Conservation Assessment And Management Plan For Sumatran Threatened Species

Parapat, North Sumatra
24-28 February 2003

Workshop Report

IUCN
The World Conservation Union

CONSERVATION INTERNATIONAL INDONESIA

A contribution of the IUCN SSC Conservation Breeding Specialist Group.

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Sumatran Threatened Species CAMP

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Workshop Report

SECTION I

Executive Summary &
Workshop Report

Sumatran Threatened Species CAMP

Executive Summary

Introduction

A Conservation Assessment and Management Plan (CAMP) Workshop for seven taxonomic groups of Sumatran fauna and flora was held from 24-28 February 2003. The five-day participatory workshop was held at Hotel Niagara on Lake Toba in Parapat, North Sumatra. More than 80 biologists from all over Indonesia participated along with a facilitator from India.

The workshop was part of a larger project by Conservation International, Indonesia Program to determine the current status of threatened vertebrates of Sumatra. An additional function of the workshop was to discuss certain core conservation issues such as corridors and road networks affecting natural habitats, along with other identified special issues. The workshop was conducted in the CBSG style of facilitation using participatory and consensual approaches.

Various stakeholders from governmental organizations, non-governmental organizations, agencies, individuals and foresters attended the workshop to share their perspective on the status of taxa and also to address the core conservation issues.

The CAMP Process

The IUCN SSC Conservation Breeding Specialist Group (CBSG) developed the CAMP Process. This process includes assembling experts such as wildlife managers, SSC Specialist Group members, representatives of the academic community or private sector, researchers, captive managers, and other stakeholders who provide the most current information in order to:

a. Assign species and subspecies to IUCN Categories of Threat;
b. Formulate broad-based management recommendations; and
c. Develop more comprehensive management and recovery programs *in situ* and/or *ex situ*.

Extensive review is carried out by participants who desire to do so before the final report is compiled and published.

2001 IUCN Red List Criteria (Version 3.1)

CAMP workshops use the most recent version of the IUCN Red List Criteria and Categories and, where appropriate, the IUCN SSC Guidelines for Application of IUCN Red List Criteria at Regional Levels, as tools in assessing the status of a group of taxa. In the last decade, IUCN has improved the method of assessing taxa by incorporating numerical values attached to different criteria for threat categories. The 2001 version of the Red List Criteria and Categories uses a set of five criteria (population reduction; restricted distribution, continuing decline and fluctuation; restricted population and continuing decline; very small population; and probability of extinction) to determine the threatened categories, which are Critically Endangered (CR), Endangered (EN) and Vulnerable (VU). Other categories are Extinct (EX), Extinct in the Wild

(EW), Near Threatened (NT), Least Concern (LC), Data Deficient (DD) and Not Evaluated (NE).

Assessment

The mandate of the workshop was to assess the status of as many vertebrate taxa as possible within the five-day period, discuss special issues, make strong recommendations for conservation action to the government, and prioritize research and management efforts. The objective of assessing taxa was to produce a current listing of status for Sumatra in order to provide an accurate analysis for species conservation efforts on the island. However, when the workshop convened, the participants and organizers felt that a better purpose would be served if other lesser-known taxa and those not already assessed were also tackled. The large gathering of biologists and foresters provided an excellent scope for assessments in seven taxonomic groups, *viz*., freshwater fishes, amphibians, reptiles, birds, mammals, butterflies and plants. Totally, 266 taxa were assessed as per the 2001 IUCN Red List Criteria and Categories guidelines. This included the assessment of 128 selected taxa from five vertebrate groups. The list of vertebrate taxa assessed in the CAMP is given in Table 1 and assessments are summarized in Table 2.

Close to 80% of the vertebrates assessed were classified as threatened and an additional 16% were categorized as Near Threatened (Figure 1). The reason for so many threatened taxa was due to the combination of restricted distribution on Sumatra or the adjoining islands, and the influence of extreme threats such as habitat loss, change in quality of habitat, decrease in area of occupancy, fragmentation and hunting. Restricted distribution accounted for nearly 105 taxa being assessed as threatened. The other main reason for some groups of fauna, especially crocodiles, testudines, viverrids, mustelids, felids and ursids, was overharvest for use as food, medicine or pets. The pressure on these populations accounted for their declines in the wild and therefore categorization as threatened. Figure 2 shows the impact of different threats on the assessment of Sumatran vertebrate taxa.

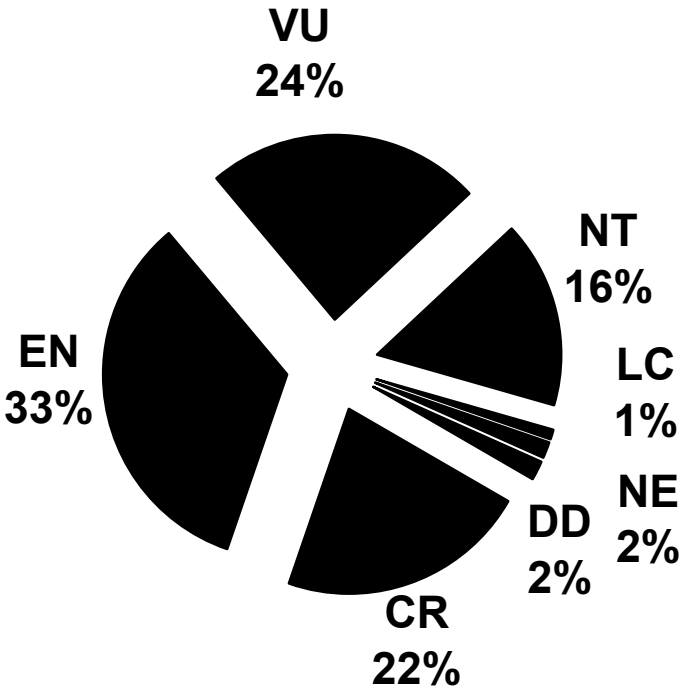

Figure 1. Overall status of all Sumatran vertebrates assessed in the CAMP.

Table 1. Vertebrate taxa in Sumatra assessed during the CAMP workshop.

	Scientific Name	Common Name	2003 CAMP Status
Freshwater Fishes			
1.	*Balantiocheilos melanopterus* (Bleeker, 1851)	Silver shark	Critically Endangered
2.	*Betta burdigala* Kottlat & Ng, 1994	Rotwein - Kempfisch	Critically Endangered
3.	*Betta chloropharynx* Kottelat & Ng, 1994	Betta	Critically Endangered
4.	*Betta miniopinna* Tan & Tan, 1994	Betta	Critically Endangered
5.	*Betta rubra* Perugia, 1893	Betta	Critically Endangered
6.	*Betta schalleri* Kottelat & Ng, 1994	Betta	Vulnerable
7.	*Betta spilotogena* Ng & Kottelat, 1994	Betta spilotogena	Critically Endangered
8.	*Encheloclarias kelioides* Ng & Lim, 1993	Ikan keli	Endangered
9.	*Encheloclarias tapeinopterus* (Bleeker, 1852)	Encheloclarias	Critically Endangered
10.	*Himantura oxyrhyncha* Sauvage, 1878	Gemarmerde	Endangered
11.	*Himantura signifer* Compagno & Robert, 1982	White-edge freshwater whipray	Endangered
12.	*Mystacoleucus padangensis* (Bleeker, 1852)	Ikan bilih	Critically Endangered
13.	*Neolissochilus thienemanni* (Ahl, 1933)	Ikan batak (ihan)	Endangered
14.	*Parosphromenus bintan* Kottlelat & Ng, 1998	Parosphromenus	Critically Endangered
15.	*Parosphromenus deissneri* Bleeker, 1859	Parosphromenus	Critically Endangered
16.	*Poropuntius tawarensis* Weber & de Beaufort, 1916	Keperas (Malay)	Critically Endangered
17.	*Pristis microdon* (Latham, 1794)	Pristis	Near Threatened
18.	*Rasbora reticulata* Weber & de Beaufort, 1915	Minnows or carps	Endangered
19.	*Rasbora tawarensis* Weber & de Beaufort, 1918	Rasbora	Critically Endangered
20.	*Scleropages formosus* Schlegel & Muller, 1844	Asian arowana	Near Threatened

Amphibians			
21.	*Bufo sumatranus* Peters, 1871	Sumatran toad	Endangered
22.	*Bufo valhallae* Meade-Waldo, 1908	Sabang toad	Endangered
23.	*Kalophrynus punctatus* Peters, 1871	Spotted sticky frog	Vulnerable
Reptiles			
24.	*Amyda cartilaginea* Boddaert, 1770	Asiatic softshell turtle	Near Threatened
25.	*Batagur baska* Gray, 1831	Cammond batagur	Near Threatened
26.	*Boiga nigriceps brevicauda*	-	Vulnerable
27.	*Calamaria abstruse* Ingel & Mary, 1965	-	Endangered
28.	*Calamaria alidae* Boulinger, 1920	-	Vulnerable
29.	*Calamaria crassa* van Lidth de Jeude, 1922	-	Critically Endangered
30.	*Calamaria doederleini* Grough, 1902	-	Critically Endangered
31.	*Calamaria eiselti* Inger & Marx, 1965	-	Critically Endangered
32.	*Calamaria elegans* de Rooij, 1917	-	Endangered
33.	*Calamaria forcarti* Inger & Marx, 1965	-	Endangered
34.	*Calamaria margaritophora* Bleeker, 1860	-	Endangered
35.	*Calamaria mecheli*	-	
36.	*Calamaria sumatrana* Edeling, 1870	-	Endangered
37.	*Calamaria ulmeria* Sackult, 1940	-	Critically Endangered
38.	*Callagur borneoensis* Schlegel & Muller, 1844	Painted batagur / Terrapin	Endangered
39.	*Caretta caretta* Linneaus, 1758	Loggerhead turtle	Endangered
40.	*Chelonia mydas* Linnaeus, 1758	Green turtle	Endangered
41.	*Chitra chitra* Nutphand, 1986	Narrow-headed softshell turtle	Near Threatened
42.	*Cuora amboinensis* Daudin 1801	Southeast Asia box turtle	
43.	*Dermochelys coriacea* Vandelli, 1761	Leatherback turtle	Near Threatened
44.	*Eretmochelys imbricata*	Hawkbill sea turtle	Endangered
45.	*Heosemys spinosa* Gray, 1831	Spiny turtle	Endangered

46.	*Iguanoghatus werneri* Boulenger, 1898	Spatula-tooth snake	Data Deficient
47.	*Lepidochelys olivacea* Eschscholtz, 1829	Olive ridley sea turtle	Critically Endangered
48.	*Malayemys subtrijuga* Schlegel & Muller, 1844	Malayan snail-eating turtle	Vulnerable
49.	*Manouria emys* Schelegel & Muller	Asian giant tortoise	Near Threatened
50.	*Notochelys platynota* Gray, 1834	Malayan flat-shelled turtle	Endangered
51.	*Orlitia borneensis* Gray, 1873	Malaysian giant turtle	Vulnerable
52.	*Pelochelys cantorii* Gray, 1864	Cantor's giant softshell	Near Threatened
53.	*Python curtus* Schlegel, 1872	Blood python	Near Threatened
54.	*Siebebrockiella crassicollis* Gray, 1831	Fat-necked turtle	Near Threatened
55.	*Tomistoma schlegelii* Muller, 1838	False gharial	Endangered
56.	*Trimeresurus brongersmai* Regenass & Kramer, 1981	Brongersmai's pit viper	Endangered
57.	*Trimeresurus popeiorum barati* Regenass & Kramer, 1981	Pope pit viper	Vulnerable
Birds			
58.	*Alcedo euryzona peninsulae* (Temminck 1830)	Kingfisher	Vulnerable
59.	*Aquila clanga* Pallas, 1811	Greater spotted-eagle	Critically Endangered
60.	*Cairina scutulata* Muller, 1842	White-winged duck	Endangered
61.	*Caprimulgus concretus* Bonaparte, 1850	Bonaparte's nightjar	Vulnerable
62.	*Carpococcyx viridis* (Temminck, 1832)	Sunda ground-cuckoo	Vulnerable
63.	*Centropus rectunguis* Stricland, 1847	Short-toed coucal	Endangered
64.	*Ciconia stormi* Blasius, 1896	Storm's stork	Vulnerable
65.	*Cochoa beccari* Salvadori, 1879	Sumatran cochoa	Vulnerable
66.	*Columba argentina* Bonaparte, 1855	Grey wood-pigeon	Endangered
67.	*Cyornis caerulatus* Bonaparte, 1857	Large-billed blue flycatcher	Vulnerable
68.	*Cyornis ruckii* Oustalet, 1881	Ruecks blue flycatcher	Vulnerable
69.	*Egretta eulophotes* Swinhoe, 1860	Chinese egret	Endangered

70.	*Fregata andrewsii* Mathews, 1914	Christmas frigatebird	Vulnerable
71.	*Heliophais personata* Gray, 1849	Masked finfood	Vulnerable
72.	*Leptoptilus javanicus* Horsfield, 1821	Lesser adjutant	Near Threatened
73.	*Lophura eryhtopthalma* Raffless, 1822	Crestless fireback	Near Threatened
74.	*Lophura hoogerwerfi* Chasen, 1939	Imperial pheasant	Vulnerable
75.	*Lophura inornata* Salvadori, 1879	Salvadori's pheasant	Vulnerable
76.	*Melanoperdix nigra* Vigors, 1829	Black partridge, black wood-partridge	Vulnerable
77.	*Mycteria cinerea* Raffless, 1822	Milky stork	Near Threatened
78.	*Padda oryziviora* Linnaeus, 1758	Java sparrow	Near Threatened
79.	*Pelecanus philippinensis* Gmelin, 1789	Spot-billed pelican	Near Threatened
80.	*Pitta schneideri* Hartert, 1909	Schneider's pitta	Endangered
81.	*Pitta venusta* Muller, 1835	Black-crowned pitta	Near Threatened
82.	*Pycnonotus zeylanicus* Gmellin, 1789	Straw-headed bulbul	Near Threatened
83.	*Setornis criniger* Lesson, 1839	Hook-billed bulbul	Vulnerable
84.	*Spizaetus nanus* Wallacea, 1868	Wallace's hawk-eagle	Near Threatened
85.	*Sula abbotti* Ridgwey, 1893	Abbot's booby	Endangered
86.	*Treron capellei* Temminck, 1823	Large-green pigeon	Vulnerable
87.	*Tringa guttifer* Nordmann, 1835	Nordmann's greenshank	Endangered
Mammals			
88.	*Aethalops alecto alecto* Thomas, 1923	Hairy mountain fruit bat	Critically Endangered
89.	*Arctogalidia trivirgata trivirgata* (Gray, 1865)	Three-striped palm civet	Vulnerable
90.	*Catopuma temminckii temminckii* (Vigors & Horsfield, 1827)	Golden cat	Vulnerable
91.	*Chimarrogale phaeura sumatrana* Thomas, 1921	Sumatran water shrew	Critically Endangered
92.	*Chripodomys karlkoopmani* Musser, 1979	Mentawai pencil-tailed mouse	Endangered
93.	*Crocidura paradoxura* Dobson, 1887	Mountain shrew	Critically Endangered
94.	*Cuon alpinus sumatrensis* (Hardwicke, 1821)	Dhole	Vulnerable
95.	*Cynocephalus variegatus chombolis* Lyon, 1909	Flying lemur chombolis	Endangered

