Biodiversity Conservation Prioritisation Project (BCPP) India

Endangered Species Project

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

REPORT

1998

Authored by the participants

Edited by B.A. Daniel, Sanjay Molur and Sally Walker

Published by Zoo Outreach Organisation

Selected Soil Invertebrates of Southern India

Hosted by the Zoological Survey of India, Southern Regional Station, Chennai

Chennai 24 -28 February, 1997

Zoo Outreach Organisation/ CBSG, India, 79 Bharati Colony, Peelamedu, Coimbatore 641 004, Tamil Nadu, India

CITATION

B.A. Daniel, Sanjay Molur & Sally Walker (eds.) (1998). Report of the Workshop "Conservation Assessment and Management Plan for selected soil invertebrates of southern India" (BCPP- Endangered Species Project), Zoo Outreach Organisation, Conservation Breeding Specialist Group, India, Coimbatore, India. 70 p.

Report # 13. (1998) Zoo Outreach Organisation/ Conservation Breeding Specialist Group, India
PB 1683, 79, Bharathi Colony, Peelamedu, Coimbatore 641 004, Tamil Nadu, India
Ph: 91 (422) 57 10 87; Fax: 91 (422) 57 32 69; e-mail: zooreach@giasmd01.vsnl.net.in

Cover design, typesetting and printing: Zoo Outreach Organisation

Contents

Selected Soil Invertebrates of Southern India

Authors of the Report and participating institutions	i-ii
Sponsors and organisers	iii
Executive Summary	1-5
Summary Data Tables	7-12
Report	13-43
Taxon Data Sheets	35-70

Acknowledgement

Dr. Ajith Kumar, Scientist, Salim Ali Centre for Ornithology and Natural History, was Coordinator of the Endangered Species component of the Biodiversity Conservation Prioritisation Project and, as such, our Advisor and Guide for the workshops. We would like to acknowledge him for suggesting the CAMP process and IUCN Red List Criteria as a means of assessment at an early stage and ZOO/CBSG, India as a possible organiser of the workshops. Dr. Ajith Kumar gave invaluable advice and support during the entire process, often attending long sessions while not in perfect health. Our grateful thanks to him for his part in providing a singular and significant experience for us.

The technical and clerical staff of the Zoo Outreach Organisation invested much time and energy in the planning, conduct, review and reporting of the BCPP CAMP Workshops. This involved much overtime work, -- late hours, working at home, coming in on Sunday. Nobody complained. The project could not have been completed by a "normal" staff. We would like to particularly acknowledge them:

Smt. Latha G. Ravi Kumar
Sri Pravin Kumar
Kum. J. Sheela
Sri C. Gunasekaran
Kum. K.C. Meena
Sri B. Jegadeesan
Sri Selvaraj
Sri Prabhu
Sri Yuvaraj
Smt. Krishnaveni
Kum. Shivamani
Late Kum. V.K. Thankamani

Report of BCPP CAMP on selected soil invertebrates of southern India

AUTHORS

Ahimaz, Mr. Preston
WWF, India, 13, 11th Street
Nandanam Extension
Chennai 600 035

Dr. M. Mary Bai
Zoological Survey of India
100, Sanhome High Road
Chennai 600 028

Bano, Dr. (Mrs.) Kubra
Dept. Of Zoology
Univ. Of Agricultural Sciences
GKVK, Bangalore 560 065

Bhanumathi, Ms. R.
WWF - I
No.13, (Ist Floor), 11th Street
Nandanam Extension
Chennai 600 035.

Chakravarthy, Dr. A.K.
University of Agricultural Sciences
G.K.V.K,
Bangalore 560 065.

Cherian, Dr. P.T.
Officer Incharge
Zoological Survey of India
100, Santhome High Road
Chennai 600 028

Daniel, Dr. B.A.
Research Consultant
Zoo Outreach Organisation
P.Box 1683, Peelamedu
Coimbatore 641 004

Daniels, Dr. Ranjit
M. S. Swaminathan Research Institute, 3rd Cross
Taramani Institutional Area
Chennai

Emiliyamma, Ms. K. G.
Zoological Survey of India
100, Santhome High Road
Chennai 600 028.

Gunasekaran, C.
Research Assistant
Zoo Outreach Organisation
Box 1683, Peelamedu
Coimbatore 641 004

Indra, Dr.(Mrs)T.J.
Zoological Survey of India
100 Santhome High Road
Chennai 600 028.

Kumar, Dr. Ajith
Scientist
SACON, Kalampalayam
Coimbatore 641 010

Kumar, Mr. V. M. Satish
Zoological Survey of India
Zoological Assistant
100 Santhome Hgh Road
Chennai 600 028.

Mathew, Mrs. Rosamma
Wildlife Sub Regional Office
XIV/18, Chullickal
Kochi, Kerala

Molur, Mr. Sanjay
ZOO/ CBSG, India
Programme Officer
Box 1683, Peelamedu
Coimbatore 641 004

Natarajan, Prof. R.
Emeritus Professor,
6/77, Teachers Colony,
Adyar, Chennai 600 020.

Paulraj, Dr. S.
District Forest Officer
Tamil Nadu Forest Department
Dharmapuri 636 705

Punithavelu, Mr. V. R.
Zoological Survey of India
100, Santhome High Road
Chennai 600 028.

Raghunathan, Dr. M.B.
Zoological Survey of India
100, Santhome High Road
Chennai 600 028.

Rajagopal, Dr. D.
University of Agricultural Sciences
Department of Apiculture
G.K.V.K Campus,
Bangalore 560 065.

Ravichandran, Dr. M. S.
Zoological Survey of India
Southern Regional Station
100, Santhome High Road
Chennai 600 028

Reddy, Dr. M. Vikram
Kakatiya University
Environmental Science Programme
Vidyaranyapuri
Warangal 506 009

Revathi, Dr. (Mrs) K.
Ethiraj College for Women
Ethiraj Salai
Chennai 600 105

Sultan, Dr. Ismail
Institute of Research in Soil Biology and Biotechnology
The New College
Royapettah, Chennai 600 014.

Vastrad, Dr. A.S.
Dy. Dir. Student Welfare
University of Agricultural Sciences
Dharwad 580 005.

Walker, Ms. Sally
Founder Secretary
Zoo Outreach Organisation
Box 1683, Peelamedu
Coimbatore 641 004

Report of BCPP CAMP workshop for selected soil invertebrates of southern India

Institutions and Organisations represented

Ethiraj College for Women, Chennai
Kakatiya University, Environmental Science Programme, Warangal
Loyola College, Entomology Research Institute, Chennai
M.S. Swaminathan Research Institute, Chennai
Chennai Christian College, Chennai
New College, Inst. of Res. in Soil Biol. and Biotech., Chennai
Salim Ali Centre for Ornithology and Natural History, Coimbatore
St. Xavier's College, Chennai
Tamil Nadu Forest Department
University of Agricultural Sciences, Dharwad
University of Agricultural Sciences, GKVK, Bangalore
Wildlife Sub Regional Office, Cochin
World Wide Fund for Nature, India, Southern Region, Chennai
Zoological Survey of India, Southern Regional Station, Chennai
Zoo Outreach Organisation/ CBSG India, Coimbatore

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

Sponsors

This project has been sponsored as a part of the Biodiversity Conservation Prioritisation Project (BCPP) of the World Wide Fund for Nature - India.

The BCPP is funded by the Biodiversity Support Program - (BSP).

The BSP is a USAID - funded consortium of the World Wildlife Fund, The Nature Conservancy and the World Resources Institute.

Workshops supported or initiated by the BCPP:

Medicinal Plants of N., N.E. & Central india
Soil Invertebrates of Southern Indian
Amphibians of India
Indian Reptiles of India
Indian Mangrove Ecosystem
Mammals of India
Indian Freshwater fishes

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

Hosts, Coordinators, Organisers, Collaborators

Host

Zoological Survey of India, Southern Regional Station, Chennai

Coordinators / Facilitators

World Wide Fund for Nature, India, Coordinator
Salim Ali Centre for Ornithology and Natural History, Coordinator
Zoo Outreach Organisation/
Conservation Breeding Specialist Group, India, Organiser / Facilitators

Collaborating institution

Forest Department of Tamil Nadu

Special thanks

A special thanks to the Conservation Breeding Specialist Group, SSC, IUCN, which developed the C.A.M.P. process and provided advice, training, other technical support from time to time throughout the BCPP CAMP Workshops. Appreciation is also due to the Species Survival Commission of the World Conservation Union for developing the IUCN Red List Criteria, a sophisticated yet flexible system, providing a means of assessing the conservation status of all manner of plant and animal groups.

Selected Soil Invertebrates of Southern India

Executive Summary

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

Selected Soil Invertebrates of Southern India
Hosted by Zoological Survey of India, Southern Regional Station
Chennai, 24 – 28 February 1997

EXECUTIVE SUMMARY

Introduction

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

A Conservation Assessment and Management Plan (C.A.M.P.) Workshop was conducted for selected Soil Invertebrates of Southern India to assess their status in the wild. The Workshop took place from 24 – 28 February 1997 in Chennai, hosted by the Zoological Survey of India, Southern Regional Station. Other local collaborators were the Wildlife Division, Forest Department of Tamil Nadu, and World Wide Fund for Nature, Chennai as well as facilitating and coordinating organisations Zoo Outreach Organisation, Conservation Breeding Specialist Group, India, Invertebrate Special Interest Group and Salim Ali Centre for Ornithology and Natural History. Forty-six participants from 36 institutes with expertise ranging from field biology to forest management attended the workshop. A total of 95 taxa of soil invertebrates were assessed in the 5-day workshop. The selection of species for assessment within certain pre-decided groups was left to the discretion of the participants on the basis of their expertise, following a discussion and consensus by the participants.

The expertise available at the workshop included reputed field biologists with years of field study in various areas as well as those currently conducting studies. Participants worked in 4 working groups for 5 days and assessed 95 taxa. Information for every taxa was entered on “Taxon Data Sheets” in which details of each taxon such as distribution, population numbers, habitat structure, threats affecting the taxa, population decline and the quality of data provided for the taxa are given here. This information was used to assess the status of the taxon and assign a category of threat according to the IUCN Red List categories. Taxon specific recommendations were also made after categorisation for use in conservation action planning.

CAMP methodology

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

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

The Conservation Breeding Specialist Group, SSC, IUCN developed the CAMP process methodology first for identifying priorities in captive management planning for the global zoo community, which needed to know the *in situ* conservation status of species in their care. The methodology, however, has proved so effective for assessing status in the wild that it has been recognised by IUCN SSC Specialist Groups, governmental and non-governmental agencies, conservation action planners and policy makers all over the world. The CAMP workshop philosophy and methodology is emerging as an effective means of conducting biodiversity inventory, identification and monitoring, thus satisfying Agenda Item 7 in the Convention on Biological Diversity.

Results

Ninety-five taxa of soil invertebrates were assessed at the workshop of which 16 are Critically Endangered, 21 Endangered, 24 Vulnerable, 20 Lower Risk near threatened, 9 Lower Risk least concern, 4 Data Deficient and 1

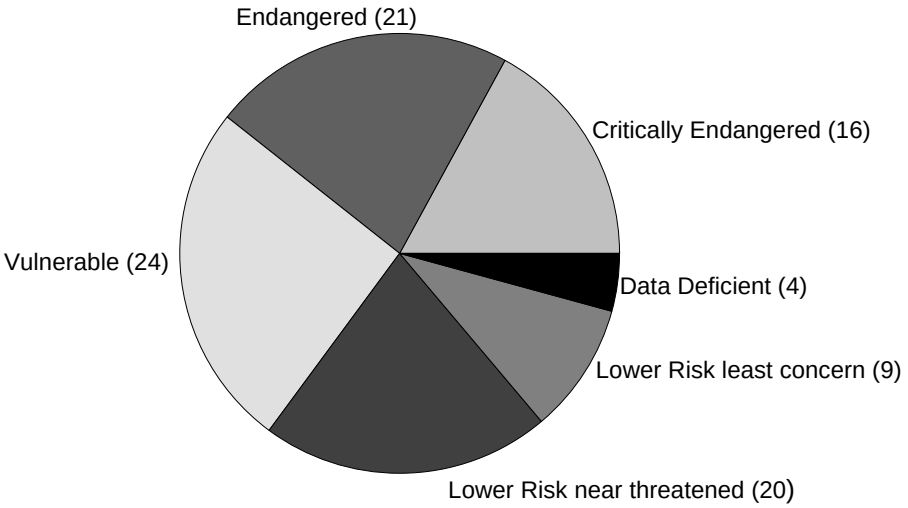
as Not Evaluated. The high percentage of threatened species (64%) in this list may not reflect the actual situation for all invertebrates in India because these 95 represent better studied invertebrates which also may have been selected for assessment due to concern for their conservation in the first instant. There are more than 72,000 species of invertebrates in India. The sample assessment does, however, give a warning of a trend towards threatened status that some invertebrates are facing in the wild in India. Threats to invertebrates are similar to threats that most fauna and flora face today – loss of habitat, fragmentation and interference all due to human needs that result in shrinking of wild habitats. Invertebrates that occupy specialised niches in the wild are facing a high risk of extinction due to rapid changes occurring in quality of habitat.

The factors that are used in a categorisation of threat are 1. Population reduction; 2. Restricted distribution; 3. Population size; 4. Number of mature individuals or population restriction and 5. Probability of extinction. The degree of threat depending on each or any of these five criteria determines the threat category. Of the threatened invertebrates, most are assessed so because of restricted distribution (91%) while only a few are due to population reduction (19%). Assessments were restricted to southern India and nearly 50% of the taxa assessed were southern Indian endemics. This being the case, most of the endemics have a restricted distribution which makes them qualify for that criteria for threat.

In addition to the 95 taxa, rapid assessment was done for 5 groups of soil invertebrates where in nearly 600 taxa were prioritised for their conservation and research importance. Specific questions such as the date of discovery, number of studies conducted after discovery, endemicity, study conducted in the last 10 years, and the state of the habitat in which the taxa occur were all scored to give a research prioritisation rating. According to that rating of the 276 species of molluscs, 264 are rated as high priority, 27 of 39 millipedes, 85 of 99 species of termites, and 25 species of 93 grass hoppers as high priority. Of the 91 ants assessed, not enough information was available to prioritise research.

Recommendations for future conservation action were proposed for every taxon of the 94 assessed. Of the threatened taxa, 67 were recommended for intensive surveys, 39 for monitoring, 34 for habitat management, 36 for life history studies, 14 for limited factor research, 7 each for taxonomic studies and population and habitat viability assessments, 4 for limiting factor management and 7 for various taxon specific recommendations. Survey was considered very important because information on complete distribution of taxa is lacking. Monitoring and habitat management were considered important because of constant human interference causing changes in population structure of invertebrates and also changes in quality of habitat in the wild.

Status of selected soil invertebrates



As part of the workshop, special working groups were formed to discuss issues related to assessing and conserving invertebrates. Three groups, Systematics and population studies on invertebrates, Education and awareness, and Logistics of conserving invertebrates were formed and relevant recommendations made Working groups reports are given in full in the body of the main report. At the end of the workshop, all participants were asked to make commitments to invertebrate conservation in their personal capacity, which is also included at the end of the main report.

Table 1. Alphabetical list of Soil Invertebrate taxa assessed at the BCPP CAMP, Chennai

Species	Class / Order	IUCN	Criteria
1. *Acanthaspis alagiriensis*	Insecta / Hemiptera	CR	(B1, 2c)
2. Acanthaspis carinata	Insecta / Hemiptera	CR	(B1, 2c)
3. Acanthaspis minutum	Insecta / Hemiptera	VU	(D2)
4. Acanthaspis nigripes	Insecta / Hemiptera	VU	(D2)
5. *Acanthaspis pedestris*	Insecta / Hemiptera	LR-nt	
6. *Acanthaspis siruvani*	Insecta / Hemiptera	VU	(D2)
7. *Alstonitermes flavescens*	Insecta / Isoptera	EN	(A1ac; B1, 2abc)
8. *Amblyopone bellii*	Insecta / Hymenoptera	DD	
9. *Aularchis miliaris*	Insecta / Orthoptera	LR-nt	
10. *Bellamya bengalensis*	Pelecypoda / Megagastropoda	LR-nt	
11. *Bellamya dissimilis*	Pelecypoda / Megagastropoda	LR-nt	
12. *Bithynia stenothyroides*	Pelecypoda / Megagastropoda	VU	(B1, 2ac)
13. Chondromorpha kelaarki	Myriapoda / Polydesmida	LR-lc	
14. Corbicula regularis	Pelecypoda / Eulamellibranchiata	DD	
15. *Crematogaster rogenhoferi*	Insecta / Hymenoptera	LR-lc	
16. *Cypris dravidensis*	Oristacca / Podocopida	EN	(B1, 2c)
17. Cypris protubera	Oristacca / Podocopida	EN	(B1, 2ac)
18. *Cypris subglobosa*	Oristacca / Podocopida	LR-nt	
19. *Dichogaster curgensis*	Oligochaeta / Lumbricina	LR-lc	
20. *Drawida nilamburensis*	Oligochaeta / Moniligastreda	CR	(B1, 2abc)
21. Ectrychotes bharathi	Insecta / Hemiptera	CR	(B1, 2c)
22. Edocia punctatum	Insecta / Hemiptera	CR	(B1, 2c)
23. *Edocla heberii*	Insecta / Hemiptera	CR	(B1, 2c)
24. *Edocla maculatus*	Insecta / Hemiptera	EN	(B1, 2c)
25. Eucoptacrella ceylonica	Insecta / Orthoptera	CR	(B1, 2abc)
26. *Eucypris bispinosa*	Oristacca / Podocopida	CR	(B1, 2ac)
27. *Gyraulus convexiusculus*	Pelecypoda / Basommatophora	VU	(B1, 2ac)
28. Gyraulus saigonensis	Pelecypoda / Basommatophora	LR-nt	
29. *Haematorrhophus fovealis*	Insecta / Hemiptera	CR	(B1, 2c)
30. *Haematorrhophus ruguloscutellaris*	Insecta / Hemiptera	VU	(D2)
31. Hemihaematorrhophus planidorsatus	Insecta / Hemiptera	EN	(B1, 2c)
32. *Heterometrus barberi*	Arachnida / Scorpiones	EN	(B1, 2c)
33. Heterometrus keralensis	Arachnida / Scorpiones	EN	(B1, 2c)
34. Heterometrus malapuramensis	Arachnida / Scorpiones	VU	(A1c; B1, 2ac)
35. Heterometrus swammerdami	Arachnida / Scorpiones	VU	(A1ac)
36. *Ilyocryptus spinifer*	Oristacca / Cladocera	LR-nt	
37. *Indoplanorbis exustus*	Pelecypoda / Basommatophora	LR-nt	
38. *Isometrus brachycentrus*	Arachnida / Scorpiones	VU	(B1, 2ac)
39. *Lamellidens marginalis*	Pelecypoda / Eulamethibranchia	LR-nt	
40. *Lychas tricarinatus*	Arachnida / Scorpiones	LR-lc	
41. *Lymnaea acuminata*	Pelecypoda / Basommatophora	NE	
42. *Lymnaea luteola*	Pelecypoda / Basommatophora	LR-nt	
43. Macrotermes estherae	Insecta / Isoptera	EN	(B1, 2abcd)
44. *Macrothrix laticornis*	Oristacca / Cladocera	LR-nt	
45. *Melania scabra*	Pelecypoda / Megagastropoda	VU	(A1c)
46. Melania tuberculata	Pelecypoda / Megagastropoda	VU	(A1c)
47. Meranoplus bellii	Insecta / Hymenoptera	DD	
48. *Mesacanthaspis kovaiensis*	Insecta / Hemiptera	CR	(B1, 2c)
49. *Mesobuthus hendersoni*	Oligochaeta / Lumbricina	LR-lc	
50. Microcerotermes fletcheri	Insecta / Isoptera	VU	(A1ac; B1, 2abc)
51. *Mysorella costigera*	Pelecypoda / Megagastropoda	LR-nt	
52. Nasutitermes indicola	Insecta / Isoptera	VU	(A1ac; B1, 2ac)
53. *Ocnerodrilus occidentalis*	Arachnida / Scorpiones	EN	(B1, 2c)
54. *Octochaetona serrata*	Oligochaeta / Lumbricina	VU	(B1, 2ce)
55. Octonochaeta rosea	Oligochaeta / Lumbricina	Lr-nt	(B1, 2c)
56. *Ocypoda ceratophthalma*	Oristacca / Decapoda	LR-nt	
57. *Ocypoda cordimana*	Oristacca / Decapoda	EN	(B1, 2ac)
58. *Ocypoda macrocera*	Oristacca / Decapoda	EN	(B1, 2bc)

Species	Class / Order	IUCN	Criteria
59. *Ocypoda platytarsis*	Oristacca / Decapoda	VU	(A1c)
60. *Odontotermes brunneus*	Insecta / Isoptera	VU	(A1ac; B1, 2ac)
61. *Odontotermes wallonensis*	Insecta / Isoptera	VU	(B1, 2c)
62. *Oecophylla smaragdina*	Insecta / Hymenoptera	LR-lc	
63. *Paludomus monile*	Pelecypoda / Megagastropoda	EN	(B1, 2b)
64. Paludomus stomatodon	Pelecypoda / Megagastropoda	CR	(B1, 2b)
65. *Paludomus tanschaurica*	Pelecypoda / Megagastropoda	VU	(A1c)
66. Parreysia corrugata	Pelecypoda / Eulamelibranchiata	VU	(B1, 2ac)
67. *Perionyx excavatus*	Oligochaeta / Lumbricina	LR-nt	
68. Phyllogonostreptus nigrolabiatus	Myriapoda / Spirostreptida	LR-nt	
69. *Pila globosa*	Pelecypoda / Megagastropoda	VU	(A1c)
70. *Pila virens*	Pelecypoda / Megagastropoda	VU	(B1, 2ac)
71. Plagiolepis jerdonii	Insecta / Hymenoptera	LR-lc	
72. *Poekilocerus pictus*	Insecta / Orthoptera	LR-lc	
73. Polydrepanum tamilum	Myriapoda / Polydesmida	LR-nt	
74. *Psilacrum convexa*	Insecta / Diptera	CR	(B1, 2abc)
75. Sechelleptus importatus	Myriapoda / Spirostreptida	CR	(B1, 2c)
76. *Speculitermes singalensis*	Insecta / Isoptera	EN	(B1, 2c)
77. Strandesia bicornuta	Oristacca / Podocopida	EN	(B1, 2a)
78. *Strandesia elongata*	Oristacca / Podocopida	EN	(B1, 2a)
79. *Strandesia flavescens*	Oristacca / Podocopida	EN	(B1, 2a)
80. *Strandesia indica*	Oristacca / Podocopida	VU	(B1, 2ac)
81. *Strandesia labiata*	Oristacca / Podocopida	LR-nt	
82. *Strandesia purpurascens*	Oristacca / Podocopida	EN	(B1, 2ac)
83. Streptogonopus jerdoni	Myriapoda / Polydesmida	EN	(B1, 2c)
84. *Sulcospira hugeli*	Pelecypoda / Megagastropoda	EN	(B1, 2ac)
85. *Synectrychotes calimerei*	Insecta / Hemiptera	CR	(B1, 2c)
86. Tetramorium rossi	Insecta / Hymenoptera	DD	
87. Tetraponera aitkeni	Insecta / Hymenoptera	LR-lc	
88. Thelyphonus sepiaris	Arachnida / Uropygi	LR-nt	
89. *Tricimbomyia muzhiyarensis*	Insecta / Diptera	CR	(B1, 2c)
90. *Trinervitermes biformis*	Insecta / Isoptera	VU	(A1ac; B1, 2c)
91. *Truxalis indica*	Insecta / Orthoptera	EN	(B1, 2c)
92. *Velitra neelai*	Insecta / Hemiptera	DD	
93. *Viviparus variata*	Pelecypoda / Megagastropoda	EN	(B1, 2bc)
94. *Xenobolus acuticonus*	Myriapoda / Spirobolida	LR-nt	
95. *Zarytes squalina*	Insecta / Orthoptera	CR	(B1, 2ab)

IUCN Red List Categories and Criteria explained in brief below

* IUCN Red List *Categories :*

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

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

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

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

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

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

** IUCN Red List *Criteria*

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

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

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

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

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

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

No. of Location : F = Fragmented

Range: A = < 100 sq.km.; B = < 5,000 sq.km.; C= < 20,000 sq.km.; D= > 20,000 sq.km.;

Area: A = < 10 sq.km.; B= < 500 sq.km.; C= <2,000 sq.km.; D = >2,000 sq.km.;

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

Threat: L = Loss of habiat; Lf = Loss of habitat due to fragmentation; D = Diseases; Dp = Decline in prey species; E = Edaphic factors (changes in); H = Harvest; Hf = Harvest for food; Hm= Harvest for medicine; I = Human interference; P = Predation; Ps = Pesticides; Sf=Fire as catastrophic event; T =Trade; Tp = Trade of parts

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

Cultivation Recommendations : 1= Cultivation for conservation either only in in situ or both in situ and ex situ with the population maintaining 90% genetic diversity for 100 years; = same as 1 but periodic reinforce-ment of cultivations with genetic materials from the wild; 3= Cultivation only for research, education or husbandry but not for conservation; P = pending

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

IUCN Red List Categories and Criteria explained in brief below

* IUCN Red List *Categories :*

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

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

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

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

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

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

** IUCN Red List *Criteria*

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

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

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

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

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

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

No. of Location : F = Fragmented

Range: A = < 100 sq.km.; B = < 5,000 sq.km.; C= < 20,000 sq.km.; D= > 20,000 sq.km.;

Area: A = < 10 sq.km.; B= < 500 sq.km.; C= <2,000 sq.km.; D = >2,000 sq.km.;

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

Threat: L = Loss of habiat; Lf = Loss of habitat due to fragmentation; D = Diseases; Dp = Decline in prey species; E = Edaphic factors (changes in); H = Harvest; Hf = Harvest for food; Hm= Harvest for medicine; I = Human interference; P = Predation; Ps = Pesticides; Sf=Fire as catastrophic event; T =Trade; Tp = Trade of parts

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

Cultivation Recommendations : 1= Cultivation for conservation either only in in situ or both in situ and ex situ with the population maintaining 90% genetic diversity for 100 years; = same as 1 but periodic reinforcement of cultivations with genetic materials from the wild; 3= Cultivation only for research, education or husbandry but not for conservation; P = pending

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

Selected Soil Invertebrates of Southern India

Summary Data Table

Summary Data Table for Selected Soil Invertebrates of Southern India

Species	Habit	Range	Area	No. Of Loc/ F	% Decline	Year/ gen.	Pop. No.	Data quality	Threats	IUCN	Crit.	Research recom.	Capt. breed	Lev. diff.
Acanthaspis alagiriensis Insecta / Hemiptera	Underneath stones	A	A	1	Unk	Unk	Unk	1	I	CR	RD	S, Lh, M	3	Unk
Acanthaspis carinata Insecta / Hemiptera	Underneath stones	A	A	1	Unk	Unk	Unk	2	I, L	CR	RD	S, Lh, Hm	No	No
Acanthaspis minutum Insecta / Hemiptera	Underneath stones	A	A	1	Unk	Unk	Unk	2	Unk	VU	RP	S, Lh	No	No
Acanthaspis nigripes Insecta / Hemiptera	Under boulders	A	A	1	Unk	Unk	Unk	2	L, I	VU	RP	S, Lh	3	Unk
Acanthaspis pedestris Insecta / Hemiptera	Under stones, Entomophagous	D	D	>20	20	20 yrs	Unk	1, 2, 3	L, I, Dp	LR-nt	—	Hm	No	1
Acanthaspis siruvani Insecta / Hemiptera	Predators on ants and termites	A	A	1	Unk	Unk	Unk	2	No	VU	RP	S, Lh, M	No	No
Alstonitermes flavescens Insecta / Isoptera	Detritus leaf litter	B	B	2 -3, F	50	10 yrs	Unk	2, 4	Ps, L	EN	PR; RD	S, M, Hm, Lr, P	1	3
Amblyopone belli Insecta / Hymenoptera	Unk	D	A	1	Unk	Unk	Unk	3	Unk	DD	—	S, M, Lh, Lr, PP	3	Unk
Aularchis miliaris Insecta / Orthoptera	Phytophagous	D	D	Many	Unk	Unk	Unk	3, 4	Ps	LR-nt	—	Lh	No	Unk
Bellamya bengalensis Pelecypoda / Megagastropoda	Shallow water-Benthic	D	D	Many	10	10 yrs	Unk	2, 5	L, Pu, Ps	LR-nt	—	S	No	1
Bellamya dissimilis Pelecypoda / Megagastropoda	Shallow Benthic water	D	D	9, F	10	10 yrs	Unk	2, 3	L, Pu, Ps	LR-nt	—	S, O	No	1
Bithynia stenothyroides Pelecypoda / Megagastropoda	Phytophagous littoral	D	C	5, F	15	10 yrs	Unk	2	L, Pu, Ps	VU	RD	S	No	2
Chondromorpha kelaarki Myriapoda / Polydesmida	Decomposed litter feeder	D	D	Many	No	Unk	Unk	2	L, C, Sd	LR-lc	—	S, T	No	1
Corbicula regularis Pelecypoda / Eulamellibranchiata	Filter feeder	B	C	1	15	10 yrs	Unk	5	Unk	DD	—	S	No	2
Crematogaster rogenhoferi Insecta / Hymenoptera	Carnivorous, phyto-phagous	D	D	Many	Stable	Unk	Unk	2	No	LR-lc	—	S, M, Hm, Lh, PP	3	1
Cypris dravidensis Oristacca / Podocopida	Benthic, lentic	D	B	4, F	10	10 yrs	Unk	2	L, Pu, I	EN	RD	Hm	No	1
Cypris protubera Oristacca / Podocopida	Littoral, Benthic	B	B	2	10	10 yrs	Unk	2	L, Pu, I	EN	RD	Hm	No	1
Cypris subglobosa Oristacca / Podocopida	Benthi, Lentic	D	D	10, F	10	10 yrs	Unk	2	L, Pu, I	LR-nt	—	Hm	1	1
Dichogaster curgensis Oligochaeta / Lumbricina	Detritivorous	D	D	Many	No	Unk	Unk	2	E, Ps, Sd	LR-lc	—	M, Lm, PP	3	1
Drawida nilamburensis Oligochaeta / Moniligastreda	Geophagous (Soil eating)	A	A	1	20	10 yrs	Unk	3	L, I	CR	RD	M, Hm, Lr, S, P	P	Unk

Species	Habit	Range	Area	No. Of Loc/ F	% Decline	Year/ gen.	Pop. No.	Data quality	Threats	IUCN	Crit.	Research recom.	Capt. breed	Lev. diff.
Ectrychotes bharathi Insecta/ Hemiptera	Underneath stones	A	A	1	Unk	Unk	Unk	2	I, L	CR	RD	S, Lh	No	No
Edocia punctatum Insecta / Hemiptera	Under stones	A	A	1	Unk	Unk	Unk	2	I	CR	RD	S, Lh	No	No
Edocla heberii Insecta / Hemiptera	Under stones	A	A	1	Unk	Unk	Unk	2	Gr, I	CR	RD	S, M, Lh	3	Unk
Edocla maculatus Insecta / Hemiptera	Underneath stones	D	B	3	Unk	Unk	Unk	2	I	EN	RD	S, Lh	No	No
Eucoptacrella ceylonica Insecta / Orthoptera	Phytophagous	B	A	2, F	10-20	10 yrs	Unk	2	L,I	CR	RD	S, M, Lr, Lh, P	3	1
Eucypris bispinosa Oristacca / Podocopida	Littoral, Benthic	A	A	1	10	10 yrs	Unk	2	L, Pu, I	CR	RD	Hm	No	1
Gyraulus convexiusculus Pelecypoda / Basommatophora	Phytophagous	C	C	Many, F	10	10 yrs	Unk	2	L, Pu, Ps	VU	RD	Hm	No	1
Gyraulus saigonensis Pelecypoda / Basommatophora	Littoral, Benthic	D	D	3, F	10	10 yrs	-	2	L, Ps, Pu	LR-nt	—	S	No	2
Haematorrhophus fovealis Insecta / Hemiptera	Under stone	A	A	1	Unk	Unk	Unk	2	I	CR	RD	S, M, Lh	No	Unk
Haematorrhophus ruguloscutellaris Insecta / Hemiptera	Under boulders	A	A	1	Unk	Unk	Unk	2	Unk	VU	RP	S, Lh, M	3	Unk
Hemihaematorrhophus planidorsatus Insecta / Hemiptera	Under stones	C	B	4, F	Unk	Unk	Unk	2	L, I, Gr	EN	RD	S, Lh, M	No	Unk
Heterometrus barberi Arachnida / Scorpiones	Nocturnal	B	C	1	Unk	-	NK	2, 3	I, L	EN	RD	T, S, M, Lh, PP	P	Unk
Heterometrus keralensis Arachnida / Scorpiones	Nocturnal	B	B	1	10	10 yrs	Unk	2	I, L	EN	RD	T, S, M, Lr Hm, Lh, PP	3	3
Heterometrus malapuramensis Arachnida / Scorpiones	Nocturnal carnivorous	C	C	5, F	20	10 yrs	Unk	2, 3	L	VU	PR; RD	S, M, Lh, Lr, PP	P	Unk
Heterometrus swammerdami Arachnida / Scorpiones	Nocturnal, carnivora	D	D	Many	20	10 yrs	Unk	2, 3	L, I, Sd, E	VU	PR	S, Hm, P	1	1
Ilyocryptus spinifer Oristacca / Cladocera	Littoral, Benthic	D	D	1	10	10 yrs	Unk	2	L, Pu, Ps	LR-nt	—	S	No	1
Indoplanorbis exustus Pelecypoda / Basommatophora	Lentic freshwater	D	D	Many	10	10 yrs	-	2	L, Pu, Ps	LR-nt	—	S	No	1
Isometrus brachycentrus Arachnida / Scorpiones	Nocturnal	C	C	3	10	10 yrs	Unk	2	I, L	VU	RD	T, S, M, Lh, PP	P	Unk
Lamellidens marginalis	Benthic Filter feeder	D	D	Many	15	10 yrs	Unk	2	L, H	LR-nt	—	S	No	1

Species	Habit	Range	Area	No. Of Loc/ F	% Decline	Year/ gen.	Pop. No.	Data quality	Threats	IUCN	Crit.	Research recom.	Capt. breed	Lev. diff.
Pelecypoda / Eulamellibranchiata														
Lychas tricarinatus Arachnida / Scorpiones	Nocturnal	D	D	Many	No	Unk	Unk	2	I, L	LR-lc	—	M, O	No	1
Lymnaea acuminata Pelecypoda / Basommatophora	Attach to floating algae	D	D	Many, F	10	10 yrs	Unk	2	L, Pu, Ps	NE	—	S	No	1
Lymnaea luteola Pelecypoda / Basommatophora	Attached to aquatic vegetation	D	D	Many	10	10 yrs	Unk	2	L, Pu, Ps	LR-nt	—	S, M	No	1
Macrotermes estherae Insecta/ Isoptera	Dry grass and leaf litter	B	B	Many, F	30	10 yrs	Unk	2	L, E	EN	RD	S, M, Hm, Lr, PP	No	Unk
Macrothrix laticornis Oristacca / Cladocera	Littoral, Benthic	D	D	3	10	10 yrs	Unk	2	L, Pu, Ps	LR-nt	—	M	No	1
Melania scabra Pelecypoda / Megagastropoda	Attached to hard substances	D	D	Many	20	10 yrs	Unk	2, 4	L, Pu, Ps	VU	PR	M	No	1
Melania tuberculata Pelecypoda / Megagastropoda	Attached to hard substratum	D	D	Many	20	10 yrs	Unk	2, 4	L, Pu	VU	PR	M	No	1
Meranoplus bellii Insecta / Hymenoptera	Nectar feeders	B	B	5	Unk	Unk	Unk	2	Unk	DD	—	S, M, Lh, PP	No	Unk
Mesacanthaspis kovaiensis Insecta / Hemiptera	Under stone	A	A	2, F	Unk	Unk	Unk	2	L, Gr, I	CR	RD	S, Lh	No	Unk
Mesobuthus hendersoni Oligochaeta / Lumbricina	Nocturnal	D	D	Many	No	Unk	Unk	2	L, I	LR-lc	—	O, PP	No	Unk
Microcerotermes fletcheri Insecta / Isoptera	Leaf litter & Tree bark feeder	D	C	Many, F	30	10 yrs	Unk	2	L, I	VU	PR; RD	S, M, Lm, Lh, Hm, PP	3	3
Mysorella costigera Pelecypoda / Megagastropoda	Littoral, Benthic	D	D	Many	10	10 yrs	Unk	2, 4	L, Pu, Ps	LR-nt	—	S	No	2
Nasutitermes indicola Insecta / Isoptera	Leaf litter and bark feeder	C	C	Many, F	> 20	10 yrs	Unk	2	L	VU	PR; RD	S, M, Hm, PP	No	Unk
Ocnerodrilus occidentalis Arachnida / Scorpiones	Detritus feeder	D	B	2	No	Unk	Unk	2, 3	L, Sd	EN	RD	S, M, T, Hm, O, PP	No	Unk
Octochaetona serrata Oligochaeta / Lumbricina	Geophytophagous subsurface feeder	C	C	Many, F	5	10 yrs	Unk	1	I, L, Sd, E	VU	RD	S, M, Hm	3	1
Octonochaeta rosea Oligochaeta / Lumbricina	Geophagous	D	D	Many	No	Unk	Unk	1, 3	E,I, Ps, Sd	LR-nt	RD	S, M, Hm, Lr, PP	P	2
Ocypoda ceratophthalma Oristacca / Decapoda	Burrowing	D	D	Many	10	10 yrs	Unk	2, 4	L, Pu, I	LR-nt	—	S	No	3
Ocypoda cordimana Oristacca / Decapoda	Burrowing	B	C	1	20	10 yrs	Unk	2, 4	Pu, I, L	EN	RD	S, Hm	No	3
Ocypoda macrocera Oristacca / Decapoda	Burrowing	B	C	Many, F	20	10 yrs	Unk	2, 4	Pu, I, L	EN	RD	S	No	3
Ocypoda platytarsis	Burrowing	D	C	Unk	20	10 yrs	Unk	2, 4	Pu, I, L, Hf	VU	PR	S, Hm, O	No	1

Species	Habit	Range	Area	No. Of Loc/ F	% Decline	Year/ gen.	Pop. No.	Data quality	Threats	IUCN	Crit.	Research recom.	Capt. breed	Lev. diff.
Oristacca / Decapoda														
Odontotermes brunneus Insecta / Isoptera	Litter feeder	C	C	Many, F	20	10 yrs	Unk	2	L, I	VU	PR; RD	S, M, Hm, PP	No	Unk
Odontotermes wallonensis Insecta / Isoptera	Soil inhabiting and subterranean	D	C	Many, F	Unk	-	Unk	2	L, E, Ps, Lf	VU	RD	S, M	3	3
Oecophylla smaragdina Insecta / Hymenoptera	Carnivorous, honey dew & sap feeder	D	D	Many	Unk	-	Unk	2	Hf	LR-lc	—	Hm	No	Unk
Paludomus monile Pelecypoda / Megagastropoda	Littoral, Benthic, on hard substances	B	C	3	20	10 yrs	Unk	2, 4	L, Pu	EN	RD	S, Hm, Lh	No	1
Paludomus stomatodon Pelecypoda / Megagastropoda	Littoral, Benthic, on hard substances	A	A	1	20	10 yrs	Unk	2	L, I	CR	RD	S, Hm, Lr	P	Unk
Paludomus tanschaurica Pelecypoda / Megagastropoda	Littoral, Benthic	D	D	4, F	20	10 yrs	Unk	2, 4	L, Pu	VU	PR	S, Lh	No	1
Parreysia corrugata Pelecypoda/ Eulamellibranchiata	Benthic, Filter feeder	C	D	Many, F	15	10 yrs	Unk	2, 4	Pu, Ps, L	VU	RD	S	No	2
Perionyx excavatus Oligochaeta / Lumbricina	Detritus feeder	D	D	Many	No	Unk	Unk	1, 3	E, L	LR-nt	—	S, M, Lr, O	3	1
Phyllogonostreptus nigrolabiatus Myriapoda / Spirostreptida	Soil and litter feeder	D	D	Many	Unk	Unk	Unk	2	L, Sd	LR-nt	—	T, S, Lh, M	P	2
Pila globosa Pelecypoda / Megagastropoda	Field and algal mass	D	D	Many	90	30 yrs	Unk	2, 4	L, Ps, Pu, I, Hf, Hm	VU	PR	S, O	No	1
Pila virens Pelecypoda / Megagastropoda	Fields and stagnent Water	D	C	5	90	30 yrs	Unk	2, 4	L, Ps, Pu, I	VU	RD PR	S	No	1
Plagiolepis jerdonii Insecta / Hymenoptera	Aphicolous, subterranean	D	D	Many	No	-	Unk	2	No	LR-lc	—	S, M, Lh	3	1
Poekilocerus pictus Insecta / Orthoptera	Phytophagous	D	D	Many	No	-	Unk	4	I	LR-lc	—	Lr	No	1
Polydrepanum tamilum Myriapoda / Polydesmida	Litter feeding	D	D	Many	Unk	Unk	Unk	2, 3	C, L, Sd	LR-nt	—	S, M	No	1
Psilacrum convexa Insecta / Diptera	On leaves of shrubs	A	A	1	Unk	Unk	Unk	1	L	CR	RD	S, Lh, PP	No	Unk
Sechelleptus importatus Myriapoda / Spirostreptida	Crop feeder	A	A	2, F	5	10 yrs	Unk	2	Pu, Ps, L	CR	RD	S, M, PP	3	3
Speculitermes singalensis Insecta / Isoptera	Detritus feeder	D	B	Many, F	Unk	-	Unk	2	L, Lf	EN	RD	S, M, Hm, Lh, Lm, PP	3	3
Strandesia bicornuta Oristacca / Podocopida	Littoral, Benthic	D	B	2, F	10	10 yrs	Unk	2, 4	L, Pu, I	EN	RD	Hm	No	1
Strandesia elongata Oristacca / Podocopida	Littoral, Benthic	D	B	10, F	10	10 yrs	Unk	2, 4	L, Pu, I	EN	RD	Hm	No	1
Strandesia flavescens Oristacca / Podocopida	Littoral, Benthic	B	B	2	10	10 yrs	Unk	2, 4	L, Pu, I	EN	RD	Hm	No	1

Species	Habit	Range	Area	No. Of Loc/ F	% Decline	Year/ gen.	Pop. No.	Data quality	Threats	IUCN	Crit.	Research recom.	Capt. breed	Lev. diff.
Strandesia indica Oristacca / Podocopida	Littoral	C	C	5, F	10	10 yrs	Unk	2, 4	L, Pu, I	VU	RD	Hm	No	1
Strandesia labiata Oristacca / Podocopida	Littoral, Benthic	D	D	8, F	10	10 yrs	Unk	2, 4	L, Pu, I	LR-nt	RD	Hm	No	1
Strandesia purpurascens Oristacca / Podocopida	Littoral, Benthic	B	B	2	10	10 yrs	Unk	2, 4	L, Pu, I	EN	RD	Hm	No	1
Streptogonopus jerdoni Myriapoda / Polydesmida	Phytophagous feeders, Fungivorous	B	C	5	No	Unk	Unk	1, 2	I, Sd	EN	RD	T, M, Lh, PP	3	2
Sulcospira hugeli Pelecypoda / Megagastropoda	Attached to substratum	B	C	3	20	10 yrs	Unk	2	L, Pu	EN	RD	S, Hm	No	1
Synectrychotes calimerei Insecta / Hemiptera	Underneath barks	A	A	1	Unk	Unk	Unk	2	I, L, Gr	CR	RD	S, Lh	No	No
Tetramorium rossi Insecta / Hymenoptera	Unk	Unk	Unk	1	Unk	-	Unk	2,3	Unk	DD	—	S, M, Lh, PP	No	Unk
Tetraponera aitkeni Insecta / Hymenoptera	Arboreal species	D	D	Many	Stable	Unk	Unk	1	No	LR-lc	—	M, Lh	No	Unk
Thelyphonus sepiaris Arachnida / Uropygi	Nocturnal, carnivorous	D	D	Many	10	10 yrs	Unk	2, 3	L	LR-nt	—	M, S, Lh, PP	No	1
Tricimbomyia muzhiyarensis Insecta / Diptera	Deciduous & semi-evergreen forests	A	A	1	Unk	-	Unk	1	L	CR	RD	S, Lh, PP	No	3
Trinervitermes biformis Insecta / Isoptera	Grass and litter feeding	D	C	Many, F	30	10 yrs	Unk	2	L, Ps	VU	RD PR	M, Lm, Lr, P	3	3
Truxalis indica Insecta / Orthoptera	Graminivorous (specific to grass)	B	C	7, F	Unk	-	Unk	1	L	EN	RD	S, M, Lr, P	3	1
Velitra neelai Insecta / Hemiptera	Underneath barks	A	A	1	Unk	Unk	Unk	2	Unk	VU	PR	S, Lh, Hm	3	Unk
Viviparus variata Pelecypoda / Megagastropoda	Shallow water, Benthic	B	B	8, F	10	10 yrs	Unk	2, 5	L, Pu	EN	RD	S	No	1
Xenobolus acuticonus Myriapoda / Spirobolida	Litter feeding leaves under barks	C	C	Many	No	Unk	Unk	2	C, Sd	LR-nt	—	M, S	No	Unk
Zarytes squalina Insecta / Orthoptera	Phytophagous	B	A	3, F	10-20	10 yrs	Unk	2	L, I	CR	RD	S, M, Lr, Lh, P	3	1

Selected Soil Invertebrates of Southern India

Report

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

Selected Soil Invertebrates of Southern India
Hosted by Zoological Survey of India, Southern Regional Station
Chennai, 24 – 28 February 1997

REPORT

Convention on Biological Diversity

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

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

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

Biodiversity Conservation Prioritisation Project – Endangered Species Component

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

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

IUCN Red List

Earlier efforts to monitor the earth's resources and activate conservation measures include the Red Data Books of IUCN, now called the World Conservation Union. The IUCN Red Data Books have provided a guide for species conservation status for the last three decades. A few years ago, it was felt that both the categories and

methodology used by individuals compiling the Red Data Books needed review. Over a seven-year period, the IUCN Criteria for Endangerment used in compiling Red Data Books, were examined, revised, reviewed and improved over six different iterations. The present system, the IUCN Red List Categories, 1994, is more objective, numerate, and consistent for all groups. The revised IUCN Red List Categories provide a methodology for assessment and categorisation, which can be applied, to any group of organisms (except microorganisms). The revised IUCN Red List criteria is being used now by conservation actioners and scientists all over the world and is considered the best method available today for assessing the conservation status of species.

