

# Summary of the Status of South Asian Non-volant Small Mammals

Rodents, Insectivores, Scandents, Lagomorphs, Pholidotes

2006



Little Indian field Mouse  
*Mus booduga*



Compiled by Sally Walker and Sanjay Molur with Illustrations by Arnab Roy  
from the Status of South Asian Non-volant Small Mammals: Conservation  
Assessment and Management Plan (C.A.M.P.) Workshop Report 2005

## Credits

The workshop was facilitated and coordinated by the IUCN SSC Conservation Breeding Specialist Group's regional network for South Asia (CBSG, South Asia).

The IUCN/SSC Rodent Specialist Group was represented by the Chair.

Other organizers and collaborators were :

Zoo Outreach Organisation (ZOO), and Wildlife Information & Liaison Development Society (WILD), Conservation Breeding Specialist Group

The workshop was sponsored by: Knowsley Safari Park, Columbus Zoo, Universities Federation for Animal Welfare and Chester Zoo



Summary taken from *Status of South Asian Non-volant Mammals: Conservation Assessment and Management Plan (C.A.M.P.) Workshop Report, 2005*

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## ***The C.A.M.P. Process***

***The Conservation Assessment and Management Plan (C.A.M.P.) process was developed by the IUCN SSC Conservation Breeding Specialist Group (CBSG) initially to assist zoos to prioritise species for conservation breeding.***

***Now C.A.M.P.s are tools for other uses as well, such as for assessing the conservation status of species and also for national biodiversity strategic activities.***

***A C.A.M.P. workshop brings together a variety of professional wildlife managers, biologists, academicians, non-governmental organisations, zoo managers, etc. -- all "stakeholders" because their vocation or avocation concerns the vital issues which come up in such a workshop.***

***The "stakeholders" contribute several types of information which is used by the workshop to evaluate the current status of species, populations and habitats and make recommendations for specific conservation-oriented research, management and public education.***

***C.A.M.P.s are run according to a philosophy of sharing information, resolving conflict, putting conservation of species first and achieving consensus to forward conservation action. There is a set of Groundrules (opposite page) which people commit to follow so that the workshop runs efficiently.***

***C.A.M.P.s are very different and exciting kinds of workshops. Participants often work long into the night and agonise over minute details for days, but generally feel that they have contributed to a very useful product at the end.***



## **Introduction**

Rodents ! Rats, mice, squirrels, shrews. Shrews are not rodents actually; they are insectivores. Tree shrews belong to another order altogether, Scandentia. There are 185 species dealt with in this Report Summary. Many subspecies were not assessed in the present exercise, and possibly many dozens which have not been identified or discovered are not listed here. All are different enough to rate their own subspecies, or even species. After some time of knowing an animal as a particular species or subspecies, it turns out that it belongs even to a different order of mammal altogether.

For most people this group of mammals are all just small, brown, furry things which could carry some disease or scurry up your pants leg. Farmers fear small, brown, furry things as potential pests which eat up their grain. It is not just the layman or proverbial man-on-the-street, but even conservation biologists, foresters, and other wildlife specialists have neglected the study and protection of this largest group of mammals.

As you will learn in this Summary, the great majority of non-volant (non-flying) small mammals are not pests at all, but innocent forest animals doing what small mammals do for ecosystems ... dispersing seeds for healthy growth of vegetation, consuming excess grasses which can clog waterways, providing a food source for a great variety of medium and large-sized mammals, birds, reptiles and even some invertebrates.

Perhaps the majority of the general population does not care so much about large-bodied spiders or even larger mammals, birds and reptiles but we ignore, neglect and reject animals at our own peril. Animal and plant life are the framework which underpins our survival. They keep our ecosystems healthy. We can't live without other organisms, whether we want to have anything to do with them or not. We are stuck with them, if we want to maintain our own quality of life and even our chances of survival.

We depend on the unknown organism for more than ecosystem health also. Research scientists in the fields of health, medicine, food production, even mechanics are forever learning something about improving our lives by the use of another organism as providers of their unique DNA or by mimicing their unique body structure, movements or one of their systems.

Zoo Outreach Organisation (ZOO), Wildlife Information Liaison Development (WILD) and our partner networks with links to much larger conservation organisations, such as IUCN SSC, have elected to focus our attention on groups of neglected fauna. The workshop and its output that is described herein reflects our attempt to do justice to these groups and serve wildlife and biodiversity science by this focus.

This summary review of the workshop is for laypersons, students, and busy professionals such as policy makers, foresters, wildlife protection specialists, educators, etc. who can't quite swallow the 618-page Report. Everything you need to begin your interest in non-volant small mammals is in here. Enjoy, and then use this information in your work and life.

## **C.A.M.P. Ground Rules for Group Interaction**

*These groundrules are used in our workshops so that we avoid wasting time and infructuous arguments, and that we get the most complete, objective and accurate information possible. We take pains to see that the whole group of experts gathered for the workshop agree on its accuracy.*

*Participate ... don't dominate; give all a chance to contribute*

*Set aside all special agendas except conserving the taxa under assessment*

*Assume good intent of all participants. Treat other participants with respect*

*Stick to the schedule... begin and end promptly*

*The primary work will be conducted in sub-groups*

*Facilitators of plenary sessions or working groups can call 'time out' when discussions reach an impasse or stray too far off the topic at hand*

*Agreements or recommendations are reached by consensus*

*Plan to complete and review of draft report by the end of the meeting*

*Flexibility is the key. We adjust our process and schedule as needed to achieve goals.*

<b>Summary status of NVSMs in South Asia.</b>			
<b>Category</b>	<b>Endemics</b>	<b>Non-endemics</b>	<b>Total</b>
Extinct (EX)	0	0	0
Extinct in the Wild (EW)	0	0	0
Locally Extinct (LE)	0	0	0
<b>Critically Endangered (CR)</b>	<b>7</b>	<b>0</b>	<b>7</b>
<b>Endangered (EN)</b>	<b>20</b>	<b>4</b>	<b>24</b>
<b>Vulnerable (VU)</b>	<b>11</b>	<b>13</b>	<b>24</b>
Near Threatened (NT)	6	24	30
Least Concern (LC)	16	68	84
Data Deficient (DD)	2	11	13
Not Evaluated (NE)	0	3	3
	<b>62</b>	<b>123</b>	<b>185</b>

### **Summary status of NVSMs**

The Table above and this information itself may be a new subject for you! We will explain and the information here will help you understand and appreciate the rest of this document. Some terms that you will encounter, perhaps for the first time, will be explained here or you will be told on which pages information about them can be found.

### **About the Table**

The Table summarises the status of endemic and non-endemic NVSMs in South Asia and lists the total species numbers as 185. For better understanding of the significance of the figures and and of the IUCN Categories, please refer to pages 20-21 for definitions and descriptions and of how they are used to place a taxon in a category.

The other terms which may not be familiar to you are "endemic" and "non-endemic". Endemic — in this context — applies to a organism or taxon (a species or subspecies) which is found in a particular locality and nowhere else. The meaning of endemic in this table is "found only in South Asia". Therefore "non-endemic" means found both in South Asia and other regions as well. This is important. Common sense can explain why. If a

particular kind or type of organism is restricted to a limited area (as opposed to the whole world), then its numbers and its potential for survival may decrease according to the size and number of localities.

If a taxa is endemic to South Asia it has a special significance to South Asia and its countries. *That is that we in South Asia are responsible for insuring the survival of that taxa on behalf of and for the future benefit of the whole world.* A tiny mouse may carry a DNA structure or behavioural traits or skills which could provide cures for diseases, or mechanical advances to make our lives safer and easier.

### **About the Information**

The assessments in the Report and in this summary document are based on information current at the time of the C.A.M.P. Workshop in 2004. (*What's a C.A.M.P.? see page 1 sidebar again and the CAMP ground rules in this page*). This was the best information available since it was given by field biologists from the countries of the region. As time goes on, as other studies are conducted and other assessments made, these assessments may vary. These differences should not create difficulties in understanding the plight of small mammals in South

Asia, however, and that is the purpose of this document.

The point is that the overall status of Non-volant Small Mammals in South Asia is alarming. Almost one third – 30% or 55 of the 185 species are threatened with extinction ! That is a very large number of threatened species for such an important taxon group.

### The IUCN Categories

For the IUCN categories you can get a general meaning from pp. 20-21. Sometimes the significance of some categories is not readily apparent however, such as the category "Data Deficient"?. It may seem that that is not even very important, but just think about it. If there is no data, we cannot make a status assessment. If we can't make a status assessment, we don't know if these taxa are going to be safe for another few years or need immediate intervention to save the last few remaining populations or even individuals.

As it happens, thirteen of the 130 non-threatened species lack any information for a meaningful status assessment and therefore are classified as Data Deficient.

There are also three species which are categorised as Not Evaluated. This is because they have been "introduced" into this region from another continent altogether. Such animals are called "aliens"! Another reason for not evaluating a species is that there may be problems in its taxonomy or identifying characters.

### South Asian Endemic species

Sixty-two species (33.5%) of the 185 NVSMs are endemic to South Asia. India, perhaps because it is the largest country of South Asia, has the most- 26 endemic non-volant small mammal species followed by Sri Lanka with 10 endemics. Nepal and Pakistan have one endemic each. Twenty-four (24) NVSM species are distributed in more than one country within South Asia.

### Non-endemic species of South Asia

Seventeen of the 123 non-endemic NVSM species (14%) were assessed as threatened (Critically Endangered, Endangered and Vulnerable) in South Asia.

Just because a species is not endemic to our country or region doesn't mean we don't look after it and try to prevent it from becoming extinct. It is a national disgrace for any country to lose a species, no matter how many other countries have it. Species (and subspecies) live in certain localities for good reasons having to do with health of ecosystems. Any species we lose can cause our ecosystems to suffer in some large or small way. Sometimes a small difference caused by the loss of one species, could impact seriously on several other factors and become disastrous. Just as parents and teachers tell kids "Don't play with fire", ecologists, foresters and conservation biologists tell adults, institutions, governments, etc. **"Don't play with ecosystems!"**

And that is why such exercises as C.A.M.P.s, Global Assessments and other technical conservation workshops are so important, and why the world's largest and most prestigious conservation organisations are involved in these workshops.

The IUCN Red List Criteria itself was developed by IUCN Species Survival Commission. Read about it in the sidebar with the Executive Summary on pp. 4 & 5. Read about CBSG (the group that developed the CAMP process) in the sidebar on this page.



Coorg Shrew  
*Suncus montanus niger*



### What is the IUCN SSC Conservation Breeding Specialist Group

CBSG is part of IUCN - The World Conservation Union with HQ in Switzerland, World Conservation Union serves as the "United Nations of conservation". With 975 volunteer members, CBSG is one of the largest IUCN Specialist Groups. CBSG has over 10 years of experience in developing, testing and applying scientifically based tools for risk assessment and decision making in the context of *in situ* and *ex situ* species management. These tools, based on small population and conservation biology, human demography, and social learning, are used in CBSG's workshop process to produce realistic management recommendations.

CBSG's workshop process provides an objective environment, expert knowledge, and neutral facilitation to support the exchange of information across diverse stakeholder groups in order to reach agreement on the important issues facing both humans and wildlife.

With this understanding, meaningful and practical management recommendations can be made. It has been remarkably successful in uncovering and integrating previously unpublished information vital to the decision making process. CBSG's interactive and participatory approach produces positive effects on management decision-making and generating political and social support for conservation by local people.

CBSG workshops provide tools for designing management decisions and programs on the basis of sound science, while allowing new information and unexpected events to be used constructively to adjust current management practices. Timely production of workshop reports has immediate impact on stakeholders and decision makers.