96.	*Cynocephalus variegatus gracilis* Miller, 1903c	Batu Island flying lemur	Vulnerable
97.	*Cynocephalus variegatus natunae* Miller, 1903	Tuangku Island flying lemur	Endangered
98.	*Cynocephalus variegatus saturatus* Miller, 1903	Serasan Island flying lemur	Endangered
99.	*Cynocephalus variegatus tellonis* Lyon, 1908	Bunguran Island flying lemur	Critically Endangered
100.	*Cynocephalus variegatus temminckii* (Waterhouse, 1839)	Telo Islands flying lemur	Near Threatened
101.	*Cynocephalus variegatus tuancus* Miller, 1903	Temmincks flying lemur	Endangered
102.	*Cynogale bennettii* Gray, 1837	Otter civet	Critically Endangered
103.	*Dyacopterus brooksi* Thomas, 1920	Dayak fruit bat	Endangered
104.	*Eonycteris major major* Andersen, K., 1910	Major blossom bat	Critically Endangered
105.	*Hipposideros breviceps* Tate, 1941	Pagai leaf-nosed bat	Critically Endangered
106.	*Hylomys parvus* Robinson, Kloss, 1916	Small gymnure	Critically Endangered
107.	*Hylomys suillus* Muller, 1841	Tupai	Least Concern
108.	*Hylopetes sipora* Chasen, 1940	Lesser gymnure	Endangered
109.	*Hylopetes winstoni* (Sody, 1949)	Winston flying squirrel	Vulnerable
110.	*Iomys sipora* Chasen & Kloss, 1928	Sipora flying squirrel	Endangered
111.	*Lutra sumatrana* (Gray, 1865)	Hairy-nosed otter	Endangered
112.	*Lutreogale perspicillata perspicillata* (Geoffroy, 1826)	Smooth-coated otter	Near Threatened
113.	*Manis javanica* Desmarest, 1822	Sunda pangolin	Endangered
114.	*Marmopterus doriae* Anderson, 1907	Sumatran mastiff bat	Critically Endangered
115.	*Martes flavigula henricii* Schinz, 1845	Yellow-throated marten	Vulnerable
116.	*Mustela lutreolina* Robinson & Thomas, 1917	Indonesia mountain weasel	Endangered
117.	*Nesolagus netscheri* (Schlegel, 1880)	Sumatran rabbit	Endangered
118.	*Panthetor lucasii* Dobson, 1880	Lucas's dusky fruit bat	Endangered
119.	*Paradoxurus lignicolor* Miller, 1903	Mentawai palm civet	Vulnerable

120.	*Pardofelis marmorata* Martin, W.C.L., 1837	Marbled cat	Endangered
121.	*Neofelis nebulosa diardi* (Cuvier, 1823)	Clouded leopard	Vulnerable
122.	*Prionailurus planiceps* (Vigors & Horsfield, 1827)	Flat-headed cat	Vulnerable
123.	*Pteropus vampyrus vampyrus* Linnaeus, 1758	Flying fox	Near Threatened
124.	*Rattus adustus* Sody, 1940	Enggano rat	Endangered
125.	*Rattus enganus* Miller, 1906	Enggano island rat	Endangered
126.	*Rhinopoma microphyllum sumatrae* Thomas, 1903	Greater mouse-tailed bat	Critically Endangered
127.	*Rousettus spinalatus* Bergmans & Hill, 1980	Bare-backed rousette bat	Data Deficient
128.	*Ursus malayanus malayanus* Raffles, 1821	Sun bear	Vulnerable

Table 2. Summary status of Sumatran vertebrate fauna assessed at the workshop.

Category	**Endemic to Sumatra**	**Not Endemic**	**Total**
Critically Endangered (CR)	18	10	28
Endangered (EN)	16	27	43
Vulnerable (VU)	14	17	31
Near Threatened (NT)	2	19	21
Least Concern (LC)	0	1	1
Data Deficient (DD)	1	1	2
Not Evaluated (NE)	1	1	2
Total	52	76	128

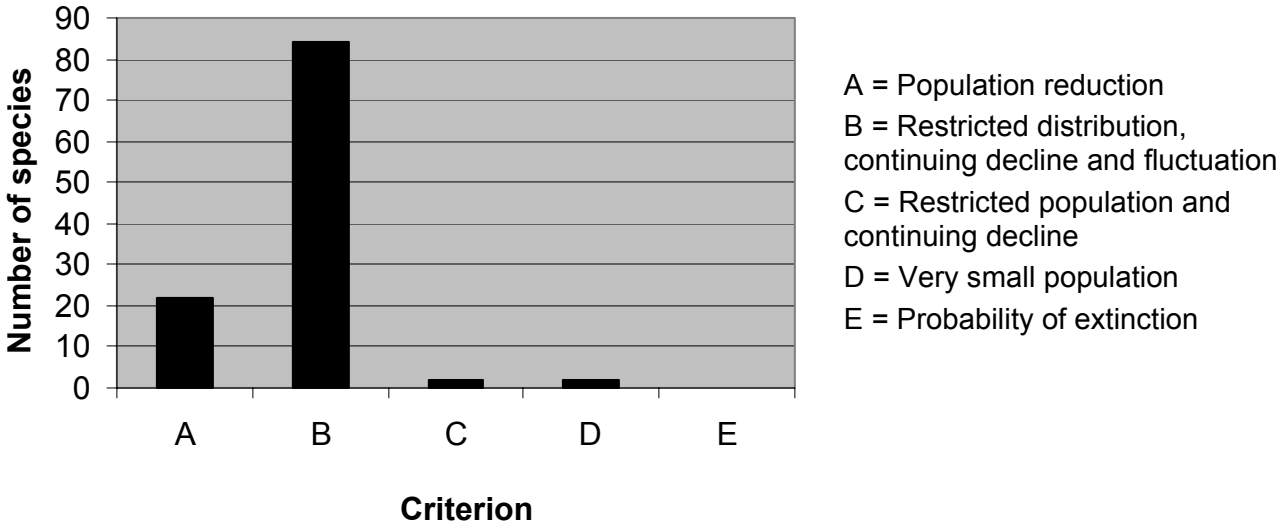

Figure 2. Assessments based on threats as per the IUCN Red List Criteria.

Recommendations

Research and management recommendations were suggested for all of the assessed taxa. Field survey was given the highest priority for research followed by life history studies, while under management needs, monitoring was followed by habitat management and wild population management.

Special issue working groups met and discussed important conservation issues such as corridors for wildlife and the threat from the planned construction of a highway through natural habitats, as well as issues relating to the individual taxon groups.

In conclusion, the workshop participants assessed a total of 128 vertebrate taxa of Sumatra, close to 80% of which are threatened. The Sumatra CAMP workshop provided an excellent opportunity to address the conservation needs for the fauna and flora and their habitat, as well as the resolution of important issues identified by all stakeholders. Research focus and management recommendations from this CAMP workshop will help conservation organizations, agencies and institutions nationally, regionally and internationally, to formulate and implement appropriate action on behalf of species conservation. Funding agencies can use this report as a reference for prioritizing proposals for maximum benefit of resources.

Sumatran Threatened Species CAMP

Workshop Report

Biodiversity of Sumatra

Sumatra is the biggest of all of the islands that form Indonesia. Starting from the Nicobar Islands of India, all Indonesian islands including Sumatra are considered a global biodiversity hotspot (Mittermeier *et al*., 1999). The region's biodiversity is threatened by developmental enthusiasm adopted by the Indonesian government, and also by intermittent ethnic and political clashes. The situation in Sumatra, which reflects the starkness of the developmental processes, is evident in the loss of more than 80% of lowland forests to logging and human habitation.

Sumatra is, by far, the most important region in terms of megafauna diversity; here is where elephants, rhinoceros, tigers, clouded leopards, and orangutans are found within one island. In terms of faunal assemblages, Sumatra has a greater variety of wildlife than any other island in Indonesia not only in numbers (210 mammals, 194 reptiles, 62 amphibians, and 580 birds) but also in uniqueness. Nine species of mammals are endemic to mainland Sumatra and a further 14 species are endemic on the isolated group of Mentawai Islands. Those endemic species include 4 primates in Mentawai, the Sumatran rabbit, 6 squirrels, 2 rats, 3 bats, 1 tree mouse and 1 weasel.

Sumatra has 15 other species confined only to the Indonesian region, including the orangutan. The island also harbors 22 species of Asian mammals found nowhere else within Indonesia. New mammal species are still being discovered or recognized; one recent discovery is a rodent species found in the Maninjau Lake area. There are 34 Important Bird Areas (IBA) in Sumatra, but almost 54% of the IBAs are found outside the existing protected areas system (PAS), and 18% are in lowland forests, the type under high land conversion pressure (Birdlife International).

Sumatra has 270 species of freshwater fishes, 42 (15%) of which are endemic (Kottelat & Whitten, 1996). New species of fish are also being discovered in the rivers, lakes and swamps of the area. One new species found recently in Bukit Tigapuluh National Park was *Gymnochanda limi*.

In terms of floral diversity, Sumatra has fewer endemic plants than any other part of Indonesia, 14 families from 11 orders. At the species level it is rich with more than 150 species from a total of 1100. Most endemic species are found below 500m in lowland forests. Plants are at the bottom of the food chain and their habitats must be conserved to support other species. Only about 15% of the plants believed to be in Sumatra are recorded.

Forest fires, agriculture development, and logging activities (legal and illegal) are major contributors to the deforestation and habitat loss in Sumatra. Forest cover has been significantly reduced from 23 million ha to about 16 million ha currently. These threats will continue to significantly increase the number of endangered species listed in the IUCN Red List.

CAMP Workshop

A Conservation Assessment and Management Plan (CAMP) workshop was conducted for selected species of vertebrates, invertebrates and plants from 24-28 February 2003 in Parapat, North Sumatra. The CAMP workshop was held at Hotel Niagara by beautiful Lake Toba. The workshop was organized in collaboration with various governmental and non-governmental organizations working in conservation to establish the status of select fauna and flora. The objective of the workshop was to understand the gravity of the situation for species by applying the latest IUCN Red List guidelines.

The workshop was organized by Conservation International, the Conservation Breeding Specialist Group (CBSG) of the IUCN – The World Conservation Union, the Directorate General of Forest Protection and Nature Conservation, Leuser Management Unit, and the Center for Biodiversity Conservation University of Indonesia.

About 81 participants including field biologists, taxonomists and forest officers from all over Sumatra and other parts of Indonesia participated in the workshop. The event provided a unique opportunity for such a varied group of stakeholders from Sumatra to come together and work on issues related to conservation status and other special issues concerning threats to wildlife on Sumatra and the adjoining islands.

In all, 266 species and subspecies in seven taxonomic groups were assessed – 41 mammals, 30 birds, 34 reptiles, 3 amphibians, 20 freshwater fishes, 49 butterflies and 90 angiosperms. Time and resources at the workshop dictated the number of taxa assessed and also the selection of taxa for assessment.

The primary focus of the workshop was to reassess the threatened taxa of Sumatra that are included in the 2001 IUCN Red List of Threatened Species. However, apart from birds, a few reptiles, a few freshwater fishes and a few plants, most of the assessments were done for the first time. The taxa chosen for assessments were either restricted to Sumatra or its adjoining islands, or were considered seriously threatened. Most participants felt that the workshop would best be served by adding more assessments to the already existing list of threatened species, as that would highlight the plight of many of the lesser known fauna and flora. This reasoning was very strong especially in the mammal group, which considered new assessments especially for smaller mammals. Since geographical barriers restrict most terrestrial fauna to islands, assessments for the non-endemic taxa were made for isolated island populations using the global criteria. National assessments were attempted for species with distribution in more than one country and also with the ability to migrate between islands and countries, such as the volant mammals (bats) and some plants.

Workshop Objectives

The objectives of the workshop included:

- Promote networking of all Sumatrans and Indonesians working in Sumatra and adjoining smaller islands – academics, government agencies, non-governmental organizations and institutions, selected individuals and other stakeholders.

- Provide an opportunity for all stakeholders, particularly those native to Sumatra, to actively participate in a process that results in the derivation of the conservation status of taxa of the region.
- Derive an accurate IUCN category for as many Sumatra-taxa based on available information – published or unpublished – as a rapid assessment providing adequate documentation as required by the IUCN Red List protocol.
- Establish research and management priorities for future action.
- Discuss special conservation issues for joint action in conserving Sumatra's biodiversity.

The CAMP Process

The Conservation Assessment and Management Plan (CAMP) Workshop is a "process" that was designed and developed by the late Dr. Ulysses S. Seal, then Chairman of the IUCN SSC Conservation Breeding Specialist Group (CBSG), and Dr. Thomas J. Foose, initially to assist zoos in prioritizing species for conservation breeding. Over the years, and as a result of the careful manner in which the workshops have been planned and conducted, CAMP workshops have evolved and many improvements from workshops conducted all over the world have been incorporated into the process. Now CAMPs are increasingly used as a means of assisting regional and national biodiversity planning and for contributing far greater numbers of species to the Red List of Threatened Species. During this time, CAMPs have continued to evolve, encompassing more recent scientific methodologies related to the requirements of the Convention on Biodiversity. CAMP Workshop Reports make available the most current information from the most recent fieldwork, and thus provide crucial direction for strategic management of threatened taxa in larger taxonomic groups.

Because the output of CAMP workshops affects wildlife policy and management through the IUCN Red List and wildlife legislation that takes its cue from the Red List, the social and scientific principles and methods established by CBSG, which are in a continuous process of evolution and improvement, should be followed meticulously. CAMP workshops have been designed to collect the knowledge of many stakeholders and to reflect the result of their combined experience and opinion after discussion. The IUCN Red List Criteria developed by IUCN SSC is an elegant system for assessing species across taxonomic orders but it is only as good as the rigor and information used to apply the Criteria and thus derive a Category.

The primary tool of a CAMP workshop is the Taxon Data Sheet, which facilitates the organization and summarization of information needed to derive a status, provides a logical framework for discussion and a uniform standard for presentation of information, and is means of maintaining scientific integrity.

A CAMP Workshop brings together a broad spectrum of experts and stakeholders consisting of wildlife managers, biologists, and representatives of the academic community or private sector, researchers, government officials and captive managers to pull together all pertinent information necessary to:

a. Evaluate the current status of populations and habitats in the wild and in captivity;
b. Assess the degree of threat using IUCN Red List Criteria;
c. Make recommendations for intensive management action; and
d. Make recommendations for specific conservation-oriented research and education.

A CAMP Workshop is intensive and interactive, which facilitates objective and systematic discussion of research and management actions needed for species conservation, both *in situ* and *ex situ*. Workshop participants assess the risks to the target group of taxa and formulate recommendations for action using a Taxon Data Sheet. The Taxon Data Sheet serves as a compendium of the data collected on the status of a population and its habitat in the wild as well as recommendations for intensive conservation action. Taxon Data Sheets also provide documentation of the reasoning behind recommendations and the criteria used for deriving a taxon's status as well as details of other species-pertinent information.

Information gathering is focused on the most recent available data, estimates, informed guesses and identification of needed knowledge that allow:
a. Assignment to IUCN categories of threat;
b. Broad-based management recommendations;
c. Specific conservation-oriented research recommendations useful to generate the knowledge needed to develop more comprehensive management and recovery programs *in situ* and/or *ex situ.*

On the last day of a CAMP workshop, participants form Special Issue Working Groups to discuss problems of conservation and management that emerged in the workshop, making recommendations using information and assessments generated in the CAMP. If time permits there is also a session for making personal commitments related to the recommendations.

The results of the initial CAMP workshops are reviewed by distribution to the following:
a. As a draft to workshop participants immediately following the workshop.
b. As a draft after corrections to a few senior biologists who were participants in the workshop.
c. As a report to experts and other users of the information in the greater conservation community.