Conservation Assessment and Management Plan

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

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

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

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

Conservation of Invertebrates

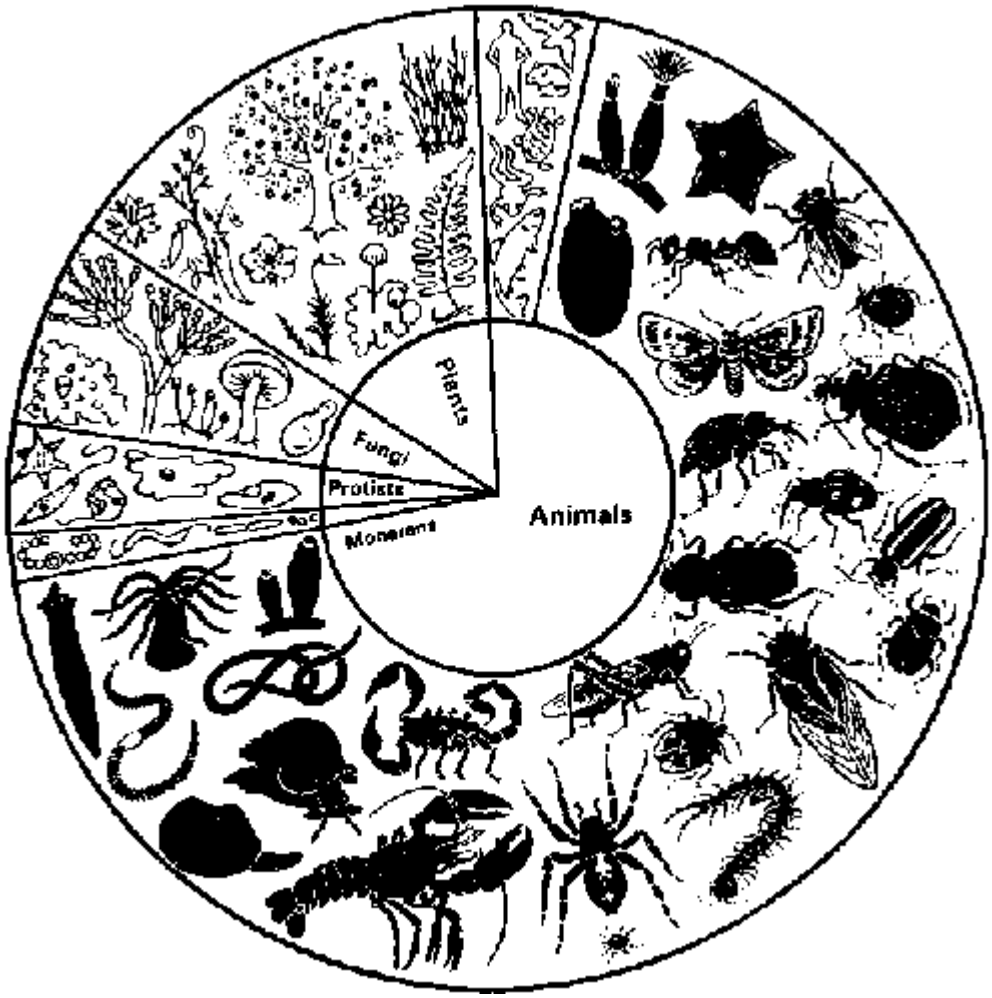
Invertebrates form the backbone of biodiversity, yet, they are the least understood and most neglected group of taxa. The amount of knowledge of invertebrates compared to that of vertebrates and plants is inversely proportional to their respective numbers. Invertebrates make up more than 75% of total number of species of faunal organism, as illustrated by the figure below.

According to some biologists, there may be 30 – 40 million species of invertebrates on the earth, although only half a million have been described. If there are 30 million species of invertebrates, the number of higher forms is almost negligible in the overall picture. Saving biodiversity, therefore, means saving invertebrates.

In India a relatively large number of invertebrates have been described – about 72,000 according to a Zoological Survey of India publication (1991). The proportion of Indian invertebrates to Indian vertebrates and plants follows a similar pattern as described for the whole world. Moreover, much of the research interest in India is more oriented towards their being pests and how to get rid of them, than in their being useful and how to conserve them. With respect to conservation or conservation assessment, one faces a formidable task in

deciding how and what to assess and where to begin. Since there was no possibility of covering all Indian invertebrates, our objective was simply to provide a model workshop, which could be used as a starting point for other exercises. In doing do, we also attempted to find ways to more easily address the vast numbers of invertebrate species.

The Biodiversity wheel



Soil invertebrates were selected as the target group for assessment in this workshop. This group was chosen because 1) soil invertebrates are singularly important due to their role in maintaining the condition of the soil; 2) rampant loss of habitat and quality of habitat; 3) suggestions by scientists that even so-called common invertebrates such as ants and termites were not observed now as much as previously; 4) no conservation assessment had ever been done for soil invertebrates before, and finally 5) our desire to avoid obviously charismatic groups such as butterflies.

Goals of the Workshop on selected species of southern Indian soil invertebrates

1. To prepare checklists of species of soil invertebrates of different orders which would be used for a) selecting species for conservation assessment according to IUCN guidelines and b) ranking (all) for research priorities on the basis of commonly known parameters,

2. To assess and assign a conservation status using population, habitat, and threat parameters as given in the revised IUCN Red List Criteria to soil invertebrate species selected by the workshop participants,

3. To collect information from participants which would be useful in drawing up action plans and management plans,

4. To produce a Conservation Assessment and Management Plan Draft for species assessed in the workshop for review by participants and, finally, distribution to individuals and institutions relevant to invertebrate conservation.

Results and Discussion

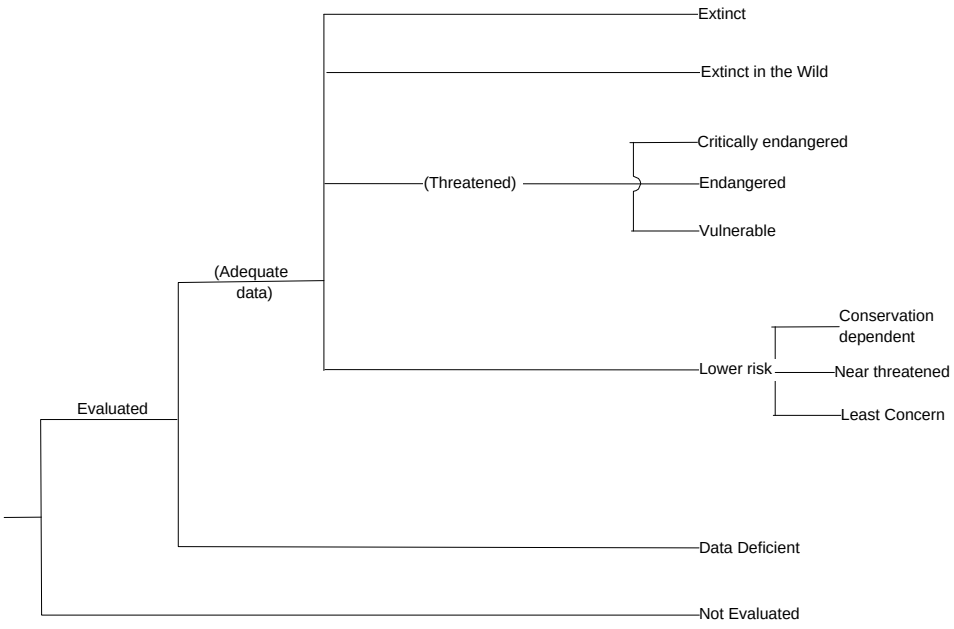
The Red Data Book of threatened animals (1996) compiled by the Species Survival Commission, IUCN lists 1891 invertebrates of the world as being threatened, 193 of which are from India. The 1990 and 1994 editions of the Red Data Book listed 28 and 148 species respectively. These numbers are not so much indicative of how many invertebrates actually are threatened in India as the sample size is small, but of a trend towards growing numbers of threatened species and the need for more systematic studies. Considering that there are 75,000 described species of Indian invertebrates, the number may also indicate how little documentation of invertebrate status and decline has been done.

The Zoological Survey of India, which compiles national Red Data Books, is in the process of assembling a list of threatened invertebrates of India. However, the assessments are based on the old IUCN Red List system and not on the 1994 IUCN Red List categories; the old categories of assessment were Extinct, Endangered, Vulnerable, Rare, Indeterminate, Insufficiently Known and Out of Danger.

The IUCN Red List Categories since 1991 have undergone a series of revisions to enhance their applicability to organisms other than mammals and to reflect the development of the new conservation sciences, population dynamics and conservation biology of the last two decades. The current version of the categories was ratified by the IUCN general assembly in December 1994. The categories can be divided into 5 divisions listed and illustrated below. This workshop represents the first attempt in India to assess and categorise Indian invertebrates using the revised IUCN categories.

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

Structure of the Categories



Methodology

Unlike other fauna and flora, information on invertebrates is very scanty and even if available, very scattered. One of the major problems with invertebrate taxonomy is the lack of reference material either in the form of museum specimen or literature. This is primarily because the type specimen have been stored in Museums

abroad and these, as well as publications, are not easily available in India due to prohibitive costs. Added to this is the fact that many descriptions are published in spurious journals. These factors made compiling information on soil invertebrates difficult.

The first step was to identify and network researchers all over the country and solicit checklists for different orders.

The C.A.M.P. process as described earlier, depends on gathering available data from a variety of specialists with particular emphasis on field biologists with direct observational experience with species and habitats. Therefore the first step in such an exercise is to identify and network researchers throughout the country and solicit their checklist for different orders. This task was made easier for invertebrates due to the networking project of the CBSG, India Invertebrate Special Interest Group, which is a project sponsored by the Invertebrate Conservation Centre, London Zoo. After a session the first day for overview of the taxon group, IUCN Red List categories, and workshop ground rules, participants form working groups to discuss each targeted species in detail in a structured, interactive group process. The guidelines provided by IUCN for each data requirement and for deriving status of a species from this data has been formatted on a taxon data sheet, which participants fill out for every species.

After forming working groups, participants decided on the following parameters for the exercise:

1. southern Indian endemic taxa with sufficient information for discussion would be taken up first, and non-endemics afterwards.

2. soil invertebrates only would be assessed with the working definition of “soil invertebrate” being determined by the fact of a crucial part of the life cycle of the organism being dependent on soil.

Assessments

Ninety-four soil invertebrate taxa were assessed at the workshop of which 45 were assessed “Globally”, 43 “Regionally” and 7 “Nationally”. One taxon (mollusc) was Not Evaluated since It was felt that not enough work had been done to suggest its validity as a species. Assessments for endemic taxa are described as “Global”, even if their range is small, because they occur only in that area in the whole world. The remaining taxa were assessed either as “Regionally” because they occur in other areas within the country or “Nationally” because they are assessed for their complete distributional range in India (Table 2). Since this workshop was restricted to soil invertebrates of southern India, “Global” assessment was made for taxa whose entire distributional range was restricted to southern India. For taxa which are endemic to India with a wider distribution within the country, the assessment was “Regional” (for southern India) and for those which are non-endemic to India but their distribution within India is restricted to southern India, the assessment was “National”. The terms “Global”, “Regional” and “National” as applied in this workshop are explained in detail in the last section of this report.

The 3 working groups formed at the workshop were the Entomological group which assessed 38 taxa, the Non-entomological group which assessed 20 taxa and the Aquatic group which assessed 36 taxa respectively. Table 1 indicates the different taxa and their orders according to working group. Of the 38 entomological taxa assessed 16 were assessed at a separate exercise at the Madras Christian College, Tambaram. The taxa were all assassin bugs (Reduviidae). The most represented orders in terms of number of taxa assessed per order are Hemiptera (16 taxa), Megagastropoda (13 taxa), Podocopida (10 taxa) and Hymenoptera and Scorpiones (7 taxa each)

Results

Of the 94 taxa assessed at the workshop, a very high number of sixty-four percent (64%) were categorised as “threatened”. This is because of threats to the species in the wild as perceived by the participants. It should be noted however, that there was a tendency to select taxa for assessment which were known to be rare in distribution and having declined in the wild. Therefore the situation as reflected in this sample list does not reflect the situation for all soil invertebrates. If such were the case, that 64% of all soil invertebrates were threatened, we would be in a most precarious position indeed and probably already suffering unimaginable ecological and environmental perturbations as a result. This sample is useful, however, to indicate that current ignorance of soil invertebrates could lead to a highly dangerous scenario involving degeneration of the very fabric of the earth, that is, the soil itself.

Another caution when considering these results is that many invertebrates are known only from a single location since their first description, with few or no records of the same after initial studies. These taxa would qualify for a threat category simply on the basis of their single location status, or on the size of the area they occupy, or the present condition of the habitat from which they were described. Given the number, variety and small body size of soil invertebrates, it is not impossible that species ascribed to one area only could actually have a much larger range which would change its status. The fact of such species having been assessed as threatened, however,

calls attention to them, which may lead to further identification in other areas. Considering the nature of ecosystems, however, the disappearance of one species from a natural area is a matter of concern for that area whether or not the species is actually limited to a single location.

Table 1. Taxa assessed in the CAMP listed by different working groups.

ENTOMOLOGICAL GROUP	AQUATIC GROUP	NON-ENTOMOLOGICAL GROUP
Acanthaspis alagiriensis * Insecta / Hemiptera	*Bellamya bengalensis* Pelecypoda / Megagastropoda	*Chondromorpha kelaarki* Myriapoda / Polydesmida
Acanthaspis carinata * Insecta / Hemiptera	*Bellamya dissimilis* Pelecypoda / Megagastropoda	*Dichogaster curgensis* * Oligochaeta / Lumbricina
Acanthaspis minutum * Insecta / Hemiptera	*Bithynia stenothyroides* Pelecypoda / Megagastropoda	*Drawida nilamburensis* * Oligochaeta / Moniligastreda
*Acanthaspis nigripes** Insecta / Hemiptera	*Corbicula regularis* Pelecypoda / Eulamellibranchiata	*Heterometrus barberi* * Arachnida / Scorpiones
*Acanthaspis pedestris** Insecta /Hemiptera	*Cypris dravidensis* * Oristacca / Podocopida	*Heterometrus swammerdami* Arachnida / Scorpiones
Acanthaspis siruvani * Insecta / Hemiptera	*Cypris protubera* * Oristacca / Podocopida	*Heterometrus malapuramensis** Arachnida / Scorpiones
Alstonitermes flavescens * Insecta / Isoptera	*Cypris subglobosa* Oristacca / Podocopida	*Heterometrus keralensis* * Arachnida / Scorpiones
Amblyopone bellii Insecta / Hymenoptera	*Eucypris bispinosa* * Oristacca / Podocopida	*Isometrus brachycentrus* * Arachnida / Scorpiones
Aularchis miliaris Insecta / Orthoptera	*Gyraulus convexisculus* Pelecypoda / Basommatophora	*Lychas tricarinatus* Arachnida / Scorpiones
Crematogaster rogenhoferi Insecta / Hymenoptera	*Gyraulus saigonensis* Pelecypoda / Basommatophora	*Ocnerodrilus occidentalis* Arachnida / Scorpiones
Ectrychotes bharathi * Insecta/ Hemiptera	*Ilyocryptus spinifer* Oristacca / Cladocera	*Octochaetona serrata* * Oligochaeta/ Lumbricina
Edocla punctatum * Insecta / Hemiptera	*Indoplanorbis exustus* Pelecypoda / Basommatophora	*Mesobuthus hendersoni* * Oligochaeta / Lumbricina
Edocla heberii * Insecta / Hemiptera	*Lamellidens marginalis* Pelecypoda / Eulamethibranchia	*Octonochaeta rosea* Oligochaeta / Lumbricina
Edocla maculatus * Insecta / Hemiptera	*Lymnaea acuminata* Pelecypoda / Basommatophora	*Perionyx excavatus* Oligochaeta / Lumbricina
Eucoptacrella ceylonica Insecta / Orthoptera	*Lymnaea luteola* Pelecypoda / Basommatophora	*Phyllogonostreptus nigrolabiatus* Myriapoda / Spirostreptida
Haematorrhophus fovealis * Insecta / Hemiptera	*Macrothrix laticornis* Oristacca / Cladocera	*Polydrepanum tamilum* * Myriapoda / Polydesmida
H. ruguloscutelaris * Insecta / Hemiptera	*Melania scabra* Pelecypoda / Megagastropoda	*Sechelleptus importatus* Myriapoda / Spirostreptida
Hemihaematorrhophus planidorsatus * *Insecta / Hemiptera*	*Melania tuberculata* Pelecypoda / Megagastropoda	*Streptogonopus jerdoni* Myriapoda / Polydesmida
Macrotermes estherae Insecta / Isoptera	*Mysorella costigera* Pelecypoda / Megagastropoda	*Thelyphonus sepiaris* Arachnida / Uropygi
Meranoplus bellii * Insecta / Hymenoptera	*Ocypoda ceratophthalma* Oristacca / Decapoda	*Xenobolus acuticonus* Myriapoda / Spirobolida
Mesacanthaspis kovaiensis * Insecta / Hemiptera	*Ocypoda cordimana* Oristacca / Decapoda	
Microcerotermes fletcheri Insecta / Isoptera	*Ocypoda macrocera* * Oristacca / Decapoda	
Nasutitermes indicola Insecta / Isoptera	*Ocypoda platyarsis* Oristacca / Decapoda	
Odontotermes brunneus * Insecta / Isoptera	*Paludomus monile* * Pelecypoda / Megagastropoda	
Odontotermes wallonensis Insecta / Isoptera	*Paludomus stomatodon* * Pelecypoda / Megagastropoda	
Oecophylla smaragdina Insecta / Hymenoptera	*Paludomus tanschaurica* Pelecypoda / Megagastropoda	
Plagiolepis jerdonii Insecta / Hymenoptera	*Parreysia corrugata* Pelecypoda / Eulamelibranchiata	
Poekilocerus pictus Insecta / Orthoptera	*Pila globosa* Pelecypoda / Megagastropoda	

ENTOMOLOGICAL GROUP	AQUATIC GROUP	NON-ENTOMOLOGICAL GROUP
Psilacrum convexa * Insecta / Diptera	*Pila virens* * Pelecypoda / Megagastropoda	
Speculitermes singalensis * Insecta / Isoptera	*Strandesia bicornuta* * Oristacca / Podocopida	
Synectrychotes calimerei * Insecta / Hemiptera	*Strandesia elongata* * Oristacca / Podocopida	
Tetramorium rossi * Insecta / Hymenoptera	*Strandesia flavescens* * *Oristacca / Podocopida*	
Tetraponera aitkeni Insecta/ Hymenoptera	*Strandesia indica* Oristacca / Podocopida	
Tricimbomyia muzhiyarensis * Insecta / Diptera	*Strandesia labiata* Oristacca / Podocopida	
Trinervitermes biformis Insecta / Isoptera	*Strandesia purpurascens* * Oristacca / Podocopida	
Truxalis indica Insecta / Orthoptera	*Sulcospira hugeli* * Pelecypoda / Megagastropoda	
Velitra neelai * Insecta / Hemiptera	*Viviparus variata* Pelecypoda / Megagastropoda	
Zarytes squalina * Insecta / Orthoptera		* Assessed Globally

Table 2. Basis of criteria for assessing selected species of soil invertebrates of southern India

Species	IUCN	Assessed	Threatened due to	Criteria
Acanthaspis alagiriensis	CR	Globally	Restricted distribution	B1, 2c
Acanthaspis carinata	CR	Globally	Restricted distribution	B1, 2c
Acanthaspis minutum	VU	Globally	Restricted population	D2
Acanthaspis nigripes	VU	Globally	Restricted population	D2
Acanthaspis pedestris	LR-nt	Globally	—	—
Acanthaspis siruvani	VU	Globally	Restricted population	D2
Alstonitermes flavescens	EN	Globally	Population reduction; Restricted distribution	A1a,1c; B1, 2a, 2b, 2c
Amblyopone bellii	DD	Southern India	—	—
Aularchis miliaris	LR-nt	Southern India	—	—
Bellamya bengalensis	LR-nt	Southern India	—	—
Bellamya dissimilis	LR-nt	Southern India	—	—
Bithynia stenothyroides	VU	Nationally	Restricted distribution	B1, 2a, 2c
Chondromorpha kelaarki	LR-lc	Southern India	—	—
Corbicula regularis	DD	Southern India	—	—
Crematogaster rogenhoferi	LR-lc	Southern India	—	—
Cypris dravidensis	EN	Globally	Restricted distribution	B1, 2c
Cypris protubera	EN	Globally	Restricted distribution	B1, 2a, 2c
Cypris subglobosa	LR-nt	Southern India	—	—
Dichogaster curgensis	LR-lc	Globally	—	—
Drawida nilamburensis	CR	Globally	Restricted distribution	B1, 2a, 2b, 2c
Ectrychotes bharathi	CR	Globally	Restricted distribution	B1, 2c
Edocia punctatum	CR	Globally	Restricted distribution	B1, 2c
Edocla heberii	CR	Globally	Restricted distribution	B1, 2c
Edocla maculatus	EN	Globally	Restricted distribution	B1, 2c
Eucoptacrella ceylonica	CR	Southern India	Restricted distribution	B1, 2a, 2b,2c
Eucypris bispinosa	CR	Globally	Restricted distribution	B1, 2a, 2c
Gyraulus convexiusculus	VU	Southern India	Restricted distribution	B1, 2a, 2c
Gyraulus saigonensis	LR-nt	Southern India	—	—
Haematorrhophus fovealis	CR	Globally	Restricted distribution	B1, 2c
Haematorrhophus ruguloscutellaris	VU	Globally	Restricted population	D2
Hemihaematorrhophus planidorsatus	EN	Globally	Restricted distribution	B1, 2c
Heterometrus barberi	EN	Globally	Restricted distribution	B1, 2c
Heterometrus keralensis	EN	Globally	Restricted distribution	B1, 2c
Heterometrus malapuramensis	VU	Southern India	Population reduction; Restricted distribution	A1c; B1, 2a, 2c

Species	IUCN	Assessed	Threatened due to	Criteria
Heterometrus swammerdami	VU	Southern India	Population reduction	A1a, 1c
Ilyocryptus spinifer	LR-nt	Southern India	—	—
Indoplanorbis exustus	LR-nt	Southern India	—	—
Isometrus brachycentrus	VU	Globally	Restricted distribution	B1, 2a, 2c
Lamellidens marginalis	LR-nt	Southern India	—	—
Lychas tricarinatus	LR-lc	Southern India	—	—
Lymnaea acuminata	NE	Not applicable	—	—
Lymnaea luteola	LR-nt	Southern India	—	—
Macrotermes estherae	EN	Southern India	Restricted distribution	B1, 2a, 2b,2c, 2d
Macrothrix laticornis	LR-nt	Southern India	—	—
Melania scabra	VU	Southern India	Population reduction	A1c
Melania tuberculata	VU	Southern India	Population reduction	A1c
Meranoplus bellii	DD	Globally	—	—
Mesacanthaspis kovaiensis	CR	Globally	Restricted distribution	B1, 2c
Mesobuthus hendersoni	LR-lc	Globally	—	—
Microcerotermes fletcheri	VU	Southern India	Population reduction; Restricted distribution	A1a, 1c; B1, 2a, 2b, 2c
Mysorella costigera	LR-nt	Southern India	—	—
Nasutitermes indicola	VU	Nationally	Population reduction; Restricted distribution	A1a, 1c; B1, 2a, 2c
Ocnerodrilus occidentalis	EN	Southern India	Restricted distribution	B1, 2c
Octochaetona serrata	VU	Globally	Restricted distribution	B1, 2c, 2e
Octonochaeta rosea	Lr-nt	Southern India	Restricted distribution	B1, 2c
Ocypoda ceratophthalma	LR-nt	Nationally	—	—
Ocypoda cordimana	EN	Nationally	Restricted distribution	B1, 2a, 2c
Ocypoda macrocera	EN	Globally	Restricted distribution	B1, 2b, 2c
Ocypoda platyarsis	VU	Nationally	Population reduction	A1c
Odontotermes brunneus	VU	Globally	Population reduction; Restricted distribution	A1a, 1c; B1, 2a, 2c
Odontotermes wallonensis	VU	Southern India	Restricted distribution	B1, 2c
Oecophylla smaragdina	LR-lc	Southern India	—	—
Paludomus monile	EN	Globally	Restricted distribution	B1, 2b
Paludomus stomatodon	CR	Globally	Restricted distribution	B1, 2b
Paludomus tanschaurica	VU	Southern India	Population reduction	A1c
Parreysia corrugata	VU	Southern India	Restricted distribution	B1, 2a, 2c
Perionyx excavatus	LR-nt	Southern India	—	—
Phyllogonostreptus nigrolabiatus	LR-nt	Southern India	—	—
Pila globosa	VU	Southern India	Population reduction	A1c
Pila virens	VU	Globally	Population reduction Restricted distribution	A1a, 1c; B1, 2a, 2c
Plagiolepis jerdonii	LR-lc	Southern India	—	—
Poecilocerus pictus	LR-lc	Southern India	—	—
Polydrepanum tamilum	LR-nt	Globally	—	—
Psilacrum convexa	CR	Globally	Restricted distribution	B1, 2a, 2b, 2c
Sechelleptus importatus	CR	Nationally	Restricted distribution	B1, 2c
Speculitermes sinhalensis	EN	Globally	Restricted distribution	B1, 2c
Strandesia bicornuta	EN	Globally	Restricted distribution	B1, 2a
Strandesia elongata	EN	Globally	Restricted distribution	B1, 2a
Strandesia flavescens	EN	Globally	Restricted distribution	B1, 2a
Strandesia indica	VU	Southern India	Restricted distribution	B1, 2a, 2c
Strandesia labiata	LR-nt	Southern India	--	--
Strandesia purpurascens	EN	Globally	Restricted distribution	B1, 2a, 2c
Streptogonopus jerdoni	EN	Southern India	Restricted distribution	B1, 2c
Sulcospira hugeli	EN	Globally	Restricted distribution	B1, 2a, 2c
Synectrychotes calimeri	CR	Globally	Restricted distribution	B1, 2c
Tetramorium rossi	DD	Globally	—	—
Tetraponera aitkeni	LR-lc	Southern India	—	—
Thelyphonus sepiaris	LR-nt	Nationally	—	—
Tricimbomyia muzhiyarensis	CR	Globally	Restricted distribution	B1, 2c

Species	IUCN	Assessed	Threatened due to	Criteria
Trinervitermes biformis	VU	Southern India	Population reduction Restricted distribution	A1a, 1c B1, 2c
Truxalis indica	EN	Southern India	Restricted distribution	B1, 2c
Velitra neelai	VU	Globally	—	—
Viviparus variata	EN	Southern India	Restricted distribution	B1, 2b, 2c
Xenobolus acuticonus	LR-nt	Southern India	—	—
Zarytes squalina	CR	Globally	Restricted distribution	B1, 2a, 2b

Threats

The reasons for most of the taxa being threatened are primarily because of loss of habitat, human interference, pesticides and pollution. Other factors of lesser proportions are habitat fragmentation, harvest for food, harvest in general, drought and others such as changes in edaphic factors, grazing and decline in prey species. The following figure and table 3 indicate the proportion of threat and the types of threats affecting every taxon.

Trade is not a major threat at least to the taxa assessed here. Only one species, *Poecilocerus pictus*, the painted grasshopper is collected widely for laboratory purposes.

Threats to soil invertebrates

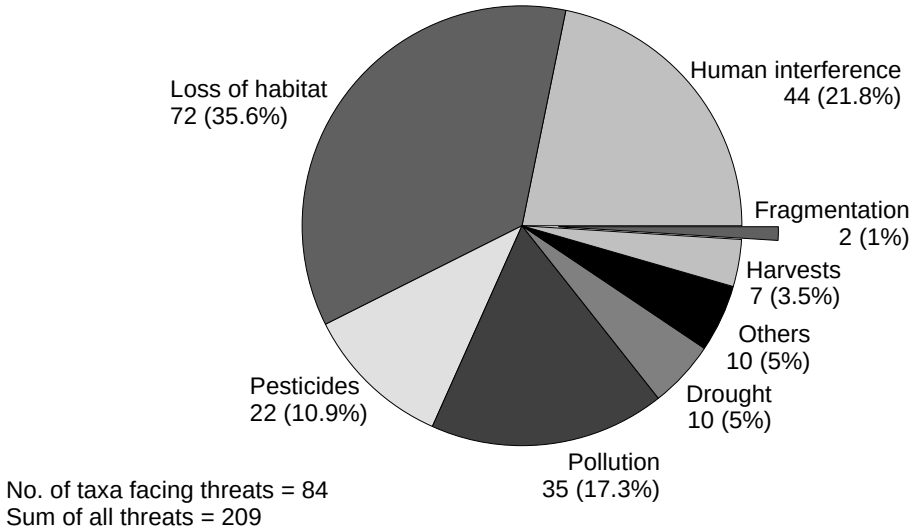


Table 3. Threats affecting the taxa

Taxon	Threats	IUCN
Acanthapsis nigripes	Loss of habitat, Human interference	DD
Acanthaspis carinata	Loss of habitat, Human interference (Manmade fire)	CR
Acanthaspis minutum	Not known	DD
Acanthaspis pedestris	Loss of habitat, Human interference, Decline in prey species	LRnt
Acanthaspis siruvanii	Not known	DD
Acanthaspsis alagiriensis	Human interference	CR
Alstonitermis flavescens	Pesticides, Loss of habitat	EN
Amblyopone bellii	Not known	DD
Aularchis miliaris	Pesticides	LRnt
Bellamya bengalensis	Pollution, Loss of habitat, Pesticides	LRnt
Bellamya dissemilis	Pollution, Loss of habitat, Pesticides	LRnt

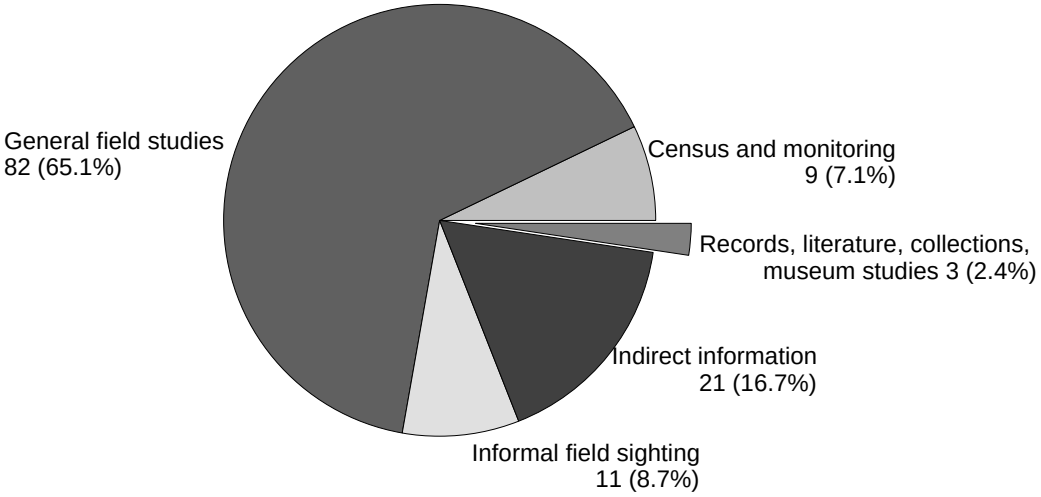
Taxon	Threats	IUCN
Bithynia stenothyroides	Loss of habitat, Pollution, Pesticides	VU
Chondromorpha kelaarki	Loss of habitat, Climate, Drought	LRlc
Corbicula regularis	Not known	DD
Crematogaster rogenhoferi	No	LRlc
Cypris dravidensis	Loss of habitat, Pollution, Human interference	EN
Cypris protubera	Loss of habitat, Pollution, Human interference	EN
Cypris subglobosa	Loss of habitat, Pollution, Human interference	LRnt
Dichogaster curgensis	Edaphic factors, Pesticides, Drought	LRlc
Drawida nilamburensis	Human interference, Loss of habitat	CR
Ectrychotes bharathii	Human interference, Loss of habitat	CR
Edocla heberii	Loss of habitat, Grazing	CR
Edocla maculatus	Human interference, Loss of habitat	EN
Edocla punctatum	Human interference	CR
Eucoptacrella ceylonica	Loss of habitat, Human interference	CR
Eucypris bispinosa	Loss of habitat, Pollution, Human interference	CR
Gyraulus convexiusculus	Loss of habitat, Pollution, Pesticides	VU
Gyraulus saigonensis	Loss of habitat, Pesticides, Pollution	LRnt
Haematorrhophus fovealis	Human interference	CR
Haematorrhophus ruguloscutellaris	Not known	CR
Hemihaematorrhophus planidorsatus	Loss of habitat, Human interference, Grazing	EN
Heterometrus barberi	Human interference, Loss of habitat	EN
Heterometrus swammerdami	Loss of habitat, Change in Edaphic factors, Human interference, Drought	VU
Heterometrus malapuramensis	Loss of habitat	VU
Heterometrus keralensis	Human interference, Loss of habitat	EN
Ilyocryptus spinifer	Pollution, Loss of habitat, Pesticides	LRnt
Indoplanorbis exustus	Pollution, Loss of habitat, Pesticides	LRnt
Isometrus brachycentrus	Human interference, Loss of habitat	VU
Lamellidens marginalis	Loss of habitat, Harvest	LRnt
Lychas tricarinatus	Human interference, Loss of habitat	LRlc
Lymnaea acuminata	Pollution, Loss of habitat, Pesticides	NE
Lymnaea luteola	Pollution, Loss of habitat, Pesticides	LRnt
Macrotermes estherae	Loss of habitat; Edaphic factors	EN
Macrothrix laticornis	Pollution, Loss of habitat, Pesticides	LRnt
Melania scabra	Pollution, Loss of habitat, Pesticides	VU
Melania tuberculata	Pollution, Loss of habitat	VU
Meranoplus bellii	Not known	DD
Mesacanthaspis kovaiensis	Loss of habitat, Grazing, Human interference	CR
Mesobuthus hendersoni	Human interference, Loss of habitat	LRlc
Microcerotermes fletcheri	Loss of habitat, Human interference	VU
Mysorella costigera	Pollution, Loss of habitat, Pesticides	LRnt
Nasutitermes indicola	Loss of habitat	VU
Ocnerodrilus occidentalis	Loss of habitat, Drought	EN
Octochaetona serrata	Human interference, Habitat loss, Edaphic factors, Drought	VU
Octonochaeta rosea	Edaphic factors, Human interference, Pesticides, Drought	CR
Ocypoda ceratophthalma	Pollution, Loss of habitat, Human interference	LRnt
Ocypoda cordimana	Pollution, Loss of habitat, Human interference	EN

Taxon	Threats	IUCN
Ocypoda macrocera	Pollution, Loss of habitat, Human interference	EN
Ocypoda platytarsis	Pollution, Human interference, Habitat loss, Harvest for food	VU
Odontotermes brunneus	Human interference, Loss of habitat	VU
Odontotermes wallonensis	Loss of habitat through cultivation, Edaphic factors, Pesticides, Loss of habitat due to fragmentation	VU
Oecophylla smaragdina	Harvest for food	LRlc
Paludomus stomatodon	Loss of habitat, Human interference	CR
Paludomus monile	Loss of habitat, Pollution	EN
Paludomus tanschaurica	Loss of habitat, Pollution	VU
Parreysia corrugata	Pollution, Pesticides, Loss of habitat	VU
Perionyx excavatus	Edaphic factors, Loss of habitat	LRnt
Phyllogonostreptus nigrolabiatus	Loss of habitat, Drought	LRnt
Pila globasa	Pollution, Loss of habitat, Pesticides, Human interference, Harvest for food, & Medicine	VU
Pila virens	Loss of habitat, Pesticides, Pollution, Human interference	VU
Plagiolepis jerdonii	No	LRlc
Poecilocerus pictus	Human interference, Collection for Laboratory study	LRlc
Polydrepanum tamilum	Climate, Loss of habitat, Drought	LRlc
Psilacrum convexa	Loss of habitat	CR
Seychalthas importantus	Pollution, Pesticides, Loss of habitat	CR
Speculitermes sinhalensis	Loss of habitat, Loss of habitat due to fragmentation	EN
Strandesia bicornuta	Loss of habitat, Pollution, Human interference	EN
Strandesia elongata	Pollution, Loss of habitat, Human interference	EN
Strandesia flavescens	Pollution, Loss of habitat, Human interference	EN
Strandesia indica	Loss of habitat, Pollution, Human interference	VU
Strandesia labiata	Loss of habitat, Pollution, Human interference	LRnt
Strandesia purpurascens	Loss of habitat, Pollution, Human interference	EN
Streptogenopus jerdoni	Human interference, Drought	EN
Sulcospiral hugeli	Loss of habitat, Pollution	EN
Synectrychotes calimerei	Human interference, Loss of habitat, Grazing	CR
Tetramorium rossi	Not known	DD
Tetraponera aitkeni	No	LRlc
Thelyphonus sepiaris	Loss of habitat	LRnt
Tricimbomyia muzhiyarensis	Loss of habitat	CR
Trinervitermes bifornis	Loss of habitat, Pesticides	VU
Truxalis indica	Loss of habitat	EN
Valitra neelai	Not known	DD
Viviparus variata	Pollution, Loss of habitat	EN
Xenobolus acuticonus	Climate, Drought	LRnt
Zarytes squalina	Loss of habitat, Human interference	CR

Data Quality

All taxa considered in this workshop have been assessed with information that was generated from general field studies (85 taxa). A few have been evaluated also based on reliable census (9 taxa), informal field sightings (11 taxa), indirect information (21 taxa) and records or literature (3 taxa).