**The IUCN Species  
Survival Commission  
(SSC)**



IUCN Species Survival Commission (SSC) is a science-based network of 7,000 volunteer experts from around the world. Members include scientists, bureaucrats, wildlife vets, zoo and P.A. managers, and experts on flora and fauna which make up 100 taxon and thematic Specialist Groups. SSC's major role is to provide information to IUCN on biodiversity conservation, intrinsic value of species & role in ecosystems, etc. SSC members also provide scientific advice to conservation groups, government agencies and other members. The IUCN Species Programme supports activities of SSC and individual Specialist Groups, as well as implementing global species conservation initiatives. It includes a number of technical units... Wildlife Trade, the Red List, and the Global Biodiversity Assessment Initiative.

**IUCN is the name for the World  
Conservation Union**

International Union for Conservation of Nature and Natural Resources or World Conservation Union is the world's largest and most important conservation network. It brings together 82 States, 111 government agencies, more than 800 NGOs, and some 10,000 scientists and experts from 181 countries.

The importance of well-functioning ecosystems in helping reduce poverty and improve livelihoods, societies and economies is increasingly clear to scientists. This knowledge needs be integrated into the decisions and actions of local, national and international policy makers in all sectors, as well as business leaders. IUCN seeks to ensure this knowledge is used in practical ways by bringing together scientists, policy makers, business leaders and NGOs to impact the way the world values and uses nature.

## **Executive Summary**

### **Status of South Asian Non-volant Small Mammals CAMP Report**

#### **Introduction**

A Conservation Assessment and Management Plan (C.A.M.P.) Workshop on South Asian Non-volant Small Mammals was held from 9-13 February 2004 at the Karl Kübel Training Institute in Coimbatore, India. Eighteen small mammal field biologists and six conservationists from all over South Asia participated. In addition, the IUCN SSC Rodent, Insectivore and Lagomorph Specialist Groups were represented with members from South Asia, UK, USA, including the Rodent Specialist Group Chair, Giovanni Amori from Italy. The workshop was a combined C.A.M.P. and Global Mammal Assessment (GMA) with a team from the Global Mammal Assessment assisting with recording information.

The South Asian Non-volant Small Mammals C.A.M.P. was endorsed by the IUCN SSC Rodent Specialist Group, The IUCN SSC Insectivore Specialist Group, the IUCN SSC Lagomorph Specialist Group, the IUCN SSC Conservation Breeding Specialist Group, the IUCN Regional Biodiversity Programme (RBP), Asia and the Reintroduction Specialist Group, South & East Asia. Knowsley Safari Park, Universities Federation for Animal Welfare, and Chester Zoo/North of England Zoological Society, UK and Columbus Zoo, USA provided funds for the workshop and this Report.

#### **The C.A.M.P. Process**

The C.A.M.P. Process was developed by the IUCN SSC Conservation Breeding Specialist Group (CBSG). It includes assembling experts such as wildlife managers, SSC Specialist Group members, representatives of the academic community or private sector, researchers, captive managers and other stakeholders who provide the most current information in order to a) assign species and subspecies to IUCN Categories of Threat; b) formulate broad-based management recommendations, and c) develop more comprehensive management and recovery programs *in situ* and/or *ex situ*. Extensive review is carried out by participants who desire to do so before the final Report is compiled and finalised.

#### **The 2001 IUCN Red List Criteria (Version 3.1)**

C.A.M.P. workshops use the most recent version of the IUCN Red List Criteria and Categories and, where appropriate, the IUCN SSC Guidelines for Application of IUCN Red List Criteria at Regional Levels, as tools in assessing the status of a group of taxa. In the last decade IUCN has improved the method of assessing taxa by incorporating numerical values attached to the different criteria for threat categories. The 2001 version of the Red List Criteria and Categories use a set of five criteria (population reduction; restricted distribution, continuing decline and fluctuation; restricted population and continuing decline; very small population; and probability of extinction) to determine the threatened categories, which are Critically Endangered (CR), Endangered (EN) and Vulnerable (VU). Other categories are Extinct (EX), Extinct in the Wild (EW), Near Threatened (NT), Least Concern (LC), Data Deficient (DD) and Not Evaluated (NE).

#### **The Workshop**

Four South Asian countries were represented at the workshop: India, Nepal, Sri Lanka and Bangladesh with participants present throughout the exercise. C.A.M.P. workshops use working group sessions alternating with review in several plenary sessions. In this workshop the groups were organised by family/orders: two

groups on Muridae (including all other families of rodents, and including lagomorphs and pholidots), Sciuridae and Insectivora.

With the added advantage of having many working field biologists from the range of these taxa, there was a significant improvement in data quality compared to the exercise conducted in 1997. In this C.A.M.P. workshop, 55 of the 185 non-volant small mammal species were categorized as threatened. Thirty-eight of the 62 species endemic to South Asia are threatened, which is over 60% of all NVSMs in the region! However, of the 123 nonendemics, only 17 are threatened. Restricted distribution is therefore a major criteria for threat assessments in the case of NVSMs in South Asia, barring six species that were categorised as threatened due to population decline and four species due to being found in only a few locations albeit with no threats to either the population or habitat.

Species not endemic to a country were assigned national status in every country of occurrence according to the IUCN Regional Red List Criteria (IUCN, 2003). India having the largest land area has the most endemic NVSM species - 26, followed by Sri Lanka with 10, and Nepal and Pakistan with one each. The remaining 24 species are endemic to South Asia distributed in more than one country.

A Draft Report containing Taxon Data Sheets for all 185 NVSM species was given to participants at the end of the workshop thanks to the C.A.M.P. Data Entry Programme and hard work by recorders. This report reflects the corrections and comments that were returned on the draft Taxon Data Sheets. The output from the workshop has been submitted to the appropriate specialist group chairs and IUCN Red List committee for inclusion in 2005 IUCN Red List of Threatened Species. This is an appropriate utilisation of information from local field biologists and primate students from South Asia, and a credit to their work.

Four members of the Global Mammal Assessment who participated in the working groups and in assessments. The GMA team filled in data into the GMA database as well as mapped the distribution on the computer. The information on non-endemic species from the region will be used to assess the global status of widely distributed species of NVSMs by GMA.

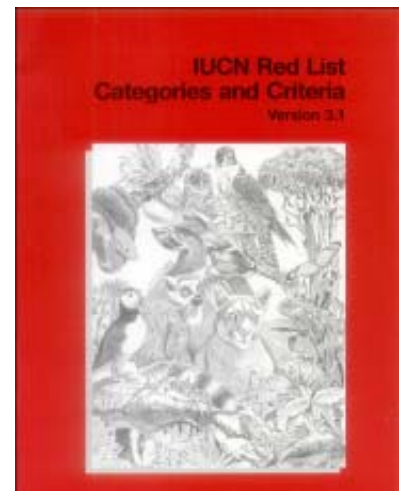
### Recommendations

A series of recommendations for research and management of South Asian Non-volant Small Mammals was derived from Taxon Data Sheets filled out by participants in the workshop. Key recommendations for research were taxonomic studies, surveys and life history studies; and for management included habitat management, public education and monitoring. Special issue working groups were formed on the following subjects: Research and Field Studies, Taxonomy and Networking, and Training and education.



Short-tailed Bandicoot Rat  
*Nesokia indica*

### *The 2001 IUCN Red List Criteria (Version 3.1)*



*The C.A.M.P. workshop process employs the IUCN Red List Criteria as a tool in assessing species status in a group of taxa. The structure of the categories includes extinct, threatened, non-threatened, data deficient and not evaluated divisions.*

*In the last decade IUCN has improved the method of assessment of species by incorporating numerical values attached to the different criteria for threat categories. The 2001 version of the Red List Threatened Categories are derived through a set of 5 criteria*

- A. Population reduction;*
  - B. Restricted distribution, continuing decline and fluctuation;*
  - C. Restricted population and continuing decline;*
  - D. Very small population;*
  - E. probability of extinction*
- based on which the threatened category is assigned.*

*The term "threatened" according to the 2001 IUCN categories means Critically Endangered, Endangered or Vulnerable.*

*The "non-threatened" categories are Near Threatened and Least Concern*

**IUCN**  
The World Conservation Union

**Global status of endemic non-volant small mammals in South Asia  
(IUCN Red List Criteria 2001 (Ver. 3.1))**

Scientific name	Status	Criteria
<b>Erinaceomorpha</b>		
<b>Erinaceidae</b>		
<i>Hemiechinus collaris</i> (Gray, 1830)	Least Concern	-
<i>Hemiechinus micropus</i> (Blyth, 1846)	Least Concern	-
<i>Hemiechinus nudiventris</i> (Horsfield, 1851)	Near Threatened	-
<b>Lagomorpha</b>		
<b>Leporidae</b>		
<i>Caprolagus hispidus</i> (Pearson, 1839)	Endangered	B2ab(ii,iii,iv)
<i>Lepus nigricollis</i> Cuvier, 1823	Least Concern	-
<b>Pholidota</b>		
<b>Manidae</b>		
<i>Manis crassicaudata</i> (Gray, 1827)	Vulnerable	A2c+3c+4c
<b>Rodentia</b>		
<b>Calomyscidae</b>		
<i>Calomyscus hotsoni</i> Thomas, 1920	Critically Endangered	B1ab(ii,iii)
<b>Muridae</b>		
<i>Alticola albicauda</i> (True, 1894)	Data Deficient	
<i>Alticola blanfordi</i> (Scully, 1880)	Vulnerable	B2ab(iii)
<i>Alticola montosa</i> (True, 1894)	Near Threatened	-
<i>Alticola roylei</i> (Gray, 1842)	Endangered	B2ab(iii)
<i>Apodemus gurkha</i> Thomas, 1924	Endangered	B1ab(iii)
<i>Bandicota maxima</i> Pradhan <i>et al.</i> , 1993	Least Concern	-
<i>Cremnomys blanfordi</i> (Thomas, 1881)	Least Concern	-
<i>Cremnomys cutchicus</i> Wroughton, 1912	Least Concern	-
<i>Cremnomys elvira</i> (Ellerman, 1947)	Critically Endangered	B1ab(ii,iii)+2ab(ii,iii)
<i>Gerbillus gleadowi</i> Murray, 1886	Near Threatened	-
<i>Hyperacrius fertilis</i> (True, 1894)	Vulnerable	B2ab(iii)
<i>Hyperacrius wynnei</i> (Blanford, 1881)	Least Concern	-
<i>Millardia gleadowi</i> (Murray, 1885)	Least Concern	-
<i>Millardia kondana</i> Mishra & Dhanda, 1975	Critically Endangered	B1ab(iii)+2ab(iii)
<i>Millardia meltada</i> (Gray, 1837)	Least Concern	-
<i>Mus famulus</i> Bonhote, 1898	Endangered	B1ab(ii,iii)+2ab(ii,iii)
<i>Mus fernandoni</i> (Phillips, 1932)	Endangered	B1ab(ii,iii)+2ab(ii,iii)
<i>Mus mayori</i> (Thomas, 1915)	Endangered	B1ab(ii,iii)
<i>Mus platythrix</i> Bennet, 1832	Least Concern	-
<i>Mus saxicola</i> Elliot, 1839	Least Concern	-
<i>Rattus burrus</i> (Miller, 1902)	Endangered	B1ab(ii,iii)+2ab(ii,iii)
<i>Rattus montanus</i> Phillips, 1932	Endangered	B1ab(ii,iii)+2ab(ii,iii)
<i>Rattus palmarum</i> (Zelevor, 1869)	Critically Endangered	B1ab(iii)
<i>Rattus ranjinae</i> Agrawal & Ghosh, 1969	Endangered	B1ab(ii,iii)+2ab(ii,iii)
<i>Rattus stoicus</i> (Miller, 1902)	Vulnerable	D2
<i>Rattus vicerex</i> (Bonhote, 1903)	Least Concern	-
<i>Srilankamys ohiensis</i> (Phillips, 1929)	Vulnerable	B1ab(ii,iii)+2ab(ii,iii)
<i>Vandeleuria nolthenii</i> (Phillips, 1929)	Endangered	B1ab(ii,iii)+2ab(ii,iii)
<b>Platacanthomyidae</b>		
<i>Platacanthomys lasiurus</i> Blyth, 1859	Vulnerable	B2ab(ii,iii)
<b>Sciuridae</b>		
<i>Biswamoyopterus biswasi</i> Saha, 1981	Critically Endangered	B1ab(iii); D
<i>Eoglaucomys fimbriatus</i> (Gray, 1837)	Least Concern	-
<i>Funambulus layardi</i> (Blyth, 1849)	Vulnerable	A3c+4c; B1ab(ii,iii)
<i>Funambulus palmarum</i> (Linnaeus, 1766)	Least Concern	-
<i>Funambulus sublineatus</i> (Waterhouse, 1838)	Vulnerable	B2ab(ii,iii,iv)
<i>Funambulus tristriatus</i> (Waterhouse, 1837)	Near Threatened	-
<i>Petaurista nobilis</i> Gray, 1842	Endangered	A2c+3c+4c
<i>Petinomys fuscocapillus</i> (Jerdon, 1847)	Near Threatened	-
<i>Ratufa indica</i> (Erleben, 1777)	Vulnerable	A2c+3c+4c
<i>Ratufa macroura</i> (Pennant, 1769)	Vulnerable	A2c+3c+4c; D