A CAMP workshop is defined as a "process" because it is a part of a continuing and evolving development of creating and improving conservation and recovery plans for the taxa involved. The CAMP review process facilitates dissemination of information from experts locally and internationally. The "process" presumes that conditions will change for populations and habitats and that a follow-up workshop will be required to reconsider issues in greater depth, or on a regional basis, or incorporate the inevitable changes. This "process" provides a system of monitoring of the population status over time as well as of the implementation and effectiveness of the earlier workshop recommendations.

The CAMP process is unique in its ability to prioritize intensive management action for species conservation in the wild and in captivity, if required. CAMP documents are used as guidelines by national and regional wildlife agencies, NGOs, and zoos as they develop their own action plans. CAMP reports, with their dependence on methodology that is participatory, objective and

scientific, have proved to be acceptable to states and nations as well as institutions for developing biodiversity strategies. CAMP workshops contribute to the wise worldwide use of limited resources for species conservation.

2001 IUCN Red List Criteria (Version 3.1)

The CAMP workshop process employs the IUCN Red List Criteria as a tool in assessing species status. Developed in 1991, the IUCN Red List Criteria were revised in 1994 and again in 2000 and ratified by the IUCN for use in threat categorization at the global level (IUCN, 2001). The structure of the categories includes extinct, threatened, non-threatened, data deficient and not evaluated divisions; the first three divisions are further split into subcategories (Figure 1). Since 1991, the old Red Data Book categories have undergone successive changes to accommodate general guidelines for use across taxonomic groups. To make application of the criteria more universal, numerical values were attached to the different criteria for threat categories. The 2001 version (version 3.1) also includes a purely quantitative criterion, which involves computation of the probability of extinction (such as in a population viability analysis) over a specified time frame for a taxon. Categories of threat using the 2001 version of the Red List are derived through a set of five criteria. The term "threatened" according to the 2001 IUCN categories means Critically Endangered, Endangered or Vulnerable. The five criteria for threat categories (IUCN, 2001) are:

A = Population reduction
B = Restricted distribution, continuing decline and fluctuation
C = Restricted population and continuing decline
D = Very small population
E = Probability of extinction

For a taxon to be categorized as threatened, it must qualify under the objective definition for any one of the above five criteria. Not qualifying for any of the criteria could mean that a taxon is either not threatened or is data deficient.

With the popularization of the 1994 IUCN Red List Criteria and its application around the world, various specialists and scientists of taxonomic groups suggested a more serious look at the criteria. The IUCN formed a Red List Review Committee in 1998 to suggest changes to the 1994 Criteria and after nearly two years of workshops and deliberations, the 2001 IUCN Red List Criteria were drafted and accepted in October 2000. All assessments from 2001 are based on the latest version (3.1) of the Red List Criteria, including the current Conservation Assessment and Management Plan (CAMP) Workshop for Threatened Species of Sumatra (2003). The changes in the Criteria are described in IUCN (2001; Appendix I of this report) but the overall structure of the Categories is shown in the figure below. The changes in the structure of the categories from the 1994 iteration include the upgrading of Lower Risk - near threatened and Lower Risk - least concern to full categories labeled Near Threatened and Least Concern. The subcategory of Lower Risk - conservation dependant was removed completely from the new structure.

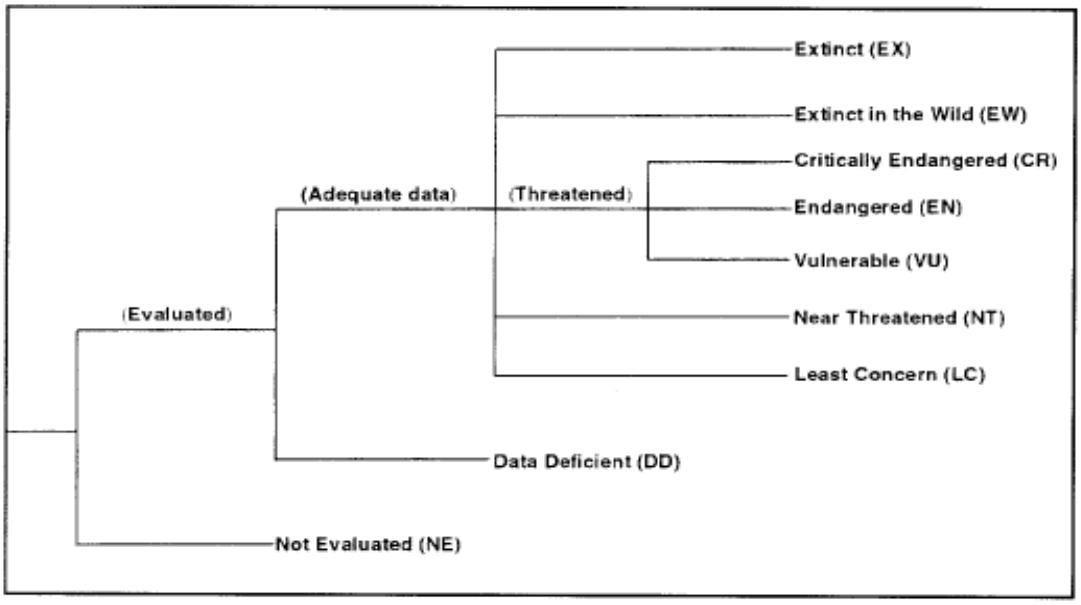

Figure 1. Structure of the 2001 IUCN categories.

Methods for Assessment

Sumatran fauna and flora are not among the best studied in Southeast Asia. Participants were given eight-page Taxon Data Sheets, which ask for available information in a logical manner to assess the status of the taxa. Information from all sources was also recorded in the CAMP Data Entry Program for review by participants.

In a CAMP workshop, most of the work is done in working groups and reviewed in several plenary sessions. In this workshop the groups were organized by taxa, which made it simple to organize each participant into one of the six working groups based on their specialization and interest, *viz*., mammals, herpetofauna, birds, freshwater fishes, butterflies and plants.

Taxon Data Sheets and Assessment Logic

The Taxon Data Sheet used at the workshop was divided into various sections, namely:

Part One
General information including taxonomy, habit, habitat, distribution, locality information, threats, populations, trade, field studies, data quality, qualifier and uncertainty.

Part Two
Status assessment as per information provided in Part One based on the 2001 IUCN Red List Criteria, CITES listing, national wildlife laws, presence in protected areas and previous assessments.

Part Three
Uncertainty issues related to data quality, qualifiers and group dynamics with respect to assessments.

Part Four
Recommendations for research, monitoring, captive breeding, education, population and habitat viability assessment and comments on the species.

Part Five
Information on migration between adjacent populations across international boundaries, threats, colonization effects, etc. to do with assessing species at the national level.

Part Six
Compilers of primary working group, reviewers of the data and sources referred to in deriving literature and other unpublished information.

Information was gathered on the Taxon Data Sheets and also electronically recorded in the CAMP Data Entry Program developed by the Conservation Breeding Specialist Group. For some taxa, information on the overall distribution was gathered and an agreement made by participants that the status would be derived after the workshop after gathering more information from other non-participating experts. All assessments were ratified by participants in plenary sessions with much discussion, which ultimately led to consensus within the workshop.

The Taxon Data Sheets are included in a separate section of this report. A synopsis of information compiled for the species and data interpretation is given in the following pages for better understanding of the process and status assessments. The flowchart in Figure 2 interprets the use of information and the criteria in deriving the status.

Interpretation and Data Source

The information provided at the workshop was a combined effort of all participating individuals and organizations in assessing the status of species on Sumatra. Although various studies have been carried out independently, for a status assessment to be holistic, information from all geographical areas of a taxon's distribution is crucial. Broad participation gives a better indication of the status than independent assessments. The CAMP provided the setting to get objective assessments in a wider forum based on the many studies represented at the workshop. The source of data was therefore varied, mixed and comprised of information gathered from different methods of studies and data sources. Much of the information was compiled from cases other than direct conservation-oriented studies or population studies. Data were gleaned to the best of the participants' ability from these various methods and interpreted in a form most acceptable for status assessments. Principles from the IUCN Red List guidelines were adopted in inferring, estimating and predicting the status of habitat and populations and in correlating habitat loss with population status.

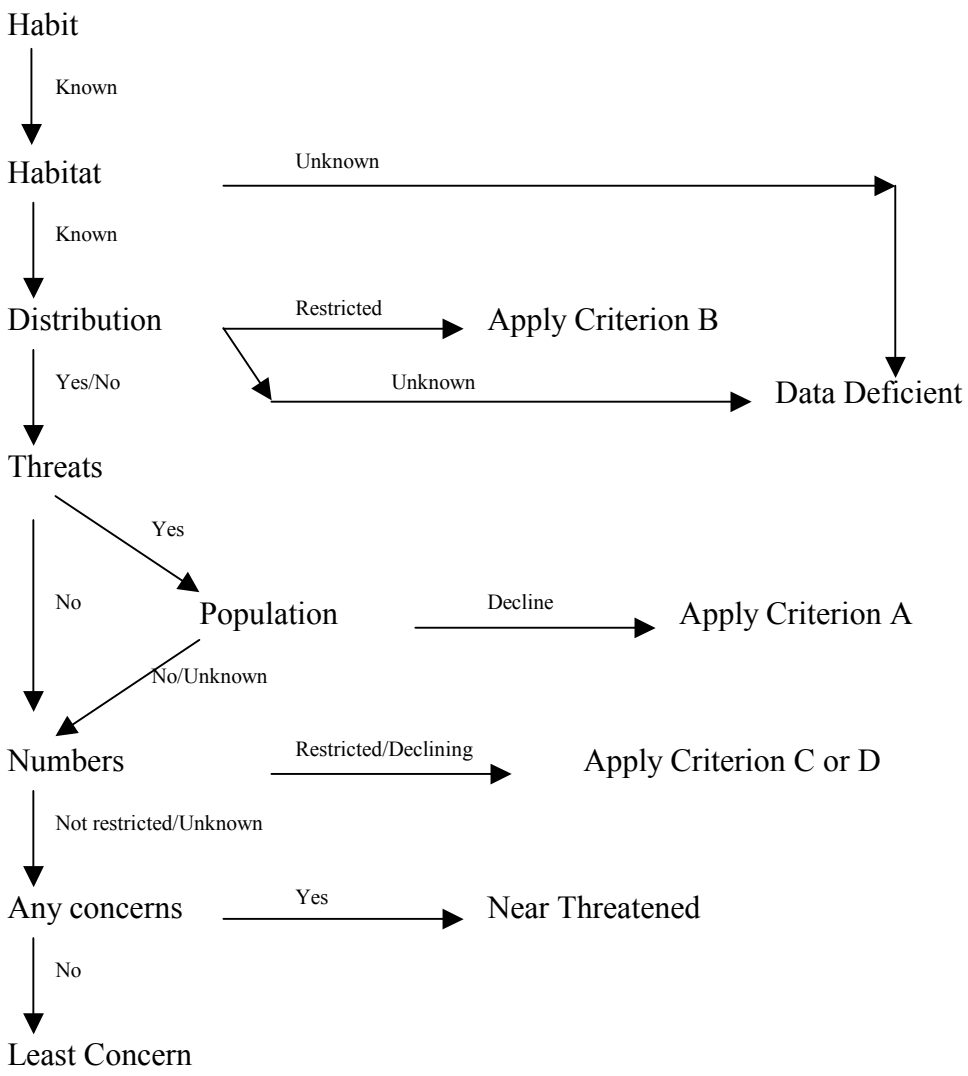

Figure 2. Flowchart for use of information and IUCN criterion in threat assessment.

Distribution, Range, Area, and Population Numbers

Distribution information on taxa occurring in Sumatra and adjoining islands were assembled from literature and personal observations. Some information was also provided by the organizers in the form of maps generated at the workshop. Further localities were added in working groups on the maps provided for some taxa. In most cases, distribution ranges of lesser-known taxa were confined to just study areas or to literature, which is the best available information at that point of time. Distribution range and areas were estimated based on available information, mostly restricted to available habitat (such as forest cover) and were not extrapolated to other habitats where the taxon was not yet known to occur. Since very few animals are studied well, population numbers were not known for most taxa. However, habitat loss, which was known, was correlated to population decline, and status was assessed for some taxa in this way.

Data Quality

Much of the data provided was based on indirect information, literature and inferences and, in only a few cases, observations from recent field studies. Some comparative data from older studies were used to assess population and habitat declines. However, other forms of data quality sometimes were utilized to assess status, including indirect information, especially from trade and from habitat trends, from museum studies to ascertain taxonomy and distribution ranges, from literature for distribution, and from inferences with respect to population trends. The overall assessment strategy involved bits of different degrees of data quality, but most of it reliable.

The groups reached a consensus in most cases, but in instances where the members of a group had a disagreement, information was clarified in the plenary. The strategy at the workshop was to utilize all available information in deriving a status for the taxa, but also to provide additional information later during the review of the draft report. It was also decided at the workshop that based on new information available, or on a thorough reexamination of all of the information provided, the assessments would be made conforming to the IUCN Red List Criteria.

General Results

A total of 266 taxa were assessed in seven different taxonomic groups but only vertebrates are included in this report. Twenty freshwater fishes, three amphibians, 34 reptiles, 30 birds and 41 mammals assessed at the workshop are discussed here, tabulated, compiled and mapped. A Taxon Data Sheet for each taxon is included along with a map.

A total of 102 of 128 vertebrate taxa assessed at the workshop were categorized as threatened (Critically Endangered, Endangered or Vulnerable). Figure 3 below indicates the threatened categories and their percentages of the representative taxa. Nearly 80% of all of the assessed vertebrates on Sumatra are threatened, and an additional 16% are close to being threatened. Only a negligible component of the vertebrates assessed were categorized as Least Concern.

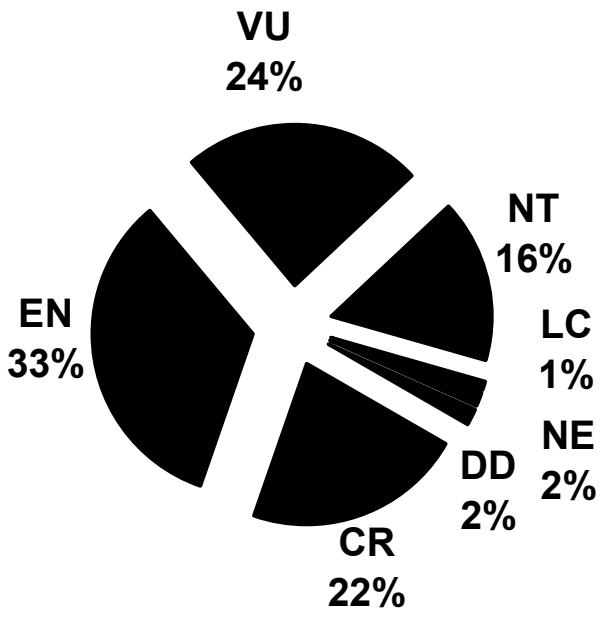

Figure 3. Overall status of all Sumatran vertebrates assessed in the CAMP.

Freshwater Fishes

The working group, which consisted of very few experts, assessed as many as 20 freshwater fishes based on available information within the group and in literature. The group decided to assess all endemic taxa, but due to lack of information and time, only 13 endemic taxa and seven non-endemic taxa were assessed. Although the non-endemic taxa are found in areas other than Sumatra or the adjoining islands, they can safely be considered as isolated populations and hence assessed as distinct taxonomic units. In that sense, each of the non-endemic taxa would by themselves become endemic taxonomic entities in Sumatra and the adjoining islands. Table 1 lists all freshwater taxa assessed along with the status derived and the criteria on which this assessment is based.