Data quality



The IUCN guidelines for assessment clearly suggest a “conservative” approach in favour of the taxa, e.g. “ . . . the absence of high quality data should not deter attempts at applying the criteria, as methods involving estimation, inference and projection are emphasized to be acceptable throughout. Inference and projection may be based on extrapolation of current or potential threats into the future (including dependence on other taxa), so factors related to population abundance or distribution (including dependence on other taxa), so long as these can reasonably be supported. Suspected or inferred patterns in either the recent past, present or near future can be based on any of a series of related factors, and these factors should be specified. Taxa at risk from threats posed by future events of low probability but with severe consequences (catastrophes) should be identified by the criteria (e.g. small distribution, few locations). Some threats need to be identified particularly early, and appropriate actions taken, because their effects may be irreversible, or nearly so (pathogens, invasive organisms, hybridization).”

The exercise to determine the status of any taxon should not be hindered by the fact that there is little hard information available. Thorough, all-encompassing hard data is impossible to gather for even a single taxon, and the time required to actually gather such detailed information could delay conservation measures for threatened taxa. The combination of elements which make up a CAMP workshop such as group effort of botanists including field workers, both past and present, museum curators, ecologists, theoreticians, policy makers and related specialists together, good faith and impartial facilitation provide informed advice for conservation action planning. The results of this Workshop are the outcome of such an exercise.

Conservation action and recommendations

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

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

Table 4 shows that since not enough information on actual distribution of the taxa are known and because some have been assessed based on information from old records, a very strong recommendation for survey has been made for this group (67 taxa). Monitoring of populations to see the effects of threats has been recommended for 39 taxa, life history studies for 36 taxa and due to loss of habitat and change in quality of habitat being a primary cause of threat, habitat management has been recommended for 34 taxa. Other recommendations include limiting factor research, taxonomic and morphological genetic studies, limiting factor management, population and habitat viability assessments and others that are taxon specific.

Research management recommendations

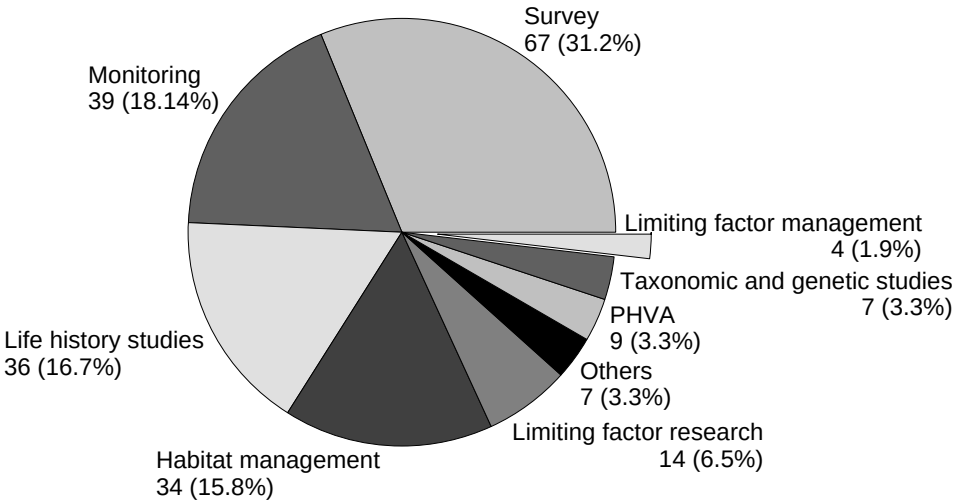


Table 4. Research recommendations

	T	S	M	G	H	Hm	Lm	Lr	Lh	P	O
CR	-	16	8	-	-	5	-	4	11	3	-
EN	4	13	8	-	-	12	1	3	7	3	1
VU	1	14	13	-	-	10	2	3	9	1	2
LR-nt	1	16	8	-	-	4	-	2	3	-	2
LR-lc	1	3	5	-	-	3	1	1	3	-	2
DD	-	4	3	-	-	-	-	1	3	-	-
NE	-	1	-	-	-	-	-	-	-	-	-
Total	7	67	45	0	0	34	4	14	36	7	7

Captive breeding and the level of difficulty

Captive breeding recommendations are at 4 levels, Levels 1, 2, 3 and 4 (see definitions on side panel pull out after the Executive Summary). Level 1 is for taxa to be interactively managed *in situ* and *ex situ* so as to retain 90% genetic diversity for 100 years. Level 2 is for *ex situ* populations to be infused with fresh genetic material from the wild so as to retain sufficient diversity. Level 3 is not for conservation but only for education, husbandry and research. Level 4 is for commercial and sustainable utilisation.

Table 5. Captive breeding recommendations

Captive Breeding	Level 1	Level 2	Level 3	Level 4	Pending	No
CR	-	-	4	-	3	9
EN	1	-	4	-	1	15
VU	1	-	4	-	2	12
LRnt	1	-	1	-	1	15
LRlc	-	-	3	-	-	7
DD	-	-	4	-	-	5
NE	-	-	-	-	-	-
Total	3	0	20	0	7	63

In this workshop a few taxa were recommended for captive breeding for education and research and only 3 were recommended for conservation. In India, the concept of captive breeding for conservation is not considered a crucial part of conservation as it is seen as a tool that utilises exploitation of the wild resources. However, given

the rate at which taxa are being threatened with extinction, captive breeding may become the final option for maintaining many species in existence. With respect to some invertebrates, captive breeding for conservation is a viable option because of the ease of maintenance and cost effectiveness. A recent study undertaken by the Coimbatore Zoological Park and Conservation Centre has demonstrated how cost-effective captive breeding of invertebrates can be.

Table 6. Level of difficulty in breeding invertebrates in captivity

	Least difficult	Moderately difficult	Very difficult	Unknown	No.
CR	3	0	2	7	4
EN	10	1	5	4	1
VU	9	2	3	8	2
LRnt	13	4	1	2	-
LRlc	6	-	-	3	-
DD	-	1	-	3	-
NE	1	-	-	-	-
Total	42	8	11	27	7

Rapid Assessment Exercise

Invertebrates are such a large group that assessment of every single species or subspecies is time consuming and expensive. Further, for most invertebrates there is not enough information available that would justify individual assessment. At the workshop, a rapid assessment table for ranking invertebrates as per research priorities was developed and distributed among the participants to fill in their respective group species information. Information required for each species were:

1. Year of description of the species
2. Studies conducted after the species was discovered and described
3. Studies conducted on the species in the last 10 years
4. Endemicity and
5. Present state of the habitat in which the species is/ was found

Table 7. Rapid assessment table indicating priorities for research and studies within the orders

Particulars	Mollusc	Milipede	Termite	Ant	Grass hopper
No. of southern Indian species ranked	276	39	99	91	93
No. of species described before 1899	262	4	7	50	67
No. of species described between 1900-1949	6	35	48	35	26
No. of species described after 1950	8	0	44	2	0
Studies of species made after description	276	9	65	Unk	70
Study conducted in the last 10 years	25	20	5	Unk	62
No. of endemic species	0	14	93	Unk	6
Rating for research priority					
High priority	264	27	85	Unk	25
Medium priority	11	8	8	Unk	7
Low priority	0	6	6	Unk	61
Incomplete information	1	7	0	91	0

Based on the above information research priority ratings were assigned to the species. As table 7 indicates, except for grasshoppers, most of the molluscs, millipedes and termites are categorised as high priority. This is directly related to how little is known about the groups and most of the species within the groups. There was no information available on ants in most cases for the above questions. Their high ranking in most cases is due to the fact that they have not been studied since description or there has been no field study in last 10 years.

Working Group Issues

Special working groups were formed at the workshop to discuss issues that were considered of importance in the context of assessing and conserving invertebrates. Three groups were formed for subjects such as 1. Systematics and population studies of invertebrates, 2. Education and awareness and 3. Logistics of conserving invertebrates. Following the working groups, on the final day of the workshop, participants were asked what they would commit in working towards invertebrate conservation. The working group reports and commitments are presented below.

Systematics and Population Working Group
Members: D. Rajagopal, R. Natarajan, K. Bano, M.B. Raghunathan, R. Mathew, A.S. Vastrad, K.G. Emyliammma

Some barriers to invertebrate conservation were listed by Dr. B.A. Daniel under the topic of "information". A working group was formed to discuss various information needs under the topic "systematics and population". The working group made the following recommendations to improve the existing situation with regard to invertebrate information requirements:

Information on invertebrates should be collected, stored and disseminated under the headings of Systematic studies and Bio-ecological studies

With regard to Systematic studies, the following aspects would be covered
1. Data on number of species

2. Species description details

3. Taxonomy

4. Nomenclature

5. Synonyms

6. Species level identification

With regard to Systematics, the following recommendations were made

1. Currently available systematics information on various species should be compiled, documented and stored in a central data bank which would be accessible to all invertebrate researchers, and updated regularly with information from ongoing studies.

2. An inventory or checklist for the species should be published periodically (at least once in 10 years).

3. Detailed descriptions should be compiled through existing information. Revision studies on the description of the species may be taken up wherever necessary.

4. Description of species that have been made in other languages should be translated into English and made available.

5. The latest information on taxonomy should be procured from various sources/ authorities and made available to the end users.

6. Types and paratypes should be deposited at Regional Centres of ZSI, Institutes and universities and the information should be made available.

7. New species descriptions should be published only in a particular journal for the benefit of all workers.

Under Bio-ecological studies, the following aspects need be studied to overcome the hurdles that are posed in invertebrate assessments and their management programmes.
1. Knowledge of life history

2. Seasonal variation

3. Role of seasonal forms on the ecosystem

4. Distribution information

5. Population information

6. Biodiversity conservation

7. Bio-ecological studies including life history studies under field and laboratory conditions on soil invertebrates (terrestrial isopods, millipedes, centipedes, Symphyla, Pauropoda, Tardigrada, Arachnida, Diplura, Protura, Collembola, Mollusca, Annelida) other than the better known insect groups should be encouraged and thoroughly studied on priority basis.

Education and Awareness Working Group
Members: R. Bhanumathi, P. Ahimaz, C. Gunasekaran, P.T. Cherian, S. Walker

Invertebrates are a neglected and misunderstood animal group. Large mammals have claimed the major amount of public sympathy and financial support. Also invertebrates have a bad image with people thinking of pests such as mosquitoes and other vectors or "dangerous creatures" such as scorpions and spiders. Consequently, people do not give importance to this largest of all groups of living forms despite its crucial importance. Through education and public awareness, this lacuna can be addressed. There are two major categories for Education and Awareness, the general public and the policy makers.

The following outline was suggested by the Working Group on Education and Awarness:

Public: Target groups are educators, students, press, villagers, general public, voluntary groups (NCC/NSS and other NGOs; educators (schools and colleges).
1. Orientation to invertebrates for educators (schools and colleges) — Workshops, field trips, seminars

2. Students
    a. School students — Art and craft seminars and workshops, field trips, workshops, exhibitions, small projects
    b. College students — Field trips, workshops, projects, exhibitions

3. Villages — Discussions, slide/ film/ video shows, exhibitions (including live exhibits), puppet shows

4. General public — Exhibitions, invertebrate section in zoos and museums, mass media (TV - one programme snippet), slide/ video shows

5. Politician / administrators / IAS officers — Discussions and meetings, slide/ video shows

6. Press — Slide/ film/ video shows, interviews with scientists, discussions

7. Voluntary groups — Slide/ film/ video shows, field trips and workshops

8. Business community — Approach industries or agro-industries which are involved in pest control or any insect research to "adopt" a Critically Endangered or Endangered invertebrate and sponsor a field study, education project, or captive programme and make that animal a symbol for their company.

Policy — target groups: bureaucrats, politicians, administrators
1. Ministry of Human Resources Development should be approached for grants for invertebrate education programme

2. Ministry of Education should be approached to make alterations in the existing curriculum to place appropriate emphasis on invertebrate studies.

3. Empower enforcement bodies to effectively enforce existing wildlife rules (IWPA, Forest protection Act, private forest acts and laws, Animal Welfare and PCA Act, Pollution Acts).

Educational materials suggested
1. Posters - all groups

2. Handouts - all groups except villagers

3. Stickers - all groups except villagers

4. Booklets - educators/ students

5. Project booklet (General description/ ideas; art/crafts, games, puzzles, crosswords, riddles, brain teasers, etc.)

6. Arts and Crafts (Finger puppets, glove puppets, paper sculpture, origami, craft from waste)

Logistics Working Group
Members: M.V. Reddy, A.K. Chakravarthy, M. Mary Bai, T.J. Indra, A. Kumar, B.A. Daniel, P.T. Cherian

Barriers to invertebrate conservation: recommendations by logistic group
1. No document is available on survey techniques of invertebrates in a readily compiled form.

2. A sampling plan has to be designed for an area that can be followed in different areas.

3. Pocket guidebook for field survey of soil invertebrates is required.

4. Need to design a statistical method to analyse data available from sampling methods

5. A multidisciplinary team is needed for sampling soil invertebrates

6. No previous data on population estimation is available.

7. Existing invertebrate collections (museum, ZSI, colleges) can be compiled, computerised and made available to researchers

8. Only about 10% of invertebrate taxa are known and this is the major barrier for identification and developing reliable inventories for a given area. This is due to lack of comprehensive information to the extent of non-census of 90% of invertebrate fauna.

9. Paucity of experts on many major invertebrate groups.

10. Disproportionate funding for invertebrate research

11. Non existence of field guides for most of the groups and smallness of the species makes it almost impossible to identify in the field.

12. Experts should be identified and assigned the task of preparing field guide to the maximum possible groups.

13. Periodical training and network group meetings has to be conducted to keep abreast of the taxonomic changes

14. Data on collections of museum specimen and field guides of surveys should be retrieved and computerised.

15. All available methodologies used abroad for invertebrate have to be designed to Indian conditions

16. Functional aspects: Very little information is available on functional aspects (ecological role) of soil invertebrates.

17. Necessary protocol procedure should be established to allow the workers to sample the soil up to 50 cm depth in forests and the forest department should allow to do it.

18. The importance of soil invertebrate conservation starts only from this Soil Invertebrate CAMP workshop

19. For mapping and inventorisation of invertebrate groups
i) R.A.P. Method (Rapid Assessment Programme) to investigate quickly poorly-known ecosystems that may be local hot spots.

ii) BIOTROP method developed by the University of Kansas, can be adapted for survey inventorisation

iii) The approach of InBio programme of Costa Rica commenced in 1989 can be considered for adoption with changes to suit local conditions

iv) GAP Analysis. This pattern of GIS may be taken up to map the structure of the ecosystems to estimate populations of species and the conditions in which they thrive.

v) Creating Biological Wealth - As species inventories expand they open the way to bioeconomic analysis to assess the economic potential of entire ecosystems. By this we can assign ecosystems their future value.

Committments
It is a “tradition” in ZOO/CBSG, India workshops to give an opportunity for participants to make personal commitments towards the conservation of the species that have been assessed. It is easy enough to wait for our institutions to act on recommendations and and to complain when “nothing is done”. To counter the tendency to let someone else do it, we make commitments for ourselves. Even if no other individual, agency, organisation or institution takes action, “I” can do at least this much. It is a way of requesting people to do

something extra that they may not ordinarily do. The participants of the Conservation Assessment and Management Plan Workshop made the following commitments:

1. Dr. A. Kumar - although he is studying a different animal group, Ajith will provide facilities for invertebrate studies in his research field stations. He will also support research into methodology and try to find funds for publishing a compilation of methodologies.

2. Dr. P.T. Cherian - will organise a training course on some aspect of invertebrate studies. He will also try to organise more CAMP Workshops taking one Order of invertebrates at a time and calling all specialists for that order.

3. Mr. P. Ahimaz - will contribute to creation of awareness programmes on carnivorous invertebrates in particular and invertebrate conservation in general.

4. Dr. B.A. Daniel - will prepare a Directory of Invertebrate Specialists

5. Dr. D. Rajagopal - will deliver lecture on soil invertebrates and their importance and prepare articles about soil fauna if guidelines as to what type of material is wanted. He will also provide identification services for invertebrate researchers for free.

6. Ms. R. Bhanumathi - will create photo/ documentation series for Education & Awareness and will help with any awareness programme.

7. Dr. S. Paulraj - will guide students in his wildlife sanctuary at Dharmapuri, providing funds for projects including studies on invertebrates. He will also provide guidance in making Invertebrate exhibits for individuals and institutions who want to keep invertebrates for education or breeding.

8. Dr. L. Narayana - will provide guidance on identification and study on southern Indian invertebrates

9. Dr. R. Natarajan will train students for Mollusc studies and prepare handbook on methodologies. Elevate *Areca* Valley to conservation status through education.

10. Dr. M.B. Raghunathan - will write general articles on fresh water soil invertebrates.

11. Mr. C. Gunasekaran - will make educational products for invertebrate awareness

12. Mr. S. Molur – will help with assessments with help from specialists as a precursor to group assessments in CAMP workshops.

13. Ms. S. Walker - will approach managers in pest control industry to adopt invertebrates, fund - educational projects etc.

14. Dr. Mary Bai - will compile notes on collection and preservation of millipedes

15. Dr. M.V. Reddy - will give will deliver lectures on the importance of invertebrates conservation and the role of soil invertebrates and their response to modern agriculture management, and will train students and research scholars for soil invertebrate population studies and prepare a hand book on methodology.

Conclusion

The BCPP Conservation Assessment and Management Plan Workshop for selected Soil Invertebrates of southern India was a pioneering effort in several ways. For the first time in India, and perhaps anywhere, a systematic conservation workshop was held for a taxon group such as soil invertebrates, which are neither particularly attractive or exciting or in trade. While the total of 64% threatened taxa may not be indicative of all soil invertebrate status, it is useful in demonstrating that even an earthworm can be endangered. The workshop also demonstrated that the revised IUCN categories can be applied to invertebrates, despite some adjustments and difficulties. Problems participants had using the categories were communicated to the Review Working Group of the Species Survival Commission, which benefited by our testing the categories on an unusual group of organisms. Perhaps more important with regard to the IUCN categories, the workshop participants reported that they learned a great deal about conservation biology and population dynamics which would be reflected in the kinds and quality of information they aspired to collect in future field studies.

Several problems of invertebrate research methodology were addressed in the special working groups, as well as the potential for education and awareness regarding invertebrates. A methodology for conducting a rapid assessment of very large numbers of organisms in the same family was developed and can be used for all invertebrate groups whereas it is not possible to conduct detailed assessments for all.

Perhaps the most useful achievement of the workshop was that a model and methodology for confronting the formidable number of described taxa represented in the Indian invertebrate group of organisms. It was necessary first to network soil invertebrate researchers, collect lists and articles from them, select participants for the workshop, provide reference material, conduct the workshop, distribute the draft and organise the information in a useful manner.

Since the CAMP workshop for selected soil invertebrates, a number of requests for CAMP workshops for invertebrates have been received, including Dragonflies, Spiders, Butterflies, and Corals. While it seems an almost impossible task to assess all of invertebrate fauna, the CAMP workshop for soil invertebrates represents a first step and a viable methodology towards achieving that objective.

Lists of invertebrates ranked by the rapid assessment method

Ants of southern India

Family : Formicidae

Subfamily : Formicinae
Camponotus compressus
Camponotus confucii
Camponotus irritans
Camponotus maculatus
Camponotus mendax
Camponotus nirvanae
Camponotus oblongus
Camponotus radiatus
Camponotus rufoglaucus
Camponotus strictus
Cecophylla smaragdina
Lepisiota fergusoni
Lepisiota opaca
Paratrechina longicornis
Paratrechina yerburyi
Plagiolepis jerdonii
Plagiolepis rogeri
Polyrhachis aculeata
Polyrhachis gracilior
Polyrhachis thrinax
Polyrhachis tibialis
Polyrhachis wroughtonii

Subfamily : Dolchoderinae
Tapinoma melanocephalum
Technomyrmex albipes

Subfamily : Aenictinae
Aenictus arya
Aenictus clavatus
Aenictus fergusoni
Aenictus gleadowii
Aenictus pachycerus
Aenictus wroughtonii

Subfamily : Dorylinae
Dorylus orientalis

Subfamily : Ponerinae
Amblyopone bellii
Anochetus kanariensis
Anochetus madaraszi
Cerapachys longitarsus
Diacamma rugosum
Harpegnathos saltator
Harpegnathos ventator
Hypoponera confinis
Leptogenys dalyi
Leptogenys dentilobis
Leptogenys minchini
Leptogenys punctiventris
Leptogenys robertis
Odontomachus haematodes
Pachcondyla jerdoni
Pachcondyla luteipes
Pachcondyla annamit

Subfamily : Myrmicinae
Aphaenogaster beccarii
Crematogaster aberrans
Crematogaster biroi
Crematogaster dayli
Crematogaster ebenina
Crematogaster ransonneti
Crematogaster rogenhoferi
Crematogaster subnuda
Crematogaster travancorensis
Lophomyrmex quadrispinosus
Meranoplus bellii
Meranoplus rothneyi
Monomorium criniceps
Monomorium dichroum
Monomorium floricola
Monomorium glabrum
Monomorium indicum
Monomorium latinode
Monomorium monomorium
Monomorium schurri
Oligomyrmex leei
Pheidole constanciae
Pheidole fergusoni
Pheidole mus
Pheidole phipsoni
Pheidole roberti
Pheidole sharpi
Pheidole spathifera
Pheidologeton diversus
Solenopsis geminata
Strumigenys godeffroyi
Tetramorium coonoorense
Tetramorium decamerum
Tetramorium fergusoni
Tetramorium guineense
Tetramorium inglebyi
Tetramorium mixtum
Tetramorium smithi
Tetramorium tortuosum

Subfamily : Pseudomyrmecinae
Tetraponera difficiles
Tetraponera nigra
Tetraponera rufonigra

Source:
Bingham, C.T. (1903) *The Fauna of British India,* Vol:2 Today and Tomorrow Printer's and Publishers, New Delhi.

Bolton, B. (1995) *A new general catalogue of the Ants of the world*. Harward University Press.

Rating by Mrs. Rosamma Mathew, D. Rajagopal and B.A. Daniel at Southern Indian Soil Invertebrate CAMP for BCPP, ZSI, Chennai

Grasshoppers of southern India

Order : Orthoptera
Family : Acridiidae

Subfamily : Acridiinae
Abbasia subserrata
Acathalobus flavopictus
Acrydium bipunctatum
Criotettix exsertus
Criotettix indicus
Criotettix oculatus
Criotettix obscurus
Deltonotus gibbiceps
Hancockia portentesa
Hedotettix gracilis
Mazarredia cristulata
Paratettix balteatus
Paratettix indicus
Paratettix scaber
Paratettix variabilis
Scelimena gavialis
Scelimena harpago
Scelimena producta
Systolederus greeni
Tripetalocera ferruginea

Subfamily : Eumastacinae
Acrida lugubris
Aeolopus affinis
Aeolopus tamulus
Aulacobothrus infernus
Aulacobothrus socius
Aulacobothrus strictus
Aulacobothrus taeniatus
Gymnobothrus indicus
Madurea cephalotes
Mastacides pterolepis
Mastacides pupaeformis
Mastacides vaginalis
Ochrilidia longiceps
Paraphaeoba carinata
Paraphaeoba platyceps
Phlaeoba panteli
Phlaeoba angustidorsis
Phlaeobida angustipennis
Phyllochoreia unicolor
Zygophlaeoba truncaticollis
Zygophlaeoba sinuatocollis

Subfamily : Oedipodinae
Chlaebora grossa
Dittopternis venusta
Gastrimargus transversus
Lerina cedipodioides

Subfamily: Pyrgomorphinae
Anarchita aptera
Atractomorpha crenulata
Aularches miliaris
Aularches punctatus
Chrotogonus brachypterus
Chrotogonus oxypterus
Chrotogonus saussurei
Colemania sphenarioides
Orthacris acuticeps
Orthacris elegans
Orthacris maindroni
Orthacris ruficornis
Orthacris simulans
Poecilocerus pictus
Poecilocerus tessellatus
Pyrgomorpha bispinosa
Zarytes squalina

Subfamily : Catantopinae
Bibracte rugulosa
Bibractoides punctoria
Brachyxenia scutifera
Caloptenopsis liturifer
Castetria dispar
Catantops acuticercus
Catantops angustulus
Catantops indicus
Catantops interruptus
Coptacra ensifera
Coptacrella martini
Cyrtacanthacris ranacea
Epistaurus sinetyi
Eucoptacra paremorsa
Euprepocnemis alacris
Euprepocnemis pulchra
Euthymia kirbyi
Gelastorrhinus semipictus
Gerenia dorsalis
Heteracris capensis
Heteracris illusotris
Leptacris filiformis
Orthacanthacris flavescens
Orthacanthacris nigricornis
Orthacanthacris succincta
Oxya velox
Paraeuprepocnemis *pictipes*
Pelecinotus brachypterus
Pelecinotus cristagalli
Stenocrobylus femoratus
Tylotropidius varicornis
Xenippa prasina

Source :
Kirby, W.F. The Fauna of British India, Vol. Today and Tomorrow Printers and Publishers, New Delhi

Rating by A.S. Vastrad at the Southern Indian Soil invertebrate CAMP for BCPP, ZSI, Chennai

Mollusca of southern India

Class : Gastropoda
Order : Pulmonata
Suborder : Stylomatophora
Family : Testacellidae

Subfamily : Streptaxinae
Ennea beddomii
Ennea bicolor
Ennea canarica
Ennea exilis
Ennea macrodon
Ennea pirriei
Ennea planguncula
Ennea sculpta
Ennea subcostulata
Ennea turricula
Streptaxis beddomii
Streptaxis canarica
Streptaxis compressus
Streptaxis concinnus
Streptaxis footei
Streptaxis peroteti
Streptaxis personatus
Streptaxis pronus
Streptaxis scalptus
Streptaxis watsoni

Family : Zonitidae

Subfamily : Ariophantinae
Ariophanta kadapaensis
Ariophanta thyreus
Cryptozona albata
Cryptozona basilessa
Cryptozona basileus
Cryptozona belangeri
Cryptozona bistrialis
Cryptozona canarica
Cryptozona gassii
Cryptozona interrupta
Cryptozona ligulata
Cryptozona maderaspatana
Cryptozona semirugata
Cryptozona sisparica
Cryptozona solata
Euplecta acalles
Euplecta acuducta
Euplecta albizonata
Euplecta apicata
Euplecta cacuminifera
Euplecta granulifera
Euplecta indica
Euplecta mucosa
Euplecta mucronifera
Euplecta orbiates
Euplecta pulchella
Euplecta subcastor
Euplecta travancorica
Indrela ampulla

Subfamily : Macrochlamyinae
Macrochlamys peringundensis
Macrochlamys hebescens
Macrochlamys infausta
Macrochlamys pedina
Macrochlamys perrotteti
Macrochlamys prava
Macrochlamys rutila
Macrochlamys tenuicula
Macrochlamys todarum
Macrochlamys vallicola
Macrochlamys vilipensa
Macrochlamys woodiana
Mariaella beddomei
Mariaella dussumieri
Pseudaustenia atra
Pseudaustenia auriformis

Subfamily : Durgellinae
Durgella levicula
Satiella dekhanensis
Satiella flexilis
Satiella levidensis
Satiella pertenuis
Sitala balliana
Sitala injussa
Sitala palmaria

Family : Endodontidae

Subfamily :Thysanotinae
Philalanka bidenticulata
Philalanka bolampattiensis
Philalanka daghoba
Philalanka febrilis
Philalanka pirrieana
Philalanka quinquelirata
Philalanka tertiana
Philalanka tricarinata
Ruthvenia clathratuloides
Ruthvenia retifera
Thysanota flavida
Thysanota guerini
Thysanota tabida

Subfamily : Pyramidulinae
Pyramidula euomphalus

Family : Helicidae

Subfamily : Corillinae
Corilla anax

Subfamily : Camaninae
Amphidromus bontiae
Amphidromus calcadensis
Amphidromus physalis
Apatetes bourdilloni
Chloritis (Trichochloritis) propinqua
Planispira (Trachia) crassicostata
Planispira (T.) fallaciosa
Planispira (T.) nilagerica
Planispira (T.) proxima
Planispira (T.) ruginosa
Planispira (T.) sordida
Planispira (T.) vittata

Subfamily: Helicinae
Valloina miserrima

Family: Enidae
Edouardia orbus
Ena (Mirus) hanleyana
Ena (Mirus) nilagirica
Rachisellus bengalensis
Rachisellus praetermissus
Rachisellus pulcher
Rachisellus punctatus
Rachisellus trutta

Family : Pupillidae
Pupilla salemensis

Family : Achatinidae

Subfamily : Stenogyrinae
Opeas gracile
Prosopeas hebes

Family : Ferussacidae
Glessula anamullica
Glessula beddomei
Glessula bensoniana
Glessula blanda
Glessula bollampattiana
Glessula botellus
Glessula canarica
Glessula corrosula
Glessula courtallica
Glessula deshayesi
Glessula facula
Glessula fairbanki
Glessula filosa
Glessula filosa exigua
Glessula gracilis
Glessula hebes
Glessula indica
Glessula isis
Glessula jerdoni
Glessula lyrata
Glessula malabarica
Glessula mullorum
Glessula neglecta
Glessula nilagirica
Glessula oreas
Glessula orophila
Glessula paupercula
Glessula perrotteti
Glessula praelustris
Glessula pseudoreas
Glessula pusilla
Glessula revnelli immitis
Glessula senator
Glessula shiplayi
Glessula sisparica
Glessula subfilosa
Glessula subinornata
Glessula subjerdoni
Glessula subperrotteti
Glessula subserena
Glessula subtornensis
Glessula tamulica

Glessula tenuitesta
Glessula textilis
Glessula tinnevellica
Glessula tornensis
Glessula travancorica

Family: Succiniidae
Succina rugosa

Family : Vaginulidae
Vaginulus frauenfeldi

Order : Streptoneura
Family : Cyclophoridae

Subfamily : Cyclophorinae
Craspedotropis cuspidata
Craspedotropis salemensis
Cyathopoma (Cyathopoma) album
Cyathopoma (C.) atrosetosum
Cyathopoma (C.) coonoorense
Cyathopoma (C.) deccanense
Cyathopoma (C.) filocincutm
Cyathopoma (C.) kalryenense
Cyathopoma (C.) kolamulliense
Cyathopoma (C.) latilabra
Cyathopoma (C.) ovatum
Cyathopoma (C.) peilei
Cyathopoma (C.) shevaroyanum
Cyathopoma (C.) sivagherrianum
Cyathopoma (C.) travancoricum
Cyathopoma (C.) vitreum
Cyathopoma (C.) wynaadense
Cyathopoma (Jerdonia) anamallayanum
Cyathopoma (J.) elatum
Cyathopoma (J.) imperforatum
Cyathopoma (J.) malabaricum
Cyathopoma (J.) natalicium
Cyathopoma (J.) trochlea
Cyathopoma (Tortalosa) tortuosa
Cyclophorus (Litostylus) jerdoni
Cyclophorus (L.) muspratti
Cyclophorus (L.) nilagiricus
Cyclophorus indicus
Ditropis beddomei
Ditropis convexa
Ditropis planorbis
Japonia (Lagochilus) malleata
Micraulax coeloconus
Micraulax scabra
Mychopoma hirsutum
Mychopoma limbiferum
Mychopoma seticinctum
Pearsonia (Pseudospiraculum) beddomei
Pearsonia (P.) fairbanki
Pearsonia (P.) travancorica
Pterocyclus cyclophoroideus subluteola
Pterocyclus bilabiatus
Pterocyclus comatus
Pterocyclus cyclophoroideus
Pterocyclus nanus
Pterocyclus nanus var. *applanata*
Pterocyclus nanus var. *reflexilabris*
Pterocyclus pseudocumingi
Theobaldius deplanatus
Theobaldius maculosus
Theobaldius ravidus
Theobaldius shiplayi
Theobaldius stenostoma
Theobaldius stenostoma anguis
Theobaldius tristis
Tortulosa (Dicharax) expatriatus
Tortulosa (Dicharax) footei
Tortulosa (Eucataulus) albescens
Tortulosa (Eucataulus) calcadensis
Tortulosa (Eucataulus) costullata
Tortulosa (Eucataulus) recurvata
Tortulosa (Tortalosa) tortuosa

Subfamily : Diplommatinae
Cyclotopsis subdiscoidea
Diplommatina (Sinica) subrubella
Diplommatina (D.) minima
Diplommatina (Sinica) canarica
Diplommatina (Sinica) gracilis
Nicida anamullayana
Nicida fairbanki
Nicida kingiana
Nicida liricincta
Nicida nilagirica
Nicida nitidula
Nicida pulneyana
Nicida subovata
Omphalotropis aurantiaca
Opisthostoma deccanense
Opisthostoma distortum
Opisthostoma fairbanki
Opisthostoma macrostoma
Opisthostoma nilgiricum

Order: Ostracoda
Cypris dravidensis
Cypris protubera
Cypris subglobosa
Eucypris bispinosa
Strandesia bicornata
Strandesia elongata
Strandesia flavescens
Strandesia indica
Strandesia labiata
Strandesia purpurescens

Order: Cladocera
Ilyocryotes spisifer
Macrothris laticornis

MOLLUSCA - Additions
Bellamya dissimilis
Bellamya bengalensis
Billysia stenolbyroides
Corbicula ryulris
Gyraulus commericulus
Gyraulus saigonensis
Indoplassonbis lruslus
Lamellidens marginalis
Lymnaela acuminata
Lymnaela luteola
Melonia (Plotic) seabra
Melonia (Striatella) tuberata
Mysorella losligara
Paledomus (Stomateclem) stomatechlem
Paludomus marile
Paludomus tamsehavica
Paludomus monile
Parreysia corugata
Pila globosa
Pila nigrens
Sulurpira hugali
Viviparus viviata

Sources : Gude, G.K. Fauna of British India, Mollusca Vol. 1, Today and Tomorrow Printers and Publishers, New Delhi

Gude, G.K. (1914). Fauna of Fauna of British India, Mollusca Vol. 2, Today and Tomorrow Printers and Publishers, New Delhi

Gude, G.K. (1921). Fauna of British India, Mollusca Vol. 3, Today and tomorrow Printers and Publishers, New Delhi

Rating by R. Natarajan and M.B. Ragunathan at Southern Indian Soil Invertebrate CAMP workshop, Chennai

Termites of southern India

Family : Kalomotidae
Cryptotermes domesticus
Cryptotermes dudleyi
Cryptotermes havilandi
Cryptotermes roonwali
Glyptotermes coorgensis
Neotermes assmuthi
Neotermes dhirendrai
Neotermes eleanorae
Neotermes fletcheri
Neotermes keralai
Neotermes krishnai
Neotermes nilamburensis
Neotermes venkateshwara
Postelectrotermes bhimi
Postelectrotermes nayari
Procryptotermes hunsurensis
Procryptotermes dhari
Procryptotermes valeriae

Family : Hodotermitidae

Subfamily: Hodotermitinae
Anacanthotermes viarum

Family : Stylotermitidae
Stylotermes fletcheri

Family : Rhinotermitidae

Subfamily : Heterotermitinae
Coptotermes beckeri
Coptotermes ceylonicus
Coptotermes heimi
Heterotermes malabaricus

Subfamily : Prorhinotermitinae
Prorhinotermes flavus

Family : Termitidae

Subfamily : Apicotermitinae
Euhamitermes dentatus
Euhamitermes indicus
Euhamitermes karnatakensis
Eurytermes budha
Eurytermes topslipensis
Speculitermes deccanensis
Speculitermes dharwarensis
Speculitermes emersoni
Speculitermes goesswaldi
Speculitermes sinhalensis

Subfamily : Termitinae
Angulitermes acutus
Angulitermes fletcheri
Angulitermes obtusus
Dicuspiditermes fletcheri
Dicuspiditermes gravelyi
Dicuspiditermes incola
Dicuspiditermes pername
Dicuspitermes fontanellus
Eremotermes fletcheri
Eremotermes madrasicus
Eremotermes paradoxalis
Homalloteremes pilosus
Labiocapritrmes distortus
Microcerotermes cameroni
Microcerotermes fletcheri
Microcerotermes ganeshi
Microcerotermes heimi
Microcerotermes minor
Pericapritermes topslipensis
Pericapritermes ceylonicus
Procapritermes fontanellus
Procapritermes goanicus

Subfamily : Macrotermitinae
Hypotermes obscuriceps
Macrotermes convulsionarius
Macrotermes estherae
Microtermes globicola
Microtermes obesi
Odontotermes bellahunisensis
Odontotermes anamallensis
Odontotermes assmuthi
Odontotermes brunneus
Odontotermes ceylonicus
Odontotermes distans
Odontotermes feae
Odontotermes feaeoides
Odontotermes horni
Odontotermes kulkarnii
Odontotermes mathadi
Odontotermes obesus
Odontotermes redemanni
Odontotermes roonwali
Odontotermes vaishnoI
Odontotermes wallonensis

Subfamily : Nasutitermitinae
Alstonitermes flavescens
Ampoulitermes wynaadensis
Ceylonitermes indicola
Emersonitermes thekadensis
Grallatotermes grallatoriformis
Grallatotermes niger
Hospitalitermes madrasi
Nasutitermes anamaliaiensis
Nasutitermes beckeri
Nasutitermes brunneus
Nasutitermes crassicornis
Nasutitermes fletcheri
Nasutitermes indicola
Nasutitermes salemensis
Nasutitermes vishnu
Nasuttermes processionarius
Trinervitermes biformis
Trinervitermes fletcheri
Trinervitermes heimi
Trinervitermes nigriostris
Trinervitermes sensarmai

Source :
Bose, G. (1984). Termite Fauna of Southern India. Records of Zoological Society of India, Calcutta.

Rating by Dr. D. Rajagopal and Mrs. Rosamma Mathew at Southern Indian Soil invertebrate CAMP for BCPP, ZSI, Chennai

Millipides of India

Source: Bano, K., (1996). Records of Paradoxomatid Millipedes of India. *In*: Acta Myriapodologia, Geoffery

J.J., Mauries, J.P & Nguyen Duy - Jacquemin, M. (eds) *Mem. Mus. natn. Hist. nat.* 169: 73 - 74.

Rating by Dr. (Mrs.) Kubra Bano at Southern Indian Soil Invertebrate CAMP Workshop at Chennai

Family : Paradoxomatidae

Anoplodesmus anthrancinus
Anoplodesmus atopus
Anoplodesmus indus
Anoplodesmus insignis
Anoplodesmus saussurii
Anoplodesmus tanjoricus
Antichirogonus hirtus
*Antichirogonus laevisulcata*us
Chondromorpha kaimura
Chondromorpha kelaarti
Chondromorpha kelaarti longipes
Chondromorpha kelaarti valparaiensis
Chondromorpha mammifera
Chondromorpha severini
Chondromorpha severini var. *robusti*
Dasypharkis pumila
Dasypharkis rugulosa
Gyrobrepanum bimontanum
Gyrodrepanum contortipes
Harpogomorpha dentata
Himantogonus rufocinctus
Hindomorpha granulifera
Kaschmiriosama contortipes
Kaschmiriosama nulla
Orthomorpha almorensis
Paranedyopus ursula
Paranedyopus subcylindricus
Parchondromorpha coonoorensis
Polydrepanum asperrimum
Polydrepanum implicatum
Polydrepanum tamilum
Streptogonopus jerdoni
Streptogonopus nitens
Streptogonopus phipsoni
Sundanina septentrionalis
Sundanina trifida
Telodrepanum badaga
Xiphidiogonus hendersoni
Xiphidiogonus dravidus
Xiphidiogonus spinipleurus

The IUCN categories and definitions to the Taxon Data Sheet

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

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

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

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

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

CRITICALLY ENDANGERED (CR)
A taxon is Critically Endangered when it is facing an extremely high risk of extinction in the wild in the immediate future as defined by the criteria listed in Table 1. An example of a Critically Endangered soil invertebrate from the present Report is *Zarytes squalina* which has been classified as such because it is restricted in its distribution, fragmentated and declining due to change in its quality of habitat, area and extent of occurrence.

ENDANGERED (EN)
A taxon is Endangered when it is not Critically Endangered but is facing a very high risk of extinction in the wild in the near future, as defined in the criteria listed in Table 1. The species *Alstonitermis flavescens* is endangered and has been categorised as such because of its restricted distribution, fragmentation and declining due to change in its quality of habitat, area and extent of occurrence and also due to population reduction of more than 50% over the last 10 years.

VULNERABLE (VU)
A taxon is Vulnerable when it is not Critical or Endangered but is facing a high risk of extinction in the wild in the medium term future, as defined by the criteria listed in Table 1. An example of a species that is Vulnerable is *Heterometrus malapuramensis* because restricted in its distribution, fragmentation and change in its quality of habitat, area and extent of occurrence. It is also assessed as Vulnerable due to reduction in population of over 20% in 10 years in the wild.

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

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

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

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

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

NOT EVALUATED (NE) A taxon is Not Evaluated when it has not yet been assessed against the criteria for some reason. An example of a soil invertebrate that was initially assessed and later categorised as Not Evaluated because of taxonomic and identification problems is *Lymnaea acuminata*.