**Soricomorpha**

**Soricidae**

<i>Crocidura andamanensis</i> Miller, 1902	Critically Endangered	B1ab(iii)
<i>Crocidura hispida</i> Thomas, 1913	Vulnerable	D2
<i>Crocidura jenkinsi</i> Chakraborty, 1978	Critically Endangered	B1ab(iii)
<i>Crocidura miya</i> Phillips, 1929	Endangered	B1ab(iii)+2ab(iii)
<i>Crocidura nicobarica</i> Miller, 1902	Endangered	B1ab(iii)+2ab(iii)
<i>Crocidura pergrisea</i> Miller, 1913	Data Deficient	-
<i>Feroculus feroculus</i> (Kelaart, 1850)	Endangered	B1ab(iii)+2ab(iii)
<i>Solisorex pearsonii</i> Thomas, 1924	Endangered	B1ab(ii,iii)+2ab(ii,iii)
<i>Sorex planiceps</i> Miller, 1911	Least Concern	-
<i>Suncus dayi</i> (Dobson, 1888)	Endangered	B1ab(ii,iii)+2ab(ii,iii)
<i>Suncus fellowesgordoni</i> Phillips, 1932	Endangered	B1ab(ii,iii)+2ab(ii,iii)
<i>Suncus montanus</i> (Kelaart, 1850)	Endangered	B2ab(ii,iii)
<i>Suncus stoliczkanus</i> (Anderson, 1877)	Least Concern	-
<i>Suncus zeylanicus</i> Phillips, 1928	Endangered	B1ab(ii,iii)+2ab(ii,iii)

**Scandentia**

**Tupaiaidae**

<i>Anathana ellioti</i> (Waterhouse, 1850)	Near Threatened	
<i>Tupaia nicobarica</i> (Zelebor, 1869)	Endangered	B1ab(iii)+2ab(iii)

**FIND SOUTH ASIAN NONENDEMIC TAXA IN TTMS [www.southasiantaxa.org](http://www.southasiantaxa.org)  
(Regional status derived using IUCN Versions 3.1 and 3.0) (sample and an explanation on following page)**

The Report, which runs over 600 pages, includes many useful tables and graphs as well as other useful and interesting information, such as national and regional status for both endemic and non-endemic taxa, but much of this data can be found in our website listed taxa by taxa. See below for home page and an example of what you will get if you type the word "Southasiantaxa.org". You can find the answers to questions such as whether an animal you have heard about is threatened or non-threatened, endemic or non endemic, etc.

Refer <[www.southasiantaxa.org](http://www.southasiantaxa.org)>. (Please write to <[pravin@zooreach.org](mailto:pravin@zooreach.org)> or <[zoocrew@vsnl.net](mailto:zoocrew@vsnl.net)> if you have a problem or question.)

**Threatened Taxa Monitoring System TTMS -- [www.Southasiantaxa.org](http://www.Southasiantaxa.org)**



## Regional / National assessment

The IUCN Red List guidelines were developed for species assessments at the global level, meaning species endemic to a region or a country. When it comes to non-volant small mammals, many species are distributed in more than one country, and usually have very wide distributions. Also, for understanding the status of species at the subglobal level, country-wise assessments become very important in formulating necessary conservation and action plans. The IUCN realized this and developed a set of regional guidelines to help regions and countries derive national status for widely distributed non-endemic species. In the NVSM CAMP, we applied the regional guidelines to non-endemic species, whereby after assessing the status of the species within the region or the country using global IUCN Red List guidelines (Version 3.1), the species was then assessed nationally using the IUCN Regional Red List guidelines (Version 3.0) by determining several factors such as the proportion of population or distribution within the country compared to the global distribution. We also looked at whether the species faced the same kinds of threats in the neighbouring countries as it did in the country of assessment; whether the species was distributed continuously across the border or if it was fragmented; whether the species was declining in population in the country like in its neighbouring areas; whether the individuals or populations of the species within the country were able to move freely across the political boundaries to either

establish new colonies or not; whether the migrating individuals between the populations of the country of assessment and the neighbouring countries could do so without hindrance or not; whether the situation in the country of assessment led to the continuous disappearance of the species, although new populations could come from the neighbouring areas; etc. These questions were weighed against each non-endemic species and the status of the species within the country of assessment was then upgraded or downgraded depending on the situation. In no instance was the national status lower than the global status.



Afghan Pika  
*Ochotona rufescens*

**Regional status of non-endemic non-volant small mammals in South Asia derived at the C.A.M.P. workshop using 2001 IUCN Red List Criteria and Categories (Version 3.1: Global and Version 3.0: Regional) (only species which have been listed as globally threatened by IUCN are included as examples)**

**The table below lists a sample of some assessments which have been done at the Global level using global criteria by IUCN and at the Regional level using National and Regional Criteria by the CAMP.**

Scientific name	Camp Status		Criteria
<b>SAMPLE ONLY :</b>			
<b>Muridae</b>			
<i>Apodemus draco</i> (Barrett-Hamilton, 1900)	Near Threatened	VU ↓ NT	B1ab(iii)+2ab(iii)
<i>Apodemus orestes</i> (Thomas, 1911)	Near Threatened	VU ↓ NT	D2
<i>Chiropodomys gliroides</i> (Blyth, 1856)	Near Threatened	VU ↓ NT	B1ab(ii,iii)+2ab(ii,iii)
<i>Dacnomys millardi</i> Thomas, 1916	Near Threatened	VU ↓ NT	B2ab(iii)
<i>Diomys crumpi</i> Thomas, 1917	Endangered		B1ab(iii)+2ab(iii)
<i>Ellobius fuscocapillus</i> (Blyth, 1842)	Vulnerable	EN ↓ VU	B1ab(ii,iii)+2ab(ii,iii)
<i>Eothenomys melanogaster</i> (Milne-Edwards, 1871)	Vulnerable	EN ↓ VU	B1ab(ii,iii)+2ab(ii,iii)
<i>Hydromys humei</i> (Thomas, 1886)	Vulnerable	EN ↓ VU	B1ab(iii)+2ab(iii)
<i>Leopoldamys edwardsi</i> (Thomas, 1882)	Near Threatened	VU ↓ NT	B2ab(ii,iii)
<i>Meriones persicus</i> (Blanford, 1875)	Near Threatened	VU ↓ NT	B2ab(ii,iii)
<i>Microtus juldaschi</i> (Severtzov, 1879)	Vulnerable	EN ↓ VU	B1ab(iii)+2ab(iii)
<i>Niviventer brahma</i> (Thomas, 1914)	Vulnerable	EN ↓ VU	B1ab(iii)+2ab(iii)
<i>Niviventer langbianis</i> (Robinson & Kloss, 1922)	Endangered	CR ↓ EN	B1ab(iii)+2ab(iii)
<i>Rhizomys pruinus</i> Blyth, 1851	Endangered		B2ab(ii,iii)
<i>Rhombomys opimus</i> (Lichtenstein, 1823)	Vulnerable	EN ↓ VU	B2ab(iii)

## C.A.M.P. Workshops, the IUCN Red Lists and GMA

What is the relationship of C.A.M.P. workshop output to the IUCN Red List? And what is the relationship of the Global Mammal Assessment GMA (or, for all taxa Global Assessment Programme (GAP) to both C.A.M.P. and IUCN Red List.

First, the IUCN Red List has replaced the old IUCN Red Data Books which were established in the 1960s. The IUCN Red Data Books used an older version of the IUCN Red List categories which were not associated with objective, scientific criteria as is the case today. The IUCN Red List Criteria (Ver. 3.1) used in this C.A.M.P. workshop, replaced several other versions which were in the development and testing process for nearly a decade.

Although C.A.M.P. workshops and other methods conducted even by individuals use the the IUCN Red List Criteria, there are often individual differences in how well the criteria are understood and even the rigour and integrity with which they are applied. Therefore, the Species Survival Commission of IUCN has a procedure and protocol for such assessments to determine whether the assessment is correct. This is a process of review.

When a C.A.M.P. is conducted, it is ideal to have the individual who has been designated as the IUCN Red List Authority for the taxa under assessment. This individual is often the taxon specialist group chair. For example in this C.A.M.P. for NVSMs of South Asia, it was the Chair of the Rodent Specialist Group of IUCN. The Rodent Specialist Group has been disbanded but the Chair was retained as the Red List Focal Point for this taxon group. There were other specialists who are familiar with assessments as well. In fact we had four persons assisting and recording from SSC IUCN's newest attempt

to make the process of Red Listing more meaningful, which is the Global Species Assessments or GSA for all taxa and the Global Mammal Assessment (GMA) for mammals. The individual selected to organise GMAs around the world had attended and brought mammal experts from UK and Europe.

We also had with us the Conservation Breeding Specialist Group CBSG Technical Expert on the Red List, Sanjay Molur. Sanjay, who was also an organiser of this CAMP and Deputy Director of ZOO and Founder/Secretary of WILD may have assessed more species than anyone and he is the only Asian member of the IUCN SSC Red List Committee. In the end, we have used Sanjay's assessments using Regional and national Guidelines for our Report and not the assessments from the Global Mammal Assessments. Therefore, if you find some difference in the Global Red List and our assessments please make sure whether the assessment is regional or not. The NVSM C.A.M.P. report has both global and regional assessments while the GMA has only global assessments.

After all information in a CAMP has been finalised and the last attempt to assess the species done, the category and rationale (which is the criteria used) should be submitted to the Chair for review. The Chair may request other specialists to review the assessment. After being satisfied that the assessment and rationale is correct, the Chair sends it to the Red List Committee. It is again examined and, if controversial, may be reviewed again. When it is accepted it is taken as part of the IUCN Red List for that year.

In the case of national or regional assessments, only species which are endemic to a particular country or region would be eligible for

consideration for the Red List which uses global criteria for assessment. Otherwise, non-endemic species which have been assessed in a country or region, could still be submitted to the Specialist Group Chair to be used by him or her as part of the picture in deriving the status for a species with a wider range.

Regional assessments have their own importance compared to global assessments, however, due to the following advantages:

- a. Smaller area of assessment resulting in greater accuracy\*
- b. More participation by local field biologists in the assessment process
- c. Assessments based on more recent field information
- d. Implications for regional action plans and management plans
- e. Bottom-up approach to assessments, i.e. regional/national information feeding into global assessments.
- f. Post assessment follow-up actions such as surveys, monitoring and education
- g. Information is likely to be used in regional or national Red Data books and national biodiversity strategies
- h. Lobbying for conservation efforts with local governments can be done more effectively
- i. Sustained effort in gathering field information and networking.

\* The same is true for national assessments, where the Regional IUCN guidelines are used.