As can be seen from Table 1, 18 of the 20 freshwater fishes assessed are threatened, with all endemic forms threatened in Sumatra and adjoining smaller islands. In most cases, the distribution of the taxa is so highly restricted (usually less than 100 km^2), that the combined effect of few locations or fragmentation and negative effects of habitat loss and degradation results in most taxa classified as Critically Endangered (9 endemics). Similarly, restricted distribution and threats are reasons for one endemic and two non-endemic fishes to be categorized as Endangered and one as Vulnerable, while population reduction has resulted in two non-endemic fishes to be categorized as Critically Endangered and two more non-endemics as Endangered. Only two of the 20 taxa fell outside of the threatened category. Figure 4 below indicates the status breakdown of freshwater fishes assessed in Sumatra.

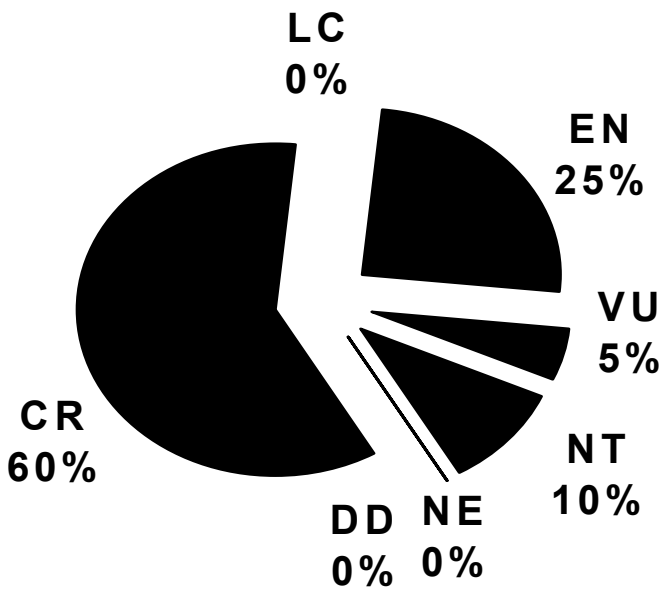

Figure 4. Status of 20 freshwater fishes in Sumatra assessed during CAMP.

Table 1. Status of selected assessed freshwater fishes of Sumatra.

Endemic to Sumatra

	Scientific Name	Common Name	2003 CAMP Status	Criteria
1.	*Betta burdigala* Kottlat & Ng, 1994	Rotwein - Kempfisch	Critically Endangered	B1ab(iii)
2.	*Betta chloropharynx* Kottelat & Ng, 1994	Betta	Critically Endangered	B1ab(iii)
3.	*Betta miniopinna* Tan & Tan, 1994	Betta	Critically Endangered	B1ab(iii)
4.	*Betta rubra* Perugia, 1893	Betta	Critically Endangered	A1ab(iii)
5.	*Betta schalleri* Kottelat & Ng, 1994	Betta	Vulnerable	B2ab(iii); A2cd
6.	*Betta spilotogena* Ng and Kottelat, 1994	Betta spilotogena	Critically Endangered	B2ab(iii)
7.	*Mystacoleucus padangensis* (Bleeker, 1852)	Ikan bilih	Critically Endangered	B1ab(iii)
8.	*Neolissochilus thienemanni* (Ahl, 1933)	Ikan batak (ihan)	Endangered	B1ab(iii)
9.	*Parosphromenus bintan* Kottlelat &Ng,1998	Parosphromenus	Critically Endangered	B1ab(iii)
10.	*Parosphromenus deissneri* Bleeker, 1859	Parosphromenus	Critically Endangered	B1ab(iii)
11.	*Poropuntius tawarensis* Weber & de Beaufort, 1916	Keperas (Malay)	Critically Endangered	B1ab(iii)
12.	*Rasbora reticulata* Weber & de Beaufort, 1915	Minnows or carps	Endangered	B1ab(iii)
13.	*Rasbora tawarensis* Weber & de Beaufort, 1918	Rasbora	Critically Endangered	B1ab(iii)

Non-endemic to Sumatra

	Scientific Name	Common Name	2003 CAMP Status	Criteria
14.	*Balantiocheilos melanopterus* (Bleeker, 1851)	Silver shark	Critically Endangered	A3cd
15.	*Encheloclarias kelioides* Ng & Lim, 1993	Ikan keli	Endangered	B1ab(iii)
16.	*Encheloclarias tapeinopterus* (Bleeker, 1852)	Encheloclarias	Critically Endangered	A3cd+4cd
17.	*Himantura oxyrhyncha* Sauvage, 1878	Gemarmerde	Endangered	A3cd
18.	*Himantura signifer* Compagno & Robert, 1982	White-edge freshwater whipray	Endangered	A3cd
19.	*Pristis microdon* (Latham, 1794)	Pristis	Near Threatened	
20.	*Scleropages formosus* Schlegel & Muller, 1844	Asian arowana	Near Threatened	

Amphibians

Only three endemic amphibians were assessed, mainly because of lack of amphibian experts in the group and also because all amphibians had already been assessed in 2002 under the Global Amphibian Assessment exercise. However, the herpetofauna group looked at the status of three endemic taxa, all of which were assessed as threatened either due to population reduction, restricted distribution, or both (Table 2).

Table 2. Status of selected assessed amphibians of Sumatra.

Endemic to Sumatra

	Scientific Name	Common Name	2003 CAMP Status	Criteria
1.	*Bufo sumatranus* Peters,1871	Sumatran toad	Endangered	A3c; B1ab(ii, iii) + 2ab(ii, iii)

Non-Endemic to Sumatra

	Scientific Name	Common Name	2003 CAMP Status	Criteria
2.	*Bufo valhallae* Meade-Waldo, 1908	Sabang toad	Endangered	B1ab(i, ii, iii) + 2ab(i, ii, iii)
3.	*Kalophrynus punctatus* Peters, 1871	Spotted sticky frog	Vulnerable	A3c; B1ab(iii)

Reptiles

As can be seen from Table 3, 16 endemic reptiles and 18 non-endemic reptiles were assessed at the workshop by the herpetofauna working group. As was the case for freshwater fishes, each of the widely distributed reptiles could potentially be considered distinct taxonomic units on Sumatra and neighboring islands and hence could be assessed globally for the island population. Thirteen of the sixteen endemic reptiles, and 10 of the 18 non-endemic reptiles, were categorized as threatened. The main reason for so many threatened reptiles is restricted distribution, except in the case of a crocodile species, which was categorized as threatened due to population decline.

Table 3. Status of selected assessed reptiles of Sumatra.

Endemic to Sumatra

	Scientific Name	Common Name	2003 CAMP Status	Criteria
1.	Boiga nigriceps brevicauda	-	Vulnerable	B1ab(i,ii,iii)+2ab(i,ii,iii)
2.	*Calamaria abstrusa* Ingel and Mary, 1965	-	Endangered	B2ab(i,ii,iii)
3.	*Calamaria alidae* Boulinger, 1920	-	Vulnerable	B1ab(i,ii,iii)+2ab(i,ii,iii)
4.	*Calamaria crassa* van Lidth de Jeude, 1922	-	Critically Endangered	B1ab(i,ii,iii)
5.	*Calamaria doederleini* Grough, 1902	-	Critically Endangered	B1ab(i,ii,iii)
6.	*Calamaria eiselti* Inger & Marx, 1965	-	Critically Endangered	B1ab(i,ii,iii)
7.	*Calamaria elegans* de Rooij, 1917	-	Endangered	A3c; B1ab(i,ii,iii)+2ab(i,ii,iii)
8.	*Calamaria forcarti* Inger & Marx, 1965	-	Endangered	B2ab(i,ii,iii)
9.	*Calamaria margaritophora* Bleeker, 1860	-	Endangered	B2ab(i,ii,iii)
10.	*Calamaria mecheli*	-		
11.	*Calamaria sumatrana* Edeling, 1870	-	Endangered	B2ab(i,ii,iii)
12.	*Calamaria ulmeria* Sackult, 1940	-	Critically Endangered	B1ab(i,ii,iii)
13.	*Iguanognathus werneri* Boulenger, 1898	Spatula-tooth snake	Data Deficient	
14.	*Python curtus* Schlegel, 1872	Blood python	Near Threatened	
15.	*Trimeresurus brongersmai* Regenass & Kramer,1981	Brongersmai's pit viper	Endangered	B1ab(i,ii,iii,iv,v)+2ab(i,ii,iii,iv,v)
16.	*Trimeresurus popeiorum barati* Regenass and Kramer, 1981	Pope pit viper	Vulnerable	B1ab(i,ii,iii)+2ab(i,ii,iii)

Non-Endemic to Sumatra

	Scientific Name	Common Name	2003 CAMP Status	Criteria
17.	*Amyda cartilaginea* Boddaert, 1770	Asiatic softshell turtle	Near Threatened	
18.	*Batagur baska* Gray, 1831	Cammond batagur	Near Threatened	
19.	*Callagur borneoensis* Schlegel & Muller,1844	Painted batagur / terrapin	Endangered	B1ab(i,ii,iii)+2ab(i,ii,iii)
20.	*Caretta caretta* Linneaus,1758	Loggerhead turtle	Endangered	B2ab(iv)
21.	*Chelonia mydas* Linnaeus, 1758	Green turtle	Endangered	B2ab(i,ii,iii,iv,v)
22.	*Chitra chitra* Nutphand, 1986	Narrow-headed softshell turtle	Near Threatened	
23.	*Cuora amboinensis* Daudin 1801	Southeast Asia box turtles		
24.	*Dermochelys coriacea* Vandelli,1761	Leatherback turtle	Near Threatened	
25.	*Eretmochelys imbricata*	Hawkbill sea turtle	Endangered	B2ab(i,ii,iii)
26.	*Heosemys spinosa* Gray, 1831	Spiny turtle	Endangered	B2ab(i,ii,iii,iv,v)
27.	*Lepidochelys olivacea* Eschscholtz, 1829	Olive ridley sea turtle	Critically Endangered	B1ab(i,ii,iii,iv,v); C2a(i); D
28.	*Malayemys subtrijuga* Schlegel & Muller,1844	Malayan snail-eating turtle	Vulnerable	B1ab(i,ii,iii,iv,v)+2ab(i,ii,iii,iv,v)
29.	*Manouria emys* Schelegel & Muller	Asian giant tortoise	Near Threatened	
30.	*Notochelys platynota* Gray, 1834	Malayan flat-shelled turtle	Endangered	B2ab(i,ii,iii,iv,v)
31.	*Orlitia borneensis* Gray,1873	Malaysian giant turtle	Vulnerable	B2ab(i,ii,iii,iv,v)
32.	*Pelochelys cantorii* Gray 1864	Cantor's giant softshell	Near Threatened	
33.	*Siebebrockiella crassicollis* Gray, 1831	Fat-necked turtle	Near Threatened	
34.	*Tomistoma schlegelii* Muller, 1838	False gharial	Endangered	A2acd

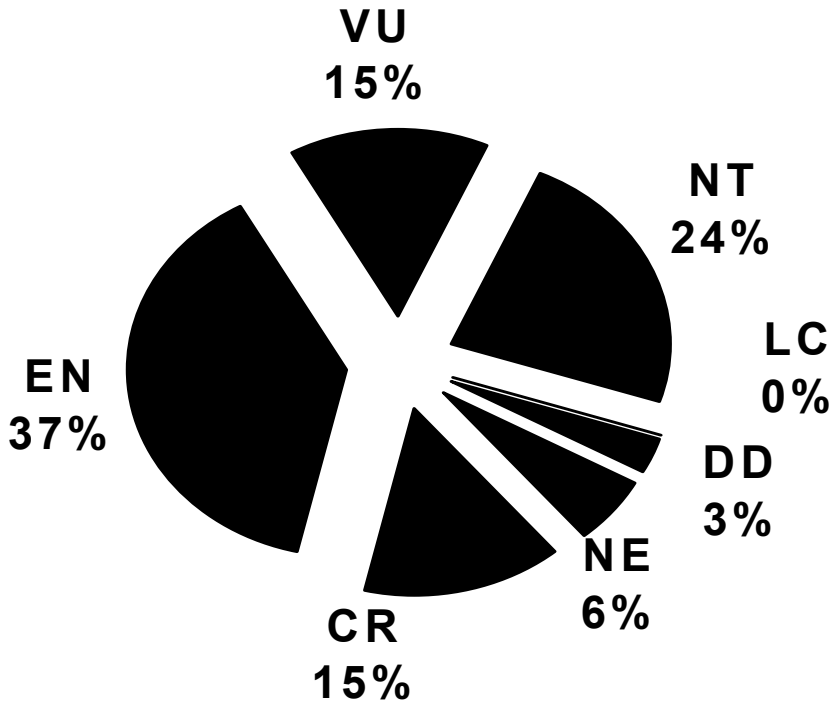

Figure 5. Status of 34 reptiles in Sumatra assessed during CAMP.

Birds

The relatively small bird working group assessed 30 bird taxa in all, six of which are endemic to Sumatra. In the case of birds, global assessments were made only for the endemics, while for the non-endemic taxa regional guidelines were applied. In most cases, birds were threatened due to restricted distribution and associated threats to habitat. In only one case was threat categorization due to few mature individuals. Only one endemic and seven non-endemic birds were categorized as Near Threatened in Sumatra, again a number very small compared to the number of threatened birds. Table 4 and Figure 6 list the assessments and indicate the status percentages, respectively.

Table 4. Status of selected assessed birds of Sumatra.