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

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

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

Regional assessment: The term Regional Assessment means applying the IUCN categories to a taxon in part of its distributional range. For example, *Macrothrix laticornis* is distributed all over India and the world. In the present CAMP workshop, this species has been assessed only for its distribution in southern India and was not assessed in rest of India. *Macrothrix laticornis* has been assessed at the Regional level, which works well in case of a taxon with a wide distribution in India. A regional assessment, by deriving the status of the taxon for a region, which may differ from other regions in which it is found, thereby facilitates conservation activities, which can be implemented more appropriately over a smaller area.

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

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

The IUCN categories work best when applied to political endemics, as distribution range does not pose problems for assessment. Assessments for all endemics taxa (6) have been made at the Global level. The remaining non-endemic taxa (69) have been assessed Regionally for northwestern India, for northeastern India or for central India, or Nationally for the taxon's complete distributional range in India. They are denoted by the letter "R" or "N", respectively, following the IUCN category. Regional and National categorisations have been made for non-endemics for the reason that the workshop is only for southern Indian soil invertebrates and that many species southern India have a distribution that crosses political boundaries (e.g species of the old biogeographical regime of Western Ghats and Sri Lanka). Taxa with distribution with political boundary such as between India and Sri Lanka have been assessed at the National level even though there is no knowledge of the population distribution of the taxa in Sri Lanka. Similarly, taxa distributed in mainland India and the Andaman and Nicobar Islands are also categorised regionally for mainland India only since the mandate of the workshop is southern Indian soil invertebrates.

Criteria
The threatened categories of the IUCN Red List — Critically Endangered, Endangered and Vulnerable are derived based on 5 criteria (See Guidelines for Criteria for threat categories end of this report), viz:
A. Population reduction (PR)

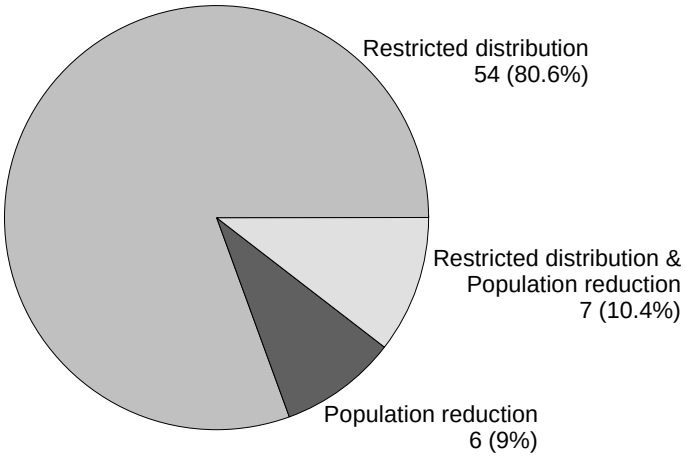
B. Restricted distribution (either extent of occurence or area of occupancy) (RD)
C. Population number, restricted distribution and fluctuation (PE)
D. Adult population numbers (Mature individuals) or restricted population (RP)
E. Probability of extinction (PX)

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

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

In the soil invertebrate workshop, only 13 taxa of the threatened taxa have been assessed based on population trends. Of this 7 taxa are also assessed based on the Restricted Distribution criteria.

Criteria used in categorisation



Restricted Distribution
As per IUCN guidelines for Restricted Distribution (see definitions for Taxon Data Sheets) a taxon is assessed as threatened if it has a restricted distribution. To meet this criterion the taxa also has to qualify two of the three subcriteria (see IUCN categories chart end of this report). Restricted distribution as per IUCN is less than 20,000 sq.km. for the Extent of Occurrence and/ or less than 2,000 sq.km. for the Area of Occupancy of the taxa. Distribution information was available at the workshop to assess 54 taxa as threatened based on this criteria which includes the 7 taxa that were assessed along with population decline.

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

If for any taxon, the number of locations is more than ten, then the question of whether the locations are fragmented or not becomes important. According to the guidelines, a population is fragmented from the other if there is no movement of genetic material between the populations. In most cases for plants it is difficult to assess what would be the critical distance for fragmentation. Information of number of locations is purely on the

participants' judgement and their view of the soil invertebrate biology and migration capability. In certain cases the concept of fragmentation is very clear while not so in others.

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

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

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

Research recommendations
Research recommendations for most of the taxa are made based on the amount of information available and the need for understanding and managing the taxa in the wild. This is part of the conservation action plan that the group derives after the assessment of every taxon. The recommendations are:
a) Survey (S)
b) Monitoring (M)
c) Taxonomic and morphological genetic studies (T)
d) Genetic management (G)
e) Husbandry research (H)
f) Habitat management (Hm)
g) Limiting factor research (Lr)
h) Limiting factor management (Lm)
i) Life history studies (Lh) and
j) Other taxon specific recommendations (O)
k) Population and Habitat Viability Assessment
Recommendations also include *ex situ* management and action plan along with *in situ* conservation. This includes different levels such as:
a) Level 1: Cultivation for metapopulation management by maintaining 90% heterozygosity for 100 years by supplementing individuals or genetic material from captivity into the wild.
b) Level 2: For maintaining healthy genetic material in cultivation by required input from the wild.
c) Level 3: Cultivation not for conservation but for either research, education or husbandry.
d) Level 4: Cultivation for either of the above and for sustainable utilisation.
e) Pending: Cultivation pending further input from research or scientists.
f) No: Cultivation not recommended.

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

Selected Soil Invertebrates of Southern India

Taxon Data Sheets

TAXON DATA SHEETS
Selected soil invertebrates of southern India

1. *Acanthaspis alagiriensis* Livingstone & Murugan,1994 -- CR (B1, 2c) -- Order /Family: Hemiptera / Reduviidae. **Taxonomic status:** Species. **Habit:** Underneath stones. **Habitat:** Moist decidious forest. **Global Distribution: ENDEMIC** to southern India. **Current Regional Distribtuion:** Southern India (Tamil Nadu). **- Elevation:** 300m. **- Range (sq**. **km):** <100 . **- Area Occupied (sq**. **km):** <10. - Number of locations**:** 1 (Alagiri Hills). **Population Trends: - % Decline:** Not known. **- Time / Rate (Yrs or gens):** Not known. **- No**. **of Mature Individuals:** Not known. **Global Population:** Not known. **Data Quality:** Census & monitoring studies (C. Murugan & D. Livingstone 1983 -88 in Alagari Hills). **Recent Field Studies:** None. **Threats:** Human interference. **Trade:** No. **Other Comments:** Temple activity at the foothills & higher elevation; Continuous surveys yielded no specimen. **Status- IUCN: CRITICALLY ENDANGERED**. **- Criteria based on: B1, 2c** (Restricted distribution, single location, continuing decline in extent of occurrence, area of occupancy and/or quality of habitat). **- CITES:** No. **- IWPA (1972; 91):** No. **- RDB, National (old cat.):** No . **- RDB, International (old cat.):** No. **Recommendations: - Research management:** Survey; Life history studies; Monitoring. **- PHVA:** No. **Captive Breeding Recommendation:** . **- Captive breeding:** Level 3. **- Level of difficulty:** Not known. **Existing Captive Programmes:** No. **- Names of facilities**—. **Sources:** Murugan, C. (1988) Biosystematics and Ecophysiology of the Tibiaroliate Assassin Bugs (Heteroptera**:** Reduviidae) of Southern India. Ph. D. thesis, Bharathiar University, Coimbatore. Murugan ,C. and Livingstone, D (1994) Two new species of *Acanthaspis* Amyot and Serville (Heteroptera **:** Reduviidae **:** Acanthaspidinae) from the Western Ghats in Tamil Nadu, India. *J. Insect.Sci.* 7(2)**:** 178 -180. **Compilers:** D. Livingstone, C. Murugan, P.T. Cherian, P. Pugalanthi, K.G. Emiliyamma, B.A. Daniel.

2. *Acanthaspis carinata* Murugan & Livingstone,1994 -- CR (B1, 2c) -- Order /Family: Hemiptera / Reduviidae. **Taxonomic status:** Species. **Habit:** Underneath stones. **Habitat:** Scrub jungle. **Global Distribution: ENDEMIC** to southern India. **Current Regional Distribtuion:** Tamil Nadu. **- Elevation:** 500 m. **- Range (sq**. **km):** < 100. **- Area Occupied (sq**. **km):** < 10. **- Number of locations:** 1 (Foot hills of Maruthamalai, Coimbatore district.). **Population Trends: - % Decline:** Not known. **- Time / Rate (Yrs or gens):** Not known. **- No**. **of Mature Individuals:** Not known. **Global Population:** Not known. **Data Quality:** Reliable census; General field studies(C. Murugan and D. Livingstone, 1985) in Maruthamalai). **Recent Field Studies:** Murugan, G. & D. Livingstone. **Threats:** Human Interference (man made fire); Loss of Habitat. **Trade:** No. **Other Comments:** Subsequent visits & survey to the site periodically did not yield specimen . **Status- IUCN: CRITICALLY ENDANGERED**. **- Criteria based on: B1, 2c** (Restricted distribution, single location, continuing decline in extent of occurrence, area of occupancy and/or quality of habitat). **- CITES:** No. **- IWPA (1972; 91):** No. **- RDB, National (old cat.):** No. **- RDB, International (old cat.):** No. **Recommendations: Research management:** Survey; Life history; Habitat management. **- PHVA:** No. **Captive Breeding Recommendation: --**. **- Captive breeding:** No. **- Level of difficulty:** No. **Existing Captive Programmes:** No. **- Names of facilities: --**. **Sources:** Murugan C. (1988) Biosystematics and Ecophysiology of the Tibiaroliate Assassin Bugs (Heteroptera**:** Reduviidae) of Southern India. Ph. D. thesis, Bharathiar University, Coimbatore. Murugan ,C and Livingstone, D (1994) Two new species of *Acanthaspis* Amyot and Serville (Heteroptera **:** Reduviidae **:** Acanthaspidinae) from the Western Ghats in Tamil Nadu, India. *J.Insect.Sci.* 7(2)**:** 178 -180. **Compilers:** D. Livingstone, C. Murugan, P.T. Cherian, P. Pugalenthi, K.G. Emiliyamma, B.A. Daniel.

3. *Acanthaspis minutum* Livingstone & Murugan,1988 -- VU (D2) -- Order /Family: Hemiptera / Reduviidae. **Taxonomic status:** Species. **Habit:** Underneath stones. **Habitat:** Semi arid. **Global Distribution: ENDEMIC** to southern India. **Current Regional Distribtuion:** Southern India. **- Elevation:** 200 m. **- Range (sq**. **km):** < 100. **- Area Occupied (sq**. **km):** < 10. - Number of locations**:** 1(Nagarjuna Sagar dam, Andhra Pradesh). **Population Trends: - % Decline:** Not known. **- Time / Rate (Yrs or gens):** Not known. **- No**. **of Mature Individuals:** Not known. **Global Population:** Not known. **Data Quality:** General field study (Murugan, C and D. Livingstone, 1985). **Recent Field Studies:** No. **Threats:** Not known. **Trade:** No. **Other Comments:** Collected close to the dam. **Status- IUCN: VULNERABLE**. **- Criteria based on: D2** (Population restricted to less than 100km2, area of occupancy in a single location). **- CITES:** No. **- IWPA (1972; 91):** No. **- RDB, National (old cat.):** No. **- RDB, International (old cat.):** No. **Recommendations**: **Research management:** Survey; Life history studies. **- PHVA:** —. **Captive Breeding Recommendation:** . **- Captive breeding:** No. **- Level of difficulty:** No. **Existing Captive Programmes:** Nil. **- Names of facilities**—. **Sources:** Murugan, C. (1988) Biosystametics and Ecophysiology of the Tibiaroliate Assassin Bugs (Heteroptera **:** Reduviidae) of Southern India. Ph. D. thesis, Bharathiar University, Coimbatore. Murugan ,C and Livingstone, D (1988) Three new species of *Acanthaspis* Amy. and Serv. from Southern India (Heteroptera **:** Reduviidae **:** Acanthaspidinae). *J. Bombay nat. Hist. Society* 85(1)**:** 170-175. . **Compilers:** D. Livingstone, C. Murugan, P.T. Cherian, P. Pugalenthi, K.G. Emiliyamma, B.A. Daniel.

4. *Acanthaspis nigripes* Livingstone & Murugan,1988 -- VU (D2) -- Order /Family: Hemiptera / Reduviidae. **Taxonomic status:** Species. **Habit:** Under boulders. **Habitat:** Scrub jungle. **Global Distribution: ENDEMIC** to southern India. **Current Regional Distribtuion:** Tamil Nadu. **- Elevation:** 1000 m. **- Range (sq**. **km):** < 100. **- Area Occupied (sq**. **km):** < 10. - Number of locations**:** 1(YelagiriHills in North Arcor, Ambedkar Dist.) . **Population Trends: - % Decline:** Not known. **- Time / Rate (Yrs or gens):** Not known. **- No**. **of Mature Individuals:** Not known. **Global Population:** Not known. **Data Quality:** General field study (Murugan and Livingstone, 1984 in Yelagiri Hills). **Recent Field Studies:** None. **Threats:** Loss of habitat; Human interference . **Trade:** No. **Other Comments:** Deforestation activities were in progress when collected. **Status- IUCN: VULNERABLE**. **- Criteria based on: D2** (Population restricted to less than 100km2, area of occupancy in single location). **- CITES:** No. **- IWPA (1972; 91):** No. **- RDB, National (old cat.):** No . **- RDB, International (old cat.):** No. **Recommendations: Research management:** Survey; Life history studies. **- PHVA:** No. **Captive Breeding Recommendation: --**. **- Captive breeding:** Level 3. **- Level of difficulty:** Not known. **Existing Captive Programmes:** No. **- Names of facilities**—. **Sources:** Murugan , C. (1988) Biosystametics and Ecophysiology of the Tibiaroliate Assassin Bugs (Heteroptera**:** Reduviidae) of Southern India. Ph. D. thesis, Bharathiar University, Coimbatore. Murugan , C and Livingstone, D (1988) Three new species of *Acanthaspis* Amy. and Serv. from Southern India (Heteroptera **:** Reduviidae **:** Acanthaspidinae).

J. Bombay nat. Hist. Society 85(1)**:** 170 -175. **Compilers:** D. Livingstone, C. Murugan, P.T. Cherian, P. Pugalenthi, K.G.Emiliyamma, B.A. Daniel.

5. *Acanthaspis pedestris* Stal, 1863 -- LRnt -- Order /Family: Hemiptera / Reduviidae. **Taxonomic status:** Species. **Habit:** Under stones, Entomophagous. **Habitat:** Semi -arid zone (Scrub jungle). **Global Distribution: ENDEMIC** to southern India. **Current Regional Distribtuion:** Southern India. **- Elevation:** 50 -500 m. **- Range (sq**. **km):** .v> 20,000. **- Area Occupied (sq**. **km):** > 2,000. **- Number of locations:** > 20 (Aliyar, Anaikatti, Periyakalendai (Pollachi), Mettupalayam, Madukarai, Kalakkad, Servalar, Maruthuvamalai (Kanyakumari dist.) etc.). **Population Trends: - % Decline:** 20% (Projected decline > 10%). **- Time / Rate (Yrs or gens):** 20 years (over the next 10 years). **- No**. **of Mature Individuals:** Not known. **Global Population:** Decline in population. **Data Quality:** Reliable censes or population monitoring; General field stuidy; Informal field sightings. **Recent Field Studies:** D. Livingstone, C. Murugan, D. Ambrose & G. Ravichandran; 1976 onwards in all the above locations. **Threats:** Loss of Habitat; Decline in prey species; Human interference. **Trade:** No. **Other Comments:** Dependent on ants, Aggressive predators. Mortality high in egg stage. Installment hatching -adaption to tide over predatory behaviour. Estimation of mature individual by census and monitoring. **Status- IUCN: LOWER RISK - NEAR THREATENED- Criteria based on:** Not applicable. **- CITES:** No. **- IWPA (1972; 91):** No. **- RDB, National (old cat.):** No. **- RDB, International (old cat.):** No. **Recommendations**: **Research management:** Habitat management. **- PHVA:** No. **Captive Breeding Recommendation: --**. **- Captive breeding:** No. **- Level of difficulty:** Least difficult. **Existing Captive Programmes:** For experimental purposes - Behavioural studies. - Names of facilitiesMadras Christian College, Dept. of Zoology, Divsion of Entomology**:** . St. Xaviers College, Entomology Research Unit, Dept. of Zoology, Palayamkottai. **Sources:** Distant, W.L (1904) *Fauna of British India, including Ceylon and Burma. Rhynchota IV. Heteroptera.* Taylor and Francis London. p272. Ambrose D. P. (1980) Bioecology, Ecophysiology and Ethology of Reduviids (Heteroptera) of the scrub jungles of Tamil Nadu, India. Ph. D. thesis, P.G.Centre, Madras University, Coimbatore. Murugan, C. (1988) Biosystematics and Ecophysiology of the Tibiaroliate Assassin Bugs (Heteroptera**:** Reduviidae) of Southern India. Ph. D. thesis, Bharathiar University, Coimbatore. Ravichandran, G.(1988) Biosystematics and Ecophysiology of the Nontibiaroliate Assassin Bugs (Heteroptera**:** Reduviidae) of Southern India. Ph. D. thesis, Bharathiar University, Coimbatore. **Compilers:** D. Livingstone, C. Murugan, P.T. Cherian, P. Pugalanthi, K.G. Emiliyamma, B.A. Daniel.

6. *Acanthaspis siruvanii* Livingstone & Murugan, 1988 -- VU (D2) -- Order /Family: Hemiptera / Reduviidae. **Taxonomic status:** Species. **Habit:** Predators on ants and termites. **Habitat:** Underneath stones; Tropical rain forests. **Global Distribution: ENDEMIC** to southern India. **Current Regional Distribtuion:** Southern India. **- Elevation:** 450 m. **- Range (sq**. **km):** < 100. **- Area Occupied (sq**. **km):** < 10. **- Number of locations:** 1 (Siruvani, Tamil Nadu). **Population Trends: - % Decline:** Not known. **- Time / Rate (Yrs or gens):** Not known . **- No**. **of Mature Individuals:** Not known . **Global Population:** Not knwon. **Data Quality:** General field study (C. Murugan, G. Ravichandran and D. Livingstone, 1985 inSiruvani) . **Recent Field Studies:** Murugan, 1994 in Siruvani. **Threats:** No. **Trade:** No. **Other Comments:** —. **Status- IUCN: VULNERABLE**. **- Criteria based on:** D2 (Population restricted to less than 100km2, area of occupancy in single location). **- CITES:** No. **- IWPA (1972; 91):** No. **- RDB, National (old cat.):** No. **- RDB, International (old cat.):** No. **Recommendations**: **- Research management:** Survey; Life history study; Monitoring. **- PHVA:** No. **Captive Breeding Recommendation:** . **- Captive breeding:** No. **- Level of difficulty:** Not known. **Existing Captive Programmes:** No. **- Names of facilities**—. **Sources:** Murugan, C. (1988) Biosystematics and Ecophysiology of the Tibiaroliate Assassin Bugs (Heteroptera**:** Reduviidae) of Southern India. Ph. D. thesis, Bharathiar University, Coimbatore. Murugan ,C and Livingstone, D (1988) Three new species of *Acanthaspis* Amy. and Serv. from Southern India (Heteroptera **:** Reduviidae **:** Acanthaspidinae). *J. Bombay nat. Hist. Society* 85(1)**:** 170 -175. **Compilers:** D. Livingstone, C. Murugan, P.T. Cherian, P. Pugalenthi, K.G.Emiliyamma, B.A. Daniel.

7. *Alstonitermes flavescens* Thakur -- EN (A1a, 1c; B1, 2a, 2b, 2c) -- Order /Family: Isoptera / Termitidae. **Taxonomic status:** Species. **Habit:** Detritus, leaf litter. **Habitat:** Arboreal (tree dwelling) in evergreen tropical forests. **Global Distribution: ENDEMIC** to the Western Ghats (heavy rainfall area of evergreen tropical forests). **Current Regional Distribtuion:** Western Ghats. **- Elevation:** 500 to 2,000 m. **- Range (sq**. **km):** < 5,000. **- Area Occupied (sq**. **km):** < 500. **- Number of locations:** 2 -3; Fragmented. **Population Trends: - % Decline:** 50%. **- Time / Rate (Yrs or gens):** 10 years. **- No**. **of Mature Individuals:** Not known. **Global Population:** Continuing decline observed. **Data Quality:** General field study (D. Rajagopal, 1977-86; M.L. Thakur, 1975); Indirect information. **Recent Field Studies:** None. **Threats:** Pesticides; Loss of habitat. **Trade:** No. **Other Comments:** Builds nests using fecal pellets; nests globular in shape on endemic tree species which mostly serve as shade trees in coffee estates. Sensitive to habitat changes and population fluctuation. Nest size is very small. **Status- IUCN: ENDANGERED**. **- Criteria based on: A1a, 1c** (Population reduction observed due to continuing decline in area, extent of occurence and /or quality of habitat); **B1, 2a, 2b, 2c** (Restricted distribution, severely fragmented, continuing decline in extent of occurrence, area of occupancy and quality of habitat). **- CITES:** No. **- IWPA (1972; 91):** No. **- RDB, National (old cat.):** No. **- RDB, International (old cat.):** No. **Recommendations: - Research management:** Survey; Monitoring; Habitat management; Limiting factor research. **- PHVA:** Yes. **Captive Breeding Recommendation: - Captive breeding:** Level 1. **- Level of difficulty:** Very difficult. **Existing Captive Programmes:** No. **- Names of facilities**—. **Sources:** Personal observation/ comments**:** D. Rajagopal, . Bose, G. (1984) *Termite fauna of southern India.* Records of ZSI, Calcutta.Rajagopal, D. (1983) Habit and habitat studies of some termites from Karnataka, *J. Soil Biol.Ecol.* 3(2)**:** 108-121. Thakur, M.L. (1975) A new native termite from South India (Isoptera**:** Termitidae**:** Nasutitermitinae) *J. Bombay nat. Hist. Soc*. 72(3)**:** 781-785. **Compilers:** D. Rajagopal, A.K. Chakravarthy, A.S. Vastrad, B.A. Daniel, R. Mathew.

8. *Amblyopone bellii* Forel -- DD -- Order/ FamilyHymenoptera / Formicidae. **Taxonomic status:** Species. **Habit:** Not known. **Habitat:** Subterranean red soil. **Global Distribution:** Not known. **Current Regional Distribtuion:** Southern India, Sriperambadur. **- Elevation:** up to 2,000 m. **- Range (sq**. **km):** > 20,000. **- Area Occupied (sq**. **km):** < 10. **- Number of locations:** 1. **Population Trends: - % Decline:** Not known. **- Time / Rate (Yrs or gens):** Not known. **- No**. **of Mature Individuals:** Not known. **Global Population:** Not known. **Regional Population:** Highly restricted area of occupancy. **Population Trends:** not known. **Data Quality:** Informal sighting. **Recent Field Studies:** None. **Threats:** Not known. **Trade:**

Not known. **Other Comments:** Primitive ant; Single individual collected from Sriperambadur. Sighted on two or three occasions elsewhere (Northeast). **Status- IUCN: DATA DEFICIENT**. **- Criteria based on:** Not applicable. **- CITES:** No. **- IWPA (1972; 91):** No. **- RDB, National (old cat.):** No . **- RDB, International (old cat.):** No. **Recommendations: Research management:** Survey; Monitoring; Life history studies; Limiting factor research. **- PHVA:** Pending. Captive breeding Recommendation. **- Captive breeding:** Level 3. **- Level of difficulty:** Not known. Existing Captive Programms**:** None. **- Names of facilities:** —. **Sources:** Bingham, C.T. (1903) *Fauna of British India including Ceylon and Burma*. . *Hymenoptera 2.* Ants and Cucko-wasps, 506 pp, London. . Bolton, B. (1995) *A New General Catelogue of the Ants of the World*, Harvard University Press. **Compilers:** R. Mathew, A.K. Chakravarthy, D. Rajagopal, A.S. Vastrad, B.A. Daniel, . K.G. Emiliamma.

9. *Aularchis miliaris* -- LRnt -- **Order /Family:** Orthoptera / Pyrogomorphidae. **Taxonomic status:** Species. **Habit:** Phytophagous. **Habitat:** Coffee plantations, phytophilous. **Global Distribution:** Most probably in S.E. Asia (Pakistan, Nepal, Tibet, Bangladesh, Vietnam, Thailand, Indonesia, Malaysia, Myanmar). **Current Regional Distribtuion:** Southern India. **- Elevation:** 1,000 m and above. **- Range (sq. km):** > 20,000 . **- Area Occupied (sq. km):** > 2,000. **- Number of locations:** Many. **Population Trends: .- % Decline:** Not known. **- Time / Rate (Yrs or gens):** Not known. **- No. of Mature Individuals:** Not known. **Global Population:** Not known. **Regional Population:** May be declining. **Data Quality:** Indirect information; informal field studies. **Recent Field Studies:** Informal sighting by Ranjit Daniels. **Threats:** Pesticides. **Trade:** No. **Other Comments:** Found in high-altitude area. **Status: - IUCN: LOWER RISK -NEAR THREATENED (Regionally -southern India)**. **DATA DEFICIENT (Globally)**. **- Criteria based on:** Not applicable. **- CITES:** No. **- IWPA (1972; 91):** No. **- RDB, National (old cat.):** No . **- RDB, International (old cat.):** No. **Recommendations: - Research management:** Life history studies . **- PHVA:** No. **Captive Breeding Recommendation: - Captive breeding:** No. **- Level of difficulty:** Not known. **Existing Captive Programmes: --**. **- Names of facilities:** None. **Sources:** COPR (1982). *The locust and grasshopper Agricultural Manual* Centre for overseas pest research, London. **Compilers:** A.S. Vastrad, R.J.R. Daniels, P.T. Cherian, K.V. Lakshminarayana, R. Mathew, . B.A. Daniel, C. Gunasekaran.

10. *Bellamya bengalensis* -- LRnt -- (*Viviparus bengalensis*). (Pond snail; Banded pond snail) **Order /Family:** Megagastropoda / Viviparidae. **Taxonomic status:** Species. **Habit:** Shallow water-Benthic. **Habitat:** Lentic freshwater Ponds. **Global Distribution:** Throughout India. **Current Regional Distribtuion:** Southern India. **- Elevation:** Below 200 m. **- Range (sq. km):** >20,000. **- Area Occupied (sq. km):** > 2,001. **- Number of locations:** Many (Tamil Nadu). **Population Trends: - % Decline:** 10 %. **- Time / Rate (Yrs or gens):** 10 years. **- No. of Mature Individuals:** Not known. **Global Population:** Not known. **Regional Population:** Continuing decline. **Data Quality:** Indirect information; Museum studies (T. Sathyamoorthy 1960 at Madras Museum); General field study (Anantharaman, 1982-83 in Tamil Nadu). **Recent Field Studies:** M.B. Ragunathan and V.R. Punithavelu, 1996 -97 (collections) Chengalpet district. **Threats:** Loss of habitat; Pollution; Pesticides. **Trade:** No. **Other Comments:** Banded pond snail (common name). **Status- IUCN: LOWER RISK - NEAR THREATENED (Regionally -southern India)**. **DATA DEFICIENT (Globally)**. **- Criteria based on:** Not applicable. **- CITES:** No. **- IWPA (1972; 91):** No. **- RDB, National (old cat.):** No . **- RDB, International (old cat.):** No. **Recommendations: - Research management:** Survey. **- PHVA:** No . **Captive Breeding Recommendations:** - **Captive breeding:** No. **- Level of difficulty:** Least difficult. **Existing Captive Programmes**None. **- Names of facilities:** —. **Sources:** Anantharaman, M. MAB Project**:** The Ecology Distribution and documentation of Freshwater Gastropods of Tamil Nadu and their Cercarial Fauna (1 Oct. 1984 -31 Mar 1988). Sathyamurthy, S.T. (1960) The Land and Freshwater Mollusca in the Colllection of the Madras Government Museum. *Bulletin of Madras Govt. Museum.* **Compilers:** R. Natarajan, M.B. Ragunathan, S. Paulraj, V.R. Punithavelu, C. Gunasekaran, Sathish Kumar.

11. *Bellamya dissimilis* -- LRnt -- (*Viviparus dissemilis,* (Muller) -- **Order /Family:** Megagastopoda / Viviparidiae. **Taxonomic status:** Species. **Habit:** Shallow Benthic water. **Habitat:** Pond, lentic freshwater . **Global Distribution:** India and neighbouring countries. **Current Regional Distribtuion:** Southern India . **- Elevation:** 1,000 m. **- Range (sq. km):** > 20,000. **- Area Occupied (sq. km):** > 2,000. **- Number of locations:** 9; Fragmented. **Population Trends: - % Decline:** 10%. **- Time / Rate (Yrs or gens):** 10 years. **- No. of Mature Individuals:** Not known. **Global Population:** Not known. **Regional Population:** Continuing gradual decline. **Data Quality:** General field study; Informal field sightings. **Recent Field Studies:** M.B. Ragunathan and V.R. Punethavelu, 1996-97 in Chengalpet Dist. **Threats:** Loss of habitat; Pollution; Pesticides. **Trade:** No. **Other Comments:** Common pond snail (common name). **Status- IUCN: LOWER RISK -NEAR THREATENED (Regionally -southern India)**. **DATA DEFICIENT (Globally)**. **- Criteria based on:** Not applicable. **- CITES:** No. **- IWPA (1972; 91):** No. **- RDB, National (old cat.):** No . **- RDB, International (old cat.):** No. **Recommendations: - Research management:** Survey; Cercarial studies. **- PHVA:** No . **Captive Breeding Recommendation: - Captive breeding:** No. **- Level of difficulty:** Least difficult. **Existing Captive Programmes:** None. **- Names of facilities:** —. **Sources:** Anantharaman, M. MAB Project**:** The Ecology Distribution and documentation of Freshwater Gastropods of Tamil Nadu and their Cercarial Fauna (1 Oct. 1984 -31 Mar 1988). Sathyamurthy, S.T.(1960) The Land and Freshwater Mollusca in the Colllection of the Madras Government Museum. *Bulletin of Madras Govt. Museum*. **Compilers:** R. Natarajan, M.B. Ragunathan, S. Paulraj, V.R. Punithavelu, C. Gunasekaran, Sathish Kumar.

12. *Bithynia stenothyroides* (Dohrn) -- LRnt -- Order /Family: Megagastropoda / Hydrobiidae. **Taxonomic status:** Species. **Habit:** Phytophagous, littoral. **Habitat:** Lentic and lotic freshwater. **Global Distribution:** Southern India and Sri Lanka. **Current Regional Distribtuion:** Southern India . **- Elevation:** 2,000 m. **- Range (sq. km):** > 20,000. **- Area Occupied (sq. km):** < 2,000. **- Number of locations:** Five (Nilgiris, Madras, Thiruchirapalli, South Arcot, Pune); Fragmented. **Population Trends: - % Decline:** 15%. **- Time / Rate (Yrs or gens):** 10 years. **- No. of Mature Individuals:** Not known. **Global Population:** Not known. **Regional Population:** Gradual continuing decline in population. **Data Quality:** General field study (R. Natarajan, 1950s). **Recent Field Studies:** None. **Threats:** Loss of habitat; Pollution; Pesticides. **Trade:** No. **Other Comments:** Little known about the species. **Status- IUCN: VULNERABLE (Nationally)**. **DATA DEFICIENT (Globally)**. **- Criteria based on: B1, 2a, 2c** (Restricted distribution, severely fragmented, limited location, continuing decline in extent of occurrence, and quality of habitat). **- CITES:** No. **- IWPA (1972; 91):** No. **- RDB, National (old cat.):** No . **- RDB, International (old cat.):** No. **Recommendations**: **- Research management:** Survey. **- PHVA:** No. **Captive Breeding**

Recommendation: - Captive breeding: No. **- Level of difficulty:** Moderately difficult. **Existing Captive Programmes**.None. **- Names of facilities:** —. **Sources:** Sathyamurthy, S.T. (1960) The land and freshwater mollusca in the collection of Madras Govt. Museum, *Bulletin of Government Museum of Natural History,* Vol 1, No. 4. **Compilers:** R. Natarajan, M.B. Ragunathan, C. Gunasekaran, M.S. Ravichandran.

13. *Chondromorpha kelaarki* (Humbert) -- LRlc -- Order/Family: Polydesmida / Paradoxosomatidae. **Taxonomic status:** Species. **Habit:** Decomposed litter feeder. **Habitat:** Moist area with organic matter. **Global Distribution:** Not known. **Current Regional Distribtuion:** Southern India. **- Elevation:** Up to 2,000 m. **- Range (sq. km):** > 20,000. **- Area Occupied (sq. km):** > 2,000. **- Number of locations:** Many. **Population Trends: - % Decline:** No change. **- Time / Rate (Yrs or gens):** Not known. **- No. of Mature Individuals:** Not known (10 -100 per m2 in each microhabitat). **Global Population:** Not known. **Regional Population:** No change. **Data Quality:** General field study. **Recent Field Studies:** K. Bano, 1995 onwards in Karnataka; M. Mary Bai, 1995 onwards in Tamil Nadu. **Threats:** Loss of habitat; Climate; Drought. **Trade:** No. **Other Comments:** Species of the genus are identical externally distinguishable only by microscopic inspection of the gonads. Secretes hydrogen cyanide from pores in keels. **Status- IUCN: LOWER RISK - LEAST CONCERN (Regionally -southern India)**. **DATA DEFICIENT (Globally)**. **- Criteria based on:** Not applicable. **- CITES:** No. **- IWPA (1972; 91):** No. **- RDB, National (old cat.):** No. **- RDB, International (old cat.):** No. **Recommendations: - Research management:** Taxonomic and morphological genetic studies; Survey. **- PHVA:** No. **Captive Breeding Recommendation:** . **- Captive breeding:** No. **- Level of difficulty:** Least difficult. **Existing Captive Programmes:** None. **- Names of facilities:** —. **Sources:** Attens,C. (1936) Diplopoda of India. *Mem. Ind. Mus.* 11**:** 212. **Compilers:** K. Bano, M. Mary Bai, M.V. Reddy, T.J. Indira, P. Ahimaz, R. Bhanumati.

14. *Corbicula regularis* (Prime) -- DD -- **Order /Family:** Eulamellibranchiata / Corbucullidae. **Taxonomic status:** Species. **Habit:** Filter feeder. **Habitat:** Lentic and lotic fresh water. **Global Distribution:** Throughout India. **Current Regional Distribtuion:** Southern India. **- Elevation:** 1,500 m. **- Range (sq. km):** < 5,000. **- Area Occupied (sq. km):** < 2,000. **- Number of locations:** 1. **Population Trends: .- % Decline:** 15%. **- Time / Rate (Yrs or gens):** 10 years. **- No. of Mature Individuals:** Not known. **Global Population:** Not known . **Regional Population:** Gradual continuing decline in population. **Data Quality:** Museum collection. **Recent Field Studies:** None. **Threats:** Not known. **Trade:** Not known. **Other Comments:** Not reported after 1960. **Status- IUCN: DATA DEFICIENT (Regionally -southern India)**. **DATA DEFICIENT (Globally)**. **- Criteria based on:** Not applicable. **- CITES:** No. **- IWPA (1972; 91):** No. **- RDB, National (old cat.):** No . **- RDB, International (old cat.): :** No. **Recommendations: - Research management:** Survey. **- PHVA:** No. **Captive Breeding Recommendation: - Captive breeding:** No. **- Level of difficulty:** Moderately difficult. **Existing Captive Programmes:** None . **- Names of facilities:** —. **Sources:** Sathyamurthy, S.T. (1960) *The land and freshwater mollusca in the collection of Madras Govt. Museum*, Bulletin of Government Museum of Natural History, Vol 1, No. 4. **Compilers:** R. Natarajan, M.B. Ragunathan, M.S. Ravichandran, C. Gunasekaran.

15. *Crematogaster rogenhoferi* Forel. -- LRlc -- **Order /Family:** Hymenoptera / Formicidae. **Taxonomic status:** Species. **Habit:** Carnivorous, phytophagous, honey dew and pollen feeder. **Habitat:** Tree inhabiting. **Global Distribution:** Widely distributed in India, Myanmar, Tenasserim. **Current Regional Distribtuion:** Southern India, limited to forest ecosystem. **- Elevation:** up to 2,000 m. **- Range (sq. km):** > 20,000. **- Area Occupied (sq. km):** > 2,000. **- Number of locations:** Many. **Population Trends:** Stable. **- % Decline:** Not known. **- Time / Rate (Yrs or gens):** —. **- No. of Mature Individuals:** Not known. **Global Population:** Not known. **Regional Population:** Not known. **Data Quality:** General field study. . . **Recent Field Studies:** T.M. Mustak Ali, 1992, Karnataka; R. Mathew, 1974-95 Northeastern India. **Threats:** No . **Trade:** No. **Other Comments:** Associated with homopterans, may be beneficial in cashew orchards as it feeds on *Helopeltis antonii*. **Status- IUCN: LOWER RISK -LEAST CONCERN (Regionally -southern India)**. **DATA DEFICIENT (Globally)**. **- Criteria based on:** Not applicable. **- CITES:** No. **- IWPA (1972; 91):** No. **- RDB, National (old cat.):** No . **- RDB, International (old cat.):** No. **Recommendations: - Research management:** Survey; Monitoring; Habitat management; Life history studies . **- PHVA:** Pending. **Captive Breeding Recommendation: - Captive breeding:** Level 3. **- Level of difficulty:** Least difficult. **Existing Captive Programmes:** None. **- Names of facilities:** —. **Sources:** Personal observation/comments**:** D. Rajagopal (Paper under preparation). Ali, T.M.M. (1992) Ants of Karnataka II, *IUSSI Newsletter,* 6(1&2)**:** 1-9. Mathew, R. *Fauna of Meghalaya,* Part II Invertebrates, (in press). **Compilers:** D. Rajagopal, A.K. Chakravarthy, A.S. Vastrad, R. Mathew, B.A. Daniel.

16. *Cypris dravidensis* (Victor and Michael) -- EN (B1,2c) -- (Shelled crustacean - seed shrimp). **Order /Family:** Popocopida (Ostracoda) / Cyprididae. **Taxonomic status:** Species. **Habit:** Benthic, lentic . **Habitat:** Freshwater. **Global Distribution: ENDEMIC** to southern India. **Current Regional Distribtuion:** Southern India. **- Elevation:** Up to 1,000 m. **- Range (sq. km):** > 20,000. **- Area Occupied (sq. km):** < 500. **- Number of locations:** 4 (Pandarpur in Maharashtra; Madurai, Trichy, Tiruppatanur (North Arcot Dist.,) in Tamil Nadu); Fragmented. **Population Trends: - % Decline:** 10 %. **- Time / Rate (Yrs or gens):** 10 years. **- No. of Mature Individuals:** Not known. **Global Population:** Gradual continuing decline in population observed. **Data Quality:** General field study (M.B. Raghunathan, 1977-83 in Madras; K. Revathi, 1982-85 in Madras). **Recent Field Studies:** M.B. Raghunathan, 1993-96 in freshwater bodies of Chengalpet district. Sunny George, 1988-94 in Kerala. **Threats:** Loss of habitat; Pollution; Human interference. **Trade:** No. **Other Comments:** Waterbodies in urban areas are desilted for commerical purposes and in rural area for agriculture. Discontinuous Distribution. **Status - IUCN: ENDANGERED** . **- Criteria based on: B1, 2c** (Restricted distribution, limited location, severely fragmented, continuing. decline observed in extent of occurrence, area of occupancy and/or quality of. habitat). **- CITES:** No. **- IWPA (1972; 91):** No. **- RDB, National (old cat.):** No. **- RDB, International (old cat.):** No. **Recommendations: - Research management:** Habitat management . **- PHVA:** No. **Captive Breeding Recommendations: - Captive breeding:** No . **- Level of difficulty:** Least difficult. **Existing Captive Programmes:** None . **- Names of facilities:** —. **Sources:** George, S., 1993, Ph.D. Thesis, Calicut University, Calicut. Victor, R. and C. H. Fernando, (1979) *The freshwater Ostracods of India*, Records of the Z.S.I. Vol. 74, (Part 2). **Compilers:** S. Paulraj, M.B. Raghunathan, K. Revathi, J.T. Jothinayagam, M. Ramalingam, Mr. Satish Kumar, V.R. Punithavelu.

17. *Cypris protubera* Victor and Fernando -- EN (B1,2a,2c) -- **Order /Family:** Podocopida (Ostracoda) / Cyprididae. **Taxonomic status:** Species. **Habit:** Littoral / Benthic. **Habitat:** Benthic lenthic freshwater. **Global Distribution: ENDEMIC** to southern India. **Current Regional Distribtuion:** Southern India. **- Elevation:** Up to 1,000 m. **- Range (sq. km):** < 5,000. **- Area Occupied (sq. km):** < 500. **- Number of locations:** 2 (Trichy and Madurai district in Tamil Nadu). **Population Trends: - % Decline:** 10%. **- Time / Rate (Yrs or gens):** 10 years. **- No. of Mature Individuals:** Not known. **Global Population:** Gradual continuing decline in population observed. **Data Quality:** General field study (M.B. Raghunathan, 1977-83 and K. Revathi, 1982-85 in Madras). **Recent Field Studies:** M.B. Raghunathan, 1993-96 In freshwater bodies of Chengalpet Dist. Dr. Sunny George, 1988-94 in Kerala. **Threats:** Loss of habitat; Pollution; Human interference. **Trade:** No. **Other Comments:** Waterbodies in urban areas are desilted for commercial purposes and in rural areas for agriculture. **Status- IUCN: ENDANGERED**. **- Criteria based on: B1, 2a, 2c,** (Restricted distribution, limited location, continuing decline in extent of occurrence, area of occupancy and/or quality of habitat). **- CITES:** No. **- IWPA (1972; 91):** No. **- RDB, National (old cat.):** No . **- RDB, International (old cat.):** No. **Recommendations: - Research management:** Habitat management. **- PHVA:** No. **Captive Breeding Recommendations: - Captive breeding:** No. **- Level of difficulty:** Least difficult. **Existing Captive Programmes:** None . **- Names of facilities:** —. **Sources:** George, S. (1993) Ostracods of Kerala Ph.D. thesis, Calicut Unversity , Calicut. Victor, R. and C.H. Fernando, (1979) The Freshwater Ostracods of India, *Records of the ZSI* Vol. 74 (Part 2) pp. 147-242. **Compilers:** S. Paulraj, M.B. Raghunathan, K. Revathi, Sathish Kumar.