**Forest Rat**  
*Rattus satarae*

**Red List Case Study :  
Regional/National  
assessment Case  
Study**

*Petaurista magnificus* (Hodgson, 1836)

The Hodgson's Flying Squirrel occurs in Nepal, India, Bhutan and China making it non-endemic to the region of South Asia. However, the distribution range within South Asia is restricted to the Himalaya. According to experts, this squirrel is restricted in its range in South Asia to less than 20,000km<sup>2</sup>, with its distribution further restricted in India and Bhutan. The habitat where the species occurs is under tremendous threat due to logging, encroachments, forest fires and plantations. This has led to habitat loss and fragmentation and thereby resulted in the species being categorized as threatened under the Criterion B for restricted distribution and continuing decline. This has also resulted in extensive reduction in populations over the last 25 years, which makes it threatened under Criterion A for population reduction. The species is therefore Vulnerable in South Asia. Since the species is thought to be facing the same kinds of threats in the neighbouring country, the status was retained. The regional status of *Petaurista magnificus* in South Asia is, therefore, VULNERABLE A2c+3c+4c; B1ab(ii,iii).

**National status:**

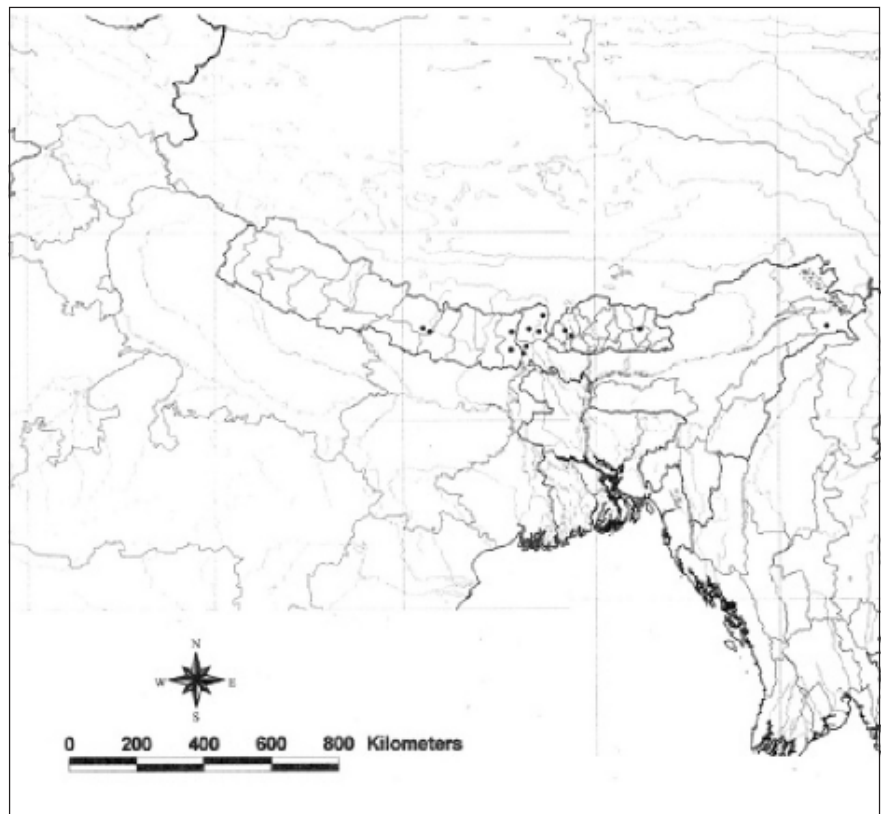
**Bhutan:** Endangered B1ab(ii,iii). The population within Bhutan is facing continuing decline due to loss of habitat, which is also the case in the neighbouring countries. Hence the status of Endangered, which was derived from restricted distributions retained without any change.

**India:** Vulnerable A2c+3c+4c; B1ab(ii,iii). The Indian population of this species is similar to that of Bhutan, except that it is just a little more widely distributed than in Bhutan. Since the situation

with respect to habitat loss and population decline is the same as in Bhutan, the status of the species is retained as Vulnerable.

Nepal: Data Deficient. The Nepal population of this species is not very well defined as it is thought by taxonomists to be a different species. Hence the assessment for Nepal is Data Deficient.

**Localities from where *Petaurista magnificus* (Hodgson, 1836) is known in Bhutan, India and Nepal**



**Hodgson's Flying Squirrel  
*Petaurista magnificus***

## IUCN Red List Criteria Rationale : What do those little letters and numbers mean ?

After every assessment of Critically Endangered CR, Endangered, EN, and Vulnerable VU, there is a list - often quite a long list - of letters and numbers that defy explanation, such as Critically Endangered CR [B1ab(ii,iii)+2ab(ii,iii)] after *Cremnomys elvira*. Actually they are very well explained in the last pages of this document in the IUCN Red List criteria expansion and rationale, but for many busy people, they will not have time or patience to look up every one. Therefore, to give an idea of what those "little letters and numer mean" we have included a batch of rats and mice which have been assessed as threatened. In order to be acceptable for a threatened category in the IUCN Red List the species assessed has to be submitted with the full rationale which tells why and on what basis. Below is the list of threatened endemics of NVSMs of South Asia.

***Alticola blanfordi* (Scully, 1880)**

VULNERABLE [B2ab(iii)]

Restricted in area of occupancy, few and fragmented locations, with major threats affecting habitat area and quality.

***Alticola roylei* (Gray, 1842)**

ENDANGERED [B2ab(iii)]

Restricted in area of occupancy, few and fragmented locations, with major threats affecting habitat area and quality.

***Apodemus gurkha* Thomas, 1924**

ENDANGERED [B1ab(iii)]

Restricted in extent of occurrence, few and fragmented locations, with major threats affecting habitat area and quality.

***Biswamoyopterus biswasi* Saha, 1981**

CRITICALLY ENDANGERED

[B1ab(iii);D]

Restricted in extent of occurrence and area of occupancy, few and fragmented locations, with major threats affecting habitat area and quality. Number of mature individuals highly restricted.

***Calomyscus hotsoni* Thomas, 1920**

CRITICALLY ENDANGERED

[B1ab(ii,iii)]

This species is known only from the type locality.

***Caprolagus***

***hispidus***

(Pearson,

1839)

ENDANGERED

[B2ab(ii,iii,iv)]

Restricted in area of occupancy,



Cape Hare

*Lepus capensis*

few and fragmented locations, with major threats affecting habitat area and quality.

***Cremnomys elvira* (Ellerman, 1947)**

CRITICALLY ENDANGERED

[B1ab(ii,iii)+2ab(ii,iii)]

Restricted in extent of occurrence and area of occupancy, single location with major threats affecting habitat area and quality.

***Crocidura andamanensis* Miller, 1902**

CRITICALLY ENDANGERED

[B1ab(iii)]

Restricted in extent of occurrence and area of occupancy, single location with major threats affecting habitat area and quality.

***Crocidura hispida* Thomas, 1913**

VULNERABLE [D2]

Restricted in area of occupancy (< 100 sq km) and occurs in only one location.

***Crocidura jenkinsi* Chakraborty, 1978**

CRITICALLY ENDANGERED

[B1ab(iii)]

Restricted in extent of occurrence and area of occupancy, single location with major threats affecting habitat area and quality.

***Crocidura miya* Phillips, 1929**

ENDANGERED [B1ab(iii)+2ab(iii)]

Restricted in extent of occurrence and area of occupancy, few and fragmented locations, with major threats affecting habitat area and quality.

***Crocidura nicobarica* Miller, 1902**

ENDANGERED [B1ab(iii)+2ab(iii)]

Restricted in extent of occurrence and area of occupancy, few and fragmented locations, with major threats affecting habitat area and quality.

***Feroculus feroculus* (Kelaart, 1850)**

ENDANGERED [B1ab(iii)+2ab(iii)]

Restricted in extent of occurrence and area of occupancy, few and fragmented locations, with major threats affecting habitat area and quality.

***Funambulus layardi* (Blyth, 1849)**

VULNERABLE [A3c+4c; B1ab(ii,iii)]

Continuing decline in population due to major threats predicted over the next three generations. Restricted in extent of occurrence, many but fragmented locations, with major threats affecting habitat area and quality.

***Funambulus sublineatus* (Waterhouse, 1838)**

VULNERABLE [B2ab(ii,iii,iv)]

Restricted in area of occupancy, many but fragmented locations, with major threats affecting habitat area, quality and populations.

***Hyperacrius fertilis* (True, 1894)**

VULNERABLE [B2ab(iii)]

This species is widely distributed throughout its range and is well adapted to changing environments.

***Manis crassicaudata* (Gray, 1827)**

VULNERABLE [A2c+3c+4c]

In the South Asian region, there is a continuing decline in population due to major threats over the last three generations. Predicted decline at the same rate over the next three generations.

***Millardia kondana* Mishra and Dhanda, 1975**

CRITICALLY ENDANGERED

[B1ab(iii)+2ab(iii)]

Restricted in extent of occurrence and area of occupancy, single location with major threats affecting habitat area and quality.

***Mus famulus* Bonhote, 1898**

ENDANGERED

[B1ab(ii,iii)+2ab(ii,iii)]

Restricted in extent of occurrence and area of occupancy, few and fragmented locations, with major threats affecting habitat area and quality.

***Mus fernandoni* (Phillips, 1932)**

ENDANGERED

[B1ab(ii,iii)+2ab(ii,iii)]

Restricted in extent of occurrence and area of occupancy, few and fragmented locations, with major threats affecting habitat area and quality.

***Mus mayori* (Thomas, 1915)**

ENDANGERED [B1ab(ii,iii)]

Restricted in extent of occurrence, few and fragmented locations, with major threats affecting habitat area and quality.

***Petaurista nobilis* Gray, 1842**

ENDANGERED [A2c+3c+4c]

Continuing decline in population due to major threats over the last three generations. Predicted decline at the same rate over the next three generations.

***Petinomys fuscocapillus***

(Jerdon, 1847)

NEAR THREATENED

Widely distributed species with major threats affecting its habitat and/or population, although not enough to be categorised as Vulnerable.

***Platacanthomys lasiurus* Blyth, 1859**

VULNERABLE [B2ab(ii,iii)]

Restricted in area of occupancy, few and fragmented locations, with major threats affecting habitat area and quality.

***Rattus burrus* (Miller, 1902)**

ENDANGERED

[B1ab(ii,iii)+2ab(ii,iii)]

Restricted in extent of occurrence and area of occupancy, few and fragmented locations, with major threats affecting habitat area and quality.

***Rattus montanus* Phillips, 1932**

ENDANGERED

[B1ab(ii,iii)+2ab(ii,iii)]

Restricted in extent of occurrence and area of occupancy, few and fragmented locations, with major threats affecting habitat area and quality.

***Rattus palmarum* (Zeblebor, 1869)**

CRITICALLY ENDANGERED

[B1ab(iii)]

Restricted in extent of occurrence and area of occupancy, single location with major threats affecting habitat area and quality.

***Rattus ranjiniae* Agrawal and Ghosh, 1969**

ENDANGERED

[B1ab(ii,iii)+2ab(ii,iii)]

Restricted in extent of occurrence and area of occupancy, few and fragmented locations, with major threats affecting habitat area and quality.

***Rattus stoicus* (Miller, 1902)**

VULNERABLE [D2]

Restricted to 5 or less than 5 locations.

***Ratufa indica* (Erxleben, 1777)**

VULNERABLE [A2c+3c+4c]

Continuing decline in population due to major threats over the last three generations. Predicted decline at the same rate over the next three generations.

***Ratufa macroura* (Pennant, 1769)**

VULNERABLE [A2c+3c+4c; D]

Continuing decline in population due to major threats over the last three generations. Predicted decline at the same rate over the next three generations. Number of mature individuals very low.

***Solisorex pearsonii* Thomas, 1924**

ENDANGERED

[B1ab(ii,iii)+2ab(ii,iii)]

Restricted in extent of occurrence and area of occupancy, few and fragmented locations, with major threats affecting habitat area and quality.

***Srilankamys ohiensis* (Phillips, 1929)**

VULNERABLE [B1ab(ii,iii)+2ab(ii,iii)]

Restricted in extent of occurrence and area of occupancy, few and fragmented locations, with major threats affecting habitat area and quality.