Endemic to Sumatra

No.	Scientific Name	Common Name	2003 CAMP Status	Criteria
1.	*Cochoa beccari* Salvadori, 1879	Sumatran cochoa	Vulnerable	B1ab(i,ii,iii)+2ab(i, ii,iii)
2.	*Cyornis caerulatus* Bonaparte, 1857	Large-billed blue flycatcher	Vulnerable	B1ab(ii, iii)+2ab(ii, iii)
3.	*Lophura hoogerwerfi* Chasen, 1939	Imperial pheasant	Vulnerable	B1ab(ii, iii)
4.	*Lophura inornata* Salvadori 1879	Salvadori's pheasant	Vulnerable	B2ab(ii, iii)
5.	*Pitta schneideri* Hartert, 1909	Schneider's pitta	Endangered	B1ab(ii, iii)
6.	*Pitta venusta* Muller, 1835	Black-crowned pitta	Near Threatened	

Non-Endemic to Sumatra

No.	Scientific Name	Common Name	2003 CAMP Status	Criteria
7.	*Alcedo euryzona peninsulae* (Temminck 1830)	Kingfisher	Vulnerable	B2ab(i, ii, iii)
8.	*Aquila clanga* Pallas,1811	Greater spotted-eagle	Critically endangered	B1ab(i,ii,iii)+2ab(i, ii,iii)
9.	*Cairina scutulata* Muller 1842	White-winged duck	Endangered	C1a+2a(i)
10.	*Caprimulgus concretus* Bonaparte, 1850	Bonaparte's nightjar	Vulnerable	B1ab(i, ii, iii)
11.	*Carpococcyx viridis* (Temminck 1832)	Sunda ground-cuckoo	Vulnerable	B2ab(iii)
12.	*Centropus rectunguis* Stricland, 1847	Short-toed coucal	Endangered	B1ab(ii,iii)
13.	*Ciconia stormi* Blasius, 1896	Storm's stork	Vulnerable	B1ab(ii, iii)
14.	*Columba argentina* Bonaparte, 1855	Grey wood-pigeon	Endangered	B1ab(iii)+2ab(iii)
15.	*Cyornis ruckii* Oustalet, 1881	Ruecks blue flycatcher	Vulnerable	B1ab(ii, iii)+2ab(ii,iii)
16.	*Egretta eulophotes* Swinhoe, 1860	Chinesse egret	Endangered	B2ab(iii)
17.	*Fregata andrewsii* Mathews, 1914	Christmas frigatebird	Vulnerable	B1ab(iii)+2ab(iii)

18.	*Heliophais personata* Gray, 1849	Masked finfood	Vulnerable	B1ab(ii, iii)+2ab(ii, iii)
19.	*Leptoptilos javanicus* Horsfield, 1821	Lesser adjutant	Near Threatened	
20.	*Lophura eryhtopthalma* Raffless, 1822	Crestless fireback	Near Threatened	
21.	*Melanoperdix nigra* Vigors, 1829	Black partridge, black wood-partridge	Vulnerable	B1ab(ii, iii)+2ab(ii, iii)
22.	*Mycteria cinerea* Raffless, 1822	Milky stork	Near Threatened	
23.	*Padda oryziviora* Linnaeus, 1758	Java sparrow	Near Threatened	
24.	*Pelecanus philippensis* Gmelin, 1789	Spot-billed pelican	Near Threatened	
25.	*Pycnonotus zeylanicus* Gmellin, 1789	Straw-headed bulbul	Near Threatened	
26.	*Setornis criniger* Lesson, 1839	Hook-billed bulbul	Vulnerable	B1ab(ii, iii)+2ab(ii, iii)
27.	*Spizaetus nanus* Wallacea, 1868	Wallace's Hawk-eagle	Near Threatened	
28.	*Sula abbotti* Ridgwey, 1893	Abbot's booby	Endangered	B2ab(ii, iii)
29.	*Treron capellei* Temminck, 1823	Large-green pigeon	Vulnerable	B1ab(ii, iii)
30.	*Tringa guttifer* Nordmann, 1835	Nordmann's greenshank	Endangered	B2ab(ii, iii)

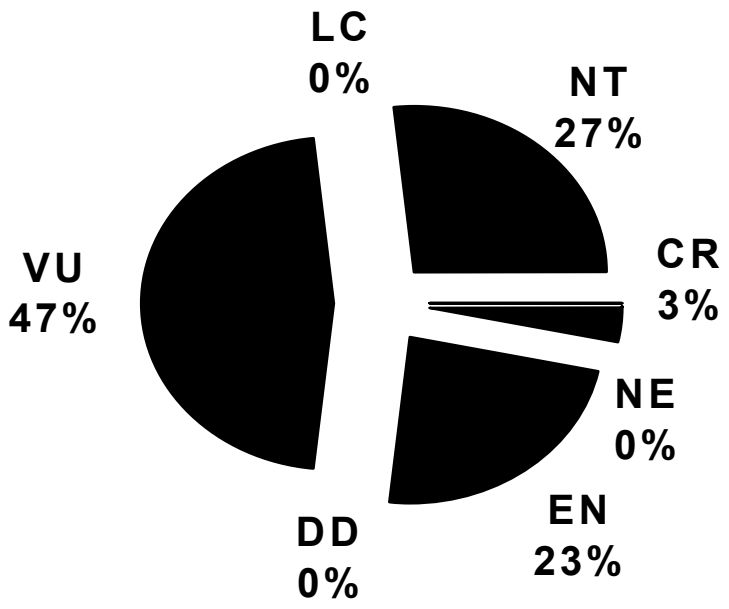

Figure 6. Status of 30 birds in Sumatra assessed during CAMP.

Mammals

This working group, which had the largest participation, assessed the smaller endemic mammals and a few larger endemic taxa totaling 41 in all. Thirty-six mammals were assessed as threatened (10 CR, 16 EN and 10 VU), three Near Threatened, one Least Concern and one Data Deficient. Most assessments were based on restricted distribution and associated threats, while a few of the larger taxa such as felids, mustelids, viverrids and ursids were categorized as threatened due to population decline, a fact attributed to poaching. All assessed mammals are listed in Table 5 with a breakdown of the assessments indicated in Figure 7.

Table 5. Status of selected assessed mammals of Sumatra.

Endemic to Sumatra

	Scientific name	Common Name	2003 CAMP Status	Criteria
1.	*Chimarrogale phaeura sumatrana* Thomas, 1921	Sumatran water shrew	Critically Endangered	B1ab(ii,iii,iv)+2ab (ii,iii,iv)
2.	*Chripodomys karlkoopmani* Musser, 1979	Mentawai pencil-tailed mouse	Endangered	B2ab(ii,iii,iv)
3.	*Cynocephalus variegatus chombolis* Lyon, 1909	Flying lemur chombolis	Endangered	A2c; B1ab(ii,iii)+2ab(ii, iii)
4.	*Cynocephalus variegatus gracilis* Miller, 1903c	Batu Island flying lemur	Vulnerable	B1ab(ii,iii)+2ab(ii, iii)
5.	*Cynocephalus variegatus natunae* Miller, 1903	Tuangku Island flying lemur	Endangered	B1ab(iii)+2ab(iii)
6.	*Cynocephalus variegatus saturatus* Miller, 1903	Serasan Island flying lemur	Endangered	B1ab(ii, iii, v)+2ab(ii, iii, v)
7.	*Cynocephalus variegatus tellonis* Lyon, 1908	Bunguran Island flying lemur	Critically Endangered	B1ab(iii,v)+2ab(iii, v)
8.	*Cynocephalus variegatus tuancus* Miller, 1903	Temmincks flying lemur	Endangered	B1ab(ii,iii,v)+2ab(i i,iii,v)
9.	*Galeopithecus temminckii* (Waterhouse, 1839)	Telo Islands flying lemur	Near Threatened	
10.	*Hylomys parvus* Robinson, Kloss, 1916	Small gymnure	Critically Endangered	B1ab(iii)+2ab(iii)
11.	*Hylopetes winstoni* (Sody, 1949)	Winston flying squirrel	Vulnerable	D2
12.	Marmopterus doriae Anderson, 1907	Sumatran mastiff bat	Critically Endangered	B1ab(iii)+2ab(iii)
13.	*Martes flavigula henricii* Schinz, 1845	Yellow-throated marten	Vulnerable	A2cd
14.	*Neofelis nebulosa diardi* (Cuvier, 1823)	Clouded leopard	Vulnerable	A2cd+3cd+4cd
15.	*Nesolagus netscheri* (Schlegel, 1880)	Sumatran rabbit	Endangered	B2ab(ii,iii,v)
16.	*Paradoxurus lignicolor* Miller, 1903	Mentawai palm civet	Vulnerable	A2c+3c+4c

Non-Endemic to Sumatra

	Scientific name	Common Name	2003 CAMP Status	Criteria
17.	*Aethalops alecto alecto* Thomas, 1923	Hairy mountain fruit bat	Critically Endangered	B1ab(iii)+2ab(iii)
18.	*Arctogalidia trivirgata trivirgata* (Gray, 1865)	Three-striped palm civet	Vulnerable	A2c; B1ab(iii, iv)+2ab(iii, iv)
19.	*Catopuma temminckii teminckii* (Vigors & Horsfield, 1827)	Golden cat	Vulnerable	B1ab(ii,iii,iv)
20.	*Crocidura paradoxura* Dobson, 1887	Mountain shrew	Critically Endangered	B1ab(ii, iiii)+2ab(ii, iii)
21.	*Cuon alpinus sumatrensis* (Hardwicke, 1821)	Dhole	Vulnerable	B1ab(i,ii,iii,iv,v)
22.	*Cynogale bennettii* Gray, 1837	Otter civet	Critically Endangered	A2c
23.	*Dyacopterus brooksi* Thomas, 1920	Dayak fruit bat	Endangered	B2ab(iii, v)
24.	*Eonycteris major major* Andersen, K., 1910	Major blossom bat	Critically Endangered	B1ab(iii, v)+2ab(iii, v)
25.	*Hipposideros breviceps* Tate, 1941	Pagai leaf-nosed bat	Critically Endangered	B1ab(iii)+2ab(iii)
26.	*Hylomys suillus* Muller, 1841	Tupai	Least Concern	
27.	*Hylopetes sipora* Chasen, 1940	Lesser gymnure	Endangered	B1ab(iii)+2ab(iii)
28.	*Iomys sipora* Chasen & Kloss, 1928	Sipora flying squirrel	Endangered	B1ab(iii)+2ab(iii)
29.	*Lutra sumatrana* (Gray, 1865)	Hairy-nosed otter	Endangered	A2cd
30.	*Lutrogale perspicillata perspicillata* (Geoffroy, 1826)	Smooth-coated otter	Near Threatened	
31.	*Manis javanica* Desmarest, 1822	Sunda pangolin	Endangered	A2cd
32.	*Mustela lutreolina* Robinson & Thomas, 1917	Indonesia mountain weasel	Endangered	B1ab(iii)+2ab(iii)
33.	*Panthetor lucasii* Dobson, 1880	Lucas's dusky fruit bat	Endangered	A2c
34.	*Pardofelis marmorata* Martin, W.C.L., 1837	Marbled cat	Endangered	A3c
35.	*Prionailurus planiceps* (Vigors & Horsfield, 1827)	Flat-headed cat	Vulnerable	A2c
36.	*Pteropus vampyrus vampyrus* Linnaeus, C., 1758	Flying fox	Near Threatened	
37.	*Rattus adustus* Sody, 1940	Enggano rat	Endangered	B1ab(iii)+2ab(iii)

38.	*Rattus enganus* Miller,1906	Engano Island rat	Endangered	B1ab(iii)+2ab(iii)
39.	*Rhinopoma microphyllum sumatrae* Thomas, 1903	Greater mouse-tailed bat	Critically Endangered	B1ab(iii)
40.	*Rousettus spinalatus* Bergmans & Hill 1980	Bare-becked rousette bat	Data Deficient	
41.	*Ursus malayanus malayanus* Raffles, 1821	Sun bear	Vulnerable	A2cd+3cd+4cd

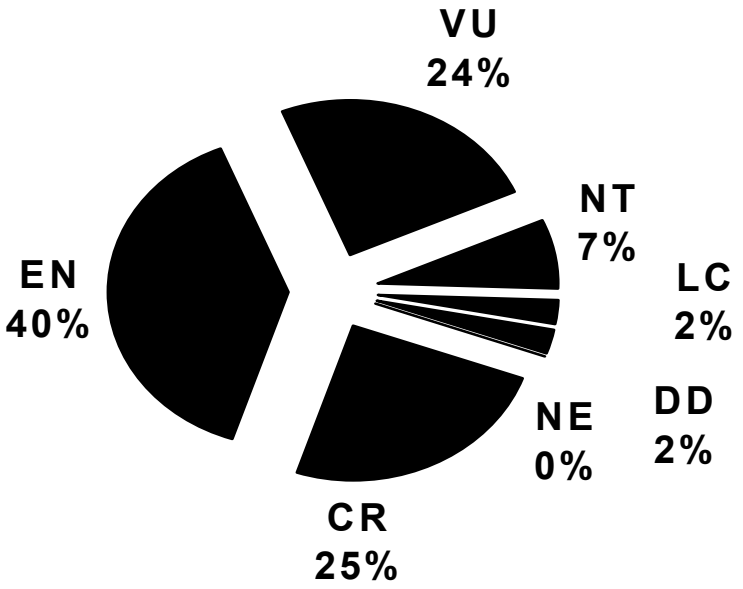

Figure 7. Status of 41 mammals in Sumatra assessed during CAMP.

Threats

A cursory look at the Taxon Data Sheets indicates that the reason most taxa were categorized as threatened is habitat loss. Human interference in the species' status through changing habitat quality is of great concern, as it is one underlying threat that is indicated for almost all assessed taxa in the workshop. Habitat loss on Sumatra is a major concern, with a recent report from the World Bank indicating that more than 80% of lowland forests have disappeared in the last 10 years and all remaining lowland forests could disappear in the next 3-4 years. Such pressure on the wild has its ramifications in localized taxa becoming extinct in a very short period. Many specialized taxa occupying such habitats have no safety or hope of recovery unless a massive effort by all stakeholders is taken to protect the remaining habitats and replenish lost areas. All highly restricted taxa are threatened on Sumatra due to this reason. If the trend continues Sumatra will soon lose many species and subspecies unique to the islands.

Since habitat loss is a major threat, a change in the quality of habitat plays a discernable role in areas where human interference in a taxon's remaining habitat can threaten its existence. For many restricted taxa, change in habitat quality is an important concern.

Some orders of vertebrates are targets for harvest for food, medicine or as pets. These taxa, which also suffer from the effects of habitat loss and quality change, are faced with continual removal of individuals from the population. Families of taxa facing population declines due to these reasons are felidae, viverridae, mustelidae, manidae and ursidae. Figure 8 represents threat categorization due to specific threats, such as those affecting habitat and those affecting populations.

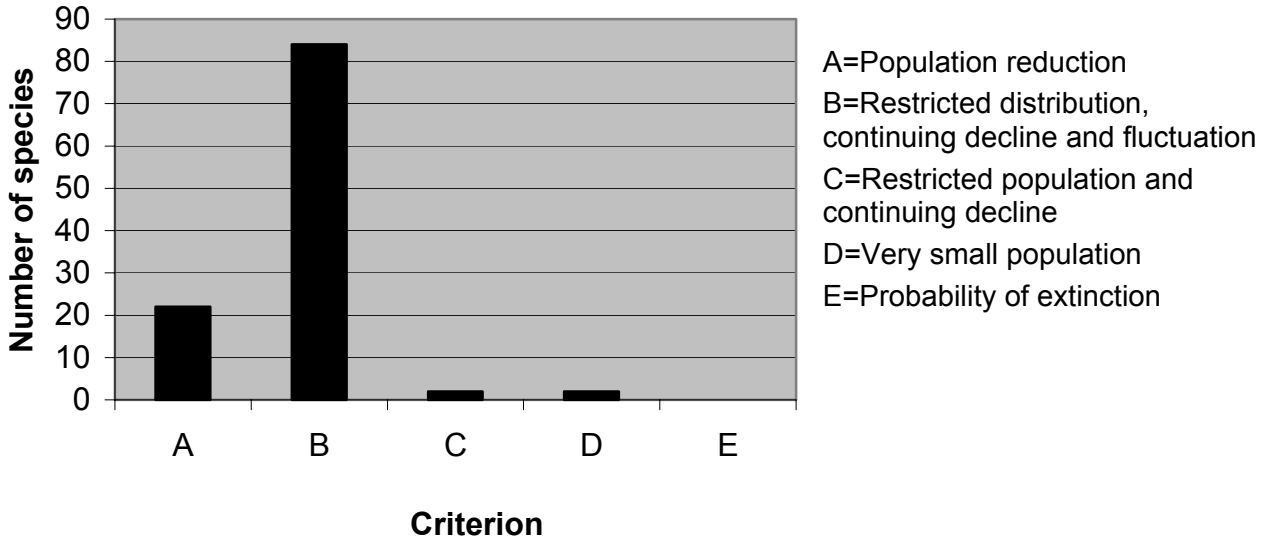

Figure 8. Distribution of assessments based on criteria related to threats to habitat and threats to population.