18. *Cypris subglobosa* Sowerby - LR -nt -- Order /Family: Popocopida (Ostracoda) / Cyprididae. **Taxonomic status:** Species. **Habit:** Benthic, Lentic. **Habitat:** Freshwater. **Global Distribution:** Throughout India. **Current Regional Distribtuion:** Peninsular India. **- Elevation:** Up to 1,000 m. **- Range (sq. km):** > 20,000. **- Area Occupied (sq. km):** > 2,000. **- Number of locations:** 10; Fragmented. **Population Trends: - % Decline:** 10%. **- Time / Rate (Yrs or gens):** 10 years. **- No. of Mature Individuals:** Not known. **Global Population:** Not known. **Regional Population:** Gradual continuing decline observed. **Data Quality:** General field study. (M.B. Raghunathan, 1977-83 and K. Revathi, 1982-85 in Madras). **Recent Field Studies:** M.B. Raghunathan, 1993 -till date In freshwater bodies of Chengalpet district. Sunny George, 1988-94 in Kerala. **Threats:** Loss of habitat; Pollution; Human interference. **Trade:** No. **Other Comments:** Water bodies in urban areas are desilted for commercial purposes and in rural areas for agriculture. **Status- IUCN: LOWER RISK -NEAR THREATENDED (Regionally -southen India)**. **DATA DEFICIENT (Globally)**. **- Criteria based on:** Not applicable. **- CITES:** No. **- IWPA (1972; 91):** No. **- RDB, National (old cat.):** No. **- RDB, International (old cat.):** No. **Recommendations: - Research management:** Habitat management. **- PHVA:** No. **Captive Breeding Recommendations: - Captive breeding:** Level 1 . **- Level of difficulty:** Least difficult. **Existing Captive Programmes:** None. **- Names of facilities:** —. **Sources:** George, S. (1993) Ph.D. Thesis, Calicut University, Calicut. Victor, R. and Fernando,C.H. (1979) The Freshwater Ostracods of India, *Records of the ZSI* Vol. 74 (Part 2) pp. 147-242 . **Compilers:** S. Paulraj, M.B. Raghunathan, K. Revathi, J.T. Jothirayagam, M. Ramalingam, Sathish Kumar, V. R. Punithavelu.

19. *Dichogaster curgensis* -- LR-lc -- (Earthworm). **Order /Family:** Lumbricina / Octochaetidae. **Taxonomic status:** Species. **Habit:** Detritivorous. **Habitat:** Epigeic. **Global Distribution: ENDEMIC** to southern India. **Current Regional Distribtuion:** Southern India . **- Elevation:** 1,000 m. **- Range (sq. km):** > 20,000. **- Area Occupied (sq. km):** > 2,000. **- Number of locations:** Many (Karnataka). **Population Trends:** No change. **- % Decline:** No change. **- Time / Rate (Yrs or gens):** Not known. **- No. of Mature Individuals:** Not known (100-200 /m2) . **Global Population:** No change observed. **Data Quality:** General field study. **Recent Field Studies:** K. Bano, 1989-91; 94. **Threats:** Change in edaphic factors; Pesticides; Drought. **Trade:** No. **Other Comments:** This species is being used for vermicomposting. *In situ* studies: for organic matter turn over can be studied. **Status- IUCN: LOWER RISK - LEAST CONCERN**. **- Criteria based on:** Not applicable. **- CITES:** No. **- IWPA (1972; 91):** No. **- RDB, National (old cat.):** No . **- RDB, International (old cat.):** No. **Recommendations: - Research management:** Monitoring; Limiting factor management . **- PHVA:** Pending. **Captive Breeding Recommendations**: **- Captive breeding:** Level 3. **- Level of difficulty:** Least difficult. **Existing Captive Programmes:** None. **- Names of facilities:** —. **Sources:** Bano,K. and Kale, R.D. (1991) Earthworm fauna of southern Karnataka. *In: Advances in Management and conservation of Soil fauna.* (Eds). Veeressh G.K , Rajagopal. D and Virakthamath, C.A. Oxford. I.B.H. publishers. pp.627-634. **Compilers:** M.V. Reddy, K. Bano, M. Mary Bai, T.J.Indira, P. Ahimaz, R. Bhanumati.

20. *Drawida nilamburensis* -- CR (B1,2a,2b,2c) -- **Family:** Moniligastridae. **Taxonomic status:** Species. **Habit:** Geophagous (soil eating). **Habitat:** Deep burrowing form (Anecid). **Global Distribution: ENDEMIC** to southern India. **Current Regional Distribtuion:** Kerala. **- Elevation:** Around 1,000 m. **- Range (sq. km):** < 100. **- Area Occupied (sq. km):** < 10. **- Number of locations:** 1(Nilambur forests). **Population Trends: .- % Decline:** 20 %. **- Time / Rate (Yrs or gens):** 10 years. **- No. of Mature Individuals:** Not known. **Global Population:** Restricted distribution and continuing decline in population. **Data Quality:** Informal field sighting (J.M. Julka, 1989 collection; P. Ahimas, WWF 1996). **Recent Field Studies:** None. **Threats:** Collection, Loss of habitat. **Trade:** Not known. **Other Comments:** 20% decline in the habitat is predicted in next 10 years; Vikram Ganapathy collected thelargest specimen in southern India. A trial of introducing the species into sugar cane field inTamil Nadu failed. **Status- IUCN: CRITICALLY ENDANGERED**. **- Criteria based on: B1, 2a, 2b, 2c** (Restricted distribution, single location, continuing decline in extent of occurrence, area of occupancy and quality of habitat). **- CITES:** No. **- IWPA (1972; 91):** No. **- RDB, National (old cat.):** No. **- RDB, International (old cat.): :** No. **Recommendations**: **- Research management:** Monitoring; Habitat management; Limiting factor research, Survey. **- PHVA:** Yes. **Captive Breeding Recommendation: - Captive breeding:** Pending. **- Level of difficulty:** Not known. **Existing Captive Programmes:** None. **- Names of facilities:** —. **Sources:** Julka, J.M.(1988) *Fauna of India: Megadrile Ologochaeta (earthworms). Vol.1: Family Octochaetidae*. Zoological Survey of India, Calcutta. Stephenson, J. (1923) *Fauna of British India: Oligochaeta.* Today and Tomorrow's Printers and Publishers, New Delhi. . **Compilers:** R. Radhakrishna, Sultan Ismail, P.T. Cherian, M.B.Ragunathan. Vikram Reddy, Kubra Bano, S. Indira, A.S. Vastrad, S. Paulraj, Ranjit Daniels, M. MaryBai P. Ahimaz, R. Bhanumathi.

21. *Ectrychotes bharathii* Murugan & Livingstone,1989 -- CR (B1, 2c) -- Order /Family: Hemiptera / Reduviidae. **Taxonomic status:** Species. **Habit:** Underneath stones. **Habitat:** Scrub jungle. **Global Distribution: ENDEMIC** to southern India. **Current Regional Distribtuion:** Southern India. **- Elevation:** 1,050 m. **- Range (sq**. **km):** < 100. **- Area Occupied (sq**. **km):** < 10. **- Number of locations:** 1 (Kolli Hills, Tamil Nadu). **Population Trends: - % Decline:** Not known . **- Time / Rate (Yrs or gens):** Not known . **- No**. **of Mature Individuals:** Not known . **Global Population:** Not known . **Data Quality:** General field study (C. Murugan and D. Livingstone, 1988). **Recent Field Studies:** D. Livingstone & C. Murugan, 1977 in Kolli Hills. **Threats:** Human Interference; Loss of Habitat. **Trade:** No. **Other Comments:** Specimen not available even at the latest field trips to Kolli Hills . **Status- IUCN: CRITICALLY ENDANGERED**. **- Criteria based on: B1, 2c** (Restricted distribution, single location, continuing decline in extent of occurrence,area of occupancy and /or quality of habitat). **- CITES:** No. **- IWPA (1972; 91):** No. **- RDB, National (old cat**.**):** No. **- RDB, International (old cat**.**):** No. **Recommendations: - Research management:** Survey; Life history studies . **- PHVA:** No. **Captive Breeding Recommendation: - Captive breeding:** No. **- Level of difficulty:** Not known. **Existing Captive Programmes:** Not known . **- Names of facilities**No. **Sources:** Murugan, C. (1988) Biosystametics and Ecophysiology of the Tibiaroliate Assassin Bugs (Heteroptera **:** Reduviidae) of Southern India. Ph. D. thesis, Bharathiar University, Coimbatore. Murugan, C. & Livingstone, D (1989) A new species of *Ectrychotes* Burm. from the Eastern Ghats - India (Heteroptera **:** Reduviidae **:** Ectrichodiinae), *Hexapoda* 1(1&2)**:** 37-40. **Compilers:** D. Livingstone, C. Murugan, P.T. Cherian, P. Pugalanthi, . K.G. Emiliyamma, B.A. Daniel

22. *Edocla heberii* Murugan & Livingstone, 1990 -- CR (B1, 2c) -- Order /Family: Hemiptera / Reduviidae. **Taxonomic status:** Species. **Habit:** Under stones . **Habitat:** Scrub jungle. **Global Distribution: ENDEMIC** to southern India . **Current Regional Distribtuion:** Southern India. **- Elevation:** 50m. **- Range (sq**. **km):** <100. **- Area Occupied (sq**. **km):** <10. **- Number of locations:** 1(Tambaram (MCC) Campus - near Heber Hall). **Population Trends: - % Decline:** Not known. **- Time / Rate (Yrs or gens):** Not known. **- No**. **of Mature Individuals:** Not known. **Global Population:** Not known. **Data Quality:** General field study (C. Murugan & D. Livingstone, 1985 in Madras Christian College campus). **Recent Field Studies:** Murugan and Livingstone on going project, MCC Campus. **Threats:** Grazing (Deer); Human interference. **Trade:** No. **Other Comments:** Ongoing studies did not yielded any individuals. **Status- IUCN: CRITICALLY ENDANGERED**. **- Criteria based on: B1, 2c** (Restricted distribution, single location, continuing decline in extent of occurrence, area of occupancy and/or quality of habitat). **- CITES:** No. **- IWPA (1972; 91):** No. **- RDB, National (old cat**.**):** No . **- RDB, International (old cat**.**):** No. **Recommendations: - Research management:** Survey; monitoring; Life History studies. **- PHVA:** No. **Captive Breeding Recommendation: - Captive breeding:** Level 3. **- Level of difficulty:** Not Known. **Existing Captive Programmes:** None. **- Names of facilities**None. **Sources:** Murugan C. (1988) Biosystametics and Ecophysiology of theTibiaroliate Assassin Bugs (Heteroptera**:** Reduviidae) of Southern India. Ph. D. thesis, Bharathiar University, Coimbatore. Murugan,C and Livinstone, D (1990) Three new species of the genus *Edocla* Stal from southern India (Heteroptera**:** Reduviidae **:** Acanthaspidinae) *Arquivos do Museu Bocage*. I (39)**:** 569 -577. **Compilers:** D. Livingstone, C. Murugan, P.T. Cherian, P. Pugalenthi, K.G. Emiliyamma, B.A. Daniel.

23. *Edocla maculatus* Murugan & Livingstone, 1990 -- EN (B1, 2c) -- Order /Family: Hemiptera / Reduviidae. **Taxonomic status:** Species. **Habit:** Underneath stones. **Habitat:** Scrub jungle. **Global Distribution: ENDEMIC** to southern India. **Current Regional Distribtuion:** Southern India. **- Elevation:** 300 -1,000 m. **- Range (sq**. **km):** 20,000. **- Area Occupied (sq**. **km):** < 500. **- Number of locations:** 3 (Yelagiri hill, Cutrallum, Alagar hills, Tamil Nadu). **Population Trends: - % Decline:** Not known . **- Time / Rate (Yrs or gens):** Not known . **- No**. **of Mature Individuals:** Not known. **Global Population:** Not known . **Data Quality:** General field study (C. Murugan & D. Livingstone 1985). **Recent Field Studies:** None. **Threats:** Human interference, Loss of Habitat. **Trade:** No. **Other Comments:** No. **Status- IUCN: ENDANGERED**. **- Criteria based on: B1**. **2c** (Restricted distribution, limited location, continuing decline in extent of occurrence, area of occupancy and/or quality of habitat). **- CITES:** No. **- IWPA (1972; 91):** No. **- RDB, National (old cat**.**):** No. **- RDB, International (old cat**.**):** No. **Recommendations**: **- Research management:** Survey; Life history studies. **- PHVA:** No. **Captive Breeding Recommendation: - Captive breeding:** No. **- Level of difficulty:** Not known. **Existing Captive Programmes:** No. - Names of facilities—. **Sources:** Murugan, C. (1988) Biosystematics and Ecophysiology of the Tibiaroliate Assassin Bugs (Heteroptera**:** Reduviidae) of Southern India. Ph. D. thesis, Bharathiar University, Coimbatore. Murugan,C and Livinstone, D (1990) Three new species of the genus *Edocla* Stal from Southern India (Heteroptera **:** Reduviidae **:** Acanthaspidinae) *Arquivos do Museu Bocage*. I (39)**:** 569 -577. . **Compilers:** D. Livingstone, C. Murugan, P.T. Cherian, P. Pugalenthi, K.G. Emiliyamma, B.A. Daniel.

24. *Edocla punctatum* Murugan & Livingstone, 1990 -- CR (B1, 2c) -- Order /Family: Hemiptera / Reduviidae. **Taxonomic status:** Species. **Habit:** Under stones. **Habitat:** Tropical. **Global Distribution: ENDEMIC** to southern India . **Current Regional Distribtuion:** Anamalai Hills, Tamil Nadu. **- Elevation:** 1,000 m. **- Range (sq**. **km):** < 100. **- Area Occupied (sq**. **km):** < 10. **- Number of locations:** 1(Topslip in Anamalai Hills, Tamil Nadu). **Population Trends: - % Decline:** Not known . **- Time / Rate (Yrs or gens):** Not known . **- No**. **of Mature Individuals:** Not known . **Global Population:** Not known. **Data Quality:** General field studies, (D. Livingstone & C. Murugan 1985). **Recent Field Studies:** None. **Threats:** Human interference. **Trade:** No. **Other Comments:** Collected from Karian chola; These are restricted to particular area. **Status- IUCN: CRITICALLY ENDANGERED**. **- Criteria based on: B1, 2c** (Restricted distribution, single location, continuing decline in extent of occurrence, area of occupancy and/or quality of habitat). **- CITES:** No. **- IWPA (1972; 91):** No. **- RDB, National (old cat**.**):** No. **- RDB, International (old cat**.**):** No. **Recommendations: Research management:** Survey; Life history studies. **- PHVA:** No. **Captive Breeding Recommendation: - Captive breeding:** No. **- Level of difficulty:** Not known. **Existing Captive Programmes:** None. **- Names of facilities**—. **Sources:** Murugan, C. (1988) Biosystematics and Ecophysiology of the Tibiaroliate Assassin Bugs (Heteroptera**:** Reduviidae) of Southern India. Ph. D. thesis, Bharathiar University, Coimbatore. Murugan,C and Livinstone, D (1990) Three new species of the genus *Edocla* Stal from southern India (Heteroptera**:** Reduviidae**:** Acanthaspidinae) *Arquivos do Museu Bocage*. I (39)**:** 569 -577. **Compilers:** D. Livingstone, C. Murugan, P.T. Cherian, P. Pugalenthi, K.G. Emiliyamma, B.A. Daniel.

25. *Eucoptacrella ceylonica* Kirby -- CR (B1, 2a, 2b, 2c) -- Order /Family: Orthoptera / Acrididae. **Taxonomic status:** Species. **Habit:** Phytophagous. **Habitat:** Forest dwelling, Arboricolus. **Global Distribution:** India and Sri Lanka. **Current Regional Distribution:** Southern India. **- Elevation:** About 1,000 M. **- Range (sq. km):** < 5,000. **- Area Occupied (sq. km):** < 10. **- Number of locations:** 2; Fragmented. **Population Trends: - % Decline:** 10 -20 % . **- Time / Rate (Yrs or gens):** 10 years. **- No. of Mature Individuals:** Not known. **Global Population:** Not known. **Regional Population:** Gradual continuing decline in restricted habitat. **Data Quality:** General field study. **Recent Field Studies:** A.S. Vastrad, 1991 in Prabhunagar Forest, Dharwad; M.S. Muralirangan, 1993 in . Tamil Nadu . **Threats:** Loss of habitat; Human interference . **Trade:** No. **Other Comments:** It seems to require highly specialised niche for its growth and population build up. . M.S. Muralirangan, 1993, intensive surveys in 30 localities in Tamil Nadu (did not yield any population). **Status- IUCN: CRITICALLY ENDANGERED (Regionally -southern India)**. **DATA DEFICIENT (Globally)**. **- Criteria based on: B1, 2a, 2b** (Restricted distribution, severely fragmented, continuing decline in extent of occurrence and area of occupancy). **- CITES:** No. **- IWPA (1972; 91):** No. **- RDB, National (old cat.):** No . **- RDB, International (old cat.): :** No. **Recommendations: - Research management:** Survey; Monitoring; Limiting factor research; Life history studies . **- PHVA:** Yes. **Captive Breeding Recommendations: - Captive breeding:** Level 3. **- Level of difficulty:** Least difficult. **Existing Captive Programmes:** No. **- Names of facilities:** —. **Sources:** Kumar, P. (1991) *Hexapoda,* 3 (1)**:** 53-70. Murlirangan, M.C., Suresh,P., Dang, P.P and Gill, G.S (1993) Observations on the grass hopper species diversity and distributional pattern in peninsular India. *Entomologist,* 112(3&4)**:** 201-210. Vastrad, A.S. (1991) Ecological distribution, lifeforms and food habits of . grasshoppers in Dhaward region, Karnataka**,** *Hexapoda*, 3(1)**:** 94-99. **Compilers:** D. Rajagopal, A.K. Chakravarthy, A.S. Vastrad, R. Matthew, B.A. Daniel.

26. *Eucypris bispinosa* Victor and Fernando -- CR (B1, 2a, 2c) -- Order /Family: Podocopida (Ostracoda) / Cyprididae. **Taxonomic status:** Species. **Habit:** Littoral, Benthic. **Habitat:** Lentic freshwater. **Global Distribution: ENDEMIC** to Southern India. **Current Regional Distribution:** Tamil Nadu. **- Elevation:** Up to 500 m. **- Range (sq. km):** < 100. **- Area Occupied (sq. km):** < 10. **- Number of locations:** 1 (Nagamalai in Madurai). **Population Trends: - % Decline:** 10%. **- Time / Rate (Yrs or gens):** 10 years. **- No. of Mature Individuals:** Not known. **Global Population:** Gradual continuing decline in population observed. **Data Quality:** General field study. (M.B. Raghunathan, 1977 -83 and K. Revathi, 1982 -85 in Madras). **Recent Field Studies:** M.B. Raghunathan, 1993 -till date. In freshwater bodies of Chengalpet Dist. Sunny George, 1988 -94 in Kerala. **Threats:** Loss of habitat; Pollution; human interference. **Trade:** No. **Other Comments:** Water bodies in urban areas are desilted for commercial purposes and in rural areas for agriculture. **Status- IUCN: CRITICALLY ENDANGERED**. **- Criteria based on: B1, 2a, 2c** (Restricted distribution, single location, continuing decline in extent of occurence, area of occupancy and/or quality of habitat). **- CITES:** No. **- IWPA (1972; 91):** No. **- RDB, National (old cat.):** No . **- RDB, International (old cat.):** No. **Recommendations: - Research management:** Habitat management. **- PHVA:** No. **Captive Breeding Recommendation: - Captive breeding:** No. **- Level of difficulty:** Least difficult. **Existing Captive Programmes:** None. **- Names of facilities:** —. **Sources:** George, S. (1993) Ostracods of Kerala Ph.D. thesis, Calicut Unversity , Calicut. Victor, R. and Fernando, C.H. (1979) The Freshwater Ostracods of India, Records of the ZSI Vol. 74 (Part 2) pp. 147 - 242 . **Compilers:** S. Paulraj, M.B. Raghunathan, K. Revathi, J.T. Jothinayagam, M. Ramalingam, Sathish Kumar, V.R. Punithavelu.

27. *Gyraulus convexiusculus* -- VU (B1, 2a, 2c) -- Order /Family: Basommatophora / Planorbidae. **Taxonomic status:** Species. **Habit:** Phytophagous. **Habitat:** Fresh water lentic. **Global Distribution:** Throughout India. **Current Regional Distribtuion:** Southern India . **- Elevation:** About 900 m. **- Range (sq. km):** < 20,000. **- Area Occupied (sq. km):** < 2,000. **- Number of locations:** Many (Madras and vicinity, Vellore, Bangalore); Fragmented. **Population Trends: - % Decline:** 10%. **- Time / Rate (Yrs or gens):** 10 years. **- No. of Mature Individuals:** Not known. **Global Population:** Not known. **Regional Population:** Gradual continuing decline in population observed. **Data Quality:** General field study (R. Natarajan, 1955 -60 in Chidambaram, South Arcot dist.). Anantharaman, 1984 -88 in Tamil Nadu. **Recent Field Studies:** None. **Threats:** Loss of habitat; Pollution; Pesticides. **Trade:** No . **Other Comments:** Common species, widely distributed. **Status- IUCN: VULNERABLE (Regionally -southern India)**. **DATA DEFICIENT (Globally)**. **- Criteria based on: B1, 2a, 2c** (Restricted distribution, severely fragmented, continuing decline in extent of occurence, area of occupancy and/or quality of habitat). **- CITES:** No. **- IWPA (1972; 91):** No. **- RDB, National (old cat.):** No . **- RDB, International (old cat.): :** No . **Recommendations: - Research management:** Habitat management. **- PHVA:** No. **Captive Breeding Recommendation: - Captive breeding:** No. **- Level of difficulty:** Least difficult. **Existing Captive Programmes:** None . **- Names of facilities:** —. **Sources:** Anantharaman, M. M.A.B. Project of the ecology, Distribution and documentation of freshwater gastropod of Tamil Nadu and their cercarial fauna (1 Oct 1984 to 31 March 1988). Sathyamurthy, S.T. (1960) The land and freshwater mollusca in the collection of Madras Govt. Museum, Bulletin of Government Museum of Natural History, 1(4) . **Compilers:** R. Natarajan, M.B. Ragunathan, S. Paulraj, C.Gunasekaran, K. Revathi.

28. *Gyraulus saigonensis* -- LRnt -- (Crosse and Fisher). **Order /Family:** Basommatophora / Planorbidae. **Taxonomic status:** Species. **Habit:** Littoral / Benthic. **Habitat:** Lentic freshwater. **Global Distribution:** Sri Lanka, Mayanmar, India. **Current Regional Distribtuion:** Southern India. **- Elevation:** 1,500 m. **- Range (sq. km):** > 20,000. **- Area Occupied (sq. km):** > 2,000. **- Number of locations:** 3 (Madras, Vellore in Tamil Nadu, Bangalore in Karnataka); Fragmented. **Population Trends: - % Decline:** 10%. **- Time / Rate (Yrs or gens):** 10 Years. **- No. of Mature Individuals:** Not known. **Global Population:** Not known. **Regional Population:** Gradual continuing decline. **Data Quality:** General field study (R. Natarajan, 1958 in Chidambaram). **Recent Field Studies:** Informal field sightings only. **Threats:** Loss of habitat; Pesticides; Pollution. **Trade:** No. **Other Comments:** Less than quarter inch -8 mm (maximum size). (After 1958 no collections were made because of the minute size). **Status- IUCN: LOWER RISK -NEAR THREATENED (Regionally -southern India)**. **DATA DEFICIENT (Globally)**. **- Criteria based on:** Not applicable. **- CITES:** No. **- IWPA (1972; 91):** No. **- RDB, National (old cat.):** No . **- RDB, International (old cat.):** No. **Recommendations: - Research management:** Survey. **- PHVA:** No. **Captive Breeding Recommendations: - Captive breeding:** No. **- Level of difficulty:** Moderately difficult. **Existing Captive Programmes:** None. **- Names of facilities:** —. **Sources:** Anantharaman, M. M.A.B. Project of the ecology, Distribution and documentation of freshwater gastropod of Tamil Nadu and their cercarial fauna (1 Oct 1984 to 31

March 1988). Sathyamurthy, S.T. (1960) The Land and Freshwater Mollusca in the . collection of Madras Govt. Museum, *Bulletin of Govt. Museum*, N.H. VI , No. 4. **Compilers:** M.B. Ragunathan, R. Natarajan, C. Gunasekaran.

29. *Haematorrhophus fovealis* Murugan & Livingstone, 1995 -- CR (B1, 2c) -- Order /Family: Hemiptera / Reduviidae. **Taxonomic status:** Species. **Habit:** Under stone . **Habitat:** Semi -arid. **Global Distribution: ENDEMIC** to southern India. **Current Regional Distribtuion:** Southern India. **- Elevation:** 300 m. **- Range (sq. km):** < 100. **- Area Occupied (sq. km):** 10. **- Number of locations:** 1 (Malumichampatti, Tamil Nadu). **Population Trends: - % Decline:** Not known . **- Time / Rate (Yrs or gens):** Not known . **- No. of Mature Individuals:** Not known. **Global Population:** Not known. **Data Quality:** General field study (C. Murugan & D. Livingstone, 1985-90 in Malumichampatti). **Recent Field Studies:** None. **Threats:** Human interference. **Trade:** No. **Other Comments:** Surveys were conducted till 1990 but no results, Feed on millipedes. Shiny insects - dark coloured . **Status- IUCN: CRITICALLY ENDANGERED**. **- Criteria based on: B1, 2c** (Restricted distribution, single location, continuing decline in extent of occurrence, area of occupancy and/or quality of habitat). **- CITES:** No. **- IWPA (1972; 91):** No. **- RDB, National (old cat.):** No. **- RDB, International (old cat.):** No. **Recommendations: - Research management:** Survey; Monitoring; Life history studies. **- PHVA:** No. **Captive Breeding Recommendation:** . **- Captive breeding:** No. **- Level of difficulty:** Not known. **Existing Captive Programmes:** None. **- Names of facilities**—. **Sources:** Murugan C. (1988) Biosystematics and Ecophysiology of the Tibiaroliate Assassin Bugs (Heteroptera**:** Reduviidae) of Southern India. Ph. D. thesis, Bharathiar University, Coimbatore. Murugan,C and Livingstone, D (1995) Description of a new genus of Ectrichodiinae and two new species of the genus *Haematorrhophus* Stal from southern India (Heteroptera**:** Reduviidae), *J.Bombay nat. Hist. Society.* 92 (32)**:** 386 -389. **Compilers:** D. Livingstone, C. Murugan, P.T. Cherian, P.

30. *Haematorrhophus ruguloscutellaris* Murugan & Livingstone 1995 -- VU (D2) -- **Order /Family:** Hemiptera / Reduviidae. **Taxonomic status:** Species. **Habit:** Under boulders. **Habitat:** Scrub jungle. **Global Distribution: ENDEMIC** to southern India. **Current Regional Distribtuion:** Southern India. **- Elevation:** 75 m. **- Range (sq. km):** < 100. **- Area Occupied (sq. km):** < 10. **- Number of locations:** 1 (Manimuthar, Thirunelvelli Dist.). **Population Trends: - % Decline:** Not known . **- Time / Rate (Yrs or gens):** Not known . **- No. of Mature Individuals:** Not known . **Global Population:** Not known. **Data Quality:** General field studies (C. Murugan & D. Livingstone, 1984 in Manimuthar). **Recent Field Studies:** None. **Threats:** Not known. **Trade:** No. **Other Comments:** 1989 survey did not yeild any specimen. Feeds on millipede - stings & sucks -dissolves completely by saliva. **Status- IUCN: VULNERABLE - Criteria based on: D2** (Restricted population in less than 100 sq.km, area of occupancy and a single locaton). **- CITES:** No. **- IWPA (1972; 91):** No. **- RDB, National (old cat.):** No. **- RDB, International (old cat.):** No. **Recommendations: - Research management:** Survey; Life history studies; Monitoring. **- PHVA:** No. **Captive Breeding Recommendation:** . **- Captive breeding:** Level 3. **- Level of difficulty:** Not known . **Existing Captive Programmes:** None. - Names of facilities—. **Sources:** Murugan C. (1988) Biosystamatics and Ecophysiology of the Tibiaroliate Assassin Bugs (Heteroptera**:** Reduviidae) of Southern India. Ph. D. thesis, Bharathiar University, Coimbatore. Murugan, C and Livingstone, D (1995) Description of a new genus of Ectrichodiinae and two new species of the genus *Haematorrhophus* Stal from Southern India (Heteroptera **:** Reduviidae), *J. Bombay nat. Hist. Society.* 92 (32)**:** 386 -389. **Compilers:** D. Livingstone, C. Murugan, P.T. Cherian, P. Pugalanthi, K.G. Emiliyamma, B.A. Daniel.

31. *Hemihaematorrhophus planidorsatus* Murugan & Livingstone 1995 -- EN (B1, 2c) -- Order /Family: Hemiptera / Reduviidae. **Taxonomic status:** Species. **Habit:** Under stones. **Habitat:** Moist deciduous. **Global Distribution: ENDEMIC** to southern India. **Current Regional Distribtuion:** Southern India. **- Elevation:** 300 -1,000 m. **- Range (sq. km):** < 20,000 . **- Area Occupied (sq. km):** < 500. **- Number of locations:** 4 (Yelagiri Hills; Servalar; Alagar Koil; Courtrallam); Fragmented. **Population Trends: - % Decline:** Not known . **- Time / Rate (Yrs or gens):** Not known. **- No. of Mature Individuals:** Not known. **Global Population:** Not known. **Data Quality:** General field studies (C. Murugan & D. Livingstone, 1983 in Servalar; 1984 in Yelagiri Hills; 1985 in Alagar koil & Courtallam). **Recent Field Studies:** None . **Threats:** Loss of Habitat; Human Interference; Grazing. **Trade:** No. **Other Comments:** 1990 survey in Alagar Koil dist. did not yield specimen. New Genus in the subfamily Ectrichodiinae. Monotypic. **Status- IUCN: ENDANGERED**. **- Criteria based on: B1, 2c** (Restricted distribution, limited location, fragmented, continuing decline in extent of occurrence, area of occupancy and/or quality of habitat). **- CITES:** No. **- IWPA (1972; 91):** No. **- RDB, National (old cat.):** No . **- RDB, International (old cat.):** No. **Recommendations: - Research management:** Survey; Life history studies; Monitoring. **- PHVA:** No. **Captive Breeding Recommendation:** . **- Captive breeding:** No. **- Level of difficulty:** Not known . **Existing Captive Programmes:** None. **- Names of facilities**—. **Sources:** Murugan, C. (1988) Biosystematics and Ecophysiology of the Tibiaroliate Assassin Bugs (Heteroptera**:** Reduviidae) of Southern India. Ph. D. thesis, Bharathiar University, Coimbatore. Murugan, C and Livingstone, D (1995) Description of a new genus of Ectrichodiinae and two new species of the genus *Haematorrhophus* Stal from southern India (Heteroptera- Reduviidae), *J. Bombay nat. Hist. Society.* 92 (32)**:** 386 -389. **Compilers:** D. Livingstone, C. Murugan, P.T. Cherian, P. Pugalenthi, K.G. Emiliyamma, B.A. Daniel.

32. *Heterometrus* barberi (Pocock) -- EN (B1, 2c) -- **Order /Family:** Scorpiones / Scorpionidae . **Taxonomic status:** Species. **Habit:** Nocturnal. **Habitat:** Dense forest. **Global Distribution: ENDEMIC** to southern India. **Current Regional Distribtuion:** Tamil Nadu. **- Elevation:** 1,000 - 1,500 m. **- Range (sq. km):** < 5,000. **- Area Occupied (sq. km):** < 2,000. **- Number of locations:** 1 (Kalakkad Mundanthurai). **Population Trends: - % Decline:** Not known. **- Time / Rate (Yrs or gens):** Not known. **- No. of Mature Individuals:** Not known. **Global Population:** Restricted habitat . Population trend not known. **Data Quality:** General field study; Informal field sighting (Indira, ZSI; P. Ahimaz, WWF). **Recent Field Studies:** M.S. Ravichandran, 1995 in Kalakkad Mundanthurai. **Threats:** Human interference; Loss of habitat. **Trade:** No. **Other Comments:** Restricted range; not studied at length; specimen collected in 1900, London Museum. First specimen collected in early 1900 by Mr. Pocock, deposited in British Museum of Natural History; subsequent specimens collected / observed in late 1980's and early 1990's. It may be inferred that this species is rare. Captive breeding - Generally easy in case of scorpions but not known in this case. Classified by group as endemic species. **Status- IUCN: ENDANGERED**. **- Criteria based on: B1, 2c** (Restricted distribution, single location, continuing decline in extent of occurrence, area of occupancy and/or

quality of habitat). **- CITES:** No. **- IWPA (1972; 91):** No. **- RDB, National (old cat.):** No . **- RDB, International (old cat.):** No. **Recommendations: - Research management:** Taxonomic and morphological genetic studies; Survey; Monitoring; Life history study . **- PHVA:** Pending . **Captive Breeding Recommendations: - Captive breeding:** Pending . **- Level of difficulty:** Not known. **Existing Captive Programmes:** None. **- Names of facilities:** —. **Sources:** Pocock, R.I (1900) *The Fauna of British India, including Ceylon and Burma.* Arachnida. Today and Tomorrow's Printers and Publishers, New Delhi. . Tikadar, B.K & D.B.Bastawade. (1983) *Fauna of India: Scorpions.* Arachnida. Vol. III**:** 1-667. **Compilers:** Indira, K. Bano, Mary Bai, M.V. Reddy, P. Ahimaz, R. Bhanumati.

33. *Heterometrus keralensis* Tikader & Bastawade -- EN (B1, 2c) -- Order /Family: Scorpiones / Scorpionidae. **Taxonomic status:** Species. **Habit:** Nocturnal. **Habitat:** Dense forest. **Global Distribution: ENDEMIC** to southern India. **Current Regional Distribtuion:** Kerala. **- Elevation:** 500 -1600 m. **- Range (sq. km):** < 5,000. **- Area Occupied (sq. km):** < 500. **- Number of locations:** 1 (New Amarambalam). **Population Trends: - % Decline:** 10 %. **- Time / Rate (Yrs or gens):** 10 years. **- No. of Mature Individuals:** Not known. **Global Population:** Gradual decline. **Data Quality:** General field study (Pillai *et .al* (ZSI, SRS), 1983). **Recent Field Studies:** None. **Threats:** Human inerference; Loss of habitat. **Trade:** No. **Other Comments:** Not sighted often before or after the first report (1983). 2 mature specimens from one location. Difficult to procure due to rarity. **Status- IUCN: ENDANGERED**. **- Criteria based on: B1, 2c** (Restricted distribution, single location, continuing decline in extent of occurrence, area of occupancy and/or quality of habitat). **- CITES:** No. **- IWPA (1972; 91):** No. **- RDB, National (old cat.):** No . **- RDB, International (old cat.):** No. **Recommendations: - Research management:** Taxanomic and genetic morphological studies; Survey; Monitoring; Habitat management; Limiting factor research; Life history studies. **- PHVA:** Pending. **Captive Breeding Recommendations: - Captive breeding:** Level 3. **- Level of difficulty:** Very difficult. **Existing Captive Programmes:** None. **- Names of facilities:** —. **Sources:** Pocock, R.I (1900) *The Fauna of British India, including Ceylon and Burma.* Arachnida. Today and Tomorrow's Printers and Publishers New Delhi. . Tikadar, B.K & D.B.Bastawade. (1983) *Fauna of India: Scorpions.* Arachnida. Vol. III**:** 1 -667. **Compilers:** T.J. Indira, P. Ahimaz, K. Bano, M.V. Reddy, M. Mary Bai, R. Bhanumathi.

34. *Heterometrus malapuramensis* Tikader and Bastawade -- VU (A1c; B1, 2a, 2c) -- Order /Family: Scorpiones / Scorpionidae. **Taxonomic status:** Species. **Habit:** Nocturnal carnivorous. **Habitat:** Mainly forest. **Global Distribution: ENDEMIC** to Southern India. **Current Regional Distribtuion:** Kerala and Tamil Nadu. **- Elevation:** Plains to 1,000 m. **- Range (sq. km):** < 20,000. **- Area Occupied (sq. km):** < 2,000. **- Number of locations:** 5; Fragmented. **Population Trends: - % Decline:** 20 %. **- Time / Rate (Yrs or gens):** 10 years. **- No. of Mature Individuals:** Not known. **Global Population:** Continuing decline. **Data Quality:** General field study; Informal field sighting (R.Bhanumathi, 1990. Topslip, I.G.Sanctuary). **Recent Field Studies:** M.S. Ravichandran, 1996. **Threats:** Loss of habitat. **Trade:** No. **Other Comments:** . **Status- IUCN: VULNERABLE**. **- Criteria based on: A1c**. (Population reduction due to decline in extent of occurence, area of occupancy and /or quality of habitat); **B1, 2a, 2c** (Restricted distribution, limited locations fragmented, continuing decline in extent of occurence and /or area of occupancy and quality of habitat). **- CITES:** No. **- IWPA (1972; 91):** No. **- RDB, National (old cat.):** No . **- RDB, International (old cat.):** No. **Recommendations: - Research management:** Survey; Monitoring; Life history studies; Limiting factor research . **- PHVA:** Pending. **Captive Breeding Recommendations: - Captive breeding:** Pending. **- Level of difficulty:** Not known. **Existing Captive Programmes:** None. **- Names of facilities:** —. **Sources:** Pocock, R.I (1900) *The Fauna of British India, including Ceylon and Burma.* Arachnida. Today and Tomorrow's printers and Publishers New Delhi. . Tikadar, B.K & D.B.Bastawade. (1983) *Fauna of India: Scorpions.* Arachnida. Vol. III**:** 1 -667. . **Compilers:** T.J. Indira, M. Mary Bai, M.V. Reddy, K. Bano, P. Ahimaz, R. Bhanumathy.

35. *Heterometrus swammerdami* (Simon) -- VU (A1a, 1c) -- Order/ Family**:** Scorpiones / Scorpionidae. **Taxonomic status:** Species . **Habit:** Nocturnal, carnivora. **Habitat:** Cosmopolitan. **Global Distribution:** India and Sri Lanka . **Current Regional Distribtuion:** Southern India. **- Elevation:** Plains. **- Range (sq. km):** > 20,000. **- Area Occupied (sq. km):** > 2,000. **- Number of locations:** Many. **Population Trends: - % Decline:** 20%. **- Time / Rate (Yrs or gens):** 10 years. **- No. of Mature Individuals:** Not known. **Global Population:** Not known. **Regional Population:** Continuing decline observed. **Data Quality:** General field study; Informal field sighing (Indira - pers. comm.; Mary Bai and party, ZSI) . **Recent Field Studies:** M. Mary Bai and party, ZSI, 1995; B. Rathinasabapathy & B.A. Daniel, 1997. in Anaikatty, Coimbatore Dist.,. **Threats:** Loss of habitat; Change in Edaphic factors; Human interference; Drought . **Trade:** No. **Other Comments:** . **Status- IUCN: VULNERABLE (Regionally -southern India)**. **DATA DEFICIENT (Globally)** . **- Criteria based on: A1a, 1c** (Population reduction observed due to decline in extent of occurrence, area of occupancy and/or quality of habitat). **- CITES:** No . **- IWPA (1972; 91):** No. **- RDB, National (old cat.):** No . **- RDB, International (old cat.):** No. **Recommendations: - Research management:** Survey; Habitat management. **- PHVA:** Yes. **Captive Breeding Recommendation:** . **- Captive breeding:** Level 1. **- Level of difficulty:** Least difficult. **Existing Captive Programmes:** None. **- Names of facilities:** —. **Sources:** Pocock, R.I (1900) *The Fauna of British India, including Ceylon and Burma.* Arachnida. Today and Tomorrow's Printers and Publishers, New Delhi. . Tikadar, B.K & D.B. Bastawade. (1983) *Fauna of India: Scorpions.* Arachnida. Vol. III**:** 1 -667. **Compilers:** T.J. Indira, M. Mary Bai, K. Bano, M.V. Reddy, P. Ahimaz, R. Bhanumathi, B.A. Daniel.

36. *Ilyocryptus spinifer* (Herrick) -- LRnt -- **Order /Family:** Cladocera. **Taxonomic status:** Species. **Habit:** Littoral / Benthic. **Habitat:** Lentic freshwater . **Global Distribution:** China, Australia, North America, India. **Current Regional Distribtuion:** Southern India . **- Elevation:** 1,000 m. **- Range (sq. km):** > 20,000. **- Area Occupied (sq. km):** > 2,000. **- Number of locations:** 1 (Thiruvananthapuram). **Population Trends: - % Decline:** 10%. **- Time / Rate (Yrs or gens):** 10 years. **- No. of Mature Individuals:** Not known. **Global Population:** Not known. **Regional Population:** Gradual continuing decline. **Data Quality:** General field study (R.G. Michael and B.K. Sharma, 1980s). **Recent Field Studies:** None. **Threats:** Pollution; Loss of habitat; Pesticides. **Trade:** No. **Other Comments:** . **Status- IUCN: LOWER RISK -NEAR THREATENED (Regionally -southern india)**. **DATA DEFICIENT (Globally)**. **- Criteria based on:** Not applicable. **- CITES:** No. **- IWPA (1972; 91):** No. **- RDB, National (old cat.):** No . **- RDB, International (old cat.):** No. **Recommendations: - Research management:** Survey. **- PHVA:** No. **Captive Breeding Recommendation:** . **- Captive breeding:** No. **- Level of difficulty:** Least difficult. **Existing Captive Programmes:** None. **- Names of facilities:** —. **Sources:** Michael, R.G. and Sharma, B.K.