***Suncus dayi* (Dobson, 1888)**

ENDANGERED

[B1ab(ii,iii)+2ab(ii,iii)]

Restricted in extent of occurrence and area of occupancy, few and fragmented locations, with major

threats affecting habitat area and quality.

***Suncus fellowesgordoni* Phillips, 1932**

ENDANGERED

[B1ab(ii,iii)+2ab(ii,iii)]

Restricted in extent of occurrence and area of occupancy, few and fragmented locations, with major threats affecting habitat area and quality.

***Suncus montanus* (Kelaart, 1850)**

ENDANGERED [B2ab(ii,iii)]

Restricted in extent of occurrence and area of occupancy, few and fragmented locations, with major threats affecting habitat area and quality.

***Suncus zeylanicus* Phillips, 1928**

ENDANGERED

[B1ab(ii,iii)+2ab(ii,iii)]

Restricted in extent of occurrence and area of occupancy, few and fragmented locations, with major threats affecting habitat area and quality.

***Tupaia nicobarica* (Zeblebor, 1869)**

ENDANGERED [B1ab(iii)+2ab(iii)]

Restricted in extent of occurrence and area of occupancy, few and fragmented locations, with major threats affecting habitat quality.

***Vandeleuria nolthenii* (Phillips, 1929)**

ENDANGERED

[B1ab(ii,iii)+2ab(ii,iii)]

Restricted in extent of occurrence and area of occupancy, few and fragmented locations, with major threats affecting habitat area and quality.



**Forest Rat**  
***Rattus rattus wroughtoni***

## Threats

No NVSM with restricted distribution is beyond threat. All Critically Endangered, Endangered and Vulnerable species are under severe pressure due to a variety of threats impacting them, while the non-threatened taxa still face threats of some kind. The Table below gives an idea of the threats of Non-volant Small Mammals and also the number of taxa which are known to be affected by specific threats.

Habitat loss due to such reasons as logging, agriculture, development, habitation, industry, commerce and fragmentation has resulted in many taxa being threatened, some as seriously as being assessed as Critically Endangered or Endangered. Approximately 74% of the threats are habitat-related and the remaining are population-related. NVSMs are under tremendous pressure because of continuing decline in habitat, which is obvious in almost all regions. Northeastern India and Bangladesh face a continuing crisis with loss of habitat due to such factors as illegal encroachments, clear-felling for human settlements, logging for firewood and mining. This has resulted in many forested areas becoming fragmented and inhospitable for some arboreal and specialized NVSMs.

In various cases, the degree of threat to the habitat is reflected in very small population numbers in restricted areas of specialized rodents such as giant squirrels and gliding squirrels. Squirrels and tree shrews are inherently shy and require a fair component of healthy habitat including canopy trees and food trees for maintaining a viable group size, and for dispersal. Lack of continuous forests in the northeast and many parts of central and southern India and Sri Lanka has affected the population dynamics, which is now a major threat. Habitat loss in the past has resulted in reduced numbers of squirrels currently. The Western Ghats has lost nearly half its forests in the last 60 years, forests that used to be home for giant and gliding squirrels.

Loss of habitat quality is another major threat identified for almost all NVSM taxa, although the effects of change in quality is not reflected in threat perception of a taxon. Man-made fires, collection of non-timber forest produce, eco-tourism, human settlements in and around forests, poor management practices and other activities can cause changes to the quality of habitat, which in turn has a negative effect on many specialized NVSM species.

Population declines are of concern with respect to giant squirrels in India. Due to loss of habitat over many years in the past, population trends were assessed based on correlations with habitat trends. Although no statistical interpretation was carried out to correlate the two, an understanding of the extent of habitat available in the past to that in the present gives an indication of the population trends.



Sundeval's Jird  
*Meriones crassus*



Vole  
*Microtus sp.*

## Threats

### and number of taxa affected

Habitat loss	94
Habitat fragmentation	2
Agri practices – pesticides	18
Pest control activities	2
Hunting	39
Natural predators	29
Domestic predators	14
Forest fire	34
Small-scale logging	43
Alien species	15
Natural calamities	25
Plantation	17
Restricted range	20
Exp. human settlements	26
Clear-cutting of forests	13
Illegal timber extraction	30
Expansion of agriculture	16
Construction of dams	9
Road kills	3
Pets/pet trade	2
Research	3
Civil unrest/war	9
Fuelwood collection	8
Livestock grazing	12
Shifting/Jhum cultivation	17
Infrastructure development	11
Military base/army est	3
Anthropogenic activities	18
Effect of canal networks	3

## Threats to rats and mice, taxa by taxa ... just a few examples

Because of the unfortunate image and reputation of rats and mice, as common representatives of the small, brown, furry creatures that people think of as pests, there is very little concern for them and the threats which may wipe out a whole species or important population. As many of these taxa are confined to small niches and few populations, they can -- in certain situations -- become extinct practically before they are fully known. One's practical experience with small, brown, furry creatures notwithstanding, a species is a species, unique and potentially or actually of inestimable value.

### Rodentia Dipodidae

*Jacomys blanfordi* -- In Syria, this species is used in falconery, it is assumed that the same might be its fate in Pakistan

### Gliridae

*Dryomys nitidula* -  
- Habitat loss and degradation due to small-scale logging of juniper, natural predators and disease due to pathogens and parasites



### Hystricidae

*Atherurus macrourus* -- Habitat loss due to *jhum*/shifting agriculture, small-scale logging, subsistence use harvest for food and accidental mortality due to collections

*Hystrix brachyura* -- Habitat loss due to construction of dams, power lines, and other infra-structure development; harvested for medicinal purposes, accidental mortality from trapping, snaring, netting shooting

*Hystrix indica* -- Habitat loss due to construction of dams, livestock grazing, harvested for local consumption and medicinal purposes and accidental mortality due to trapping, snaring, netting, shooting, poisoning, pest control practices, human induced disturbances, road kills and poaching

### Muridae

*Alticola argentatus* -- High altitude livestock grazing

*Alticola blanfordi* -- High altitude livestock grazing

*Alticola montosa* -- Anthropogenic activities and military disturbance

*Alticola roylei* -- Habitat loss due to livestock grazing, human settlements, and natural disasters like avalanche and landslides

*Alticola stoliczkanus* -- Habitat loss due to infrastructure (road) development and increase in human settlements

*Apodemus draco* -- *Jhum*/shifting agriculture

*Apodemus gurkha* -- Agriculture and harvesting by locals for consumption

*Apodemus sylvaticus* -- Habitat under anthropogenic pressures

*Bandicota bengalensis* -- Pest control activities

*Bandicota indica* -- Pest control activities and change in land use pattern

*Bandicota maxima* -- Pest control activities

*Cannomys badius* -- Habitat loss due to *jhum* cultivation, forest fire and harvesting for subsistence use



*Chiropodomys gliroides* -- Habitat loss due to *jhum* cultivation, small-scale logging, forest fire, clearing of bamboo patches, expansion of human settlements and construction of dams

*Cremnomys cutchicus* -- Expansion of agriculture

*Cremnomys elvira* -- Habitat loss conversion of forests to agriculture lands and plantations and fuel-wood collection

*Cricetulus alticola* -- Habitat loss due to expansion of human settlements and army camps

*Cricetulus migratorius* -- Habitat loss due to small-scale logging and defence establishments

*Diomys crumpi* -- Shifting agriculture, however, not enough information exists to predict the effect of threats on this taxon



*Ellobius fuscocapillus* -- Natural calamities such as drought, wildfires, avalanches and land-slides

*Eothenomys melanogaster* -- Habitat loss and degradation due to expansion of agriculture, small-scale logging and human settlements

*Gerbillus gleadowi* -- Habitat loss and degradation due to small-holder farming, livestock grazing; presence of alien species and predators; pollution due to excessive use of pesticides and disturbance due to human activities and transport. The major threat for the habitat is the construction of the Indira Gandhi Canal.

*Gerbillus nanus* -- Habitat loss and degradation due to livestock grazing, mismanagement of non-farm lands, small scale logging and harvesting of this species for local consumption. The major threat for the habitat is the construction of the Indira Gandhi Canal.



*Golunda ellioti* -- Habitat loss and degradation due to mining, stone quarrying, infrastructure development, invasion of alien plant species thereby directly impacting the habitat, pest control practices, natural disasters in the form of floods, storms, fire and improper management of grasslands. Harvested for local consumption

*Hyperacrius wynnei* -- Habitat loss and degradation due to agro-industries, expansion of farming, apple orchards, potato crops, increase in human settlements and expansion of agricultural lands

*Leopoldamys edwardsi* -- Habitat loss and degradation due to small-scale logging, non-farm land management and harvest for local consumption

*Leopoldamys sabanus* -- Habitat loss and degradation due to shifting agriculture and small-scale logging

*Meriones crassus* -- Natural disasters, drought,





human disturbance in the form of civil unrest, war.

*Meriones hurrianae* -- Habitat loss or degradation due to expansion of agriculture, small-scale logging, invasion of alien plant species directly impacting the habitat, collection of fuelwood, pest control practices, natural disasters like drought, floods, drowning and other edaphic changes and competitors in the form of other species

*Meriones lybicus* -- Habitat loss due to drought



*Meriones persicus* -- Natural disasters in the form of drought

*Micromys minutus* -- Habitat loss and degradation due to small-scale logging and expansion of agriculture

*Microtus juldaschi* -- Habitat loss and degradation due to natural disasters in the form of avalanches and landslides

*Microtus sikimensis* -- Habitat loss and degradation due to small-scale logging, invasive alien species (directly impacting the habitat), and to some extent domestic dogs and cats pose threat to this species. This species ventures very less out in the open and is mostly found frequenting tunnels

*Millardia meltada* -- Habitat loss and degradation due to infrastructure development, invasive alien species, exotic plants, harvest for local consumption, accidental mortality by poison, pest control practices, pesticides used in agriculture, drowning, domestic and wild predators, and also due to pathogens/parasites

*Mus booduga* -- Habitat loss and degradation due to expansion of agricultural activities, livestock grazing, non-farm activities, accidental mortality due to poisoning, pest control practices, natural disasters such as, drought, storms, flood, habitat change, persecution by domestic predators and harvest for local consumption purposes



*Mus cervicolor* -- Habitat loss or degradation due to invasive alien

species, harvest for local consumption, natural disasters like storms and flood

*Mus fernandoni* -- Increased use of pesticides in agriculture, human disturbance and presence of domestic predators

*Mus mayori* -- Deforestation due to expansion of farm lands, human encroachments and presence of domestic predators

*Mus musculus* -- Habitat loss and degradation due to



infrastructure development, accidental mortality due to poisoning, pest control activities, excessive use of pesticides, habitat alteration, natural disasters in the form of drought, fire and interspecific competition

*Mus platythrix* -- Habitat loss or degradation due to expansion of agriculture, human encroachments, pest control practices, agricultural pollution and natural calamities like fire

*Nesokia indica* -- Habitat loss and degradation due to irrigation canals leading to change in native species

*Niviventer brahma* -- Habitat loss and degradation due to natural disasters in the form of avalanches and landslides, shifting agriculture, presence and competition with alien species and harvesting for subsistence

*Niviventer eha* -- Hunting for subsistence

*Platacanthomys lasiurus* -- Habitat loss and degradation due to expansion of coffee and tea plantations, agro-industry based farming activities, mortality due to pest control practices as it is considered as a pest of cardamom, pepper and jackfruit plantation and forest fires

*Rattus montanus* -- Habitat loss and degradation due to expansion of agriculture and clear-cutting of forests

*Rattus nitidus* -- Habitat loss and degradation due to shifting agriculture, small-scale logging, natural disasters and hunting for local consumption

*Rattus norvegicus* -- Pest control practices and presence of predators

*Rattus palmarum* -- Competition from alien species

*Rattus ranjinae* -- Habitat loss and natural disasters

*Rattus rattus* -- Pest control practices, natural calamities like fire, rise of temperature, pathogens or parasites affecting the individuals, used in research for human disease investigations and hunted for local consumption