Assessments

Status assessments were made using the best available information in the literature and expertise available at the workshop. Since many experts of the region were present, the information may be considered the best compiled up to now. A quick comparison of the assessments done previously on Sumatran vertebrates with those at the workshop indicates that there are likely a number of reasons for the discrepancies. The most obvious is that the situation for these species has changed in the years since the previous assessments were made and the current assessments reflect these changes. Other factors include the differences in information availability and the regional approach of the CAMP. The 2002 IUCN Red List of Threatened Species (Hilton-Taylor, 2002) lists the status assessments at both the species and subspecies levels. At this workshop, apart from species, endemic subspecies were assessed. In addition, the 2002 IUCN assessment is based on the 1994 Red List Criteria, while the assessments at this workshop were based on the 2001 IUCN Red List Criteria.

Conservation Action Recommendations

Research

As in the case of most taxa across the biodiversity-rich areas, survey was the highest and most critical research recommendation suggested. Many Sumatran vertebrates need proper distribution studies; for many of the smaller forms, information is scant and incomplete. Life history studies are the second most frequently identified research need. Much of the information available and used at the workshop was based on literature studies and a small number of current studies. There are only a few consistent studies involving inventories or sampling of newer areas in Sumatra that are required for understanding species composition.

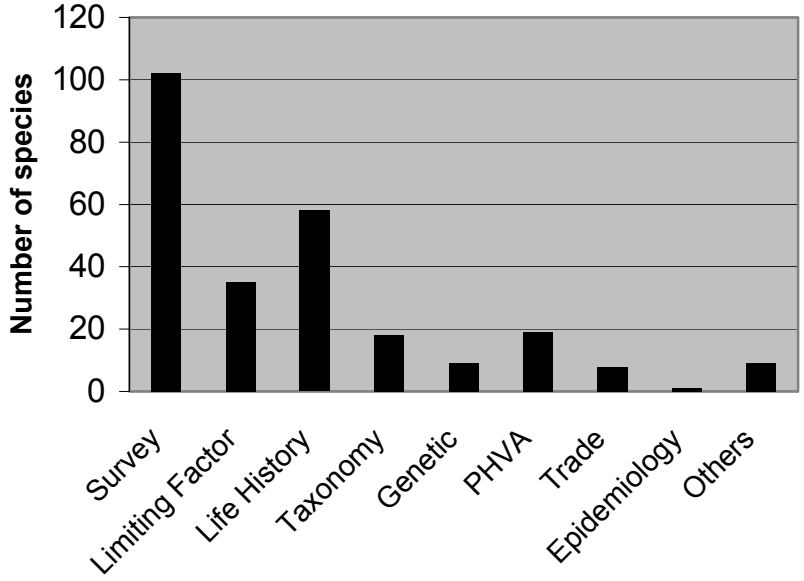

Figure 9. Research recommendations suggested for the assessed vertebrates.

Management

Addressing habitat loss was considered the first step in tackling conservation of threatened primate taxa in Sumatra. Habitat management was designated as the first priority, mainly to stem the loss by human interference and to develop suitable habitats for all vertebrate fauna. In achieving this, it was felt that management cannot be done in isolation, so public awareness and education were strongly recommended for many taxa. Implementation of these recommendations would work well in conserving the remaining habitat and populations of vertebrates in Sumatra and adjoining islands.

A hurdle to overcome for better management is the lack of knowledge of current trends of a taxon. Monitoring was recommended as a priority to understand the current status of all populations and habitats and implement an holistic conservation action plan.

Captive breeding was not considered an important tool in the long-term conservation of Sumatran vertebrates, not because of its lack of intrinsic importance, but for the following reasons: the lack of understanding of captive breeding as a viable tool, the absence of faith in captive facilities in the region, inadequate resource personnel, no coordinated breeding plans, limited taxonomic understanding, and the personal belief of several field biologists that captive breeding is not worth the investment that could be better spent on wild habitat management.

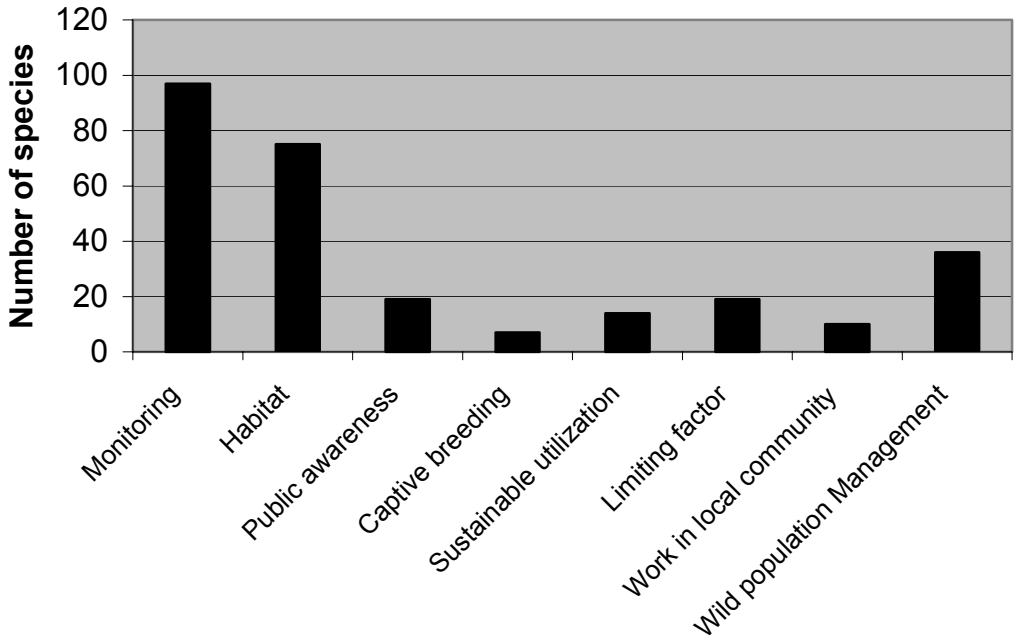

Figure 10. Management recommendations suggested for the assessed vertebrates.

Conclusion

In conclusion, the workshop participants assessed a total of 128 vertebrate taxa of Sumatra, close to 80% of which are threatened (Table 6). The Sumatra CAMP workshop provided an excellent opportunity to address the conservation needs for the fauna and flora and their habitat, as well as the resolution of important issues identified by all stakeholders. Research focus and management recommendations from this CAMP workshop will help conservation organizations, agencies and institutions nationally, regionally and internationally, to formulate and implement appropriate action on behalf of species conservation. Funding agencies can use this report as a reference for prioritizing proposals for maximum benefit of resources.

Table 6. Overall status of vertebrate fauna assessed at the CAMP workshop.

Category	Endemic to Sumatra	Not Endemic	Total
Critically Endangered (CR)	18	10	28
Endangered (EN)	16	27	43
Vulnerable (VU)	14	17	31
Near Threatened (NT)	2	19	21
Least Concern (LC)	0	1	1
Data Deficient (DD)	1	1	2
Not Evaluated (NE)	1	1	2
Total	52	76	128

This report only deals with vertebrates; results for the two other groups that were assessed – angiosperm plants and butterflies - will be published separately. The status of most of those taxa is similar to the vertebrate fauna, with many being threatened. The Butterfly Working Group assessed 49 taxa dependent on plants of the Asclepediaceae family. The Plant Working Group assessed about 90 taxa of higher plants. The assessments in both of these groups constitute first time assessments.

Conservation Assessment And Management Plan For Sumatran Threatened Species

Parapat, North Sumatra
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Workshop Report

SECTION II: Freshwater Fishes

Working Group Report
Taxon Data Sheets and Maps

Freshwater Fishes Working Group Report

Working Group Members

- Sunarya, Universitas Indonesia, Faculty of Mathematics and Natural Sciences, Jakarta
- Adnan Kasry, Universitas Riau, Faculty of Fisheries, Pekanbaru
- Martina Napitupulu, University of Medan, Faculty of Mathematics and Natural Sciences
- Endri Junaidi, Universitas Sriwidjaja, Faculty of Mathematics and Natural Sciences
- Effendi P. Sagala, Universitas Sriwidjaja, Faculty of Mathematics and Natural Sciences

List of Species Assessed

Endemic Species assessed present in the 2002 IUCN Red List of Threatened Species

1. *Betta burdigala*
2. *Betta chloropharynx*
3. *Poropuntius tawarensis*
4. *Neolissochilus thienemanni*
5. *Betta miniopinna*
6. *Betta spilotogena*
7. *Rasbora tawarensis*

Endemic Species assessed not present in the 2002 IUCN Red List of Threatened Species

8. *Parosphromeneus deissneri*
9. *Betta schaleri*
10. *Parosphromeneus bintan*
11. *Rasbora reticulata*
12. *Betta rubra*
13. *Mystacoleucus padangensis*

Non Endemic Species assessed present in the 2002 IUCN Red List of Threatened Species

14. *Pristis microdon*
15. *Encheloclarias tapeinopterus*
16. *Encheloclarias kelioides*
17. *Himmantura signifer*
18. *Balantiocheilos melanopterus*
19. *Scleropages formosus*
20. *Himantura oxyrhyncha*

Location and Habitat of Endemic Species

No	Location and Habitat	Scientific Name
1	Bangka Island	*Betta burdigala*
		Betta chloropharynx
		Betta schaleri
		Parosphromeneus deissneri
2	Bintan Island	*Betta miniopinna*
		Betta spilotogena
		Parosphromeneus bintan
3	Nias Island	*Rasbora reticulate*
4	Lake Toba	*Neolissochilus thienemanni*
		Betta rubra
5	Lake Laut Tawar	*Rasbora tawarensis*
		Poropuntius tawarensis

Location and Habitat of Non Endemic Species

No	Location and Habitat	Scientific Name
1	Palembang, Jambi, Berbak NP, Kuantan river	*Balantiocheilos melanopterus*
2	Bintan island,	*Encheloclarias kelioides*
3	Bangka island	*Encheloclarias tapeinopterus*
4	R tulang Bawang, Bt. Hari Basin, Borneo	*Himmantura signifer*
5	Way Sekampung, Laut Tador, Palembang, River Rawa Gambut, Lematang	*Scleropages formosus*
6	Batanghari Basin	*Pristis microdon*

Notes: *Pristis microdon* and *Scleropages formosus* population decline due to high harvest activities (overfishing) and high price (local, national and international)

Freshwater Fishes Assessed at the CAMP Workshop

No	Species	Status		Reasons
		2002 Red List Status	2003 CAMP Status	
1	*Balantiocheilos melanopterus*	**EN A1ac**	**CR A3cd**	
2	*Betta burdigala* *	**VU D2**	**CR B1ab(iii)**	Endemic, single location, decline population number (overfishing) and decline in habitat quality
3	*Betta chloropharynx* *	**VU D2**	**CR B1ab(iii)**	Endemic, single location, decline population number (overfishing) and decline in habitat quality
4	*Betta miniopinna* *	**CR A2c**	**CR B1ab(iii)**	Endemic, rapid decline population number (overfishing) and decline in habitat quality
52	*Betta rubra* *	-	**CR A1ab(iii)**	
6	*Betta schalleri* *	-	**VU B2ab(iii); A2cd**	
7	*Betta spilotogena* *	**CR A2c**	**CR B2ab(iii)**	Recently discovered and insufficient
8	*Encheloclarias kelioides*	**CR B1+2bcde**	**EN B1ab(iii)**	Integrated conservation management will protect this species from further risk of population decline
9	*Encheloclarias tapeinopterus*	**VU D2**	**CR A3cd+4cd**	
10	*Himantura oxyrhyncha*	**--**	**EN A3cd**	
11	*Himantura signifer*	**EN B1+2c**	**EN A3cd**	
12	*Mystacoleucus padangensis* *	-	**CR B1ab(iii)**	Endemic, rare, overfishing and trade, upgraded status is recommended
13	*Neolissochilus thienemanni* *	**VU D2**	**EN B1ab(iii)**	Endemic, Decline population number (overfishing) and decline in habitat quality
14	*Parosphromenus bintan* *	-	**CR B1ab(iii)**	Mass exploitation must be seen as a serious threats
15	*Parosphromenus deissneri* *	-	**CR B1ab(iii)**	This species must be treated as similar to other species found in Bangka island such *Betta burdigala* and *B. chloropharynx*.
16	*Poropuntius tawarensis* *	**VU D2**	**CR B1ab(iii)**	
17	*Pristis microdon*	**EN A1bcde+2bcde**	**NT**	
18	*Rasbora reticulata* *	-	**EN B1ab(iii)**	
19	*Rasbora tawarensis* *	**VU D2**	**CR B1ab(iii)**	
20	*Scleropages formosus*	**EN A1cd+2cd**	**NT**	

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Workshop Report

SECTION III: Amphibians and Reptiles

Working Group Report
Taxon Data Sheets and Maps

Amphibians and Reptiles Working Group Report

Working Group Members

- Mumpuni, group leader
- Darmawan Liswanto
- Irvan Sidik
- Dalil Sutekad
- Dewi I. Roesma; Mistar
- Djati Wicaksono Hadi

Background

Increasing forest cover change and development projects in Indonesia have reduced the quality of the environment and habitat of Indonesian wildlife. Illegal logging and forest fires have caused significant damage to habitat throughout Indonesia. This condition will have a significant impact on the survival of several endemic and habitat specialist species due to population decline and even local extinction of the species. Reptile and amphibian species have several limiting factors resulting from the chemical and physical condition of their habitat. Forest cover change both by logging and conversion will have significant impact on forest dwelling species that are intolerant of open and polluted areas. Forest fires directly kill all slow-moving forest species. Pesticide and herbicide spill-off from agricultural land to rivers and ponds, proved by several experts, are human-induced threats to aquatic amphibians and reptiles as well as other aquatic organisms and have resulted in egg tanning in several bird species. The most destructive of human-induced threats to reptiles and amphibians is hunting. Thousands of snakes are caught from the wild to supply fashion, pharmaceutical industries and pet animal business. Similar situations exist with freshwater and soft-shell turtles; hundreds of tons of these species are caught and exported to several East Asian countries for food, medicine and pets. Frog legs of some big species of frogs are exported to Europe and East Asia.

Based on this situation, it is important to evaluate the conservation status of endemic species of Sumatra and several habitat specialist species, which are not listed yet in the IUCN Red list, as well as to re-evaluate the listed species.

Amphibians

We assessed three species of amphibians, which need special attention due to their restricted range in Sumatra and their specialization to habitat. Future assessment should be done on all endemic and habitat specialist species of frogs. Arboreal, semi-aquatic and aquatic species of primary lowland and swamp forest need special attention due to accelerating loss of these ecosystems in Sumatra.

Reptiles

Endemic species of snakes with restricted distributional status to Sumatra and adjacent islands, as well as all threatened species already listed in the IUCN Threatened Species List, were our special focus. The group assessed all endemic species and subspecies belong to Calamaria,

Python, Boiga and Trimeresurus genera. In total, we assessed 34 reptile taxa consisting of 17 species of turtles, 16 species of snake and one species of crocodile.

Assessment Approach

Since we had very limited data on population status of amphibians and reptiles, we proposed to use biogeographic range of species as a basic tool to evaluate the vulnerability to extinction of the species. This approach was proposed for amphibians and reptiles of Madagascar (Raxworthy and Nussbaum, 2000), and for birds (see Birdlife International reports on Endemic Bird Areas and Important Birds Areas; www.birdlife.net). This approach was useful to avoid bias from using population factors (e.g., population density, generation time, predation, hunting pressure) caused by habitat loss or other threat. Another important reason was that the data on biogeographic criteria is easier to collect than population factor data, which needs a long time and much effort for each species.

