable more accurate projections of population sizes, which can be back-calculated from the areas of occupancy.

Comments on the IUCN criteria by Vivek Menon

A major lacuna in the existing criteria is that it does not provide for trade data to be used in the absence of quantitative population estimates. In India, population data is rarely available for many, if not most, species and to estimate or infer a reduction of a fixed percentage would be erroneous. However, for many species, quantitative data is available on numbers is trade and / or poaching figures. This data cannot, however, be used unless population reduction is first inferred or estimated.

There is, therefore, a requirement for a separate criteria which can be used to evaluate species having significant trade in them. This is particularly important as commercial trade in any species can have cataclysmic effects on it that cannot be quantified by traditional monitoring of the species.

Comments on the IUCN criteria by Mir Mansoor

1. Under the categories of Critically endangered, Endangered and Vulnerable one more condition should be introduced, which will cover those species which are although in considerable numbers, but are commercially threatened, e.g. most of cats, musk deer, etc.

2. There has been a general feeling that this categorisation may come into conflict with Indian Wildlife Protection Act, 1972, especially with regard to those species which come under Schedule I and Schedule II, Part II of this Act but are defined as Lower Risk as per the IUCN categories as assessed by the workshop.

3. No consideration has been given to species, which are being exploited at an enormous rate for biomedical research.

Personal commitments by participants to conservation in context of the workshop

Mir Mansoor -- give more attention to illegal trade in wildlife
G. Ramaswamy -- duty bound commitment
Armugam -- provide information on unknown taxa
Ramachandran -- focus on DD species
J. C. Daniel -- provide data base from BNHS collections
Lal Mohan -- work for establishment of a wildlife sanctuary in Kanniakumari Dist., Tamilnadu (Kodayar Wildlife Sanctuary) and to establish a reiver dolphin sanctuary in Kilsi River, Brahmaputra, Assam to save river dolphins.in Kodayar sections of river's in river dolphins and sanctuaries
Westley -- provide information on biodiversity in desert region
Nameer -- devote study to lower mammals
Chakraborty -- collection studies of ZSI
Chatto -- love people who love nature
Gigi -- study DD mammals
Pradhan -- identification of questionable mammals
Sinha -- Information about birds and mammals
Padmanabhan -- complete wildlife protection projects in a better way
Manoj Muni - CAMP workshop for bats only after some time; updation of data base
Marimuthu - Study on fruit bats - vermin or not
Renee -- inspire students to do research
Ravikumar -- information on fauna / flora of Lakshadweep
Riki Krishnan -- work for conservation of bats
Praveen -- information on flora and fauna from CAMP
Sanjay -- IUCN revision
Sally -- ZP Pullout for bat specialist group; develop means of explaining IUCN categories with relation to WLP Act for clear understanding for government policy; organise workshop on facilitation skills
Arun -- Maintaining traditional skills among tribals

Conclusion

The BCPP Conservation Assessment and Management Plan Workshop for all Indian mammals was a pioneering effort in several ways. For the first time in India, and perhaps anywhere, a systematic conservation workshop was held for most of the mammals of an entire country.

The workshop was a good exercise in the application of the IUCN Categories, which are meant for all living organisms except microorganisms. Problems participants had using the categories were communicated to the Review Working Group of the Species Survival Commission, which benefited by our testing the categories on mammals. Since the categories have undergone changes from their original mammal bias to encompassing all organisms, there are problems to be addressed. Perhaps more importantly with regard to the IUCN categories, workshop participants reported that they learned a great deal about conservation biology and population dynamics which would be reflected in the kind and quality of information they aspired to collect in future field studies.

Several problems of mammal systematics and research methodology were discussed during the assessments. These discussions proved very useful in bringing together and lending focus to the participants to discuss the difficulties in subjects such as taxonomy and field methodology.

Perhaps the most useful achievements of the workshop was that it provided a forum and occasion for many mammalian field biologists and taxonomists to get together and discuss status of mammalian taxa in India; some of the researchers being referred for their knowledge for the first time.

The BCPP Conservation Assessment workshop for Indian mammals has helped in understanding the urgent need to keep current studies going, to protect threatened taxa from extinction and to manage them in the near future. Some of these taxa 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.

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TAXON DATA SHEETS

This Report is incomplete without the Taxon Data Sheets and the Summary Data Table. A Taxon Data Sheet is one were in information regarding the species is included as given by the participants at the workshop. Information includes (as given in the example below) details about species distribution, threats to the habitat, threats to the population, population trends, number of individuals and other important information i.e., require to derive the threat category. For every species, data quality index is also provided to distinguish the kind of information gathered at the workshop, be it through scientific field study, records, indirect information or popular belief. Finally, the Taxon Data Sheets also includes recommendation for research and management action for every species as suggested by participants, which is the outcome of the CAMP process. A Taxon Data Sheet is filled for everyone of the 372 taxa assessed at the workshop, making it a treasure-trove of information on all Mammals in India, in a single source.

We are unable to publish the two due to their length as they are too long for ZOOS' PRINT. Persons interested in a complete report may write to ZOO/CBSG, India and order it for Rs. 375 (Indians and equavalent for other Asian countries) and $ 35.00 for people from development countries.

Anourosorex squamipes **Milne-Edwards — VU/N (B1, 2c) — Family:** Soricidae. **Taxonomic status:** Species. **Habit:** Terrestrial, fossorial. **Habitat:** Mainly in forest, burrowing in leaf-litter and topsoil. **Global Distribution:** India, Bhutan, China, Taiwan, Thailand, Vietnam. **Current Regional Distribution:** Assam, Meghalaya, Arunachal Pradesh, Manipur. **-Elevation:** 300-000 m. **-Range (Sq. Km):** > 20,000. **-Area Occupied (Sq. Km):** < 2,000. **-Number of location:** > 5; 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:** Not known. **Data Quality:** General field studies, Indirect information. **Recent Field Studies:** Not known. **Threats:** Loss of Habitat; Human interference; Loss of habitat because of fragmentation. **Trade:** No. **Other Comments:** —. **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:** Taxonomic and morphological genetic studies; Survey; Monitoring. **-PHVA:** No. **Captive Breeding Recommendations: -Captive breeding:** Level 1. **-Level of difficulty:** Not known. **Existing Captive Population:** None in India. **-Name of facilities:** —. **Sources (Refer Appendix):** 27, 28. 89, 98,110,127, 206 . **Compilers:** S. Chakraborty. M.S. Pradhan. K.A. Subramanian.

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.

D – Restricted populations – **(1)** Population estimated to number less than 1000 (VU), or 250 (EN), or 50 (CR) mature individuals; **(2)** Population restricted in area of occupancy of less than 100 sq km or less than 5 locations (VU).

E – Probability of extinction – quantative analysis showing the probability of extinction in the wild is at least 10% in 100 years (VU), or 20% in 20 years or 5 generations, whichever is longer (EN), or 50% in 10 years or 3 generations, whichever is longer (CR).