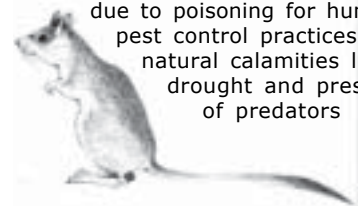


*Rattus stoicus* -- Competition from alien species

*Rhizomys pruinosus* -- Habitat loss and degradation due to shifting cultivation, bamboo extraction and accidental mortality due to hunting for local consumption

*Srilankamys ohiensis* -- Habitat loss and degradation due to expansion of agriculture, clear-cutting, natural disasters like forest fire in Horton Plains, under growth clearing (in Knuckles Range), predation by domestic carnivores

*Tatera indica* -- Habitat loss and degradation due to expansion of agricultural activities, agro-industry based farming activities, expansion of human settlements, stone quarrying, invasion of exotic plant species, hunting for local consumption purposes, accidental mortality due to poisoning for hunting, pest control practices, natural calamities like drought and presence of predators



*Vandeleuria nolthenii* -- Habitat loss and degradation due to expansion of agricultural activities and clear-cutting of the forest

*Vandeleuria oleracea* -- Habitat loss and degradation due to expansion of agriculture, human encroachment, grazing by livestock, illicit wood cutting, increase of urban areas, mining, stone quarrying, small-scale logging, lopping, accidental mortality due to drowning, poisoning, hunting for local consumption, presence of wild and domestic predators

**A Document of Interest commissioned by Ministry of Environment and Forests**

F.No. 2-2/2003(PE) Ministry of Environment & Forests, Project Elephant

**Subject: Amendment in the Schedules of the Wildlife (Protection) Act, 1972 with regard to Spiders, Bats and Rats & Mice.**

During the Wildlife Workshop at Chennai on 30<sup>th</sup> June-1<sup>st</sup> July 2003, many participants had talked about the lack of legal protection to a large number of endangered yet non-charismatic species under the Wildlife (Protection) Act, 1972 (WPA-1972). In particular, some suggestions regarding the representation of spiders, bats and rodents in the schedules of WPA-1972 were received from the Zoo Outreach Organisation. As desired by the Addl. DGF(WL), I have analysed these proposals and my comments are as follows:

**General comments:**

I. In the WPA-1972, as amended in 2002, wild animals now include only the species listed in Schedules I to IV. Therefore, the species included in Schedule V (Vermins) and those excluded from the schedules are no longer 'wild animals'. This has led to some anomalies. For example:

(a) The Import-Export Policy of Government of India accepts the same definition of wild animals as that given in the WPA-1972. Therefore, although the general tenet of the Policy is to discourage wildlife trade, yet in practice Schedule V animals and non-scheduled animals are available freely for export.

(b) The Schedules of the WPA-1972 are not exhaustive and a large number of species, many of them endangered, are not covered by the schedules (Ref. A Critical Review of the Schedules of the Wildlife (Protection) Act, 1972 – by S.S. Bist, Indian Forester, October, 1999).

(c) A large number of non-scheduled species are economically important and prone to bio-piracy.

(d) With the change in the definition of wild animals in the WPA-1972, non-scheduled animals and Schedule V animals no longer enjoy the protection of Section 12 (i.e. hunting for the purpose of education, research and scientific management).

II. In view of the position explained above, it is essential that all the species which are endangered or have some economic potential, should be brought under any of the Schedules from I to IV.

**Specific comments: Note from Editors : Spiders and bats listing (A) and (B) have been removed from this version of the document in the interests of saving space in this booklet; only NVSMs listing has been retained.**

**(C) Rats and Mice (Muridae)**

I. 70 species of rats and mice (family Muridae) have been recorded in India. All of them have been categorised as Vermins (Schedule V). Many experts have questioned this categorisation on the grounds that only a few species of mice and rats are actually known to be pests while many species are either endemic or sparsely distributed.

II. All India Coordinated Research Project on Rodent Control set up by the ICAR has recorded the following species of rats and mice as major pests of agricultural and horticultural crops (Ref. Jain, Tripathi and Rana, 1993):

1. *Bandicota bengalensis* (Lesser Bandicoot Rat)
2. *Bandicota indica* (Larger Bandicoot Rat)
3. *Rattus rattus* (House Rat)
4. *Rattus norvegicus* (Brown or Norway Rat)
5. *Rattus nitidus* (Himalayan Rat)
6. *Rattus meltada* (Syn. *Millardia meltada*) (Soft-furred Field Rat)
7. *Meriones hurrianae* (Desert Gerbil)
8. *Mus booduga* (Indian Field Mouse)

9. *Mus platythrix* (Spiny Field Mouse)
10. *Mus musculus* (House Mouse)
11. *Tatera indica* (Indian Gerbil)
12. *Niviventer niviventer* (Syn. *Rattus niviventer*) (White bellied Rat)
13. *Vandeleuria oleracea* (Palm Mouse)

III. Researchers of Dr. Y.S. Parmar University (1999) and V.R. Parshad (1999) have listed the following additional species as pests:

14. *Golunda ellioti* (Indian Bush Rat)
15. *Gerbillus gleadowi* (Indian Hairy-footed Gerbil)
16. *Rattus rattus brunneusculus* (Sikkim Rat)
17. *Rattus rattus wroughtoni* (Wroughton's Rat)
18. *Nesokia indica* (Short-tailed Mole Rat)

V. The following proposal is being made for providing suitable representation to rats and mice in the schedules of the WPA-1972:

- (a) Existing entries relating to rats and mice should be substituted with the 18 species as listed above.
- (b) The family Muridae (except the species listed in Schedule V) should be added to Schedule IV.

#### **Proposals in a nutshell**

In a nutshell, it is proposed that:

- (a) All Mygalomorph spiders (Suborder Orthognatha) should be included in Schedule IV.
- (b) One species of bat (viz. *Murina grisea*) should be included in Schedule I (Part I) while 26 species of bats known to be endangered / vulnerable should be included in Schedule II (Part II). All the remaining species of bats should be included in Schedule IV. The existing entry regarding fruit bats should be deleted from Schedule V.
- (c) The existing entries regarding rats and mice in Schedule V should be deleted and replaced with 18 species widely recognised as pests. The family Muridae (except the species listed in Schedule V) should be added to Schedule IV.

Under Section 61(1) of the WPA-1972, the Central Government is competent to amend the Schedules by a notification. A draft notification will be prepared after the approval of the Hon'ble MEF to the aforesaid proposals.

Submitted for favour of consideration.

(S.S. Bist) IGF & Director (PE)  
14.8.2003  
Addl. DGF (WL) &  
Director, Wildlife Preservation

***Editors' Note : Despite this government assessment and recommendation from within the Ministry itself, so far, none of the proposed steps have been taken despite its obvious merit.***

## Public Education for rodents and insectivores

Educating people about rodents is not so easy, particularly in India where there is not so much of a culture of the comic mouse and sneaky rat to use for capturing kids imaginations. The rat which accompanies Lord Ganesha could be called in Hindu cultures as a dignified example of a rodent.

Generally the things that need to be communicated about rodents are very different for different audiences...

### to the Ministry of Environment, Government of India and the State Forest Departments we need to say —

"pay more attention to these animals !" Why? because :

- (rats, mice, and shrews) make up 32.7% percent of the mammal diversity of India and 38% of South Asia
- they are the largest group of mammals in the world
- they do far more good than harm for mankind as part of forest ecosystems, serving as prey for some medium and small carnivores of mammals, birds and reptiles; they disperse seeds for better growth of forests; they consume vegetation by waterways which otherwise would clog the small streams
- they should be taken off the "Vermin" (Schedule V) category of the Wildlife Protection Act because some of them are threatened with extinction
- only about 12 out of 171 species are potential or actual pests to agriculture.
- 51 rodents and insectivores were categorised as threatened according to IUCN Red List Criteria, Global, Regional and National Guidelines.

### to adults and particularly farmers we need to say

- be careful with rodent poisons so that you don't poison innocent animals (non-pest rodent species, amphibians, reptiles, other small mammals)
- at the same time be careful that you do not permit rodents in your home and particularly where foodstuffs are stored or prepared as some rodents could carry disease.
- while it is not correct to teach your kids to fear *all* animals, some rats in particular could be carriers of disease or also apt to bite, so do teach them not to pick up or try to catch the small brown furry things that they see.

### to kids we need to teach respect and kindness to all life, but at the same time to stay out of harms way !

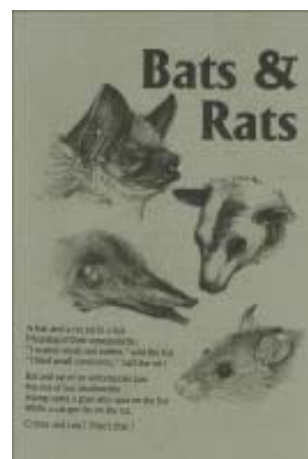
- to understand that some animals should not be handled,
- to understand that some animals have to be discouraged from coming into the home,
- to understand that there is a big difference in protecting one's self and family and in being deliberately cruel to animals and making them suffer a painful death unnecessarily, also to maintain their room and living area to be clean and clean up after eating so that rodents won't find any reason to stay in the house,
- to enjoy the diversity of rodents and insectivores, which are interesting to study and do more good than harm
- to know that even such a small, seemingly insignificant animal has its role in the ecosystem and that some of them are in danger of becoming extinct.

### Different levels of Educational material

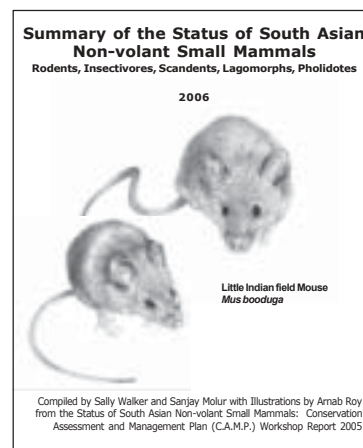
#### Newsletter for rodent biologists



#### Booklet for children



#### Summary booklet for laypersons, like yourself !



**Multi-level Education Programme**

Taking into consideration the different groups that need educating and the wide variety of facts and attitudes that need to be communicated, ZOO with the help of talented individuals from its networks developed a range of educational materials, some of which are illustrated in these pages. We make educational packets and guidelines for us which are free to educators, academics, NGOs and zoos to use in organizing specific programmes for teaching youngsters about rodents. In this way we act as educator-trainer so that teaching techniques can be communicated to individuals working with the public.

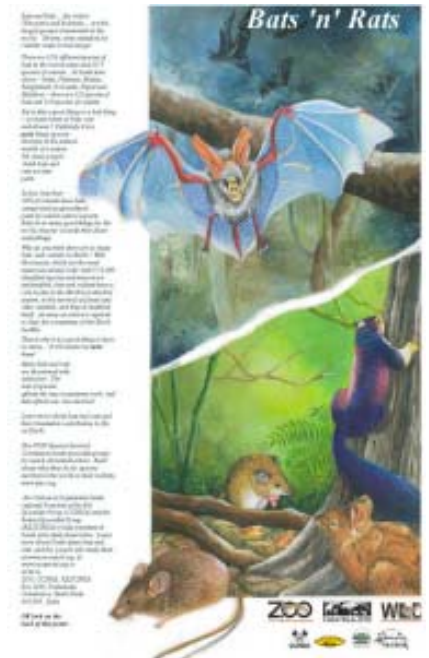
**Every scientist a teacher**

Also many of the scientists – taxonomists, field biologists, etc – who are part of rodent “community” or network we have organized, have indicated their interest in public education successfully conducted programmes for kids. Kids really enjoy programmes run by “real” scientists, who can show dead specimens in jars or as dried specimens and tell them their adventures in the field. In fact, there is so much awareness now that conservation can only be achieved if there is grass roots support, some foundations and other institutions offering research grants require include an education component. The importance of incorporating ecosystem-based relationships, is well-known. The links in the food chain between species of plants and animals, such as the important small mammals (rodents and insectivores, for example) as prey to large mammals, can be effective in attracting positive attention from the public while communicating a positive lesson.