Raxworthy and Nussbaum (2000) had proposed biogeographic evaluation criteria to assess all species of herpetofauna of Madagascar as described in the table below:

Measuring extinction vulnerability with biogeographic criteria (Raxworthy and Nussbaum, 2000)

Biogeographic criteria	**Extinction Risk**	
	High	**Low**
Extent of occurrence	Small	Large
Number of known sites	Few	Many
Distribution structure	Fragmented	Continuous
Habitats	Specialist of declining habitats	Non-specialist or specialist of stable habitats

Threats and Recommendations

Continuing decline, both in area and quality, of preferred habitats due to forest conversion for agriculture, inappropriate land management, wood extraction, and infrastructure development as well as human settlement are major threats to the reptiles and lead to an increase in the vulnerability to extinction of the species being assessed, particularly the forest species. Water pollution and infrastructure development were identified as major threats to marine turtles.

Research on population number and range, biology and ecology, threat, trend/monitoring and conservation measures were recommended for almost all assessed species. Uses and harvest level studies were recommended for all species in trade to develop sustainable harvest management of the species. Habitat and wild population management, as well as monitoring and limiting factor management, were strongly recommended for all assessed species.

Herpetofauna Assessed at the CAMP Workshop

No.	Species	IUCN Red List Category	
		2002 Red List Status	2003 Sumatra CAMP Status
A	**Freshwater Turtles**		
1	*Amyda cartilaginea*	VU A1cd+2cd	NT
2	*Batagur baska*	CR A1cd	NT
3	*Callagur borneoensis*	CR A1bcd	EN B1ab(i,ii,iii)+2ab(i,ii,iii)
4	*Chitra chitra*	CR A1cd+B1+2c	NT
5	*Cuora amboinensis*	VU A1d+2d	
6	*Heosemys spinosa*	EN A1bcd	EN B2ab(i,ii,iii,iv,v)
7	*Malayemys subtrijuga*	VU A1d+2d	VU B1ab(i,ii,iii,iv,v)+2ab(i,ii,iii,iv,v)
8	*Manouria emys*	EN A1cd+2cd	NT
9	*Notochelys platynota*	VU A1cd+2cd	EN B2ab(i,ii,iii,iv,v)
10	*Orlitia borneensis*	EN A1d+2d	VU B2ab(i,ii,iii,iv,v)
11	*Pelochelys cantorii*	EN A1cd+2cd	NT
12	*Siebenrockiella crassicollis*	VU A1cd+2cd	NT
B	**Marine Turtles**		
1	*Caretta caretta*	EN A1abd	EN B2ab(iv)
2	*Chelonia mydas*	EN A1bd	EN B2ab(i,ii,iii,iv,v)
3	*Dermochelys coriacea*	CR A1abd	NT
4	*Eretmochelys imbricata*	CR A1bd	EN B2ab(i,ii,iii)
5	*Lepidochelys olivacea*	EN A1abd	CR B1ab(i,ii,iii,iv,v); C2a(i); D
C	**Snakes**		
1	*Iguanognathus werneri**	VU D2	DD**
2	*Boiga nigriceps brevicauda**	NE	VU B1ab(i,ii,iii)+2ab(i,ii,iii)
3	*Calamaria abstrusa**	NE	EN B2ab(i,ii,iii)
4	*Calamaria alidae**	NE	VU B1ab(i,ii,iii)+2ab(i,ii,iii)
5	*Calamaria crassa**	NE	CR B1ab(i,ii,iii)
6	*Calamaria doederleini**	NE	CR B1ab(i,ii,iii)
7	*Calamaria eiselti**	NE	CR B1ab(i,ii,iii)
8	*Calamaria elegans**	NE	EN A3c;B1ab(i,ii,iii)+2ab(i,ii,iii)
9	*Calamaria forcarti**	NE	EN B2ab(i,ii,iii)
10	*Calamaria margaritophora**	NE	EN B2ab(i,ii,iii)
11	*Calamaria mecheli**	NE	
12	*Calamaria sumatrana**	NE	EN B2ab(i,ii,iii)
13	*Calamaria ulmeria**	NE	CR B1ab(i,ii,iii)
14	*Python curtus**	NE	NT
15	*Trimeresurus brongersmai**	NE	EN B1ab(i,ii,iii,iv,v)+2ab(i,ii,iii,iv,v)
16	*Trimeresurus popeiorum barati**	NE	VU B1ab(i,ii,iii)+2ab(i,ii,iii)
D	**Crocodile**		
1	*Tomistoma schlegelii*	EN C1	EN A2acd
E	**Frogs**		
1	*Bufo sumatranus**	NE	EN A3c; B1ab(ii,iii)+2ab(ii,iii)
2	*Bufo valhallae*	NE	EN B1ab(i,ii,iii)+2ab(i,ii,iii)
3	*Kalophrynus punctatus*	NE	VU A3c;B1ab(iii)

Notes:

* Endemic

** Locality data are not known but the group suspected Extinct since there have been no new record of this species for over 100 years.

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Workshop Report

SECTION IV: Birds

Working Group Report
Taxon Data Sheets and Maps

Bird Working Group Report

Summary

- Number of taxa assessed: 30 species.
- Only 6 of the 30 birds assessed were endemic to Sumatra. The status of two of these six species changed from the 2002 Red List of Threatened Species.
- The rest of the species assessments cannot be compared since the CAMP assessments for those species were at the regional level and not at the global level.
- One species, *Pitta schneideri*, is proposed to be upgraded into the threatened category of Endangered from the Lower Risk category under which it is currently placed.
- One species, *Pitta venusta*, which was assessed earlier as Vulnerable, is proposed to be downgraded to Near Threatened.

Working Group Members

- Chairul Saleh, WWF Indonesia, group leader
- Belry Zetra, Yayasan Warsi
- Sunarto, Conservation International
- Wilson Novarino, Universitas Andalas
- Adi Susmianto, Directorate KKH-PHKA, Min. of Forestry
- Susi Oktalina, BKSDA-Jambi
- Zulfikar, Berbak National Park
- Istanto, Berbak National Park
- Andre Hansen Siregar, Bukit Tigapuluh National Park
- Didi Wuryanto, BKSDA-Bengkulu

Species Assessed

The working group assessed 30 species of Sumatran avifauna listed as threatened in the IUCN Red List (2000), six of which are endemic to the island: Hoogerwerf's pheasant (*Lophora hogerwerfi*), Salvadori's pheasant (*Lophora inornata*), Sumatran cochoa (*Cochoa beccarii*), Rueck's blue flycatcher (*Cyornis ruckii*), Schneider's pitta (*Pitta schneideri*), and Black-crowned pitta (*Pitta venusta*). Of the endemic species, the Rueck's blue flycatcher was listed as critically endangered in the 2002 Red List of Threatened Species (IUCN 2002).

In addition, the group evaluated four other Critically Endangered species that are not endemic to Sumatra: Silvery pigeon (*Columba argentina*), Sunda ground-cuckoo (*Carpococcyx viridis*), Chrismast frigatebird (*Fregata andrewsi*), and Abbot's booby (*Sula abbottii*). The Chrismast frigatebird and Abbot's booby are also included in the Appendix I of CITES and are protected species in Indonesia as well. The other birds from the list categorized as endangered species, Appendix I CITES, and protected species are as follows: white-winged duck (*Cairina scutulata*) and Nordmann's greenshank (*Tringa guttifer*). Another endangered bird species, Storm's stork (*Ciconia stormi*), was assessed.

Due to time limitation the group decided to prioritize the evaluation of Sumatran endemic birds at this CAMP workshop based on the fact that many Sumatran endemic birds are very threatened especially by habitat loss caused mainly by illegal logging, forest conversion, land clearing, etc.

Discussion Process

In the beginning of the process to select birds to be assessed, the group used a category of species with which they were most familiar, and for which many of the group members had recent data or information. Following requirements from the committee organizer, the group was asked to work on Taxon Data Sheets (TDS) for all 30 bird species listed and to add other endemic birds in Sumatra if time was available. The group felt that making time for this was important because many endemic birds in Sumatra do not have protected species status under Indonesian regulation.

To make the assessment process easy and faster for all birds listed, the group adopted the strategy of dividing into three small groups, each having responsibility for assessing 10 birds. TDSs from all small groups were then put together into the TDS database as one of the workshop outputs. The database will be reviewed and discussed again in the larger group in order to reflect reliable and accurate information from all the group members. The group members considered all information in the TDSs to be the entire group's responsibility.

The group process had a bit of a problem when five of the group members (mostly from Forest Protection and Nature Conservation, PHKA) had to leave the workshop on the third day to attend another meeting in Medan. In addition, one other group member was unavailable on day three. Nevertheless, the review and discussion process continued with this portion of the meeting conducted by four group members: Belry Zetra, Wilson Novarino, Sunarto and Chairul Saleh.

The group members who were involved in this last review process of the TDSs at the workshop decided to help the committee by finishing the TDSs with more data and information after the workshop. It was decided that the final TDSs would be communicated among group members through e-mail and the final TDSs would be submitted to the committee as soon as the work was completed. These reviewed and finalized TDSs are included in this document.

Recommendations

1. Another CAMP workshop specifically designed to focus on Sumatran birds, as a follow-up of this workshop, should be planned to continue the assessments involving more experts on birds.

2. The draft of the bird TDSs should be sent to the group members for review and final check before produced as formal document.

3. The CBSG should inform the bird group members of all programs or activities as well as the follow-up of the Sumatra Threatened Species CAMP.

Birds Assessed at the CAMP Workshop

Scientific Name	English Name	Indonesian Name	2002 Red List Status	2003 Sumatra CAMP Status
Alcedo euryzona peninsulae	Blue-banded kingfisher	Raja-udang kalung-biru	VU A1c+2c (species level)	VU B2ab(i,ii,iii)
Aquila clanga	Spotted eagle		VU C1	CR B1ab(i,ii,iii)+2ab(i,ii,iii)
Cairina scutulata	White-winged duck	Mentok rimba	EN A1cd+2cd; C1+2a	EN C1a+2a(i)
Caprimulgus concretus	Bonaparte's nightjar	Cabak kolong	VU A1c+2c	VU B1ab(i,ii,iii)
Carpococcyx viridis	Sunda ground-cuckoo	Tokhtor Sumatera	CR D	VU B2ab(iii)
Centropus rectunguis	Short-toed coucal	Bubut teragop	VU A1c+2c	EN B1ab(ii,iii)
Ciconia stormi	Storm's stork	Bangau Storm	EN A1c+2c; C1	VU B1ab(ii,iii)
Cochoa beccari	Sumatran cochoa	Ciung- kungkal Sumatera	VU C1+2a	VU B1ab(i,ii,iii)+2ab(i,ii,iii)
Columba argentina	Silvery pigeon	Merpati perak	CR D	EN B1ab(iii)+2ab(iii)
Cyornis caerulatus	Sunda blue flycatcher	Sikatan biru-langit	VU A1c+2c	VU B1ab(ii,iii)+2ab(ii,iii)
Cyornis ruckii	Rueck's blue flycatcher	Sikatan Aceh	CR D	VU B1ab(ii,iii)+2ab(ii,iii)
Egretta eulophotes	Chinese egret	Kuntul Cina	VU C1	EN B2ab(iii)
Fregata andrewsii	Christmas frigatebird	Cikalang Christmas	CR A2ce; B1+2bce	VU B1ab(iii)+2ab(iii)
Heliophais personata	Masked finfoot	Pedendang kaki-sirip	VU A1c+2c; C1	VU B1ab(ii,iii)+2ab(ii,iii)
Leptoptilos javanicus	Lesser adjutant	Bangau tongtong	VU C1	NT
Lophura erythrophthalma	Crestless fireback	Sempidan merah	VU A1cd+2cd	NT
Lophura hoogerwerfi	Hoogerwerf's pheasant	Sempidan Aceh	VU C2b	VU B1ab(ii,iii)
Lophura inornata	Salvadori's pheasant	Sempidan Sumatera	VU C1+2a	VU B2ab(ii,iii)
Melanoperdix nigra	Black partridge	Puyuh hitam	VU A1cd+2cd	VU B1ab(ii,iii)+2ab(ii,iii)
Mycteria cinerea	Milky stork	Bangau bluwok	VU A2cd; C1	NT
Padda oryziviora	Java sparrow	Gelatik Jawa [kekedek]	VU A1acd+2cd; C1	NT
Pelecanus philippensis	Spot-billed pelican	Undan paruh-totol	VU A1cde; C1	NT
Pitta schneideri	Schneider's pitta	Paok Schneider	VU C1	EN B1ab(ii,iii)
Pitta venusta	Black-crowned pitta	Paok topi-hitam	VU C1	NT
Pycnonotus zeylanicus	Straw-headed bulbul	Cucak rawa	VU A1cd+2cd	NT
Setornis criniger	Hook-billed bulbul	Empuloh paruh-kait	VU A1c+2c	VU B1ab(ii,iii)+2ab(ii,iii)
Spizaetus nanus	Wallace's hawk-eagle	Elang Wallace	VU A1c+2c; C1	NT
Sula abbotti	Abbott's booby	Angsa-batu Christmas [Moni]	CR A2ce, B1+2bce	EN B2ab(ii,iii)
Treron capellei	Large green pigeon	Punai besar	VU A1c+2c	VU B1ab(ii,iii)
Tringa guttifer	Nordmann's greenshank	Trinil Nordman	EN C1	EN B2ab(ii,iii)

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SECTION V: Mammals

Working Group Report
Taxon Data Sheets and Maps

Mammal Working Group Report

Summary

- Number assessed: 41 taxa.
- 16 endemic taxa assessed, 12 of which were assessed for the first time.
- 2 endemic species assessed previously (*Hylopetes winstoni* and *Nesolagus netscheri*) differed in the status due to availability of more information.
- Since all other non-endemic taxa were assessed for Sumatra only, a comparison with the global assessment from the 2002 IUCN Red List of Threatened Species is not possible.