(1988) *Fauna of India and Adjacent countries* (Crustacea, Brachiopoda, Cladocera) Zoological Survey of India, . pp. 1-262. **Compilers:** M.B. Ragunathan, R. Natarajan, M.S. Ravichandran, C. Gunasekaran.

37. *Indoplanorbis exustus* (Deshayes) -- LRnt -- Order /Family: Basommatophora / Planorbidae. **Taxonomic status:** Species. **Habit:** Lentic freshwater. **Habitat:** Ponds . **Global Distribution:** Sri Lanka, India, China, Indonesia and Myanmar. **Current Regional Distribtuion:** Southern India . **- Elevation:** Up to 1,000 m. **- Range (sq. km):** > 20,000. **- Area Occupied (sq. km):** > 2,000. **- Number of locations:** Many (Bangalore in Karnataka; Tamil Nadu). **Population Trends: - % Decline:** 10 %. **- Time / Rate (Yrs or gens):** 10 years. **- No. of Mature Individuals:** Not known. **Global Population:** Not known. **Regional Population:** Gradual continuing decline observed. **Data Quality:** General field studies (MAB Project 1984-87 in 72 localities of Tamil Nadu). **Recent Field Studies:** M.B. Ragunathan and V.R. Punithavelu, 1996-97 in Chengalpet Dist. **Threats:** Loss of habitat; Pollution; Pesticides. **Trade:** Not known. **Other Comments:** . **Status-IUCN: LOWER RISK - NEAR THREATENED (Regionally -southern India)**. **DATA DEFICIENT (Globally)**. **- Criteria based on:** Not applicable. **- CITES:** No. **- IWPA (1972; 91):** No. **- RDB, National (old cat.):** No . **- RDB, International (old cat.):** No. **Recommendations: - Research management:** Survey, Cercarial studies. **- PHVA:** No. **Captive Breeding Recommendation: :** . **- Captive breeding:** No. **- Level of difficulty:** Least difficult. **Existing Captive Programmes**None. **- Names of facilities:** —. **Sources:** Anandantharaman,M. MAB Project**:** The Ecology Distribution and documentation of Fresh water Gastropods of Tamil Nadu and their Cercarial Fauna (1 Oct. 1984 - 31 Mar 1988). Sathyamurthy, S.T. (1960) The Land and Freshwater Mollusca in the Colllection of the Madras Government Museum. *Bulletin of Madras Govt. Museum.*. **Compilers:** R. Natarajan, M.B. Ragunathan, V.R. Punithavelu, S. Paulraj, C. Gunasekaran, Satish Kumar.

38. *Isometrus brachycentrus* -- VU (B1, 2a, 2c) -- **Order /Family:** Scorpiones / Buthidae. **Taxonomic status:** Species. **Habit:** Nocturnal. **Habitat:** Forest. **Global Distribution: ENDEMIC** to Western Ghats. **Current Regional Distribtuion:** .Western Ghats. **- Elevation:** 1,000 - 1,500 m. **- Range (sq. km):** < 20,000. **- Area Occupied (sq. km):** < 2,000. **- Number of locations:** Collected from 3 locations (Anamalai, Mangalore, Kerala). **Population Trends: - % Decline:** 10 %. **- Time / Rate (Yrs or gens):** 10 years. **- No. of Mature Individuals:** Not known. **Global Population:** Gradual continuing decline observed . **Data Quality:** General field study, (G.U. Kurup, Dec 1983) . **Recent Field Studies:** G.U. Kurup, February 1992. **Threats:** Human interference; Loss of habitat. **Trade:** No. **Other Comments:** Rare species. **Status-IUCN: VULNERABLE**. - **- Criteria based on: B1, 2a, 2c** (Restricted distribution, Limited location,continuing decline in extent of occurrence, and /or area of occupancy and quality of habitat). **- CITES:** No. **- IWPA (1972; 91):** No. **- RDB, National (old cat.):** No . **- RDB, International (old cat.):** No. **Recommendations: - Research management:** Taxonomic and morphological genetic studies; Survey; Monitoring; Life history studies . **- PHVA:** Pending. **Captive Breeding Recommendations: - Captive breeding:** Pending. **- Level of difficulty:** Not known. **Existing Captive Programmes:** None . **- Names of facilities:** —. **Sources:** Pocock, R.I (1900) *The Fauna of British India, including Ceylon and Burma.* Arachnida. Today and Tomorrow's Printers and Publishers, New Delhi. . Tikadar, B.K & D.B.Bastawade. (1983) *Fauna of India: Scorpions.* Arachnida. Vol. III**:** 1 -667. **Compilers:** T.J. Indira, V.M. Reddy, Mary Bai, K. Bano, P. Ahimaz, R. Bhanumathi.

39. *Lamellidens marginalis* (Lamarele) -- LRnt -- **Order /Family:** Eulamethibranchiata / Unionidae. **Taxonomic status:** Species. **Habit:** Benthic, filterfeeder. **Habitat:** Lentic and Lotic freshwater. **Global Distribution:** India, Myanmar, Sri Lanka. **Current Regional Distribtuion:** Southern India. **- Elevation:** 1,000 m. **- Range (sq. km):** > 20,000. **- Area Occupied (sq. km):** > 2,000. **- Number of locations:** Many. **Population Trends: - % Decline:** 15%. **- Time / Rate (Yrs or gens):** 10 . **- No. of Mature Individuals:** Not known. **Global Population:** Not known. **Regional Population:** Gradual continuing decline. **Data Quality:** General field studies. **Recent Field Studies:** M.B. Ragunathan, 1996 Sep. in Dharmapuri Dist. **Threats:** Loss of habitat; Harvest (for lab. studies). **Trade:** No. **Other Comments:** Collections for laboratory studies. **Status- IUCN: LOWER RISK -NEAR THREATENED (Regionally -southern India)**. **DATA DEFICIENT (Globally)**. **- Criteria based on:** Not applicable. **- CITES:** No. **- IWPA (1972; 91):** No. **- RDB, National (old cat.):** No . **- RDB, International (old cat.):** No. **Recommendations: - Research management:** Survey. **- PHVA:** No. **Captive Breeding Recommendation:** . **- Captive breeding:** No. **- Level of difficulty:** Least difficult. **Existing Captive Programmes**None. **- Names of facilities:** —. **Sources:** . **Compilers:** M.B. Ragunathan, R. Natarajan, M.S. Ravichandran, C. Gunasekaran.

40. *Lychas tricarinatus* Simon -- LRlc -- **Order /Family:** Scorpiones / Buthidae. **Taxonomic status:** Species. **Habit:** Nocturnal. **Habitat:** Cosmopolitan in distribution. **Global Distribution:** Widely distributed in India. **Current Regional Distribtuion:** Southern India. **- Elevation:** Plains to 1000 m. **- Range (sq. km):** > 20,000. **- Area Occupied (sq. km):** > 2,000. **- Number of locations:** Many (Chennai, Chengalpet, Salem, Dharmapuri, Pondicherry, Nilgiris). **Population Trends:** No change. **- % Decline:** No change. **- Time / Rate (Yrs or gens):** No change. **- No. of Mature Individuals:** Not known. **Global Population:** Not known. **Regional Population:** No change observed. **Data Quality:** General field study ZSI (SRS) from 1980 onwards. **Recent Field Studies:** Mary Bai and party during Feb. 1997 (ZSI) in Chengalpet Dist.,; B. Rathinasabapathy &. B.A. Daniel, 1997 in Anaikatty, Coimbatore Dist.,. **Threats:** Human interference; Loss of habitat . **Trade:** No. **Other Comments:** —. **Status- IUCN: LOWER RISK -LEAST CONCERN (southern India)**. **DATA DEFICIENT (Globally)**. **- Criteria based on:** Not applicable. **- CITES:** No. **- IWPA (1972; 91):** No. **- RDB, National (old cat.):** No . **- RDB, International (old cat.):** No. **Recommendations: - Research management:** Monitoring; Research on venom for medical purposes. **- PHVA:** No. **Captive Breeding Recommendation:** . **- Captive breeding:** No . **- Level of difficulty:** Least difficult. **Existing Captive Programmes:** None. **- Names of facilities:** —. **Sources:** Pocock, R.I (1900) *The Fauna of British India, including Ceylon and Burma.* Arachnida. Today and Tomorrow's Printers and Publishers New Delhi. . Tikadar, B.K & D.B.Bastawade. (1983) *Fauna of India: Scorpions.* Arachnida. Vol. III**:** 1 -667. **Compilers:** T.J. Indra, M.V. Reddy, Mary Bai, K. Bano, P. Ahimaz, R. Bhanumathy, B.A. Daniel.

41. *Lymnaea acuminata* -- NE -- Order /Family: Basommatophora / Lymnaediae. **Taxonomic status:** Species. **Habit:** Attach to floating algae. **Habitat:** Fresh water lentic . **Global Distribution:** India and Burma . **Current Regional Distribtuion:** Southern India. **- Elevation:** Up to 900 m. **- Range (sq. km):** > 20,000. **- Area Occupied (sq. km):** > 2,000. **- Number of locations:** Many; Fragmented. **Population Trends: - % Decline:** 10 %. **- Time / Rate (Yrs or gens):** 10 years.

- No. **of Mature Individuals:** Not known. **Global Population:** Not known. **Regional Population:** Gradual continuing decline. **Data Quality:** General field studies. (Natarajan, 1956; 1958 -60 in Chidambaram;. Anantharaman, 1984 -88 in Tamil Nadu). **Recent Field Studies:** None. **Threats:** Loss of habitat; Pollution; Pesticides. **Trade:** No. **Other Comments:** Common species, widely distributed. Only shells have been studied as no living specimen in Tamil Nadu studied. Latent studies. No report of species. Specimen identification made on the basis of dead shells only. No authentic information available. **Status- IUCN: NOT EVALUATED**. **- Criteria based on:** Not applicable. **- CITES:** No . **- IWPA (1972; 91):** No. **- RDB, National (old cat.):** No . **- RDB, International (old cat.):** No. **Recommendations: - Research management:** Survey. **- PHVA:** No. **Captive Breeding Recommendation:** . **- Captive breeding:** No. **- Level of difficulty:** Least difficult. **Existing Captive Programmes**None. **- Names of facilities:** —. **Sources:** Anantharaman, M. MAB Project**:** The Ecology Distribution and documentation of Freshwater Gastropods of Tamil Nadu and their Cercarial Fauna (1 Oct. 1984 - 31 Mar 1988). Sathyamurthy, S.T. (1960) The Land and Freshwater Mollusca in the collection of the Madras Government Museum. *Bulletin of Madras Govt. Museum.*. **Compilers:** M.B. Raghunathan, S. Paulraj, K. Revati, R. Natarajan, C. Gunasekaran.

42. *Lymnaea luteola* -- LRnt -- **Order /Family:** Basommatophora / Lymnaeidae. **Taxonomic status:** Species. **Habit:** Attached to aquatic vegetation. **Habitat:** Fresh water lentic. **Global Distribution:** Indian subcontinent. **Current Regional Distribtuion:** Southern India. **- Elevation:** About 900 m. **- Range (sq**. **km):** > 20,000. **- Area Occupied (sq**. **km):** > 2,000. **- Number of locations:** Many (Bangalore, Conoor, Trichy, Madras). **Population Trends: - % Decline:** 10 %. **- Time / Rate (Yrs or gens):** 10 years. **- No**. **of Mature Individuals:** Not known. **Global Population:** Not known. **Regional Population:** Gradual continuing decline observed. **Data Quality:** General field studies (R. Natarajan 1955-60 in Chidambaram; Anantharaman, 1984-88 in Tamil Nadu) . **Recent Field Studies:** None. **Threats:** Loss of habitat; Pollution; Pesticides. **Trade:** No. **Other Comments:** Common species, widely distributed. **Status- IUCN: LOWER RISK -NEAR THREATENED (Regionally -southern India)**. **DATA DEFICIENT (Globally)**. **- Criteria based on:** —. **- CITES:** No. **- IWPA (1972; 91):** No. **- RDB, National (old cat.):** No . **- RDB, International (old cat.):** No. **Recommendations: - Research management:** Survey; Monitoring. **- PHVA:** No. **Captive Breeding Recommendation:** . **- Captive breeding:** No. **- Level of difficulty:** Least difficult. **Existing Captive Programmes**None. **- Names of facilities:** —. **Sources:** Anantharaman,M. MAB Project**:** The Ecology Distribution and documentation of Freshwater Gastropods of Tamil Nadu and their Cercarial Fauna (1 Oct. 1984 -31 Mar 1988). Sathyamurthy, S.T. (1960) The Land and Freshwater Mollusca in the Colllection of the Madras Government Museum. *Bulletin of Madras Govt. Museum.*. **Compilers:** R. Natarajan, M.B. Raghunathan, S. Paulraj, K. Revati, C. Gunasekaran.

43. *Macrotermes estherae* (Desneux) -- EN (B1, 2a, 2b, 2c, 2d) -- (*Termes estherae* Desneux). **Order/ Family:** Isoptera / Termitidae. **Taxonomic status:** Species. **Habit:** Dry grass and leaf litter. **Habitat:** Subterranean in forests and plantations between 500-1,500 m. **Global Distribution:** India, Sri Lanka. **Current Regional Distribtuion:** Karnataka, Tamil Nadu, Andhra Pradesh. **- Elevation:** 500-1,500 m. **- Range (sq**. **km):** < 5,000. **- Area Occupied (sq**. **km):** < 500. **- Number of locations:** Many; Fragmented. **Population Trends: - % Decline:** 30%. **- Time / Rate (Yrs or gens):** 10 yrs. . **- No**. **of Mature Individuals:** Not known. **Global Population:** Not known. **Regional Population:** Continuing decline observed. **Data Quality:** General field studies (D. Rajagopal, 1983, Karnataka). **Recent Field Studies:** D. Rajagopal, 1997 in Karnataka . Threats**:** Loss of habitat; Change in edaphic factors . **Trade:** No. **Other Comments:** Restricted to forest and plantations. Largest size among termites. Length of soldier 15 to 16mm. Length with wings ca.32 to 33mm. **Status- IUCN: ENDANGERED (Regionally -southern India)**. **DATA DEFICIENT (Globally)**. **- Criteria based on: B1, 2a, 2b, 2c, 2d** (Restricted distribution, severely fragmented, continuing decline in area, extent of occurrence, quality of habitat and number of locations). **- CITES:** No. **- IWPA (1972; 91):** No. **- RDB, National (old cat.):** No . **- RDB, International (old cat.):** No. **Recommendations: - Research management:** Survey; Monitoring; Habitat management; Limiting factor research . **- PHVA:** Pending. **Captive Breeding Recommendation:** . **- Captive breeding:** No. **- Level of difficulty:** Not known. **Existing Captive Programmes:** None. **- Names of facilities:** —. **Sources:** Rajagopal, D. (1983) Habit and habitat studies of some termites of Karnataka. *J.Soil Biol. Ecol.* 3(2)**:** 108 -123. Chhotani, O.B. (1980) *Termite pest of Agriculture in the Indian Region and their control*, . ZSI, Calcutta. **Compilers:** D. Rajagopal, A.K. Chakravarthy, A.S. Vastrad, R. Mathew, B.A. Daniel.

44. *Macrothrix laticornis* (Jurine) -- LRnt -- **Order /Family:** Cladocera / Macrothricidae. **Taxonomic status:** Species. **Habit:** Littoral / Benthic. **Habitat:** Lentic freshwater. **Global Distribution:** Distributed throughout the world. **Current Regional Distribtuion:** Southern India . **- Elevation:** Up to 3,050 m. **- Range (sq**. **km):** > 20,000. **- Area Occupied (sq**. **km):** > 2,000. **- Number of locations:** 3 (Tamil Nadu, Karnataka, Kerala - Irinjalkuda). **Population Trends: - % Decline:** 10 %. **- Time / Rate (Yrs or gens):** 10 years. **- No**. **of Mature Individuals:** Not known. **Global Population:** Not known. **Regional Population:** Gradual continuing decline observed. **Data Quality:** General field studies. **Recent Field Studies:** M.B. Ragunathan 1993-97 in Tamil Nadu. **Threats:** Loss of habitat; Pollution; Pesticides. **Trade:** No. **Other Comments:** No. **Status- IUCN: LOWER RISK - NEAR THREATENED (Regionally -southern India)**. **DATA DEFICIENT (Globally)**. **- Criteria based on:** Not applicable. **- CITES:** No. **- IWPA (1972; 91):** No. **- RDB, National (old cat.):** No. **- RDB, International (old cat.):** No. **Recommendations: - Research management:** No. **- PHVA:** No. **Captive Breeding Recommendation:** . **- Captive breeding:** Monitoring. **- Level of difficulty:** Least difficult. **Existing Captive Programmes**None. **- Names of facilities:** —. **Sources:** Michael, R.G. and Sharma B.K. (1988) *Fauna of India and adjacent countries.*. Indian Cladocera (Crusteacea, Brachopoda, Cladocera). **Compilers:** M.B. Ragunathan, R. Natarajan, M.S. Ravichandran, C. Gunasekaran.

45. *Melania scabra* -- VU (A1c) -- **Order /Family:** Megagastropoda / Melaniidae. **Taxonomic status:** Species. **Habit:** Attached to hard substances. **Habitat:** Lotic freshwater. **Global Distribution:** Throughout the world in Equatorial regions. **Current Regional Distribtuion:** Southern India. **- Elevation:** Up to 500 m. **- Range (sq**. **km):** > 20,000. **- Area Occupied (sq**. **km):** > 2,000. **- Number of locations:** Many. **Population Trends: - % Decline:** 20%. **- Time / Rate (Yrs or gens):** 10. **- No**. **of Mature Individuals:** Not known. **Global Population:** Not known. **Regional Population:** Continuing decline in population observed. **Data Quality:** General field studies (Anantharaman, 1984 -88 in Tamil Nadu) and indirect information. **Recent Field Studies:** None. **Threats:** Loss of habitat; Pollution; Pesticides. **Trade:** No. **Other Comments:**

Common species; widely distributed. **Status- IUCN: VULNERABLE (Regionally -southern India)**. **DATA DEFICIENT (Globally)**. **- Criteria based on: A1c** (Population reduction due to decline in area of occupancy, extent of occurrence and /or quality of habitat). **- CITES:** No. **- IWPA (1972; 91):** No. **- RDB, National (old cat.):** No . **- RDB, International (old cat.):** No. **Recommendations: - Research management:** No. **- PHVA:** No. **Captive Breeding Recommendation:** . **- Captive breeding:** No. **- Level of difficulty:** Least difficult. **Existing Captive Programmes:** None. **- Names of facilities:** —. **Sources:** Anantharaman, M. MAB Project**:** The Ecology Distribution and documentation of Freshwater Gastropods of Tamil Nadu and their Cercarial Fauna (1 Oct. 1984 -31 Mar 1988). Sathyamurthy, S.T. (1960) The Land and Freshwater Mollusca in the Colllection of the Madras Government Museum. *Bulletin of Madras Govt. Museum.*. **Compilers:** R. Natarajan, M.B. Ragunathan, S. Paulraj, K.Revathi, C. Gunasekaran, . V.R. Punithavelu.

46. *Melania tuberculata* (Muller) -- VU (A1c) -- **Order /Family:** Megagastropoda / Melanidae. **Taxonomic status:** Species. **Habit:** Attached to hard substratum. **Habitat:** Lotic freshwater. **Global Distribution:** Africa, Asia, China, N. Australia, India, Sri Lanka, Myanmar. **Current Regional Distribtuion:** Southern India. **- Elevation:** Up to 1,500 m. **- Range (sq. km):** > 20,000. **- Area Occupied (sq. km):** > 2,000. **- Number of locations:** Many ((Madras, Pulla River, Cudappah, Pune, Mahe, Krusady Islands, Gulf of Mannar). **Population Trends: - % Decline:** 20%. **- Time / Rate (Yrs or gens):** 10 years. **- No. of Mature Individuals:** Not known. **Global Population:** Not known. **Regional Population:** Continuing decline in population observed. **Data Quality:** General field studies (M. Anantharaman, 1984-88); Indirect information. **Recent Field Studies:** None. **Threats:** Loss of habitat; Pollution. **Trade:** No. **Other Comments:** Parthenogenetic reproduction. Well established species. **Status- IUCN: VULNERABLE (Regionally -southern India)**. **DATA DEFICIENT (Globally)**. **- Criteria based on: A1c** (population reduction due to reduction in area of occupancy, extent of occurence and/or quality of habitat). **- CITES:** No. **- IWPA (1972; 91):** No. **- RDB, National (old cat.):** No . **- RDB, International (old cat.):** No. **Recommendations: - Research management:** No. **- PHVA:** No. **Captive Breeding Recommendation:** . **- Captive breeding:** No. **- Level of difficulty:** Least difficult. **Existing Captive Programmes**None . **- Names of facilities:** —. **Sources:** Sathyamurthy, S. T. (1960). The Land and Freshwater Mollusca in the Collection of the Madras Government Museum. *Bulletin of Madras Govt. Museum.*. Anantharaman, M. MAB Project**:** The Ecology Distribution and documentation of Freshwater Gastropods of Tamil Nadu and their Cercarial Fauna (1 Oct. 1984 -31 Mar 1988). R. Natarajan, M.B. Ragunathan, S. Paulraj, V.R. Punithavelu , C. Gunasekaran.

47. *Meranoplus bellii* Forel -- DD -- **Order /Family:** Hymenoptera / Formicidae. **Taxonomic status:** Species. **Habit:** Nectar feeders. **Habitat:** Soil inhabiting, restricted to forests. **Global Distribution:** ENDEMIC to southern India. **Current Regional Distribtuion:** Southern India . **- Elevation:** 50 -1,100 m. **- Range (sq. km):** < 5,000. **- Area Occupied (sq. km):** < 500. **- Number of locations:** 5 (Jog falls in Shimoga and Coorg; Calicut in Kerala). **Population Trends: - % Decline:** Not known. **- Time / Rate (Yrs or gens):** Not known. **- No. of Mature Individuals:** Not known. **Global Population:** Sighted only five times, Trends not known. **Data Quality:** General Field Studies (T.M.M. Ali, 1983 in Karnataka). **Recent Field Studies:** Sheila, 1992-96 in Calicut; T.C. Narendran and Sheela, 1994 in Calicut. **Threats:** Not known. **Trade:** No . **Other Comments:** Nests in hard soil. Restricted to forests. Population assessments have not been made. **Status- IUCN: DATA DEFICIENT**. **- Criteria based on:** Not applicable. **- CITES:** No. **- IWPA (1972; 91):** No. **- RDB, National (old cat.):** No . **- RDB, International (old cat.):** No. **Recommendations: - Research management:** Survey; Monitoring; Life history studies . **- PHVA:** Pending. **Captive Breeding Recommendations: - Captive breeding:** No. **- Level of difficulty:** Not known. **Existing Captive Programmmes:** None . **- Names of facilities:** —. **Sources:** Ali, T.M.M. (1992) Ants of Karnataka, *IUSSI Newsletter*, 3(1&2)**:** 1-9. Bingham, C.T. (1903) *Fauna of British India including Ceylon and Burma*, . *Hymenoptera 2. Ants and Cukoo - wasps*. 506pp. London. . Bolton, B. (1995) *A New General Catalogue of the ants of the World,* Harvard University Press. **Compilers:** P.T. Cherian, D. Rajagopal, K.V. Lakshminarayana, R. Mathew, B.A. Daniel.

48. *Mesacanthaspis kovaiensis* Livingstone & Murugan 1993 -- CR (B1, 2c) -- **Order /Family:** Hemiptera / Reduviidae . **Taxonomic status:** Species. **Habit:** Under sotne. **Habitat:** Semi - arid. **Global Distribution: ENDEMIC** to southern India. **Current Regional Distribtuion:** Southern India. **- Elevation:** 350 m. **- Range (sq. km):** < 100. **- Area Occupied (sq. km):** < 10. **- Number of locations:** 2 (Chandrapuram and Maruthamalai, Coimbatore district); Fragmented. **Population Trends: - % Decline:** Not known . **- Time / Rate (Yrs or gens):** Not known . **- No. of Mature Individuals:** Not known . **Global Population:** Not known. **Data Quality:** General field studies (D. Livingstone & C. Murugan 1983-84 in Chandrapuram; D. Livingstone & C. Murugan 1989 in Maruthamalai). **Recent Field Studies:** None. **Threats:** Loss of Habitat; Grazing; Human intereference. **Trade:** No. **Other Comments:** New genus in the subfamily Acanthaspidinae. Monotypic. **Status- IUCN: CRITICALLY ENDANGERED**. **- Criteria based on: B1, 2c** (Restricted distribution, limited location, severely fragmented, continuing decline in extent of occurrence, area of occupancy and/or quality of habitat). **- CITES:** No. **- IWPA (1972; 91):** No. **- RDB, National (old cat.):** No. **- RDB, International (old cat.):** No. **Recommendations: - Research management:** Survey; Life history studies. **- PHVA:** No. **Captive Breeding Recommendation: - Captive breeding:** No . **- Level of difficulty:** Not known. **Existing Captive Programmes:** None. **- Names of facilities**—. **Sources:** Murugan C. (1988) Biosystematics and Ecophysiology of the Tibiaroliate Assassin Bugs (Heteroptera**:** Reduviidae) of Southern India. Ph. D. thesis, Bharathiar University, Coimbatore. Murugan, C and Livingstone, D (1993) Description of a new genus of Acanthaspidinae Stal with a key for the southern Indian genera (Heteroptera**:** Reduviidae), *Hexopoda* 5(1)**:** 37 -44. **Compilers:** D. Livingstone, C. Murugan, P.T. Cherian, P. Pugalenthi, K.G. Emiliyamma, B.A. Daniel.

49. *Mesobuthus hendersoni* (Pocock) -- LRlc -- **Order /Family:** Scorpiones / Buthidae. **Taxonomic status:** Species. **Habit:** Nocturnal. **Habitat:** Cosmopolitan; forests, cities, coconut groves, humid places. **Global Distribution: ENDEMIC** to southern India. **Current Regional Distribtuion:** Southern India. **- Elevation:** Plains. **- Range (sq. km):** > 20,000. **- Area Occupied (sq. km):** > 2,000. **- Number of locations:** Many (Chennai, Chengleput, S. Arcot, N. Arcot, Pondicherry, Nilgiris in Tamil Nadu; Andhra Pradesh). **Population Trends: - % Decline:** No change. **- Time / Rate (Yrs or gens):** Not known. **- No. of Mature Individuals:** Not known. **Global Population:** No change observed. **Data Quality:** General field study (ZSI scientists from 1983 onwards). **Recent Field Studies:** T.J. Indira - ongoing surveys. **Threats:** Loss

of habitat; Human interference. **Trade:** No. **Other Comments:** Belongs to one of the most venomous groups of scorpions. Widespread species. **Status- IUCN: LOWER RISK -LEAST CONCERN**. **- Criteria based on:** Not applicable. **- CITES:** No. **- IWPA (1972; 91):** No. **- RDB, National (old cat.):** No . **- RDB, International (old cat.):** No. **Recommendations: - Research management:** Research on venom for medical purposes. **- PHVA:** Pending. **Captive Breeding Recommendation:** . **- Captive breeding:** No. **- Level of difficulty:** Not known. **Existing Captive Programmes:** None . **- Names of facilities:** -. **Sources:** Pocock, R.I (1900) *The Fauna of British India, including Ceylon and Burma.* Arachnida. Today and Tomorrow's Printers and Publishers New Delhi. . Tikadar, B.K & D.B.Bastawade. (1983) *Fauna of India: Scorpions.* Arachnida. Vol. III**:** 1 -667. **Compilers:** T.J. Indira, V.M. Reddy, Mary Bai, K. Bano, P. Ahimaz, R. Bhanumathi.

50. *Microcerotermes fletcheri* Holmgren & Holmgren -- VU (A1a, 1c; B1, 2a, 2b, 2c) -- Order /Family: Isoptera / Termitidae. **Taxonomic status:** Species. **Habit:** Leaf litter feeder, tree bark feeder. **Habitat:** Trees stem dwelling on cashew, arboreal. **Global Distribution:** India, Bangaladesh, Pakistan, Bhutan. **Current Regional Distribtuion:** Southern India. **- Elevation:** up to 600 m. **- Range (sq. km):** > 20,000. **- Area Occupied (sq. km):** < 2,000. **- Number of locations:** Many (Karnataka, Andhra Pradesh, Kerala, Tamil Nadu); Fragmented. **Population Trends: - % Decline:** 30 %. **- Time / Rate (Yrs or gens):** 10 yrs. . **- No. of Mature Individuals:** Not known. **Global Population:** Gradual decline. **Regional Population:** Continuing decline observed. **Data Quality:** General field study . **Recent Field Studies:** D. Rajagopal, 1973-97 in southern India. **Threats:** Loss of habitat; Human interference. **Trade:** No. **Other Comments:** It has association with Cashew Tree, *Shorea robusta* and other plantations. Not commonly seen in plains but mostly in coastal areas. **Status- IUCN: VULNERABLE (Regionally -southern India)**. **DATA DEFICIENT (Globally)**. **- Criteria based on: A1a, 1c** (Observed population reduction due to decline in area, extent of occurrence & quality of habitat); **B1, 2a, 2b, 2c** (Restricted distribution, severely fragmented, . continuing decline in extent of occurrence, area of occupancy and quality of habitat). **- CITES:** No. **- IWPA (1972; 91):** No. **- RDB, National (old cat.):** No . **- RDB, International (old cat.): :** No. **Recommendations: - Research management:** Survey; Monitoring; Limiting factor management; Life history studies; Habitat managament. **- PHVA:** Pending . **Captive Breeding Recommendation:** . **- Captive breeding:** Level 3 . **- Level of difficulty:** Very difficult. **Existing Captive Programmes:** None. **- Names of facilities:** —. **Sources:** Rajagopal, D. (1983) Habit and habitat studies of ants of Karnataka, *J.Soil Biol.Ecol.* 3(2)**:** 108-121. **Compilers:** D. Rajagopal, A.S. Vastrad, A.K. Chakravorty, K.G. Emiliamma, R. Mathew, B.A. Daniel.

51. *Mysorella costigera* (Kuster) -- LRnt -- **Order /Family:** Megagastropoda / Hydrobiidae. **Taxonomic status:** Species. **Habit:** Littoral/ Benthic. **Habitat:** Lentic, freshwater . **Global Distribution:** India and Sri Lanka. **Current Regional Distribtuion:** Southern India. **- Elevation:** Up to 500 m. **- Range (sq. km):** > 20,000. **- Area Occupied (sq. km):** > 2,000. **- Number of locations:** Many. **Population Trends: - % Decline:** 10%. **- Time / Rate (Yrs or gens):** 10 years. **- No. of Mature Individuals:** Not known. **Global Population:** Not known. **Regional Population:** Gradual decline. **Data Quality:** General field study; Indirect information. **Recent Field Studies: :** None. **Threats:** Loss of habitat; Pollution; Pesticides. **Trade:** No . **Other Comments:** Common species, size 7.5 mm. **Status- IUCN: LOWER RISK - NEAR THREATENED** (**Regionally -southern India)**. **DATA DEFICIENT (Globally)**. **- Criteria based on:** Not applicable. **- CITES:** No. **- IWPA (1972; 91):** No. **- RDB, National (old cat.):** No . **- RDB, International (old cat.): :** No. **Recommendations: - Research management:** Survey. **- PHVA:** No. **Captive Breeding Recommendation:** . **- Captive breeding:** No. **- Level of difficulty:** Moderately difficult. **Existing Captive Programmes**None. **- Names of facilities:** —. **Sources:** Sathyamurthy, S.T. (1960) The land and freshwater mollusca in the collection of Madras Government Museum, *Bulletin of Government Museum Natural History*, Vol 1, No. 4. **Compilers:** R. Natarajan, M.B. Ragunathan, V.R. Punithavelu, S. Paulraj, . C. Gunasekaran, M.S. Ravichandran.

52. *Nasutitermes indicola* Holmgren & Holmgren -- VU (A1a, 1c; B1, 2a, 2c) -- **Order /Family:** Isoptera / Termitidae. **Taxonomic status:** Species. **Habit:** Leaf litter and bark feeder. **Habitat:** Trees, Arboreal. **Global Distribution:** Southern India and Sri Lanka. **Current Regional Distribtuion:** Southern India. **- Elevation:** Upto 1200 m. **- Range (sq. km):** < 20,000. **- Area Occupied (sq. km):** < 2,000. **- Number of locations:** Many; Fragmented. **Population Trends: - % Decline:** > 20%. **- Time / Rate (Yrs or gens):** 10 years. **- No. of Mature Individuals:** Not known. **Global Population:** Not known. **Regional Population:** Continuing decline observed. **Data Quality:** General field study. **Recent Field Studies:** D. Rajagopal, 1975 -95 in Mudigere, Karnataka. **Threats:** Loss of habitat. **Trade:** No. **Other Comments:** Nests used in medicine for respiratory disorder (fumes are inhaled) The nest is built using fecal pellets of termites only. . **Status- IUCN: VULNERABLE (Nationally)**. **DATA DEFICIENT (Globally)**. **- Criteria based on: A1a, 1c**; (Observed population reduction due to decline in area, extent of occurence and . quality of habitat); **B1, 2a, 2c** (Restricted distribution, severely fragmented and continued . decline in area of occupancy, extent of occurrence and habitat quality). **- CITES:** No. **- IWPA (1972; 91):** No. **- RDB, National (old cat.):** No . **- RDB, International (old cat.):** No. **Recommendations: - Research management:** Survey; Monitoring; Habitat management. **- PHVA:** Pending. **Captive Breeding Recommendation:** . **- Captive breeding:** No. **- Level of difficulty:** Not known. **Existing Captive Programmes:** No. **- Names of facilities:** —. **Sources:** Rajagopal, D. (1983) Habit and habitat studies of termites of Karnataka, *J. Soil Biol.* . *Ecol.* 3(2)**:** 108 -121. **Compilers:** D. Rajagopal, R. Mathew, B. A. Daniel, A.K. Chakravarthy, A.S. Vastrad.

53. *Ocnerodrilus occidentalis* Soota and Julka -- EN (B1, 2c) -- Order /Family: Lumbricina / Ocnerodrilidae. **Taxonomic status:** Species. **Habit:** Detritus feeder. **Habitat:** Marshy areas. **Global Distribution:** India, Pakistan; Sri Lanka; Singapore; China; Japan; Philippines; Mexico; Italy; Denmark; Greece; Central Asia Basin . . **Current Regional Distribtuion:** Southern India. **- Elevation:** 300 m. **- Range (sq. km):** > 20,000. **- Area Occupied (sq. km):** < 500. **- Number of locations:** 2 (Warangal in Andhra Pradesh). **Population Trends: - % Decline:** No change. **- Time / Rate (Yrs or gens):** Not known. **- No. of Mature Individuals:** Not known (50 /m2). **Global Population:** No change observed. **Data Quality:** General field study; Informal field sightings . **Recent Field Studies:** M.V. Reddy 1992 -93 in Warangal. **Threats:** Loss of habitat; Drought. **Trade:** No. **Other Comments:** Warangal population has the highest density amongst all species of earthworms. **Status- IUCN: ENDANGERED (Regionally -southern India)**. **DATA DEFICIENT (Globally)**. **- Criteria based on: B1, 2c** (Restricted distribution, limited locations, continuing decline in extent of occurrence, area of occupancy and /or

quality of habitat). **- CITES:** No. **- IWPA (1972; 91):** No. **- RDB, National (old cat.):** No . **- RDB, International (old cat.):** No. **Recommendations**: **- Research management:** Survey; Monitoring; Taxonomic studies, Habitat management, Research for pharmaceutical properties. **- PHVA:** Pending. **Captive Breeding Recommendation: - Captive breeding:** No. **- Level of difficulty:** Not known. **Existing Captive Programmes:** None. **- Names of facilities:** —. **Sources:** M.V. Reddy (1997) *Soil Biol.Ecol.* (in press). Stephenson, J. (1923) *Fauna of British India: Oligochaeta.* Today and Tomorrow's Printers and Publishers, New Delhi. . **Compilers:** M.V. Reddy, M. Mary Bai, T.J. Indira, P. Ahimaz, R Bhanumati.

54. *Octochaetona serrata* (Gates) -- VU (B1, 2c, 2e) -- (Earthworm). **Order /Family:** Lumbricina / Octochaetidae. **Taxonomic status:** Species. **Habit:** Geophytophagus subsurface feeder (soil and soil organic matter feeder). **Habitat:** Reddish brown acidic soil (Red soil). **Global Distribution: ENDEMIC** to southern India. **Current Regional Distribtuion:** Southern India. **- Elevation:** Plains, up to 500 m. **- Range (sq. km):** < 20,000. **- Area Occupied (sq. km):** < 2,000. **- Number of locations:** Many; restricted to red soil -Fragmented. **Population Trends: - % Decline:** 5% (GNP - Chennai) Localised as restricted population. **- Time / Rate (Yrs or gens):** 10 years. **- No. of Mature Individuals:** Not known (10 -15 / m2 during monsoon Oct -Nov). **Global Population:** Gradual continuing decline. **Data Quality:** Census and monitoring (S. Ismail in GNP, 1980-83; Ismail *et.al.*, 1993-96). **Recent Field Studies:** M.V. Reddy, Warangal, 1989-94; S. Ismail, 1993-96 in Guindy NP. **Threats:** Human interference; Change in edaphic factors; Loss of habitat; Drought. **Trade:** No. **Other Comments:** Litter preferences; Vegetation cover -favoured; show diapose (non-obligatory) aestivation undergone; This species prefers acid soil -has calciferous glands; neutralises soil by their action. K. Bano has surveyed red soil in Karnataka and notfound it. **Status- IUCN: VULNERABLE**. **- Criteria based on: B1, 2c, 2e** (Restricted distribution,severely fragmented, continuing decline in extent of occurrence, area of occupancy and /or quality of habitat, and number of mature individuals). **- CITES:** No. **- IWPA (1972; 91):** No. **- RDB, National (old cat.):** No. **- RDB, International (old cat.):** No. **Recommendations: - Research management:** Survey; Monitoring; Habitat management. **- PHVA:** No. **Captive Breeding Recommendation:** . **- Captive breeding:** Level 3 (Research and educational requirement). **- Level of difficulty:** Least difficult. **Existing Captive Programmes:** Complete culture facilities available . **- Names of facilities:** Institute of Research in soil Biology and Biotechnology, The New College, Chennai - 600 014. The facility available for *Perionyx excavatus* and *Lampito mauritii* can also be extended to *O.serrata*. **Sources:** Ismail, S. and Murthy, V.A (1985) Distribution of Earthworms in Madras. *Proceedings of Indian Academy of Sciences* 94**:** 557-566. . Ismail, S., Ramakrishnan, C. and & Anzera, M.M. (1990) Density and diversity in relation to the distribution of earthworm in Madras. *Proceeding. Indian Acad. Science.* 99(1)**:** 73-78. . **Compilers:** S. Ismail, M.V. Reddy, K. Bano, Mary Bai, T.J. Indira, P. Ahimaz, R Bhanumathi.

55. *Octonochaeta rosea* (Stephenson) -- LRnt -- **Order /Family:** Lumbricina / Megascolecidae. **Taxonomic status:** Species. **Habit:** Geophagus (soil feeder) . **Habitat:** Anecic in semi-arid areas. **Global Distribution:** Not known. **Current Regional Distribtuion:** Southern India. **- Elevation:** 300 - 500 m. **- Range (sq. km):** >20,000. **- Area Occupied (sq. km):** >2,000. **- Number of locations:** Many. **Population Trends: - % Decline:** Not known. **- Time / Rate (Yrs or gens):** Not known. **- No. of Mature Individuals:** Not known. **Global Population:** Not known. **Regional Population:** No change observed. **Data Quality:** Census and monitoring; Informal field sighting . **Recent Field Studies:** M.V. Reddy, 1992-93 at ICRISAT Farm near Hyderabad. **Threats:** Changes in edaphic factors; Human interference; Pesticides, Drought. **Trade:** No. **Other Comments:** This species has disappeared from the adjacent areas where modern agricultural practices are in operation. **Status- IUCN: LOWER RISK** NEAR THREATENED **(Regionally -southern India)**. **DATA DEFICIENT (Globally)**. **- Criteria based on:** Not applicable. **- CITES:** No. **- IWPA (1972; 91):** No. **- RDB, National (old cat.):** No . **- RDB, International (old cat.):** No. **Recommendations: - Research management:** Survey; Monitoring; Habitat management, Limiting factor research . **- PHVA:** Pending. **Captive Breeding Recommendation:** . **- Captive breeding:** Pending. **- Level of difficulty:** Moderately difficult. **Existing Captive Programmes:** None . **- Names of facilities:** —. **Sources:** M.V. Reddy, M.Vikram, V.P.K. Kumar, V.R.Reddy, P.Balashursi, D.G. Tule, A.L.Cogle, and Hangawad (1995) Earthworm biomass response to soil management in semi-Arid tropcal agroecosystem. *Biology Fertility of soil.* 1**:** 317 -321. Julka J.M (1997) in literature. . **Compilers:** M.V. Reddy, K. Bano, T.J. Indira, M. Mary Bai, P. Ahimaz, R. Bhanumati.