**Zoological Gardens and Natural History Museums**

Zoos and Natural History Museums which don't display rodents and insectivores miss a valuable opportunity to teach about the food chain, ecology,

conservation and simple biology. Rodents and insectivores are inexpensive and easy to display due to their small size. Exhibits (can be designed like terrariums) need to be small, with a glass front and “furnished” with appropriate small plants, pieces of branches, rocks, fallen leaves, etc. so that their enclosure looks like their habitat. Their food should be placed in the front of the exhibit so that the public can see them eat. The public should be prevented from tapping on the glass ! Kids really enjoy such exhibits when properly done. If an animal cannot be seen in the exhibit from time to time, it would be helpful to put a very large picture of it over the exhibit as in the illustration below.



Individuals and institutions interested in educational material for teaching about rodents and insectivores can contact ZOO at any of these emails :  
[zooreach@zooreach.org](mailto:zooreach@zooreach.org)  
[Marimuthu@zooreach.org](mailto:Marimuthu@zooreach.org)  
[zocrew@vsnl.net](mailto:zocrew@vsnl.net).



Some students from Mysore City, Karnataka, participating in a programme on rodents which included role-playing with masks. The Programme was conducted by the Regional Museum of Natural History.

## The IUCN Red List CRITERIA

### CRITICALLY ENDANGERED (CR)

A taxon is Critically Endangered when the best available evidence indicates that it meets any of the following criteria (A to E), and it is therefore considered to be facing an extremely high risk of extinction in the wild:

A. Reduction in population size based on any of the following:

1. An observed, estimated, inferred or suspected population size reduction of > or =90% over the last 10 years or three generations, whichever is the longer, where the causes of the reduction are clearly reversible AND understood AND ceased, based on (and specifying) any of the following:
  - (a) direct observation
  - (b) an index of abundance appropriate to the taxon
  - (c) a decline in area of occupancy, extent of occurrence and/or quality of habitat
  - (d) actual or potential levels of exploitation
  - (e) the effects of introduced taxa, hybridization, pathogens, pollutants, competitors or parasites.

2. An observed, estimated, inferred or suspected population size reduction of > or = 80% over the last 10 years or three generations, whichever is the longer, where the reduction or its causes may not have ceased OR may not be understood OR may not be reversible, based on (and specifying) any of (a) to (e) under A1.

3. A population size reduction of > or =80%, projected or suspected to be met within the next 10 years or three generations, whichever is the longer (up to a maximum of 100 years), based on (and specifying) any of (b) to (e) under A1.

4. An observed, estimated, inferred, projected or suspected population size reduction of > or = 80% over any 10 year or three generation period, whichever is longer (up to a maximum of 100 years in the future), where the time period must include both the past and the future, and where the reduction or its causes may not have ceased OR may not be understood OR may not be reversible, based on (and specifying) any of (a) to (e) under A1.

B. Geographic range in the form of either B1 (extent of occurrence) OR B2 (area of occupancy) OR both:

1. Extent of occurrence estimated to be less than 100 km<sup>2</sup>, and estimates indicating at least two of a–c:
  - a. Severely fragmented or known to exist at only a single location.
  - b. Continuing decline, observed, inferred or projected, in any of the following:
    - (i) extent of occurrence
    - (ii) area of occupancy

- (iii) area, extent and/or quality of habitat
- (iv) number of locations or subpopulations
- (v) number of mature individuals.

c. Extreme fluctuations in any of the following:

- (i) extent of occurrence
- (ii) area of occupancy
- (iii) number of locations or subpopulations
- (iv) number of mature individuals.

2. Area of occupancy estimated to be less than 10 km<sup>2</sup>, and estimates indicating at least two of a–c:

- a. Severely fragmented or known to exist at only a single location.
- b. Continuing decline, observed, inferred or projected, in any of the following:
  - (i) extent of occurrence
  - (ii) area of occupancy
  - (iii) area, extent and/or quality of habitat
  - (iv) number of locations or subpopulations
  - (v) number of mature individuals.
- c. Extreme fluctuations in any of the following:
  - (i) extent of occurrence
  - (ii) area of occupancy
  - (iii) number of locations or subpopulations
  - (iv) number of mature individuals.

C. Population size estimated to number fewer than 250 mature individuals and either:

1. An estimated continuing decline of at least 25% within three years or one generation, whichever is longer, (up to a maximum of 100 years in the future) OR
2. A continuing decline, observed, projected, or inferred, in numbers of mature individuals AND at least one of the following (a–b):
  - a. Population structure in the form of one of the following:
    - (i) no subpopulation estimated to contain more than 50 mature individuals, OR
    - (ii) at least 90% of mature individuals in one subpopulation.
  - b. Extreme fluctuations in number of mature individuals.

D. Population size estimated to number fewer than 50 mature individuals.

E. Quantitative analysis showing the probability of extinction in the wild is at least 50% within 10 years or three generations, whichever is the longer (up to a maximum of 100 years).

### ENDANGERED (EN)

A taxon is Endangered when the best available evidence indicates that it meets any of the following criteria (A to E), and it is therefore considered to be facing a very high risk of extinction in the wild:

A. Reduction in population size based on any of the following:

1. An observed, estimated, inferred or

suspected population size reduction of > or = 70% over the last 10 years or three generations, whichever is the longer, where the causes of the reduction are clearly reversible AND understood AND ceased, based on (and specifying) any of the following:

- (a) direct observation
- (b) an index of abundance appropriate to the taxon
- (c) a decline in area of occupancy, extent of occurrence and/or quality of habitat
- (d) actual or potential levels of exploitation
- (e) the effects of introduced taxa, hybridization, pathogens, pollutants, competitors or parasites.

2. An observed, estimated, inferred or suspected population size reduction of > or = 50% over the last 10 years or three generations, whichever is the longer, where the reduction or its causes may not have ceased OR may not be understood OR may not be reversible, based on (and specifying) any of (a) to (e) under A1.

3. A population size reduction of > or = 50%, projected or suspected to be met within the next 10 years or three generations, whichever is the longer (up to a maximum of 100 years), based on (and specifying) any of (b) to (e) under A1.

4. An observed, estimated, inferred, projected or suspected population size reduction of > or = 50% over any 10 year or three generation period, whichever is longer (up to a maximum of 100 years in the future), where the time period must include both the past and the future, and where the reduction or its causes may not have ceased OR may not be understood OR may not be reversible, based on (and specifying) any of (a) to (e) under A1.

B. Geographic range in the form of either B1 (extent of occurrence) OR B2 (area of occupancy) OR both:

1. Extent of occurrence estimated to be less than 5000 km<sup>2</sup>, and estimates indicating at least two of a–c:
  - a. Severely fragmented or known to exist at no more than five locations.
  - b. Continuing decline, observed, inferred or projected, in any of the following:
    - (i) extent of occurrence
    - (ii) area of occupancy
    - (iii) area, extent and/or quality of habitat
    - (iv) number of locations or subpopulations
    - (v) number of mature individuals.
  - c. Extreme fluctuations in any of the following:
    - (i) extent of occurrence
    - (ii) area of occupancy
    - (iii) number of locations or subpopulations
    - (iv) number of mature individuals.

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2. Area of occupancy estimated to be less than 500 km<sup>2</sup>, and estimates indicating at least two of a–c:

- a. Severely fragmented or known to exist at no more than five locations.
- b. Continuing decline, observed, inferred or projected, in any of the following:
  - (i) extent of occurrence
  - (ii) area of occupancy
  - (iii) area, extent and/or quality of habitat
  - (iv) number of locations or subpopulations
  - (v) number of mature individuals.
- c. Extreme fluctuations in any of the following:
  - (i) extent of occurrence
  - (ii) area of occupancy
  - (iii) number of locations or subpopulations
  - (iv) number of mature individuals.

C. Population size estimated to number fewer than 2500 mature individuals and either:

1. An estimated continuing decline of at least 20% within five years or two generations, whichever is longer, (up to a maximum of 100 years in the future) OR
2. A continuing decline, observed, projected, or inferred, in numbers of mature individuals AND at least one of the following (a–b):
  - a. Population structure in the form of one of the following:
    - (i) no subpopulation estimated to contain more than 250 mature individuals, OR
    - (ii) at least 95% of mature individuals in one subpopulation.
  - b. Extreme fluctuations in number of mature individuals.

D. Population size estimated to number fewer than 250 mature individuals.

E. Quantitative analysis showing the probability of extinction in the wild is at least 20% within 20 years or five generations, whichever is the longer (up to a maximum of 100 years).

#### **VULNERABLE (VU)**

A taxon is Vulnerable when the best available evidence indicates that it meets any of the following criteria (A to E), and it is therefore considered to be facing a high risk of extinction in the wild:

A. Reduction in population size based on any of the following:

1. An observed, estimated, inferred or suspected population size reduction of > or = 50% over the last 10 years or three generations, whichever is the longer, where the causes of the reduction are: clearly reversible AND understood AND ceased, based on (and specifying) any of the following:
  - (a) direct observation
  - (b) an index of abundance appropriate to the taxon
  - (c) a decline in area of occupancy, extent of occurrence and/or quality of habitat
  - (d) actual or potential levels of exploitation

(e) the effects of introduced taxa, hybridization, pathogens, pollutants, competitors or parasites.

2. An observed, estimated, inferred or suspected population size reduction of > or = 30% over the last 10 years or three generations, whichever is the longer, where the reduction or its causes may not have ceased OR may not be understood OR may not be reversible, based on (and specifying) any of (a) to (e) under A1.

3. A population size reduction of > or = 30%, projected or suspected to be met within the next 10 years or three generations, whichever is the longer (up to a maximum of 100 years), based on (and specifying) any of (b) to (e) under A1.

4. An observed, estimated, inferred, projected or suspected population size reduction of > or = 30% over any 10 year or three generation period, whichever is longer (up to a maximum of 100 years in the future), where the time period must include both the past and the future, and where the reduction or its causes may not have ceased OR may not be understood OR may not be reversible, based on (and specifying) any of (a) to (e) under A1.

B. Geographic range in the form of either B1 (extent of occurrence) OR B2 (area of occupancy) OR both:

1. Extent of occurrence estimated to be less than 20,000 km<sup>2</sup>, and estimates indicating at least two of a–c:
  - a. Severely fragmented or known to exist at no more than 10 locations.
  - b. Continuing decline, observed, inferred or projected, in any of the following:
    - (i) extent of occurrence
    - (ii) area of occupancy
    - (iii) area, extent and/or quality of habitat
    - (iv) number of locations or subpopulations
    - (v) number of mature individuals.
  - c. Extreme fluctuations in any of the following:
    - (i) extent of occurrence
    - (ii) area of occupancy
    - (iii) number of locations or subpopulations
    - (iv) number of mature individuals.

2. Area of occupancy estimated to be less than 2000 km<sup>2</sup>, and estimates indicating at least two of a–c:

- a. Severely fragmented or known to exist at no more than 10 locations.
- b. Continuing decline, observed, inferred or projected, in any of the following:
  - (i) extent of occurrence
  - (ii) area of occupancy
  - (iii) area, extent and/or quality of habitat
  - (iv) number of locations or subpopulations
  - (v) number of mature individuals.
- c. Extreme fluctuations in any of the following:
  - (i) extent of occurrence
  - (ii) area of occupancy
  - (iii) number of locations or subpopulations
  - (iv) number of mature individuals.

C. Population size estimated to number fewer than 10,000 mature individuals and either:

1. An estimated continuing decline of at least 10% within 10 years or three generations, whichever is longer, (up to a maximum of 100 years in the future) OR
2. A continuing decline, observed, projected, or inferred, in numbers of mature individuals AND at least one of the following (a–b):
  - a. Population structure in the form of one of the following:
    - (i) no subpopulation estimated to contain more than 1000 mature individuals, OR
    - (ii) all mature individuals are in one subpopulation.
  - b. Extreme fluctuations in number of mature individuals.