56. *Ocypoda ceratophthalma* -- LRnt -- (Ghost Crab). **Order /Family:** Decapoda / Ocypodida. **Taxonomic status:** Species. **Habit:** Burrowing. **Habitat:** Intertidal zone . **Global Distribution:** Indian coasts and coast of Africa to the Sandwich Island. **Current Regional Distribtuion:** Indian coast. **- Elevation:** Sea level. **- Range (sq. km):** > 20,000. **- Area Occupied (sq. km):** > 2,000. **- Number of locations:** Many. **Population Trends: - % Decline:** 10%. **- Time / Rate (Yrs or gens):** 10 years. **- No. of Mature Individuals:** Not known. **Global Population:** Not known. **Regional Population:** Gradual continuing decline. **Data Quality:** General field study (S. Krishnan, 1985); Indirect information. **Recent Field Studies:** None. **Threats:** Loss of habitat; Pollution; Human interference. **Trade:** No. **Other Comments:** S. Paulraj studied the relative growth, waterloss and autotomy in two species of Ocypoda crabs (*O. platytarsis* and *O. cordimana*). **Status- IUCN: LOWER RISK - NEAR THREATENED (Nationally)**. **DATA DEFICIENT (Globally)**. **- Criteria based on:** Not applicable. **- CITES:** No. **- IWPA (1972; 91):** No. - RDB, National(old cat.)**:** No . **- RDB, International (old cat.): :** No. **Recommendations: - Research management:** Survey . **- PHVA:** No. **Captive Breeding Recommendation:** . **- Captive breeding:** No. **- Level of difficulty:** Very difficult. **Existing Captive Programmes:** None. **- Names of facilities:** —. **Sources:** Alcock, A. (1968) Materials for a Carcinological fauna of India . Compliers**:** S. Paulraj, R. Natarajan, M.B. Ragunathan, K. Revathi, V.R. Punithavelu, . C. Gunasekaran.

57. *Ocypoda cordimana* -- EN (B1, 2a, 2c) -- (Ghost crab) **Order /Family:** Decapoda / Ocypodidae. **Taxonomic status:** Species. **Habit:** Burrowing. **Habitat:** Intertidal zone. **Global Distribution:** India and Sri Lanka coasts. **Current Regional Distribtuion:** Indian coast. **- Elevation:** Sea level. **- Range (sq. km):** < 5,000. **- Area Occupied (sq. km):** < 2,000. **- Number of locations:** 1 (Tamil Nadu). **Population Trends: - % Decline:** 20%. **- Time / Rate (Yrs or gens):** 10 years. **- No. of Mature Individuals:** Not known. **Global Population:** Not known . **Regional Population:** Restricted Distribution and continuing decline in population. **Data Quality:** General field study; Indirect information. **Recent Field Studies:** S. Krishnan, 1985 to till date in Madras. **Threats:** Pollution; Human interference; Loss of habitat. **Trade:** No. **Other Comments:** -. **Status- IUCN: ENDANGERED (Nationally)**. **DATA DEFIIENT (Globally)**. **- Criteria based on: B1, 2a, 2c**

(Restricted distribution, single location, continuing decline in extent of occurrence, and quality of habitat). **- CITES:** No. **- IWPA (1972; 91):** No. **- RDB, National (old cat.):** No . **- RDB, International (old cat.): :** No. **Recommendations: - Research management:** Survey; Habitat management . **- PHVA:** No. **Captive Breeding Recommendation:** . **- Captive breeding:** No. **- Level of difficulty:** Very difficult. **Existing Captive Programmes:** None. **- Names of facilities:** —. **Sources:** Alcock, A. (1968) *Materials for a carcinological fauna of India*. Paulraj, S. (1981) Studies on relative growth water loss and autotomy in two species of Ocypode crabs *O. platytaris* and *O. cordimana*. **Compilers:** S. Paulraj, M.B. Ragunathan, K. Revati, J.T. Jothinayagam, V.R. Punithavelu, . C. Gunasekaran, .

58. *Ocypoda macrocera* -- EN (B1, 2b, 2c) -- (Ghost crab). **Order /Family:** Decapoda / Ocypodidae. **Taxonomic status:** Species. **Habit:** Burrowing. **Habitat:** Intertidal. **Global Distribution:** ENDEMIC to East coast of India. **Current Regional Distribtuion:** East coast of India. **- Elevation:** Sea level. **- Range (sq. km):** < 5,000. **- Area Occupied (sq. km):** < 2,000. **- Number of locations:** Many; Fragmented. **Population Trends: - % Decline:** 20%. **- Time / Rate (Yrs or gens):** 10 . **- No. of Mature Individuals:** Not known. **Global Population:** Continuing decline. **Data Quality:** General field studies (Dr. S. Krishnan, 1985 in Madras); Indirect information. **Recent Field Studies:** None. **Threats:** Pollution; Human interference; Loss of habitat. **Trade:** No. **Other Comments:** Paulraj, S. (1981) Studies on Relative Growth Water Loss and Autotomy in two species of Ocypoda Crabs. *O. platytarsis* and *O. cordimane*, Ph.D., Thesis . **Status- IUCN: ENDANGERED**. **- Criteria based on: B1, 2b, 2c** (Restricted distribution, severely fragmented, continuing decline in extent of occurrence, area of occupancy and quality of habitat). **- CITES:** No. **- IWPA (1972; 91):** No. **- RDB, National (old cat.):** No . **- RDB, International (old cat.):** No. **Recommendations: - Research management:** Survey. **- PHVA:** No. **Captive Breeding Recommendation:** . **- Captive breeding:** No. **- Level of difficulty:** Very difficult. **Existing Captive Programmes:** None. **- Names of facilities:** —. **Sources:** Alcock, A.(1968) Materials for a Carcinological Fauna of India, . **Compilers:** S. Paulraj, M.B. Raghunathan, K. Revathi, R. Natarajan, C. Gunasekaran.

59. Ocypoda platytarsis -- VU (A1c) -- (Ghost crab). **Order /Family:** Decapoda / Ocypodidae. **Taxonomic status:** Species. **Habit:** Burrowing. **Habitat:** Intertidal zone. **Global Distribution:** Sri Lanka, India. **Current Regional Distribtuion:** East and west coast of India. **- Elevation:** Sea level. **- Range (sq. km):** > 20,000. **- Area Occupied (sq. km):** < 2,000. **- Number of locations:** Not known. **Population Trends: - % Decline:** 20 %. **- Time / Rate (Yrs or gens):** 10 years. **- No. of Mature Individuals:** Not known. **Global Population:** Not known. **Regional Population:** Continuing decline in population. **Data Quality:** General field study (S. Krishnan, 1985 in Madras); Indirect information. **Recent Field Studies:** None. **Threats:** Pollution; Human interference; Loss of habitat; Harvest for food. **Trade:** No. **Other Comments:** Eaten by local people for increasing lactation. **Status- IUCN: VULNERABLE (Nationally)**. **DATA DEFICIENT (Globally)**. **- Criteria based on: A1c** (Population reduction due to decline in area, extent of occurrence and /or quality of habitat). **- CITES:** No. **- IWPA (1972; 91):** No. **- RDB, National (old cat.):** No . **- RDB, International (old cat.):** No. **Recommendations: - Research management:** Survey; Habitat management; Studies on medicinal value and food. **- PHVA:** No. **Captive Breeding Recommendation:** . **- Captive breeding:** No. **- Level of difficulty:** Least difficult. **Existing Captive Programmes:** No. **- Names of facilities:** —. **Sources:** Alcock, A. (1968) Materials for a Carcinological Fauna of India, . **Compilers:** S. Paulraj, M.B. Ragunathan, K. Revathi, R. Natarajan, C. Gunasekaran.

60. *Odontotermes brunneus* Hagen -- VU (A1a, 1c; B1, 2a, 2c) -- **Order /Family:** Isoptera / Termitidae. **Taxonomic status:** Species. **Habit:** Litter feeder. **Habitat:** Subterreanean. **Global Distribution: ENDEMIC** to southern India . **Current Regional Distribtuion:** Southern India. **- Elevation:** 1,000 m. **- Range (sq. km):** < 20,000. **- Area Occupied (sq. km):** < 2,000. **- Number of locations:** Many locations (Karnataka, Tamil Nadu, Andhra Pradesh); Fragmented . **Population Trends: - % Decline:** 20 %. **- Time / Rate (Yrs or gens):** 10. **- No. of Mature Individuals:** Not known. **Global Population:** Continuing decline observed. **Data Quality:** General field study. **Recent Field Studies:** D. Rajagopal, 1975 -96 in Karnataka. **Threats:** Human interference (Intensive crop cultivation); Loss of habitat. **Trade:** No. **Other Comments:** . **Status - IUCN: VULNERABLE**. **- Criteria based on: A1a,1c** (Observed population reduction due to decline in area, extent of occurrence and quality of habitat); **B1, 2a, 2c** (Restricted distribution, severely fragmented and . continued decline in area of occupancy extent of occurrence and quality of habitat) . **- CITES:** No. **- IWPA (1972; 91):** No. **- RDB, National (old cat.):** No . **- RDB, International (old cat.):** No. **Recommendations: - Research management:** Survey; Monitoring; Habitat management . **- PHVA:** Pending. **Captive Breeding Recommendation:** . **- Captive breeding:** No. **- Level of difficulty:** Not known. **Existing Captive Programmes:** None. **- Names of facilities:** —. **Sources:** Rajagopal, D. (1983) Habit and habitat studies of termites in Karnataka, *J. Soil. Biol. Ecol.* 3(2)**:** 108 -121. **Compilers:** D. Rajagopal, A.K. Chakravarthy, A.S. Vastrad, R. Mathew, B.A. Daniel.

61. *Odontotermes wallonensis* (Wasmann) -- VU (B1, 2c) -- (Mound-building termite). ***Termes obesus* ssp. *wallonensis* Wasmann**. **Order /Family:** Isoptera / Termitidae. **Taxonomic status:** Species. **Habit:** Soil inhabiting and subterranean. **Habitat:** Red soil tracts of India, only in arid zone. **Global Distribution:** Southern India and parts of Central India including parts of Gujarat, Maharashtra, Madhya Pradesh, Orissa and Bihar. **Current Regional Distribtuion:** Southern India . **- Elevation:** About 1,000 m . **- Range (sq. km):** < 20,000. **- Area Occupied (sq. km):** < 2,000. **- Number of locations:** Many (Karnataka, Andhra Pradesh, Tamil Nadu); Fragmented. **Population Trends: - % Decline:** Not known. **- Time / Rate (Yrs or gens):** Not known. **- No. of Mature Individuals:** Not known. **Global Population:** Not known. **Regional Population:** Decline not known, though restricted in distribution. **Data Quality:** General field study. **Recent Field Studies:** D. Rajagopal, 1975-96 in southern India. **Threats:** Loss of habitat through cultivation; Change in edaphic factors; Pesticides; Loss of habitat due to fragmentation. **Trade:** No. **Other Comments:** Completely absent in heavy rainfall, deep black soil areas in Karnataka and very much confined to the arid zones of redsoil of S. India. In N. India it is not found in the same habitat. Winged termites are eaten by local people but it is not a factor in the population decline currently. Not possible to culture artificially. **Status - IUCN: VULNERABLE (Regionally -southern India)**. **DATA DEFICIENT (Globally)**. **- Criteria based on: B1, 2c** (Restricted distribution, severely fragmented, continuing decline in area of occupancy, extent of occurrence and/or quality of habitat). **- CITES:** No. **- IWPA (1972; 91):** No. **- RDB, National (old cat.):** No . **- RDB, International (old cat.):** No. **Recommendations: - Research management:** Survey; Monitoring. **- PHVA:** No. **Captive Breeding**

Recommendations: - Captive breeding: Level 3. **- Level of difficulty:** Very difficult. **Existing Captive Programmes:** None. **- Names of facilities:** —. **Sources:** Chhotani, O.B. (1980) T*ermite pests of Agriculture in the Indian region and their control*,Tech. Mono. , ZSI, Calcutta. Rajagopal, D. (1979) Ecological studies in mound-building termite. *Odontotermes wallonesis*, Ph.D. thesis, Univ. Agri. Sciences, Bangalore. Rajagopal, D. (1982) Mound Building Behaviour of *Odontotermes wallonensis*,. *Sociobiol.* 17(3)**:** 289-304. **Compilers:** D. Rajagopal, A.K. Chakravarthy, R. Mathew, A.S. Vastrad, B.A. Daniel.

62. *Oecophylla smaragdina* (Fabricius) -- LRlc -- (*Formica smaragdina* Fabricius). (Red tree ant). **Order /Family:** Hymenoptera / Formicidae. **Taxonomic status:** Species. **Habit:** Carnivorous, honey dew and sugary sap feeder. **Habitat:** On mango, guava, coffee, cardamom, banana plants. **Global Distribution:** India, Myanmar, Sri Lanka, China, Malayan Subregion to Australia and New Guinea. **Current Regional Distribution:** Southern India. **- Elevation:** up to 2,000 m. **- Range (sq**. **km):** > 20,000. **- Area Occupied (sq**. **km):** > 2,000. **- Number of locations:** Many. **Population Trends: - % Decline:** No change. **- Time / Rate (Yrs or gens):** Not known. **- No**. **of Mature Individuals:** Not known. **Global Population:** Not known. **Regional Population:** Stable. **Data Quality:** General field studies. . **Recent Field Studies:** Mustak Ali, 1992 in Karnataka; A.K. Chakravarthy, 1983-96 in Karnataka; D. Rajagopal 1982-96 in Karnataka. **Threats:** Harvest for food . **Trade:** No . **Other Comments:** They cultivate homopterans in their subsidiary nests as biocontrol agents against black ants, termites and scale insects. **Status- IUCN: LOWER RISK - LEAST CONCERN (Regionally -southern India)**. **DATA DEFICIENT (Globally)**. **- Criteria based on:** Not applicable. **- CITES:** No. **- IWPA (1972; 91):** No. **- RDB, National (old cat.):** No. **- RDB, International (old cat.):** No. **Recommendations: - Research management:** Habitat management; Monitoring. **- PHVA:** No. **Captive Breeding Recommendation:** . **- Captive breeding:** No. **- Level of difficulty:** Not known. **Existing Captive Programmes:** No . **- Names of facilities:** —. **Sources:** Rajagopal, D. and Ali, T.M.M.(1984) Predatory ants of the mount building termite, Odontotermes wallonensis(Wasmann) with special reference to predatory behaviour of *Leptogynes processonalis* (Jerdon) *J. Bombay nat. Hist. Soc.*81(3)**:** 721-725. Ali, T.M.M. (1992) Ant Fauna of Karnataka, Part II *IUSSI Newsletter* 3**:** 1-9. **Compilers:** D. Rajagopal, R. Mathew, A.K.Chakravarthy, A.S. Vastrad, K.G. Emiliyamma, B.A. Daniel.

63. *Paludomus monile* (Hanley) -- EN (B1, 2b) -- Order /Family: Megagastropoda / Melaniidae. **Taxonomic status:** Species. **Habit:** Littoral / Benthic, attached to hard substances. **Habitat:** Lotic freshwater. . **Global Distribution: ENDEMIC** to southern India. **Current Regional Distribtuion:** Southern India. **- Elevation:** 2,500 m. **- Range (sq**. **km):** < 5,000. **- Area Occupied (sq**. **km):** < 2,000. **- Number of locations:** 3. **Population Trends: - % Decline:** 20 %. **- Time / Rate (Yrs or gens):** 10 years. **- No**. **of Mature Individuals:** Not known. **Global Population:** Continuing decline. **Data Quality:** General field study; Indirect information. **Recent Field Studies:** None. **Threats:** Loss of habitat; Pollution. **Trade:** No. **Other Comments:** Known to be carriers of cercarial parasites. **Status- IUCN: ENDANGERED**. **- Criteria based on: B1, 2b** (Restricted distribution, limited locations, continuing decline in area of occupancy). **- CITES:** No. **- IWPA (1972; 91):** No. - RDB, National(old cat.)**:** No . **- RDB, International (old cat.):** No. **Recommendations: - Research management:** Survey; Habitat management; Life history studies. **- PHVA:** No. **Captive Breeding Recommendations: - Captive breeding:** No. **- Level of difficulty:** Least difficult. **Existing Captive Programmes:** None. **- Names of facilities:** —. **Sources:** Sathyamurthy, S.T. (1960). The Land and Freshwater Mollusca in the collection of the Madras Government Museum. *Bulletin of Madras Govt. Museum.*. **Compilers:** R. Natarajan, M.B. Ragunathan, S. Paulraj, K. Revati, V.R. Punithavelu, . C. Gunasekaran.

64. *Paludomus stomatodon* Benson -- CR (B1, 2b) -- **Order /Family:** Megagastropoda / Melaniidae. **Taxonomic status:** Species. **Habit:** Littoral/ Benthic, attached to hard substances. **Habitat:** Lotic freshwater. **Global Distribution: ENDEMIC** to southern India . **Current Regional Distribtuion:** Southern India. **- Elevation:** 1,500 m. **- Range (sq**. **km):** < 100. **- Area Occupied (sq**. **km):** < 10. **- Number of locations:** 1 (Kottayam, Thiruvananthapuram in Kerala). **Population Trends: - % Decline:** 20 %. **- Time / Rate (Yrs or gens):** 10 years. **- No**. **of Mature Individuals:** Not known. **Global Population:** Continuing decline in its highly restricted distribution. **Data Quality:** General field study. **Recent Field Studies:** None. **Threats:** Loss of habitat; Human interference. **Trade:** No. **Other Comments:** Restricted in Distribution. **Status- IUCN: CRITICALLY ENDANGERED**. **- Criteria based on: B1, 2b** (Restricted distribution, single location, continuing decline in area of occupancy). **- CITES:** No . **- IWPA (1972; 91):** No. **- RDB, National (old cat.):** No . **- RDB, International (old cat.):** No. **Recommendations: - Research management:** Survey; Habitat management; Limiting factor research. **- PHVA:** No. **Captive Breeding Recommendation:** . **- Captive breeding:** Pending. **- Level of difficulty:** Not known. **Existing Captive Programmes:** None. **- Names of facilities:** —. **Sources:** Anantharaman, M. M.A.B. Project of the ecology, distribution and documentation of freshwater gastropod of Tamil Nadu and their cercarial fauna (1 Oct 1984 to 31 March 1988). Sathyamurthy, S.T. (1960). The Land and Freshwater Mollusca in the Colllection of theMadras Government Museum. *Bulletin of Madras Govt. Museum.*. **Compilers:** R. Natarajan, M.B. Ragunathan, S. Paulraj, K. Revati, V.R. Punithavelu, . C. Gunasekaran .

65. *Paludomus tanschaurica* Gmelin -- VU (A1c) -- **Order /Family:** Megagastropoda / Melaniidae . **Taxonomic status:** Species. **Habit:** Littoral/ Benthic. **Habitat:** Lotic freshwater. **Global Distribution:** India and Sri Lanka. **Current Regional Distribtuion:** Southern India. **- Elevation:** 5,000 m. **- Range (sq**. **km):** > 20,000. **- Area Occupied (sq**. **km):** > 2,000. **- Number of locations:** 4; Fragmented. **Population Trends: - % Decline:** 20 %. **- Time / Rate (Yrs or gens):** 10 years. **- No**. **of Mature Individuals:** Not known. **Global Population:** Not known. **Regional Population:** Continuing decline though widespread. **Data Quality:** General field study; Indirect information. **Recent Field Studies:** None. **Threats:** Loss of habitat; Pollution. **Trade:** —. **Other Comments:** Carrier of cercarial parasites. **Status- IUCN: VULNERABLE (Regionally - southern India)**. **DATA DEFICIENT (Globally)**. **- Criteria based on: A1c** (Population reduction due to decline in area, extent of occurrence and /or quality of habitat). **- CITES:** No. **- IWPA (1972; 91):** No. **- RDB, National (old cat.):** No . **- RDB, International (old cat.):** No. **Recommendations: - Research management:** Survey; Life history studies. **- PHVA:** No. **Captive Breeding** Recs. **- Captive breeding:** No . **- Level of difficulty:** Least difficult. Existing Captive Progs.**:** None. **- Names of facilities:** —. **Sources:** Sathyamurthy, S.T. (1960). The Land and Freshwater Mollusca in the collection of the Madras Government Museum. *Bulletin of Madras Govt. Museum.* **Compilers:** R. Natarajan, M.B. Ragunathan, S. Paulraj, K. Revati, V.R. Punithavelu, C. Gunasekaran.

66. *Parreysia corrugata* (Lea) -- VU (B1, 2a, 2c) -- **Order /Family:** Eulamellibranchiata / Unionidae. **Taxonomic status:** Species. **Habit:** Benthic, Filter feeder. **Habitat:** Lentic and lotic freshwater. **Global Distribution:** Throughout India. **Current Regional Distribtuion:** Southern India . **- Elevation:** About 1,000 m. **- Range (sq. km):** < 20,000. **- Area Occupied (sq. km):** > 2,000. **- Number of locations:** Many (Gudur, Godavari river in Andhra Pradesh and in Tamil Nadu); Fragmented. **Population Trends: - % Decline:** 15%. **- Time / Rate (Yrs or gens):** 10 years. **- No. of Mature Individuals:** Not known. **Global Population:** Not known. **Regional Population:** Gradual continuing decline. **Data Quality:** General field study; Indirect information. **Recent Field Studies: :** None. **Threats:** Pollution; Pesticides; Loss of habitat. **Trade:** No. **Other Comments:** Not much known. All freshwater bivalves are under threat. **Status- IUCN: VULNERABLE (Regionally -southern India)**. **DATA DEFICIENT (Globally)**. **- Criteria based on: B1, 2a, 2c** (Restricted distribution, severely fragmented, continuing decline in extent of occurrence and quality of habitat). **- CITES:** No. **- IWPA (1972; 91):** No. **- RDB, National (old cat.):** No . **- RDB, International (old cat.): :** No. **Recommendations: - Research management:** Survey . **- PHVA:** No. **Captive Breeding Recommendation:** . **- Captive breeding:** No . **- Level of difficulty:** Moderately diffcult. **Existing Captive Programmes:** None. **- Names of facilities:** —. **Sources:** Sathyamurthy, S. T. (1960). The Land and Freshwater Mollusca in the collection of the Madras Government Museum. *Bulletin of Madras Govt. Museum.*. **Compilers:** R. Natarajan, M.B. Ragunathan, S. Paulraj, M.S. Ravichandran, C.Gunasekaran, V.R. Punithavelu.

67. *Perionyx excavatus* E.Perr -- LRnt -- (Indian blue earthworm). **Order /Family:** Lumbricina / Megascolecidae. **Taxonomic status:** Species. **Habit:** Detritus feeder . **Habitat:** Epigeic. **Global Distribution:** Southeast Asia (including India, up to Japan / Australia) . **Current Regional Distribtuion:** Southern India. **- Elevation:** Plains and up to 1,000 m. **- Range (sq. km):** > 20,000. **- Area Occupied (sq. km):** > 2,000. **- Number of locations:** Many. **Population Trends: - % Decline:** No change. **- Time / Rate (Yrs or gens):** Not known. **- No. of Mature Individuals:** Not known. **Global Population:** Not known . **Regional Population:** No change observed. **Data Quality:** Census Studies**:** (Karnataka); Informal field sightings (Orissa and A.P.). **Recent Field Studies:** K. Bano, 1989-92 in southern Karnataka . **Threats:** Change in edaphic factors; Loss of habitat. **Trade:** No. **Other Comments:** Kubro Bano thought this species to be helped by humans. Used commercially for vermicomposting. Lifecycle worked out. A workshop on economic importance of this species is recommended. **Status- IUCN: LOWER RISK -NEAR THREATENED (Regionally -southern India)**. **DATA DEFICIENT (Globally)**. **- Criteria based on:** Not applicable. **- CITES:** No. **- IWPA (1972; 91):** No. **- RDB, National (old cat.):** No . **- RDB, International (old cat.):** No. **Recommendations: - Research management:** Survey; Monitoring; Limiting factor research; Species association studies (intra- and inter) . **- PHVA:** No. **Captive Breeding Recommendation:** . **- Captive breeding:** Level 3 . **- Level of difficulty:** Least difficult. **Existing Captive Programmes:** Yes. **- Names of facilities:** Vermiculture units at different places, institutes and private people. **Sources:** Julk, J.M. and B.K. Senapati (1987) Earthworms (Oligochaete**:** Annelida) of Orissa, India. Miscellaneous publications of ZSI *Occasional paper No.92. pp.49.* Stephenson, J. (1923) *Fauna of British India: Oligochaeta.* Today and Tomorrow's Printers and Publishers, New Delhi. **Compilers:** Kubra Bano, M. Vikram Reddy, S. Ismail, Mary Bai, T.J. Indira, Ranjit Daniels, . P.T. Cherian, M.B. Raghunathan, S. Paulraj, M.S. Ravichandran, P. Ahimaz, . R. Bhanumathi.

68. *Phyllogonostreptus nigrolabiatus* (Newport) -- LRnt -- **(**Large common millipede). **Order /Family:** Spirostreptida / Harpagophoridae. **Taxonomic status:** Species. **Habit:** Soil and litter feeder. **Habitat:** Forest floor; litter heaps. **Global Distribution:** Throughout India. **Current Regional Distribtuion:** Southern India. **- Elevation:** Plains and up to 1,800 m. **- Range (sq. km):** > 20,000. **- Area Occupied (sq. km):** > 2,000. **- Number of locations:** Many. **Population Trends: - % Decline:** Not known. **- Time / Rate (Yrs or gens):** Not known. **- No. of Mature Individuals:** Not known (10 -20 per m2 during monsoon). **Global Population:** Not known. **Regional Population:** Trends not known. **Data Quality:** General field study. **Recent Field Studies:** K. Bano and Mary Bai, 1994-95 onwards in Karnataka and Tamil Nadu. **Threats:** Loss of habitat; Drought. **Trade:** No. **Other Comments:** It is a ubiquitous animal; soil and litter feeder; major decomposer of organic matter in its habitat. Whenever there is a loss of litter in its habitat it becomes phytophagous or dangerous to the crops. . **Status- IUCN: LOWER RISK -NEAR THREATENED (Regionally -southern India)**. **DATA DEFICIENT (Globally)**. **- Criteria based on:** Not applicable. **- CITES:** No. **- IWPA (1972; 91):** No. **- RDB, National (old cat.):** No . **- RDB, International (old cat.):** No. **Recommendations: - Research management:** Taxonomic and morphological genetic studies; Survey; Life history studies; Monitoring . **- PHVA:** No. **Captive Breeding Recommendations**. **- Captive breeding:** Pending . **- Level of difficulty:** Moderately difficult. **Existing Captive Programmes:** None. **- Names of facilities:** —. **Sources:** Attens C. (1936) Thyropygus nigrolabiatus (Newp). *Mem. Ind.Mus.* Vol.II p.259. . Demange, J.M (1991) Materiaure pour servin A ure Revision Des Harpugophoridae. *Mem.Mus. Nat..His.Natl*.Vol.XXIV **:** 190-95. **Compilers:** K. Bano, M. Mary Bai, M.V. Reddy, T.J. Indira, P. Ahimaz, R. Bhanumathi.

69. *Pila globosa* (Swainson) -- VU (A1c) -- (Large apple snail). **Order /Family:** Megagastropoda / Ampullaridae. **Taxonomic status:** Species. **Habit:** Field and algal mass. **Habitat:** Pond (Lentic freshwater) . **Global Distribution:** Indian subcontinent . **Current Regional Distribtuion:** Southern India . **- Elevation:** 1,000 m . **- Range (sq. km):** > 20,000. **- Area Occupied (sq. km):** > 2,000. **- Number of locations:** Many (Andhra Pradesh and parts of Tamil Nadu). **Population Trends: - % Decline:** 90 %. **- Time / Rate (Yrs or gens):** 30 years. **- No. of Mature Individuals:** Not known. **Global Population:** Not known. **Regional Population:** Continuing decline though wide spread. **Data Quality:** General field study; Indirect information. **Recent Field Studies:** M.B. Ragunathan and V.R. Punithavelu, 1996-97 in Madras . **Threats:** Loss of habitat; Pesticides; Pollution; Human interference; Harvest for food; Harvest for medicine; Collection for lab studies; Loss of food plants. **Trade:** Local; Domestic. **Other Comments:** *P. globosa* is more common in N. India. Collected in plenty for medicinal purpose (piles). **Status- IUCN: VULNERABLE (Regionally -southern India)**. **DATA DEFICIENT (Globally)**. **- Criteria based on: A1c** (Population reduction due to decline in area, extent of occurrence and /or quality of habitat). **- CITES:** No. **- IWPA (1972; 91):** No. **- RDB, National (old cat.):** No . **- RDB, International (old cat.):** No. **Recommendations: - Research management:** Survey; Studies on medicinal properties. **- PHVA:** No. **Captive Breeding Recommendations: - Captive breeding:** No . **- Level of difficulty:** Least difficult. **Existing Captive Programmes:** No. **- Names of facilities:** --. **Sources:** . **Compilers:** R. Natarajan, M.B. Ragunathan, S. Paulraj, V.R. Punithavelu, Sathish Kumar, . C. Gunasekaran.

70. *Pila virens* (Lamarck) -- VU (A1a, 1c; B1, 2a, 2c) -- **Order /Family:** Megagastropoda / Ampullaridae. **Taxonomic status:** Species. **Habit:** Fields and stagnent water. **Habitat:** Pond (Lentic freshwater). **Global Distribution: ENDEMIC** to southern India. **Current Regional Distribtuion:** Southern India. **- Elevation:** 1,000 m. **- Range (sq. km):** > 20,000. **- Area Occupied (sq. km):** < 2,000. **- Number of locations:** 5. **Population Trends: - % Decline:** 90 %. **- Time / Rate (Yrs or gens):** 30 years. **- No. of Mature Individuals:** Not known. **Global Population:** Continuing decline. **Data Quality:** General field study; Indirect information. **Recent Field Studies:** M.B. Ragunathan and V.R. Punithavelu, 1996-97 in Tamil Nadu. **Threats:** Loss of habitat; Pesticides; Pollution; Human interference; Loss of food plants. **Trade:** No . **Other Comments:** More common in southern India. Usually confused for *Pila globosa*. **Status- IUCN: VULNERABLE**. **- Criteria based on: B1, 2a, 2c** (Restricted distribution, limited locations, continuing decline in extent of occurrence and quality of habitat); **A1a, 1c** (Population reduction due to . decline in extent of occurrence, area of occupancy and quality of habitat). **- CITES:** No. **- IWPA (1972; 91):** No. **- RDB, National (old cat.):** No . **- RDB, International (old cat.):** No. **Recommendations: - Research management:** Survey. **- PHVA:** No. **Captive Breeding Recommendations:** . **- Captive breeding:** No. **- Level of difficulty:** Least difficult. **Existing Captive Programmes:** None. **- Names of facilities:** —. **Sources:** Anantharaman, M. MAB Project**:** The Ecology Distribution and documentation of Freshwater Gastropods of Tamil Nadu and their Cerearial Fauna (1 Oct. 1984 - 31 Mar 1988). Sathyamurthy, S.T. (1960) The Land and Freshwater Mollusca in the collection of the Madras Government Museum. *Bulletin of Madras Govt. Museum.*. **Compilers:** R. Natarajan, M.B. Ragunathan, S. Paulraj, V.R. Punithavelu, Sathish Kumar, . C. Gunasekaran.

71. *Plagiolepis jerdonii* Forel -- LRlc -- **Order /Family:** Hymenoptera / Formicidae. **Taxonomic status:** Species. **Habit:** Aphicolous (Aphids); Subterranean. **Habitat:** Commensal. **Global Distribution:** Throughout India. **Current Regional Distribtuion:** Southern India. **- Elevation:** Up to 2,000 m. **- Range (sq. km):** > 20,000. **- Area Occupied (sq. km):** > 2,000. **- Number of locations:** Many . **Population Trends: - % Decline:** No change (as it inhabits many types of habitats). **- Time / Rate (Yrs or gens):** Not known. **- No. of Mature Individuals:** Not known. **Global Population:** Fairly stable; widely distributed and adaptable species . **Regional Population:** Stable. **Data Quality:** General field study. **Recent Field Studies:** Musthak Ali, 1992 in Karnataka. **Threats:** No. **Trade:** No. **Other Comments:** Often associated with homopterans in many types of habitats. However also found . without homopterans as these are nectar feeders. **Status- IUCN: LOWER RISK - LEAST CONCERN (Regionally -southern India)**. **DATA DEFICIENT (Globally)**. **- Criteria based on:** Not applicable. **- CITES:** No. **- IWPA (1972; 91):** No. **- RDB, National (old cat.):** No . **- RDB, International (old cat.): :** No. **Recommendations: - Research management:** Survey; Monitoring; Life history studies. **- PHVA:** No. **Captive Breeding Recommendations:** . **- Captive breeding:** Level 3. **- Level of difficulty:** Least difficult. **Existing Captive Programmes:** No. **- Names of facilities:** —. **Sources:** Ali, T.M.M. (1992) Ants of Karnataka, *IUSSI Newsletter*. **Compilers:** D. Rajagopal, A.K. Chakravarthy, A.S. Vastrad, R. Mathew, B.A. Daniel.

72. *Poekilocerus pictus* Fab -- LRlc -- **Order /Family:** Orthoptera / Pyrgomorphidae. **Taxonomic status:** Species. **Habit:** Phytophagous. **Habitat:** Wasteland. **Global Distribution:** India, Pakistan. **Current Regional Distribtuion:** Southern India. **- Elevation:** Up to 900 m. **- Range (sq. km):** > 20,000. **- Area Occupied (sq. km):** > 2,000. **- Number of locations:** Many (Tamil Nadu, Karnataka, Maharashtra, Kerala). **Population Trends: - % Decline:** No decline. **- Time / Rate (Yrs or gens):** Not known. **- No. of Mature Individuals:** Not known. **Global Population:** Not known. **Regional Population:** No decline . **Data Quality:** Indirect information. **Recent Field Studies:** None. **Threats:** Human interference; Collection for laboratory study (Harvest) . **Trade:** No. **Other Comments:** Weed killer. **Status** . **- IUCN: LOWER RISK -LEAST CONCERN (Regionally -southern India)**. **DATA DEFICIENT (Globally)**. **- Criteria based on:** Not applicable. **- CITES:** No. **- IWPA (1972; 91):** No. **- RDB, National (old cat.):** No . **- RDB, International (old cat.):** No. **Recommendations: - Research management:** Limiting factor research. **- PHVA:** No. **Captive Breeding Recommendation:** . **- Captive breeding:** No. **- Level of difficulty:** Least difficult. **Existing Captive Programmes:** None. **- Names of facilities:** —. **Sources:** COPR (1982) *Centre for Overseas Pest Research.*The Locust and grasshopper agricultural manual. **Compilers:** A.S. Vastrad, R.J.R. Daniels, R. Mathew, B.A. Daniel, C. Gunasekaran.

73. *Polydrepanum tamilum* Carl -- LRnt -- (Millipede). **Order /Family:** Polydesmida / Paradoxosomatidae. **Taxonomic status:** Species. **Habit:** Litter feeding. **Habitat:** Litter and soil. **Global Distribution: ENDEMIC** to southern India. **Current Regional Distribtuion:** .Karnataka, Tamil Nadu. **- Elevation:** 1,000 - 2,000 m. **- Range (sq. km):** > 20,000. **- Area Occupied (sq. km):** > 2,000. **- Number of locations:** Many. **Population Trends: - % Decline:** Not known. **- Time / Rate (Yrs or gens):** Not known. **- No. of Mature Individuals:** Not known (5 -10 / m2). **Global Population:** Not known . **Data Quality:** General field study; Informal field sighting; . **Recent Field Studies:** K. Banu, 1994-95, Karnataka. **Threats:** Climate; Loss of habitat; Drought. **Trade:** No. **Other Comments:** . **Status- IUCN: LOWER RISK -NEAR THREATENED- - Criteria based on:** Not applicable. **- CITES:** No. **- IWPA (1972; 91):** No. **- RDB, National (old cat.):** No . **- RDB, International (old cat.):** No. **Recommendations: - Research management:** Survey; Monitoring . **- PHVA:** No. **Captive Breeding Recommendation:** . **- Captive breeding:** No. **- Level of difficulty:** Least difficult. **Existing Captive Programmes:** None. **- Names of facilities:** —. **Sources:** Carl, J.(1932) Diplopoda aus sud. Indien and Ceylon.1.Teil polydesmoidea. *Ann.Soc.Zool.Sui.Musa. His.Natl.* Geneve. . Jeekal,C.A.W. (1980) Some little known poudonsomatidae from India and Ceylon with the description of four new genera. (Diplopoda-Polydesmida). *Beufortia***:** 30(8)**:** 175 -177. **Compilers:** K. Bano, M. Mary Bai, V.M. Reddy, T.J. Indra, P. Ahimaz, R. Bhanumathi.

74. *Psilacrum convexa* (Cherian) -- CR (B1, 2a, 2b, 2c) -- (*Javanosenis convexa* Cherian). **Order /Family:** Diptera / Chloropidae. **Taxonomic status:** Species. **Habit:** On leaves of shrubs . **Habitat:** Evergreen forest. **Global Distribution: ENDEMIC** to Southern India. **Current Regional Distribtuion:** Idukki. **- Elevation:** About 900 m. **- Range (sq. km):** < 100. **- Area Occupied (sq. km):** < 10. **- Number of locations:** 1 (Idukki). **Population Trends: - % Decline:** Not known. **- Time / Rate (Yrs or gens):** Not known. **- No. of Mature Individuals:** Not known. **Global Population:** Population trend not observed. **Data Quality:** Census and population monitoring. **Recent Field Studies:** P.T. Cherian, 1984 -95 in Idukki, Kerala. **Threats:** Loss of habitat. **Trade:** No. **Other Comments:** Not collected since first recorded in 1985. The habitat is gradually being destroyed because of the development of Idukki district head quarters. **Status- IUCN: CRITICALLY**

ENDANGERED- Criteria based on: B1, 2a, 2b, 2c (Restricted distribution, single location, continuing decline in extent of occurence, area of occupancy and quality of habitat). **- CITES:** No. **- IWPA (1972; 91):** No. **- RDB, National (old cat.):** No . **- RDB, International (old cat.):** No. **Recommendations: - Research management:** Survey; Life history studies. **- PHVA:** Pending. **Captive Breeding Recommendations:** . **- Captive breeding:** No. **- Level of difficulty:** Not known. **Existing Captive Programmes:** None. **- Names of facilities:** —. **Sources:** Cherian, P.T. (1990) *Hexapoda* 2(1)**:** 18 -19. **Compilers:** P.T. Cherian, K.V. Lakshminarayana, K.G. Emiliyamma, B.A. Daniel.

75. *Sechelleptus importatus* Demange 1977 -- CR (B1, 2c) -- (Millipede). **Order /Family:** Spirostreptida / Spirostrephidae. **Taxonomic status:** Species. **Habit:** Crop feeder. **Habitat:** Cultivated field. **Global Distribution:** Southern India and Seychelles Island. **Current Regional Distribtuion:** Southern India. **- Elevation:** 200 - 1,000 m. **- Range (sq. km):** < 100. **- Area Occupied (sq. km):** < 10. **- Number of locations:** 2 (South Kanara, Coorg, North Kanara, Bellary in Karnataka), F. **Population Trends: - % Decline:** 5 %. **- Time / Rate (Yrs or gens):** 10 years. **- No. of Mature Individuals:** Not known (4 -5/m2). **Global Population:** Not known . **Regional Population:** Gradual continuing decline. **Data Quality:** General field studies. **Recent Field Studies:** K. Bano 1994 -95 in Karnataka. **Threats:** Pollution; Pesticides, Loss of habitat. **Trade:** No. **Other Comments:** A study has to be undertaken to assess the ecological position of this animal as a pest in relation to the extent of damage it causes and the range of crops it damages as well as the range of host. **Status- IUCN: CRITICALLY ENDANGERED (Nationally)**. **DATA DEFICIENT (Globally)**. **- Criteria based on: B1, 2c** (Restricted distribution, limited location, continuing decline in area of occupancy, extent of occurrence and/or quality of habitat). **- CITES:** No. **- IWPA (1972; 91):** No. **- RDB, National (old cat.):** No . **- RDB, International (old cat.):** No. **Recommendations: - Research management:** Survey; Monitoring. **- PHVA:** Pending . **Captive Breeding Recommendation:** . **- Captive breeding:** Level 3. **- Level of difficulty:** Very difficult. **Existing Captive Programmes:** None . **- Names of facilities:** —. **Sources:** Demange. (1977) Description de novells espcees despirostreptoidea (Myriapodes, Diplopodes) de l'Inde, dontune appartenant a un genre typiqnement african. *Bull. Mus.Natn.Hist.nat.Paris*. 3ser. no.431. Zoologie. 301**:** 237-242. **Compilers:** K. Bano, T.J. Indira, Mary Bai, P. Ahimaz, R. Bhanumathi.

76. *Speculitermes sinhalensis* Roonwal & Sen-Sarma -- EN (B1, 2c) -- Order /Family: Isoptera / Termitidae. **Taxonomic status:** Species. **Habit:** Detritus feeder. **Habitat:** Subterranean (Cultivated and uncultivated patches). **Global Distribution: ENDEMIC** to southern India. **Current Regional Distribtuion:** Karnataka. **- Elevation:** 50 - 1,000 m. **- Range (sq. km):** < 5,000. **- Area Occupied (sq. km):** < 500. **- Number of locations:** Many; Fragmented. **Population Trends: - % Decline:** May be declining. **- Time / Rate (Yrs or gens):** Not known. **- No. of Mature Individuals:** Not known. **Global Population:** Not known. **Data Quality:** General field studies. . **Recent Field Studies:** D. Rajagopal, 1975-95 in Karnataka. **Threats:** Loss of habitat; Loss of habitat due to fragmentation. **Trade:** No. **Other Comments:** Since it is presently found in both cultivated and uncultivated areas, the species may not be so sensitive to disturbance; builds up the population very rapidly wherever organic matter is abundant although the colony size is small. **Status- IUCN: ENDANGERED**. **- Criteria based on: B1, 2c** (Restricted distribution, severely fragmented, continuing decline in extent of occurrence, area of occupancy and/or quality of habitat). **- CITES:** No. **- IWPA (1972; 91):** No. **- RDB, National (old cat.):** No . **- RDB, International (old cat.):** No. **Recommendations: - Research management:** Survey; Monitoring; Habitat management; Life history studies; Limiting factor management. **- PHVA:** Pending. **Captive Breeding Recommendation:** . **- Captive breeding:** Level 3. **- Level of difficulty:** Very difficult. **Existing Captive Programmes:** None. **- Names of facilities:** —. **Sources:** Rajagopal, D. (1983) Habit and habitat studies of some termites from Karnataka, *J. Soil Biol. Ecol.* 3(2)**:** 108-121. **Compilers:** D. Rajagopal, A.K. Chakravarthy, A.S. Vastrad, R. Mathew, B.A. Daniel.

77. *Strandesia bicornuta* (Hartman) -- EN (B1, 2a) -- Order /Family: Podocopida (Ostracoda) / Cyprididae. **Taxonomic status:** Species. **Habit:** Littoral / Benthic. **Habitat:** Benthic lentic freshwater . **Global Distribution: ENDEMIC** to southern India . **Current Regional Distribution:** Southern India. **- Elevation:** Up to 2,000 M. **- Range (sq. km):** > 20,000 . **- Area Occupied (sq. km):** < 500. **- Number of locations:** 2 (Travancorei in Kerala; Goa); Fragmented. **Population Trends: - % Decline:** 10%. **- Time / Rate (Yrs or gens):** 10 years. **- No. of Mature Individuals:** Not known. **Global Population:** Continuing gradual decline observed. **Data Quality:** General field study; (M.B. Raghunathan, 1977-83 and K. Revathi, 1982-85 in Madras); Indirect information. **Recent Field Studies:** M.B. Raghunathan, 1993-till date In freshwater bodies of Chengalpet Dist. Sunny George, 1988-94 in Kerala. **Threats:** Loss of habitat; Pollution; Human interference. **Trade:** No. **Other Comments:** Water bodies in urban areas are desilted for commercial purposes and in rural areas for agriculture. **Status- IUCN: ENDANGERED**. **- Criteria based on: B1, 2a** (Restricted distribution, few fragmented locations, continuing decline in extent of occurrence). CITES**:** No. **- IWPA (1972; 91):** No. **- RDB, National (old cat.):** No . **- RDB, International (old cat.):** No. **Recommendations: - Research management:** Habitat management. **- PHVA:** No. **Captive Breeding Recommendations:** - **Captive Breeding :** No. **- Level of difficulty:** Least difficult. **Existing Captive Programmes:** None . **- Names of facilities:** —. **Sources:** George,S. (1993) Ostracods of Kerala, *Ph.D. thesis, Calicut University,* Calicut. Victor, R. and C.H. Fernando, (1979) The Freshwater Ostracods of India, *Records of the ZSI* Vol. 74 (Part 2) pp. 147-242. . **Compilers:** S. Paulraj, M.B. Raghunathan, K. Revathi, J.T. Jothinayagam, M. Ramalingam, Sathish Kumar, V.R. Punithavelu .

78. *Strandesia elongata* (Hartman) -- EN (B1, 2a) -- **Order /Family:** Podocopida (Ostracoda) / Cyprididae. **Taxonomic status:** Species. **Habit:** Littoral / Benthic. **Habitat:** Benthic lentic freshwater . **Global Distribution: ENDEMIC** to southern India. **Current Regional Distribtuion:** .Southern India. **- Elevation:** Up to 1,000 m. **- Range (sq. km):** > 20,000. **- Area Occupied (sq. km):** < 500. **- Number of locations:** 10 (Trichy Distt., Madurai district, Madras, Arakonam, Pondicherry Karaikal in Tamil Nadu; Doublabad, Korva in Andhra Pradesh, Thiruvananthapuram in Kerala, Goa); Fragmented. **Population Trends: - % Decline:** 10%. **- Time / Rate (Yrs or gens):** 10 years. **- No. of Mature Individuals:** Not known. **Global Population:** Continuing gradual decline observed. **Data Quality:** General field study (M.B. Raghunathan, 1977-83 and K. Revathi, 1982-85 in Madras); Indirect information. **Recent Field Studies:** M.B. Raghunathan, 1993 - present In freshwater bodies of Chengalpet district. Sunny George, 1988 - 1994 in Kerala. **Threats:** Loss of habitat; Pollution; Human interference. **Trade:** No. **Other Comments:** Waterbodies in urban areas are desilted for commercial purposes and in rural areas for agriculture. **Status- IUCN: ENDANGERED**. **- Criteria based on: B1, 2a** (Restricted distribution, Severely

fragmented, continuing decline in extent of occurrence). **- CITES:** No. **- IWPA (1972; 91):** No. **- RDB, National (old cat.):** No . **- RDB, International (old cat.):** No. **Recommendations: - Research management:** Habitat management. **- PHVA:** No. **Captive Breeding Recommendations: - Captive breeding:** No. **- Level of difficulty:** Least difficult. **Existing Captive Programmes:** None . **- Names of facilities:** —. **Sources:** George,S. (1993) Ostracods of Kerala, *Ph.D. thesis, Calicut University,* Calicut. Victor, R. and C.H. Fernando, (1979) The Freshwater Ostracods of India, *Records of the ZSI* Vol. 74 (Part 2) pp. 147-242. **Compilers:** S. Paulraj, M.B. Raghunathan, K. Revathi, J.T. Jothinayagam, M. Ramalingam, Sathish Kumar, V.R. Punithavelu .

79. *Strandesia flavescens* (Klie) -- EN (B1, 2a) -- **Order /Family:** Podocopida (Ostracoda) / Cyprididae. **Taxonomic status:** Species. **Habit:** Littoral / Benthic. **Habitat:** Benthic lentic freshwater. **Global Distribution: ENDEMIC** to southern India . **Current Regional Distribtuion:** Southern India . **- Elevation:** Up to 500 m. **- Range (sq. km):** < 5,000. **- Area Occupied (sq. km):** < 500 . **- Number of locations:** 2 (Ramnad and Madurai district). **Population Trends: - % Decline:** 10%. **- Time / Rate (Yrs or gens):** 10 years. **- No. of Mature Individuals:** Not known. **Global Population:** Continuing gradual decline observed in the species restricted habitat. **Data Quality:** General field study (M.B. Raghunathan, 1977-83 and K. Revathi, 1982-85 in Madras); Indirect information. **Recent Field Studies:** M.B. Raghunathan, 1993-till date In freshwater bodies of Chengalpet Dist. Sunny George, 1988-1994 in Kerala. **Threats:** Loss of habitat; Pollution; Human interference. **Trade:** No. **Other Comments:** Waterbodies in urban areas are desilted for commercial purposes and in rural areas for agriculture. **Status- IUCN: ENDANGERED**. **- Criteria based on: B1, 2a** (Restricted distribution, limited location, continuing decline in extent of occurrence). **- CITES:** No. **- IWPA (1972; 91):** No. **- RDB, National (old cat.):** No . **- RDB, International (old cat.):** No. **Recommendations: - Research management:** Habitat management. **- PHVA:** No. **Captive Breeding Recommendation:** . **- Captive breeding:** No. **- Level of difficulty:** Least difficult. **Existing Captive Programmes:** None . **- Names of facilities:** —. **Sources:** George, S. (1993) Ostracods of Kerala, *Ph.D. thesis, Calicut University,* Calicut. Victor, R. and C.H. Fernando, (1979) The Freshwater Ostracods of India, *Records of the ZSI* Vol. 74 (Part 2) pp. 147-242. **Compilers:** S. Paulraj, M.B. Raghunathan, K. Revathi, J.T. Jothirayagam, M. Ramalingam, Sathish Kumar, V.R. Punithavelu.

80. *Strandesia indica* (Hartman) -- VU (B1, 2a, 2c) -- **Order /Family:** Podocopida (Ostracoda) / Cyprididae. **Taxonomic status:** Species. **Habit:** Littoral . **Habitat:** Bentic lentic freshwater . **Global Distribution:** Southern, western & eastern India. **Current Regional Distribtuion:** Southern India. **- Elevation:** Up to 500 m. **- Range (sq. km):** < 20,000 . **- Area Occupied (sq. km):** < 2000 . **- Number of locations:** 5 (Madras in Tamil Nadu; Thiruvananthapuram in Kerala; Pondicherry); . Fragmented. **Population Trends: - % Decline:** 10%. **- Time / Rate (Yrs or gens):** 10 years. **- No. of Mature Individuals:** Not known. **Global Population:** Not known. **Regional Population:** Continuing gradual decline observed. **Data Quality:** General field study (M.B. Raghunathan, 1977 -83 and K. Revathi, 1982-85 in Madras); Indirect information. **Recent Field Studies:** M.B. Raghunathan, 1993-till date In freshwater bodies of Chengalpet Dist. Sunny George, 1988-94 in Kerala. **Threats:** Loss of habitat; Pollution; Human interference. **Trade:** No. **Other Comments:** Water bodies in urban areas are desilted for commercial purposes and in rural areas for agriculture. **Status- IUCN: VULNERABLE (Regionally -southern India)**. **DATA DEFICIENT (Globally)**. **- Criteria based on: B1, 2a, 2c** (Restricted distribution, limited location, fragmented, continuing decline in extent of occurrence, and /or area of occupancy and quality of habitat). **- CITES:** No. **- IWPA (1972; 91):** No. **- RDB, National (old cat.):** No . **- RDB, International (old cat.):** No. **Recommendations: - Research management:** Habitat management. **- PHVA:** No. **Captive Breeding Recommendations**. **- Captive breeding:** No. **- Level of difficulty:** Least difficult. **Existing Captive Programmes:** None . **- Names of facilities:** —. **Sources:** George, S. (1993) Ostracods of Kerala, Ph.D. thesis, Calicut University, Calicut. Victor, R. and Fernando, C.H. (1979) The Freshwater Ostracods of India, *Records of the ZSI* Vol. 74 (Part 2) pp. 147-242. **Compilers:** S. Paulraj, M.B. Raghunathan, K. Revathi, J.T. Jothinayagam, M. Ramalingam, Sathish Kumar, V.R. Punithavelu .

81. *Strandesia labiata* (Hartman) -- LRnt -- **Order /Family:** Podocopida (Ostracoda) / Cyprididae. **Taxonomic status:** Species. **Habit:** Littoral / Benthic. **Habitat:** Benthic lentic freshwater. . **Global Distribution:** Southern, western & eastern India. **Current Regional Distribtuion:** Southern India. **- Elevation:** Up to 3,000 m. **- Range (sq. km):** > 20,000 . **- Area Occupied (sq. km):** > 2,000 . **- Number of locations:** 8 (Bombay in Maharashtra, Travancore in Kerala, Palni Hills, Kodaikonal. Hills, Nilgiris Hills and Madras in Tamil Nadu, Hyderabad in Andhra Pradesh); Fragmented. **Population Trends: - % Decline:** 10%. **- Time / Rate (Yrs or gens):** 10 years. **- No. of Mature Individuals:** Not known. **Global Population:** Not known. **Regional Population:** Continuing gradual decline observed. **Data Quality:** General field study (M.B. Raghunathan, 1977-83 and K. Revathi, 1982-85 in Madras); Indirect information. **Recent Field Studies:** M.B. Raghunathan, 1993-till date In freshwater bodies of Chengalpet district. Sunny George, 1988-94 in Kerala. **Threats:** Loss of habitat; Pollution; Human interference. **Trade:** No. **Other Comments:** Water bodies in urban areas are desilted for commercial purposes and in rurual areas for agriculture. **Status- IUCN: LOWER RISK - NEAR THREATENED (Regionally -southern India)**. **DATA DEFICIENT (Globally)**. **- Criteria based on:** Not applicable. **- CITES:** No. **- IWPA (1972; 91):** No. **- RDB, National (old cat.):** No . **- RDB, International (old cat.):** No. **Recommendations: - Research management:** Habitat management. **- PHVA:** No. **Captive Breeding Recommendation:** . **- Captive breeding:** No. **- Level of difficulty:** Least difficult. **Existing Captive Programmes:** None . **- Names of facilities:** —. **Sources:** George, S. (1993) Ostracods of Kerala, *Ph.D. thesis, Calicut University*, Calicut. Victor, R. and Fernando, C.H. (1979) The Freshwater Ostracods of India, *Records of the ZSI* Vol. 74 (Part 2) pp. 147-242. **Compilers:** S. Paulraj, M.B. Raghunathan, K. Revathi, J.T. Jothirayagam, M. Ramalingam, Sathish Kumar, V.R. Punithavelu.

82. *Strandesia purpurascens* (Brady) -- EN (B1, 2a, 2c) -- **Order /Family:** Podocopida (Ostracoda) / Cyprididae. **Taxonomic status:** Species. **Habit:** Littoral/ Benthic. **Habitat:** Benthic lentic freshwater. **Global Distribution: ENDEMIC** to southern India . **Current Regional Distribtuion:** Southern India. **- Elevation:** Up to 500 m. **- Range (sq. km):** < 5,000. **- Area Occupied (sq. km):** < 500. **- Number of locations:** 2 (Ramnad and Madurai Districts in Tamil Nadu). **Population Trends: - % Decline:** 10%. **- Time / Rate (Yrs or gens):** 10 years. **- No. of Mature Individuals:** Not known. **Global Population:** Not known. **Regional Population:** Continuing gradual decline observed. **Data Quality:** General field

study (M.B. Raghunathan, 1977 -83 and K. Revathi, 1982-85 in Madras); Indirect information. **Recent Field Studies:** M.B. Raghunathan, 1993 -present in freshwater bodies of Chengalpet Dist. Sunny George, 1988-94 in Kerala. **Threats:** Loss of habitat; Pollution; Human interference. **Trade:** No. **Other Comments:** Water bodies in urban areas are desilted for commercial purposes and in rurual areas for agriculture. **Status- IUCN: ENDANGERED** . **- Criteria based on: B1, 2a, 2c**(Restricted distribution, Limited location, continuing decline in extent of occurrence, and /or area of occupancy and quality of habitat). **- CITES:** No. **- IWPA (1972; 91):** No. **- RDB, National (old cat.):** No . **- RDB, International (old cat.):** No. **Recommendations: - Research management:** Habitat management. **- PHVA:** No. **Captive Breeding Recommendation:** . **- Captive breeding:** No. **- Level of difficulty:** Least difficult. **Existing Captive Programmes:** None . **- Names of facilities:** —. **Sources:** George,S. (1993) Ostracods of Kerala, *Ph.D. thesis, Calicut University*, Calicut. Victor, R. and C.H. Fernando, C.H. (1979) The Freshwater Ostracods of India, *Records of the ZSI* Vol. 74 (Part 2) pp. 147-242. **Compilers:** S. Paulraj, M.B. Raghunathan, K. Revathi, J.T. Jothinayagam, M. Ramalingam, Sathish Kumar, V.R. Punithavelu .

83. *Streptogonopus jerdoni* (Pocock) -- EN (B1, 2c) -- (Millipede). **Order /Family:** Polydesmida / Paradoxosomatidae. **Taxonomic status:** Species. **Habit:** Phytophagous feeders, Fungivorous. **Habitat:** Cultivated fields. **Global Distribution:** Not known. **Current Regional Distribtuion:** Southern India. **- Elevation:** 200 -1,000 m. **- Range (sq. km):** < 5,000. **- Area Occupied (sq. km):** < 2,000. **- Number of locations:** 5 (Karnataka). **Population Trends: - % Decline:** No change. **- Time / Rate (Yrs or gens):** Not known. **- No. of Mature Individuals:** Not known (500 -1,000/m2 in each microhabitat). **Global Population:** Not known. **Regional Population:** No change. **Data Quality:** Census and monitoring; General field study (Allens 1936, Madras). **Recent Field Studies:** K. Bano, 1994-95 in Chitradurga, Dharwad, North Kanara, South Kanara, Shimoga. **Threats:** Human interference; Drought. **Trade:** No. **Other Comments:** The population consists of only female individuals so it is surmised that the animal is parthogenically breeding; hence survey and biological studies to find out the male- female ratio is required. **Status- IUCN: ENDANGERED (Regionally -southern India)**. **DATA DEFICIENT (Globally)**. **- Criteria based on: B1, 2c** (Restricted distribution, limited locations, continuing decline in extent of occurrence, area of occupancy and /or quality of habitat). **- CITES:** No . **- IWPA (1972; 91):** No. **- RDB, National (old cat.):** No . **- RDB, International (old cat.):** No. **Recommendations: - Research management:** Taxonomic and morphological genetic studies; Monitoring; Life history studies. **- PHVA:** Pending. **Captive Breeding Recommendation:** . **- Captive breeding:** Level 3. **- Level of difficulty:** Moderately difficult. **Existing Captive Programmes:** None. **- Names of facilities:** —. **Sources:** Attems, C. (1936) Diplopoda of India. *Mem.Ind. Mus.* 11**:** 216. **Compilers:** M. Mary Bai, K. Bano, M.V. Reddy, T.J. Indira, P. Ahimaz, R. Bhanumathi.

84. *Sulcospira hugeli* (Philippi) -- EN (B1, 2a, 2c) -- Order/ Family**:** Megagastropoda/ Melanitidae. **Taxonomic status:** Species. **Habit:** Attached to substratum. **Habitat:** Lotic freshwater. **Global Distribution: ENDEMIC** to southern India . **Current Regional Distribtuion:** Southern India . **- Elevation:** ca. 2,500 m. **- Range (sq. km):** < 5,000. **- Area Occupied (sq. km):** < 2,000. **- Number of locations:** 3 (Wynad, Lohen in Kerala; Cauvery River in Karnataka and Tamil Nadu). **Population Trends: - % Decline:** 20% . **- Time / Rate (Yrs or gens):** 10 years. **- No. of Mature Individuals:** Not known. **Global Population:** Continuing decline in the species restricted distribution . **Data Quality:** General field study (K.C. Jayaraman 1983, Cauvery survey). **Recent Field Studies:** None. **Threats:** Loss of habitat; Pollution. **Trade:** No. **Other Comments:** Cercarial intermediate host. **Status- IUCN: ENDANGERED**. **- Criteria based on: B1, 2a, 2c** (Restricted distribution, Limited location, continuing decline in extent of occurence, and /or area of occupancy and quality of habitat). **- CITES:** No. **- IWPA (1972; 91):** No. **- RDB, National (old cat.):** No . **- RDB, International (old cat.):** No. **Recommendations: - Research management:** Survey; Habitat management. **- PHVA:** No. **Captive Breeding Recommendation:** . - **Captive Breeding :** No. **- Level of difficulty:** Least difficult. **Existing Captive Programmes:** None . **- Names of facilities:** —. **Sources:** Jayaraman, K. C., Venkateswaralu, T. Ragunathan, M. B. (1983). A Survey of River Cauvery. *Records of ZSI*, *occasional paper no. 38.*. Sathyamurthy, S. T. (1960). The Land and Freshwater Mollusca in thecollection of the Madras Central Museum, *Bulletin of Madras Central Museum.*. **Compilers:** R. Natarajan, M.B. Ragunathan, S. Paulraj, V.R. Punithavelu, C. Gunasekaran, Sathish Kumar.

85. *Synectrychotes calimerei* Livingstone & Murugan 1987 -- CR (B1, 2c) -- Order /Family: Hemiptera / Reduviidae . **Taxonomic status:** Species. **Habit:** Underneath barks. **Habitat:** Scrub jungle. **Global Distribution: ENDEMIC** to southern India. **Current Regional Distribtuion:** Southern India. **- Elevation:** 10 m. **- Range (sq. km):** < 100. **- Area Occupied (sq. km):** < 10. **- Number of locations:** 1 (Point Calimere, Tamil Nadu). **Population Trends: - % Decline:** Not known . **- Time / Rate (Yrs or gens):** Not known. **- No. of Mature Individuals:** Not known . **Global Population:** Not known. **Data Quality:** General field studies, (Murugan & Livingstone 1983 in Point Calimere). **Recent Field Studies:** None. **Threats:** Human interference (man made fire); Loss of habitat; Browsing. **Trade:** No. **Other Comments:** New genus in the sub family Ectrichotiinae. Monotypic. **Status- IUCN: CRITICALLY ENDANGERED**. **- Criteria based on: B1, 2c** (Restricted distribution, single location, continuing decline in extent of occurrence, area of occupancy and/or quality of habitat). **- CITES:** No. **- IWPA (1972; 91):** No. **- RDB, National (old cat.):** No. **- RDB, International (old cat.):** No. **Recommendations: - Research management:** Survey; Life history studies. **- PHVA:** No. **Captive Breeding Recommendation:** . **- Captive breeding:** No. **- Level of difficulty:** Not known. **Existing Captive Programmes:** None. - Names of facilities—. **Sources:** Murugan, C. (1988) Biosystrmatics and Ecophysiology of the Tibiaroliate Assassin Bugs (Heteroptera**:** Reduviidae) of Southern India. Ph. D. thesis, Bharathiar University, Coimbatore. Livingstone, D and Murugan, C (1987) A new genus of Ectrichodiinae from Point Calimere, Southern India (Heteroptera **:** Reduviidae) *Uttar Pradesh J. Zool.* 7(1)**:** 92 -95. **Compilers:** D. Livingstone, C. Murugan, P.T. Cherian, P. Pugalenthi, K.G. Emiliyamma, B.A. Daniel.

86. *Tetramorium rossi* (Bolton) -- DD -- (*Triglyphothrix rossi* Bolton). **Order /Family:** Hymenoptera / Formicidae. **Taxonomic status:** Species. **Habit:** Not known . **Habitat:** Not known. **Global Distribution: ENDEMIC** to Southern India. **Current Regional Distribtuion:** Kerala. **- Elevation:** Not known. **- Range (sq. km):** Not known. **- Area Occupied (sq. km):** Not known. **- Number of locations:** 1 (Munnar). **Population Trends: - % Decline:** Not known. **- Time / Rate (Yrs or gens):** Not known. **- No. of Mature Individuals:** Not known. **Global Population:** Not known. **Data Quality:** General field studies; Informal field sighting . **Recent Field Studies:** S. Sheela, 1992-95. **Threats:** Not known. **Trade:** Not known. **Other Comments:** . **Status- IUCN: DATA DEFICIENT**. **- Criteria based on:** Not applicable. **- CITES:** No. **- IWPA (1972; 91):** No.

- RDB, National (old cat.): No . **- RDB, International (old cat.):** No. **Recommendations: - Research management:** Survey; Monitoring; Life history studies. **- PHVA:** Pending. **Captive Breeding Recommendations:** . **- Captive breeding:** No. **- Level of difficulty:** Not known. **Existing Captive Programmes:** None. **- Names of facilities:** —. **Sources:** Bolton, B. (1976) The ant tribe Tetramoriini (Hymenoptera**:** Formicidae)constitunt genera, review of smaller genera and revision of *Triglyphothrix* Forel. *Bull. Br.Mus. (Nat. Hist) ent.* 34**:** 281-379. . Sheela, S. (1995) Unpublished data. . **Compilers:** P.T. Cherian, R. Mathew, B.A. Daniel, A.K. Chakravarthy.

87. *Tetraponera aitkeni* (Forel) -- LRlc -- (*Sima aitkeni* Forel). **Order /Family:** Hymenoptera / Formicidae. **Taxonomic status:** Species. **Habit:** Arboreal species . **Habitat:** Arid zone (*Acasia* sp.) . **Global Distribution:** India and Sri Lanka. **Current Regional Distribtuion:** Southern India. **- Elevation:** 800 m. **- Range (sq. km):** > 20,000. **- Area Occupied (sq. km):** > 2,000 (about 50% of the extent of occurrence). **- Number of locations:** Many. **Population Trends: - % Decline:** Stable. **- Time / Rate (Yrs or gens):** Not known. **- No. of Mature Individuals:** Not known. **Global Population:** Not known. **Regional Population:** No change observed. **Data Quality:** Census and monitoring studies. **Recent Field Studies:** Mustak Ali, 1970-90 in Karnataka. **Threats:** No. **Trade:** No. **Other Comments:** Stenophagic, may be used in local, traditional and aurvedic medicine. **Status- IUCN: LOWER RISK -LEAST CONCERN (Regionally -southern India)**. **DATA DEFICIENT (Globally)**. **- Criteria based on:** Not applicable. **- CITES:** No. **- IWPA (1972; 91):** No. **- RDB, National (old cat.):** No . **- RDB, International (old cat.):** No. **Recommendations: - Research management:** Monitoring; Life history studies. **- PHVA:** No. **Captive Breeding Recommendation:** . **- Captive breeding:** No . **- Level of difficulty:** Not known. **Existing Captive Programmes:** None . **- Names of facilities:** —. **Sources:** Ali, T.M.M. (1992) Ant Fauna of Karnataka II, *IUSSI Newsletter*, 6(1&2)**:** 1-9. **Compilers:** D. Rajagopal, A.K. Chakravarthy, R. Mathew, A.S. Vastrad, B.A. Daniel. .

88. *Thelyphonus sepiaris* -- LRnt -- (Whip scorpion). **Order /Family:** Uropygi/ Thelyphonidae. **Taxonomic status:** Species. **Habit:** Nocturnal, carnivorous. **Habitat:** Scrub forest and open land. **Global Distribution:** Southern India and Sri Lanka. **Current Regional Distribtuion:** Southern India . **- Elevation:** Up to 1,300 m. **- Range (sq. km):** > 20,000. **- Area Occupied (sq. km):** > 2,000. **- Number of locations:** Many (Anamalais, Nilgiris, Shevaroy Hills in Yercaud). **Population Trends: - % Decline:** 10 % . **- Time / Rate (Yrs or gens):** 10 years. **- No. of Mature Individuals:** Not known. **Global Population:** Not known. **Regional Population:** Gradual continuing decline. **Data Quality:** General field studies; Informal field sightings (P. Ahimaz, 1978, MSPT at GNP;1984, at Mundanthurai,WS. Thirunelvelli; P. Ahimaz and Bhanumathi, WWF, 1989 at GNP, Madras). **Recent Field Studies:** ZSI, 1995 in Kathupakkam Agri fields near Tambaram, Madras). P. Ahimaz, WWF, 1996 at MCC, Tamburam, Madras. **Threats:** Loss of habitat . **Trade:** No. **Other Comments:** Common name is misleading since the animal lacks a stinger. Although the speci-men at hand has been positively identified, taxonomic studies may be required due to the doubtful distribution of this species elsewhere. **Status- IUCN: LOWER RISK - NEAR THREATENED (Nationally)**. **DATA DEFICIENT (Globally)**. **- Criteria based on:** Not applicable. **- CITES:** No. **- IWPA (1972; 91):** No. **- RDB, National (old cat.):** No . **- RDB, International (old cat.):** No. **Recommendations: - Research management:** Monitoring; Survey; Life history studies. **- PHVA:** Pending. **Captive Breeding Recommendation:** . **- Captive breeding:** No. **- Level of difficulty:** Least difficult. **Existing Captive Programmes:** None. **- Names of facilities:** —. **Sources:** Pocock, R. I. (1930) *The Fauna of British India including Ceylon and Burma*. Arachnida. Today and Tomorrow's Printers and Publishers, New Delhi. **Compilers:** T.J. Indira, M.V. Reddy, P. Ahimaz, R. Bhanumathi, Mary Bai, K. Bano.

89. *Tricimbomyia muzhiyarensis* -- CR (B1, 2c) -- **Order /Family:** Diptera / Chloropidae. **Taxonomic status:** Species. **Habit:** Not known. **Habitat:** Dense deciduous and semi-evergreen forests. MicrohabitatFound on leaves of shrubs. **Global Distribution: ENDEMIC** to southern western ghats. **Current Regional Distribtuion:** Kerala. **- Elevation:** Above 100 m. **- Range (sq. km):** < 100. **- Area Occupied (sq. km):** < 10. **- Number of locations:** 1 (Muzhiyar Forest in Pattanamthitta district of Kerala). **Population Trends: - % Decline:** Not known. **- Time / Rate (Yrs or gens):** Not known. **- No. of Mature Individuals:** Not known. **Global Population:** No specimen recorded for 22 years. Trends not known. . **Data Quality:** Reliable census and population monitoring (P. T. Cherian, March 1975, December 1983, April 1987). **Recent Field Studies:** P.T. Cherian and party (ZDI) in 1990 . **Threats:** Loss of habitat . **Trade:** No. **Other Comments:** Not found after type collection in 1975; attempts at collection on four occasions over 15 years in the same and similar ecosystem did not yield results. The original habitat was destroyed. Monotypic species which links two families (now merged). **Status- IUCN: CRITICALLY ENDANGERED**. **- Criteria based on: B1, 2c** (Restricted distribution, single location, continuing decline in extent of occurrence, area of occupancy and/or quality of habitat). **- CITES:** No. **- IWPA (1972; 91):** No. **- RDB, National (old cat.):** No . **- RDB, International (old cat.):** No. **Recommendations: - Research management:** Survey; Life history studies. **- PHVA:** Pending. **Captive Breeding Recommendation:** . **- Captive breeding:** No. **- Level of difficulty:** Very difficult. **Existing Captive Programme:** None. **- Names of facilities:** —. **Sources:** Cherian, P.T (1990) On some new genera of Chloropidae, *Oriental Insects* . **Compilers:** P.T. Cherian, A.S. Vastrad, R. Mathew, B.A. Daniel, K.V. Lakshminarayana, . C. Gunasekaran.

90. *Trinervitermes biformis* (Wasman) -- VU (A1a, 1c; B1, 2c) -- **Order /Family:** Isoptera / Termitidae. **Taxonomic status:** Species. **Habit:** Grass and lilter feeding. **Habitat:** Subterranean. **Global Distribution:** India, Sri Lanka, Pakistan. **Current Regional Distribtuion:** Southern India. **- Elevation:** 500 -2,000 m. . **- Range (sq. km):** > 20,000 . **- Area Occupied (sq. km):** < 2,000 km. **- Number of locations:** Many; Fragmented. **Population Trends: - % Decline:** 30% . **- Time / Rate (Yrs or gens):** 10 years. **- No. of Mature Individuals:** Not known. **Global Population:** Not known. **Regional Population:** Gradual decline. **Data Quality:** General field studies (Chhotani, 1975-76 South India). **Recent Field Studies:** D. Rajagopal, 1975-95 in Karnataka. **Threats:** Loss of habitat; Pesticides. **Trade:** No. **Other Comments:** . **Status- IUCN: VULNERABLE (Regionally -southern India)**. **DATA DEFICIENT(Globally)**. Criteria based on**: A1a, 1c** (Observed population reduction due to decline in extent of occurrence, area of occupancy and/or quality of habitat); **B1, 2c** (Restricted distribution, severely . fragmented, continuing decline in extent of occurrence, area of occupancy and/or quality of habitat). **- CITES:** No. **- IWPA (1972; 91):** No. **- RDB, National (old cat.):** No . **- RDB, International (old cat.): :** No. **Recommendations: - Research management:** Monitoring; Limiting factor management; Limiting factor research. **- PHVA:** Yes. **Captive Breeding Recommendation:** . **- Captive breeding:** Level 3. **- Level of difficulty:** Very difficult. **Existing**

Captive Programmes: None. **- Names of facilities:** —. **Sources:** Rajagopal, D. (1983) Habit and habitat Studies of some Termites of Karnataka, *J. Soil Biol. Ecol.* 3(2)**:** 108-123. Chhotani, O.B. (1980) *Termite pest of Agriculture in the region and their control,* ZSI, Calcutta. **Compilers:** D. Rajagopal, A.K. Chakravarthy, A.S. Vastrad, R. Matthew, B.A. Daniel.

91. *Truxalis indica* (T. Bol) -- EN (B1, 2c) -- (Short-horned grasshopper)**Order /Family:** Orthoptera / Acrididae. **Taxonomic status:** Species. **Habit:** Graminivorous (specific to grass). **Habitat:** Grassland. **Global Distribution:** Southern India. **Current Regional Distribtuion:** Karnataka - Dharwad, Tamil Nadu. **- Elevation:** about 100 m. **- Range (sq**. **km):** < 5,000. **- Area Occupied (sq**. **km):** < 2,000. **- Number of locations:** 7 (2 in Karnataka; 5 in Tamil Nadu) Fragmented. **Population Trends: - % Decline:** Not known. **- Time / Rate (Yrs or gens):** Not known. **- No**. **of Mature Individuals:** Not known. **Global Population:** Not known. **Regional Population:** Restricted in distribution and fragmented. Population decline not known. **Data Quality:** Census (P. Kumar, 1984, 1986; A.S. Vastrad, 1984, 1986 in Dharwad). **Recent Field Studies:** Muralirangan *et.al,* 1993 in Tamil Nadu. **Threats:** Loss of habitat. **Trade:** No. **Other Comments:** It is very scarce in TN and Karnataka. Two individuals recorded in Dharwad. **Status- IUCN: ENDANGERED (Regionally -southern India)**. **DATA DEFICIENT (Globally)**. **- Criteria based on: B1, 2c** (Restricted distribution, severely fragmented, continuing decline in extent of occurrence, area of occupancy and/or quality of habitat). **- CITES:** No. **- IWPA (1972; 91):** No. **- RDB, National (old cat.):** No . **- RDB, International (old cat.):** No. **Recommendations: - Research management:** Survey; Monitoring; Limiting factor research . **- PHVA:** Yes. **Captive Breeding Recommendations: - Captive breeding:** Level 3. **- Level of difficulty:** Least difficult. **Existing Captive Programme:** None. **- Names of facilities:** —. **Sources:** Kumar, P. (1991) *Hexapoda,* 3 (1)**:** 53-70. . Muralirangan, M.C., Suresh,P., Dang, P.P and Gill, G.S (1993) Observations on the grasshopper species diversity and distributional pattern in peninsular India.

92. *Velitra neelai* Murugan and Livingstone 1987 -- VU (D2) -- **Order /Family:** Hemiptera / Reduviidae. **Taxonomic status:** Species. **Habit:** Underneath barks. **Habitat:** Ever green Forest. **Global Distribution: ENDEMIC** to southern India. **Current Regional Distribtuion:** Southern India. **- Elevation:** 450 m. **- Range (sq**. **km):** < 100. **- Area Occupied (sq**. **km):** < 10. **- Number of locations:** 1(Siruvani, Coimbatore district). **Population Trends: - % Decline:** Not known . **- Time / Rate (Yrs or gens):** Not known . **- No**. **of Mature Individuals:** Not known . **Global Population:** . **Data Quality:** General field studies (C. Murugan & D. Livingstone, 1985 in Siruvani). **Recent Field Studies:** None. **Threats:** Not known . **Trade:** No. **Other Comments:** Fortnightly visits for 5 years (1983-88) did not yield a single specimen. Survey after 1994 also did not yield specimen. Restricted distribution in terms of elevation. **Status- IUCN: VULNERABLE**. **- Criteria based on: D2** (Restricted population in less than 100 sq.Km area of occupancy and a single location). **- CITES:** No. **- IWPA (1972; 91):** No. **- RDB, National (old cat.):** No. **- RDB, International (old cat.):** No. **Recommendations: - Research management:** Survey; Life history studies; Habitat management . **- PHVA:** No. **Captive Breeding Recommendation:** . **- Captive breeding:** Level 3. **- Level of difficulty:** Not known . **Existing Captive Programmes:** None. - Names of facilities— . **Sources:** Murugan, C. (1988) Biosystematics and Ecophysiology of the Tibiaroliate Assassin Bugs (Heteroptera**:** Reduviidae) of Southern India. Ph. D. thesis, Bharathiar University, Coimbatore. Murugan, C and Livingstone, D (1987) A new species of the genus *Vilitra* Stal from Southern India (Heteroptera**:** Reduvidae **:** Acanthaspidinae) *J. Ent. Res*. 11(1) **:** 87-89. . **Compilers:** D. Livingstone, C. Murugan, P.T. Cherian, P. Pugalenthi, K.G. Emiliyamma, . B.A. Daniel. .

93. *Viviparus variata* (Frauen feld) -- EN (B1, 2b, 2c) -- **Order /Family:** Megagastropoda / Viviparidae. **Taxonomic status:** Species. **Habit:** Shallow water, Benthic. **Habitat:** Ponds, lentic freshwater. **Global Distribution:** Throughout India . **Current Regional Distribution:** Southern India. **- Elevation:** Below 500 m. **- Range (sq**. **km):** < 5,000. **- Area Occupied (sq**. **km):** < 500. **- Number of locations:** 8 (Pondicherry, Tamil Nadu); Fragmented. **Population Trends: - % Decline:** 10 %. **- Time / Rate (Yrs or gens):** 10 years. **- No**. **of Mature Individuals:** Not known. **Global Population:** Not known. **Regional Population:** Continuing gradual decline. **Data Quality:** Museum studies (T. Sathyamurthy 1960 at Madras Museum; Anantharaman, 1980s); General field study. **Recent Field Studies:** M.B. Ragunathan and V.R. Punethavelu, 1996-97 in Chengalpet district. **Threats:** Loss of habitat; Pollution. **Trade:** No. **Other Comments:** No. **Status- IUCN: ENDANGERED (Regionally -southern India)**. **DATA DEFICIENT (Globally)**. **- Criteria based on: B1, 2b, 2c** (Restricted distribution, severely fragmented, continuing decline in extent of occurrence, and /or area of occupancy and quality of habitat). **- CITES:** No. **- IWPA (1972; 91):** No. **- RDB, National (old cat.):** No . **- RDB, International (old cat.):** No. **Recommendations: - Research management:** Survey. **- PHVA:** No . **Captive Breeding Recommendations: - Captive breeding:** No. **- Level of difficulty:** Least difficult. **Existing Captive Programmes**None. **- Names of facilities:** —. **Sources:** Anantharaman, M. MAB Project**:** The Ecology Distribution and documentation of Freshwater Gastropods of Tamil Nadu and their Cercarial Fauna (1 Oct. 184 -31 Mar 1988). Sathyamurthy, S.T. (1960) The Land and Freshwater Mollusca in the Collection of the Madras Government Museum. *Bulletin of Madras Govt. Museum.* **Compilers:** R. Natarajan, M.B. Ragunathan, S. Paulraj, V.R. Punithavelu, C. Gunasekaran, Sathish Kumar.

94. *Xenobolus acuticonus* Attems -- LRnt -- (Millipede). **Order /Family:** Spirobolida / Trigoniulidae. **Taxonomic status:** Species. **Habit:** Litter feeding leaves under barks, leaf litter, in between tree trunks and wherever moisture is present . **Habitat:** Wide range of habitats including urban and rural areas. **Global Distribution:** Not known. Current regional dist**:** Southern India. **- Elevation:** 1,400 m. **- Range (sq**. **km):** < 20,000. **- Area Occupied (sq**. **km):** < 2,000. **- Number of locations:** Many (Tamil Nadu). **Population Trends: - % Decline:** No change noticed. **- Time / Rate (Yrs or gens):** Not known. **- No**. **of Mature Individuals:** Not known (30 -40/m2). **Global Population:** Not known. **Regional Population:** Stable. **Data Quality:** General field study . **Recent Field Studies:** M. Mary Bai, ZSI in Tamil Nadu, 1994-95 . **Threats:** Climate; Drought. **Trade:** No. **Other Comments:** This species is a nuisance during monsoon due to its large population. **Status- IUCN: LOWER RISK - NEAR THREATENED (Regionally -southern India)**. **DATA DEFICIENT (Globally)**. **- Criteria based on:** Not applicable. **- CITES:** No. **- IWPA (1972; 91):** No. **- RDB, National (old cat.):** No . **- RDB, International (old cat.):** No. **Recommendations: - Research management:** Monitoring; Survey (new areas). **- PHVA:** No. **Captive Breeding Recommendations:** . **- Captive breeding:** No. **- Level of difficulty:** Not known. **Existing Captive Programmes:** None . **- Names of facilities:** —. **Sources:** Attems, C. (1936) Diplopoda of India. *Mem.Ind. Mus.* 11**:** 303. **Compilers:** M. Mary Bai, K. Bano, M.V. Reddy, T.J. Indira, P. Ahimaz, R. Bhanumathi.

95. *Zarytes squalina* (Bol.) -- CR (B1, 2a, 2b) -- **Order /Family:** Orthoptera / Pyrgomorphidae. **Taxonomic status:** Species. **Habit:** Phytophagous. **Habitat:** Rocky scrub in forests. **Global Distribution: ENDEMIC** to southern India . **Current Regional Distribtuion:** Tamil Nadu and Karnataka. **- Elevation:** about 1,000 m. **- Range (sq. km):** < 5,000. **- Area Occupied (sq. km):** < 10. **- Number of locations:** 3; Fragmented. **Population Trends: - % Decline:** 10 -20% . **- Time / Rate (Yrs or gens):** 10 years. **- No. of Mature Individuals:** Not known. **Global Population:** Gradual continuing decline in population. **Data Quality:** General field studies. **Recent Field Studies:** M.C. Muralirangan, *et. al*., 1993 in entire Tamil Nadu; Prasad Kumar and Virakthamath, 1991 in entire Karnataka; A.S. Vastrad, 1991 in northern Karnataka. **Threats:** Loss of habitat; Human interference. **Trade:** No. **Other Comments:** . **Status- IUCN: CRITICALLY ENDANGERED**. **- Criteria based on: B1, 2a, 2b** (Restricted distribution, severely fragmented, continuing decline in extent of occurrence and area of occupancy). **- CITES:** No. **- IWPA (1972; 91):** No. **- RDB, National (old cat.):** No . **- RDB, International (old cat.):** No. **Recommendations: - Research management:** Survey; Monitoring; Limiting factor research; Life history studies. **- PHVA:** Yes. **Captive Breeding Recommendation:** . **- Captive breeding:** Level 3. **- Level of difficulty:** Least difficult. **Existing Captive Programmes:** None . **- Names of facilities:** —. **Sources:** Kumar, P. (1991) *Hexapoda,* 3(1)**:** 53 -70. Muralirangan, M.C., Suresh,P., Dang, P.P. and Gill, G.S. (1993) Observations on the grasshopper species diversityand distributional pattern in peninsular India. *Entomologist,* 112(3&4)**:** 201-210. Vastrad, A.S. (1991) Ecological distribution, lifeforms and food habits of . grasshoppers in Dhaward region, Karnataka**,** *Hexapoda*, 3(1)**:** 94 -99. **Compilers:** D. Rajagopal, A.K. Chakravarthy, A.S. Vastrad, R. Mathew, B.A. Daniel.