D. Population very small or restricted in the form of either of the following:

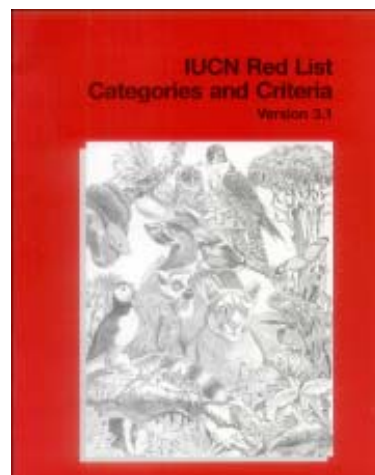
1. Population size estimated to number fewer than 1000 mature individuals.
2. Population with a very restricted area of occupancy (typically less than 20 km<sup>2</sup>) or number of locations (typically five or fewer) such that it is prone to the effects of human activities or stochastic events within a very short time period in an uncertain future, and is thus capable of becoming Critically Endangered or even Extinct in a very short time period.

E. Quantitative analysis showing the probability of extinction in the wild is at least 10% within 100 years.

IUCN Red List Categories and Criteria  
Version 3.1

Prepared by the IUCN Species Survival Commission  
As approved by the 51st meeting of the IUCN Council Gland, Switzerland  
9 February 2000, IUCN – The World Conservation Union, 2001

*The Red List Categories and Criteria, Version 3.1* are available at:  
<http://www.iucn.org/themes/ssc/red-lists.htm>1Explanation of Criteria



## **Summary of the Status of South Asian Non-volant Small Mammals, 2006**

## South Asian Non-volant Small Mammals

- Acomys dimidiatus* (Cretzschmar, 1826)  
*Allactaga elater* (Lichtenstein, 1828)  
*Allactaga hotsoni* Thomas, 1920  
*Alticola albicauda* (True, 1894)  
*Alticola argentatus* (Severtzov, 1879)  
*Alticola blanfordi* (Scully, 1880)  
*Alticola montosa* (True, 1894)  
*Alticola roylei* (Gray, 1842)  
*Alticola stoliczkanus* (Blanford, 1875)  
*Alticola stracheyi* (Thomas, 1880)-  
*Anathana ellioti* (Waterhouse, 1850)  
*Anourosorex squamipes* Milne Edwards, 1872  
*Apodemus draco* (Barrett Hamilton, 1900)  
*Apodemus gorkha* Thomas, 1924  
*Apodemus latronum* (Thomas, 1911)  
*Apodemus orestes* (Thomas, 1911)  
*Apodemus sylvaticus* (Linnaeus, 1758)  
*Atherurus macrourus* (Linnaeus, 1758)  
*Bandicota bengalensis* (Gray & Hardwicke, 1833)  
*Bandicota indica* (Bechstein, 1800)  
*Bandicota maxima* Pradhan et al. 1993  
*Belomys pearsonii* (Gray, 1842)  
*Berylmys bowersi* (Anderson, 1879)  
*Berylmys mackenziei* (Thomas, 1916)  
*Berylmys manipulus* (Thomas, 1916)  
*Biswamoyopterus biswasi* Saha, 1981  
*Callosciurus erythraeus* (Pallas, 1799)  
*Callosciurus pygerythrus* (I. G. Saint Hilaire, 1831)  
*Calomyscus baluchi* Thomas, 1920  
*Calomyscus hotsoni* Thomas, 1920  
*Cannomys badius* (Hodgson, 1841)  
*Caprolagus hispidus* (Pearson, 1839)  
*Chimmarogale himalayica* (Gray, 1842)  
*Chirodomomys gliroides* (Blyth, 1856)  
*Cremnomys blanfordi* (Thomas, 1881)  
*Cremnomys cutchicus* Wroughton, 1912  
*Cremnomys elvira* (Ellerman, 1947)  
*Cricetulus alticola* Thomas, 1917  
*Cricetulus migratorius* (Pallas, 1773)  
*Crocidura andamanensis* Miller, 1902  
*Crocidura attenuata* Milne Edwards, 1872  
*Crocidura gueldenstaedtii* (Pallas, 1811)  
*Crocidura hispida* Thomas, 1913  
*Crocidura horsfieldi* (Tomes, 1856)  
*Crocidura jenkinsi* Chakraborty, 1978  
*Crocidura leucodon* (Hermann, 1780)  
*Crocidura miya* Phillips, 1929  
*Crocidura nicobarica* Miller, 1902  
*Crocidura pergrisea* Miller, 1913  
*Crocidura zarudnyi* Ognev, 1928  
*Dacnomys millardi* Thomas, 1916  
*Diomys crumpi* Thomas, 1917  
*Dremomys lokriah* (Hodgson, 1836)  
*Dremomys pernyi* (Milne Edwards, 1867)  
*Dremomys rufigenis* (Blanford, 1878)  
*Dryomys nitedula* (Pallas, 1778)  
*Ellobius fuscocapillus* (Blyth, 1842)  
*Eoglaucumys fimbriatus* (Gray, 1837)  
*Eothenomys melanogaster* (Milne Edwards, 1871)  
*Eupetaurus cinereus* Thomas, 1888  
*Eurosaptor micrura* (Hodgson, 1841)  
*Feroculus feroculus* (Kelaart, 1850)  
*Funambulus layardi* (Blyth, 1849)  
*Funambulus palmarum* (Linnaeus, 1766)  
*Funambulus pennantii* Wroughton, 1905  
*Funambulus sublineatus* (Waterhouse, 1838)  
*Funambulus tristriatus* (Waterhouse, 1837)  
*Gerbillus aquilus* Schmitter & Stezer, 1972  
*Gerbillus cheesmani* Thomas, 1919  
*Gerbillus gleadowi* Murray, 1886  
*Gerbillus nanus* Blanford, 1875  
*Golunda ellioti* Gray, 1837  
*Hadromys humei* (Thomas, 1886)  
*Hemiechinus auritus* (Gmelin, 1770)  
*Hemiechinus collaris* (Gray, 1830)  
*Hemiechinus hypomelas* (Brandt, 1836)  
*Hemiechinus micropus* (Blyth, 1846)  
*Hemiechinus nudiventris* (Horsfield, 1851)  
*Hylomys alboniger* (Hodgson, 1836)  
*Hylomys baberi* (Blyth, 1847)  
*Hyperacrius fertilis* (True, 1894)  
*Hyperacrius wynnei* (Blanford, 1881)  
*Hystrix brachyura* Linnaeus, 1758  
*Hystrix indica* (Kerr, 1792)  
*Jaculus blanfordi* (Murray, 1884)  
*Leopoldamys edwardsi* (Thomas, 1882)  
*Leopoldamys sabanus* (Thomas, 1887)  
*Lepus capensis* Linnaeus, 1758  
*Lepus nigricollis* Cuvier, 1823  
*Lepus oiostolus* Hodgson, 1840  
*Lepus tolai* Pallas, 1778  
*Manis crassicaudata* (Gray, 1827)  
*Manis pentadactyla* Linnaeus, 1758  
*Marmota caudata* (Geoffroy, 1844)  
*Marmota himalayana* (Hodgson, 1841)  
*Meriones crassus* Sundevall, 1842  
*Meriones hurrianae* (Jerdon, 1867)  
*Meriones lybicus* Lichtenstein, 1823  
*Meriones persicus* (Blanford, 1875)  
*Micromys minutus* (Pallas, 1771)  
*Microtus juldaschi* (Severtzov, 1879)  
*Microtus leucurus* (Blyth, 1863)  
*Microtus sikimensis* (Hodgson, 1849)  
*Millardia gleadowi* (Murray, 1885)  
*Millardia kondana* Mishra & Dhanda, 1975  
*Millardia meltada* (Gray, 1837)  
*Mus booduga* (Gray, 1837)  
*Mus cervicolor* Hodgson, 1845  
*Mus cookii* Ryley, 1914  
*Mus famulus* Bonhote, 1898  
*Mus fernandoni* (Phillips, 1932)  
*Mus mayori* (Thomas, 1915)  
*Mus musculus* Linnaeus, 1758  
*Mus pahari* Thomas, 1916  
*Mus phillipsi* Wroughton, 1912  
*Mus platythrix* Bennet, 1832  
*Mus saxicola* Elliot, 1839  
*Nectogale elegans* Milne Edwards, 1870  
*Nesokia indica* (Gray & Hardwicke, 1832)  
*Niviventer brahma* (Thomas, 1914)  
*Niviventer eha* (Wroughton, 1916)  
*Niviventer fulvescens* (Gray, 1847)  
*Niviventer langbianis* (Robinson & Kloss, 1922)  
*Niviventer niviventer* (Hodgson, 1836)  
*Niviventer tenaster* (Thomas, 1916)  
*Ochotona curzoniae* (Hodgson, 1858)  
*Ochotona forresti* Thomas, 1923  
*Ochotona himalayana* Feng, 1973  
*Ochotona ladacensis* (Gunther, 1875)  
*Ochotona macrotis* (Gunther, 1875)  
*Ochotona nubrica* Thomas, 1922  
*Ochotona roylei* (Ogilby, 1839)  
*Ochotona rufescens* (Gray, 1842)  
*Ochotona thibetana* (Milne Edwards, 1871)  
*Parascaptor leucura* (Blyth, 1850)  
*Petaurista caniceps* (Blyth, 1842)  
*Petaurista magnificus* (Hodgson, 1836)  
*Petaurista nobilis* (Gray, 1842)  
*Petaurista petaurista* (Pallas, 1766)  
*Petaurista philippensis* (Elliot, 1839)  
*Petinomys fuscocapillus* (Jerdon, 1847)  
*Platacanthomys lasiurus* Blyth, 1859  
*Rattus burrus* (Miller, 1902)  
*Rattus exulans* (Peale, 1848)  
*Rattus montanus* Phillips, 1932  
*Rattus nitidus* (Hodgson, 1845)  
*Rattus norvegicus* (Berkenhout, 1769)  
*Rattus palmarum* (Zebleur, 1869)  
*Rattus ranjinae* Agrawal & Ghosh, 1969  
*Rattus rattus* (Linnaeus, 1758)  
*Rattus sikkimensis* (Hinton, 1919)  
*Rattus stoicus* (Miller, 1902)  
*Rattus tanezumii* (Temminck, 1844)  
*Rattus turkestanicus* (Satunin, 1903)  
*Rattus vicerex* (Bonhote, 1903)  
*Ratufa bicolor* (Sparrman, 1778)  
*Ratufa indica* (Erxleben, 1777)  
*Ratufa macroura* (Pennant, 1769)  
*Rhizomys pruinosus* Blyth, 1851  
*Rhombomys opimus* (Lichtenstein, 1823)  
*Salpingotus michaelis* Fitzgibbon, 1966  
*Sicista concolor* (Buchner, 1892)  
*Solisorex pearsonii* Thomas, 1924  
*Sorex bedfordiae* Thomas, 1911  
*Sorex excelsus* Allen, 1923  
*Sorex minutus* Linnaeus, 1766  
*Sorex planiceps* Miller, 1911  
*Soriculus caudatus* (Horsfield, 1851)  
*Soriculus leucops* (Hodgson, 1855)  
*Soriculus macrurus* Blanford, 1888  
*Soriculus nigriscens* (Gray, 1842)  
*Srilankamys ohienensis* (Phillips, 1929)  
*Suncus dayi* (Dobson, 1888)  
*Suncus etruscus* (Savi, 1822)  
*Suncus fellowesgordoni* Phillips, 1932  
*Suncus montanus* (Kelaart, 1850)  
*Suncus murinus* (Linnaeus, 1766)  
*Suncus stoliczkanus* (Anderson, 1877)  
*Suncus zeylanicus* Phillips, 1928  
*Tamiops macclellandi* (Horsfield, 1840)  
*Tatera indica* (Hardwicke, 1807)  
*Tupaia belangeri* (Wagner, 1841)  
*Tupaia nicobarica* (Zebleur, 1869)  
*Vandeleuria nolthenii* (Phillips, 1929)  
*Vandeleuria oleracea* (Bennett, 1832)