Working Group Members

- Nico J. van Strien, IRF (International Rhino Foundation), group leader
- Dudi Rufendi, WWF - Riau
- Dolly Priatna, Leuser Management Unit
- Amsir Bakar, Universitas Andalas
- Boeadi, Museum Bogoriense, Indonesian Institute of Sciences
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- Nukman, BKSDA Riau
- Susilo Legowo, BKSDA West Sumatra
- Ramses Siregar, BKSDA Jambi
- Dulhadi, BKSDA South Sumatra
- Puja Utama, BKSDA Lampung
- Hart Lamer Susetyo, Leuser National Park
- Pratiara, Leuser National Park
- Moh. Haryono, Bukit Tigapuluh National Park
- Andre Hansen Siregar, Bukit Tigapuluh National Park
- Tri Prasetyo, Siberut National Park
- Donal Hutasoit, Kerinci – Seblat National Prk
- Istanto, Berbak National Park
- Zulfikar, Berbak National Park
- R. Bintoro, Way Kambas National Park
- Tamen Sitorus, Bukit Barisan Selatan National Park
- Bukti Sinulingga, North Sumatra Provincial Forestry Office
- Enny Niswaty, North Sumatra Provincial LandUse Planning Office

Mammals Assessed at the CAMP Workshop (* = Endemic)

Scientific Name	English Name	Indonesian Name	2002 Red List Status	2003 Sumatra CAMP Status
Aethalops alecto alecto	Hairy mountain fruit bat	codot gunung	LR/nt (species level)	CR B1ab(iii)+2ab(iii)
Arctogalidia trivirgata	Small-toothed palm civet	musang akar	--	VU A2c; B1ab(iii,iv)+2ab(iii, iv)
Catopuma temminckii temminckii	Golden cat	kucing emas	VU C2a(i) (species level)	VU B1ab(ii,iii,iv)
Chimarrogale phaeura sumatrana *	Sumatran water shrew	cecurut air Sumatera	CR B1+2c (species level)	CR B1ab(ii,iii,iv)+2ab(ii,iii,iv)
Chiropodomys karlkoopmani *	Mentawai pencil-tailed mouse	mencit bambo	EN B1+2c	EN B2ab(ii,iii,iv)
Crocidura paradoxura	Mountain shrew	cucurut gunung	EN B1+2c	CR B1ab(ii,iii)+2ab(ii,iii)
Cuon alpinus sumatrensis *	Dhole	ajag	VU C2a (species level)	VU B1ab(i,ii,iii,iv,v)
Cynocephalus variegatus chombolis *	Flying lemur Chombolis	kubung Combol	--	EN A2c; B1ab(ii,iii)+2ab(ii,iii)
Cynocephalus variegatus gracilis *	Serasan Island flying lemur	kubung Malaya – pulau Serasan	--	VU B1ab(ii,iii)+2ab(ii,iii)
Cynocephalus variegatus natunae *	Bunguran Island flying lemur	kubung Malaya – pulau Bunguran	--	EN B1ab(iii)+2ab(iii)
Cynocephalus variegatus saturatus *	Batu Island flying lemur	kubung pulau Batu	--	EN B1ab(ii,iii,v)+2ab(ii,iii,v)
Cynocephalus variegatus tellonis *	Telo Islands flying lemur	kubung Malaya – pulau Telo	--	CR B1ab(iii,v)+2ab(iii,v)
Cynocephalus variegatus tuancus *	Tuangku Islands flying lemur	kubung Tuangku	--	EN B1ab(ii,iii,v)+2ab(ii,iii,v)
Cynogale bennettii	Otter civet	musang air	EN A1ce; C2a	CR A2c
Dyacopterus brooksi	Dayak fruit bat	kusing Dayak	--	EN B2ab(iii,v)
Eonycteris major major	Major blossom bat	codot kembang besar	--	CR B1ab(iii,v)+2ab(iii,v)
Galeopithecus temminckii	Temmincks flying lemur	kubung Halaua	--	NT
Hipposideros breviceps	Pagai leaf-nosed bat	lawa barong Pagai	VU D2	CR B1ab(iii)+2ab(iii)
Hylomys parvus *	Small gymnure	cucurut babi	CR B1+2c	CR B1ab(iii)+2ab(iii)
Hylomys suillus	Lesser gymnure	tikus babi	--	LC
Hylopetes sipora	Sipora flying squirrel	chukbo Sipora	EN B1+2c	EN B1ab(iii)+2ab(iii)
Hylopetes winstoni *	Winston flying squirrel	chukbo Aceh	CR B1+2c; C1	VU D2
Iomys sipora	Sipora flying squirrel	chukbo Sipora	VU B1+2c	EN B1ab(iii)+2ab(iii)
Lutra sumatrana	Hairy-nosed otter	berang-berang besar	DD	EN A2cd
Lutrogale perspicillata perspicillata	Smooth-coated otter	berang-berang lembut	VU A1acd (species level)	NT
Manis javanica	Sunda pangolin	trenggiling	LR-nt	EN A2cd
Marmopterus doriae *	Sumatran mastiff bat	Lawa tayo Sumatera	--	CR B1ab(iii)+2ab(iii)
Martes flavigula henricii *	Yellow-throated marten	pulusan gunung	--	VU A2cd
Mustela lutreolina	Indonesia mountain weasel	pulusan gunung	EN B1+2c	EN B1ab(iii)+2ab(iii)
Neofelis nebulosa diardi *	Clouded leopard	macan dahan	VU C2a(i) (species level)	VU A2cd+3cd+4cd
Nesolagus netscheri *	Sumatran rabbit/hare	kelinci Sumatera	CR B1+2abcde; C2a	EN B2ab(ii,iii,v)
Panthetor lucasi	Lucas's dusky fruit bat	codot Lucas	--	EN A2c
Paradoxurus lignicolor *	Mentawai palm civet	musang Mentawai	VU A2c	VU A2c+3c+4c
Pardofelis marmorata	Marbled cat	kucing batu	VU C2a(i)	EN A3c
Prionailurus planiceps	Flat-headed cat	kucing dampak	VU C2a(i)	VU A2c
Pteropus vampyrus vampyrus	Flying fox	kalong	--	NT
Rattus adustus	Enggano rat	Tikus Enggano	VU D2	EN B1ab(iii)+2ab(iii)
Rattus enganus	Enggano Island rat	Tikus Enggano	CR C2b	EN B1ab(iii)+2ab(iii)
Rhinopoma microphyllum sumatrae	Greater mouse-tailed bat	lawa ekor panjang	--	CR B1ab(iii)
Rousettus spinalatus	Bare-backed rousette bat	codot roset sayap nyambung	VU C2a	DD
Ursus malayanus malayanus	Sun bear	beruang madu	--	VU A2cd+3cd+4cd

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SECTION VI

Corridor Working Group Reports
Forest Cover andConservation Areas Maps

Corridor-Based Working Group Reports

Northern Sumatra Corridor Working Group

Reported, facilitated and compiled by Darmawan Liswanto

Working Group Members

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- Cyccu Tobing
- Mistar
- Sunarto

Introduction

Forest fragmentation in Northern Sumatra has accelerated in the last ten years. Illegal logging and forest conversion, as well as road construction, are identified as the major causes of forest fragmentation. This situation has led to the partitioning of populations of key species (including orangutans, elephants, and other primate species) into several-isolated subpopulations and increased incidences of human-wildlife conflicts. In facing these problems, the working group calls for the establishment of corridors among fragmented habitats.

Corridors establishment will potentially increase the opportunity for migration among subpopulations, which we believe will enhance the viability of the species, and reduce frequency of human-wildlife conflicts. This approach also will provide an opportunity to protect remaining habitat outside of conservation areas through collaborative management schemes with local key stakeholders and greater protection of the habitats. The working group members also identified several potential difficulties from both political and social aspects, which will challenge this proposed approach.

Recent and Potential Future Problems

The major concerns in establishing the corridors are the status of most remaining habitat and the existing land use plans. It is recognized that the creation of corridors may lead to land tenure conflict with some local stakeholders. Planned infrastructure development includes the proposed road construction in Aceh that would criss-cross Gunung Leuser National Park to connect the west and east coasts of the province. Illegal logging and weak law enforcement are the major obstacles to protecting the remaining habitats, which had been identified as targeted areas to be connected.

The lack of appreciation and commitment by local governments (provinces, kabupatens and local community) to environmental conservation needs to be addressed if the long-term establishment of the corridors is to be successful. Appropriate actions should be identified and implemented to reduce potential land ownership conflicts with local communities and their wealth as well as to reduce forest encroachment on remaining habitats. Development of specific programs to provide alternative economic income for local illegal loggers should be in place in the near future to stop continuing decline of remaining habitats inside the conservation areas and other forest habitats. Increasing participation of local stakeholders in protection and management of forest habitat should become a high priority as soon candidate areas to be connected within proposed corridor regions, as well as inter-regions, have been identified. Formal status of future corridors should be decided based on agreement with local stakeholders through transparent public consultations to ensure the long-term security of established corridor regions.

Proposed Area for Corridor Establishment

Almost all of the remaining forest in the northern part of Sumatra lies along the Barisan mountain range. Several small and scattered forests occur in the eastern part of this region, which are swamp and mangrove forests. The proposed areas were chosen based on: 1) the probability of being connected; 2) the importance of the areas to key species, which are wide-ranging endemics; and 3) the vulnerability of these species to extinction due to habitat fragmentation. Following these criteria, the working group proposed four corridor regions, which lie along the Barisan range. First is Seulawah Ecosystem region, the area between Janto in the northwest to Lingga Isaq in the southeast and Seulawah Mountain in the north to Teunom in the south. The second is Leuser Ecosystem region comprising of the area between Jambo Angene in the northwest to Singkil swamp in the southeast and Krueng Pase in the south to Besitang in the north. The third comprises an area in two Kabupatens: North Tapanuli and Central Tapanuli. This region comprises areas between the Batang Toru in the south, northward to the southern tip of the Singkil swamps, and bordered by Lake Toba in the east, westward to the coast. The fourth region includes the area commonly referred to as ‘Angkola’, and stretches from the Batang Toru and Padangsidempuan in the North, south to the border of North Sumatra with West Sumatra, between Natal and Hutanopan.

The detailed information and proposed corridor establishment within each region are shown in the table below.

Detailed information and proposed corridor establishment within each proposed corridor region in Northern Sumatra.

Locations	Objectives	Justifications	Potential Problems	Potential Solutions	Proposed Corridors
Seulawah Ecosystem Region	1. To reconnect elephant and primates sub-populations within the region. 2. To reduce human-wildlife conflicts.	1. The area has been identified as an elephant range and home for several endemic species of Sumatra. 2. This region is also suspected to have similar biodiversity value to Leuser Ecosystem.	1. Non-protected status of the remaining forest. 2. Continuing forest conversion for agriculture land and settlements. 3. Existing land use planning. 4. Illegal logging practices.	1. Propose conservation status of remaining habitats in the region. 2. Develop sustainable management scheme. 3. Revise land use planning. 4. Stop timber extraction activity (moratorium).	1. Seulawah – Janto 2. Tangse – Geumpang 3. Sampoinet – Tenom 4. Tenom – Krueng Sabe 5. Betung – Lingga Isaq
Leuser Ecosystem Region	1. To reconnect sub-populations of migratory species. 2. To preserve remaining swamp and lowland ecosystem. 3. To reduce human-wildlife conflicts. 4. To reconnect northern and southern part of the region.	1. This region is home for over 80% of the orangutan population. 2. Swamp forest has significant loss and become the most rare habitat type through out northern Sumatra region. 3. Lowland forests is heavily fragmented in this region.	1. Non-protected status of the remaining forest. 2. Continuing forest conversion for agriculture land and settlements. 3. Existing land use planning. 4. Illegal logging practices. 5. Proposed road construction. 6. Timber concessions.	1. Land compensations. 2. Tunnel and bridge construction. 3. Law enforcement. 4. Land Use Planning Revision. 5. Stop timber concession activities (moratorium).	1. Singkil – Bengkung 2. Tripa – Barisan range 3. West Menggamat – East Menggamat 4. West Alas Hulu – East Alas Hulu

Locations	Objectives	Justifications	Potential Problems	Potential Solutions	Proposed Corridors
North Tapanuli and Central Tapanuli (Toba Watershed) region	1. To protecting water-catchments area of Lake Toba. 2. To preserve biodiversity. 3. To reconnect orangutan subpopulations. 4. To reduce human – wildlife conflict . 5. To change formal status to conservation area.	1. Significant decrease of water debit or level of Lake Toba has been reported recently. 2. This region is important habitat for the remaining orangutan population outside the Leuser Ecosystem.	Identification of potential problems in this region is not conducted yet.	Identify potential problems and proposed corridors within this area.	
Angkola Ecosystem Region	1. To conserve subpopulations of endemic flora and fauna in fragmented habitats. 2. To preserve and protect swamp and lowland forest ecosystem.	1. This area is home for orangutans, tigers, elephants, and several endemic flora and fauna of Sumatra. 2. This area is important tiger range. 3. This area consists of fragmented swamp and lowland forest ecosystem.	1. Habitat fragmentation 2. Existing land use. 3. Road construction. 4. Forest encroachment and conversion for agriculture and settlement. 5. Illegal logging. 6. Existing human settlement. 7. Delineation of borders.	1. Increasing conservation area. 2. Integrated area management. 3. Compensation to local community (incentive). 4. Develop bridges and tunnels.	1. Sipirok NR – Sibualbuali NR 2. Sibualbuali NR – Lubuk Raya 3. Angkola 4. Sipirok NR – West Sarula

Proposed Sumatra Corridors Working Groups

Introduction

This report documents discussion of the values of corridors in Sumatra, and the action plans to actuate corridor designation in Sumatra. The need to develop corridors in Sumatra was supported by working groups consisting of participants from different professional disciplines such as researchers, lecturers, environmental activists, and government officials. The proposed corridors are situated along the Sumatra Island from north to south. The discussion recommends some *applicable* actions in developing corridors.

Background

Forest fragmentation in Northern Sumatra region has accelerated in the last ten years. Illegal logging, forest conversion and road construction have been identified as the major causes of fragmentation. This situation has also led to separating key species populations into several isolated subpopulations, particularly in the case of orangutans and elephants, which subsequently result in increased human-wildlife conflicts. Coping with these problems, the working group calls for the need to establish corridors between the fragmented habitats.

Objective

The objective of the discussion was to address the needs of corridor development in Sumatra, to determine the precise locations of the proposed corridors, and to design an action plan to develop corridors.

Method

The corridor working group was divided into three major groups, namely:

- North Sumatra corridor working group
- Central Sumatra corridor working group
- South Sumatra corridor working group

The group members consisted of participants from different backgrounds and professions and occupations. The idea of mixed professions was to exercise a balanced opinion of the need and the corridor concept, and also to gather as much input as possible into the action plan for developing corridors in Sumatra.

Definition of Corridor

Working groups used different wording in determining a definition of ‘corridor’. However, the definition below is, most likely, the acceptable description:

A corridor is a certain area, connecting habitats, which can be used by the wildlife/target species to allow free movement, or healthy interaction, within the surrounding ecosystem and enables sufficient reproduction for the population to sustain itself.

Criteria of the Target Species

The following criteria were used by the working groups to determine target species with the purpose of deciding the locations of corridors.

- Large home range, i.e., large mammals
- Involved in conflict with human needs
- Isolated/fragmented species
- Protected species
- Flagship species
- Umbrella species

Target Taxa Identified

- Primates
- Tiger
- Rhino
- Elephant

The taxa listed above were selected because they comply with almost all of the stated criteria. Except for the rhino, they all have direct conflict with human activities. They can also be categorized as umbrella species, meaning that conserving those species also protects and conserves many other smaller species, plants and animals within their home range including those who live in the corridor.

Proposed Corridor Locations in Sumatra

The justification to select the corridor sites is due to the fact that the locations are the fragmented habitats of the target species. Conflicts between human activities and the movement of the target species are also frequently found in these locations. Along with these considerations, the proposed corridors also take into account the protection of the existing natural corridors.

The proposed corridors were divided into three regions: North Sumatra, Central Sumatra and South Sumatra (maps are attached):

North Sumatra Corridor

Almost all remaining forest in the northern part of Sumatra lies along the Barisan mountain range. Several small and scattered forests are found in the eastern part of this region, which are swamp and mangrove forests.

The working group proposed four corridors that lie along the Barisan range.

1. Seulawah Ecosystem region, the area between Janto in the northwest to Lingga Isaq in the southeast and Seulawah Mountain in the north to Teunom in the south.

2. Leuser Ecosystem region encompassing area between Jambo Angene in the northwest to Singkil swamp in the southeast and Krueng Pase in the south to Besitang in the north.

3. An area in two Kabupatens, North Tapanuli and Central Tapanuli. This region comprises areas between Batang Toru in the south, northward to the southern tip of the Singkil swamps, and bordered by Lake Toba in the east, westward to the coast.

4. The area commonly referred to as 'Angkola, which stretches from the Batang Toru and Padangsidempuan in the North, south to the border of North Sumatra with West Sumatra, between Natal and Hutanopan.

Central Sumatra Corridor

1. Unite Berbak NP and Sembilang NP based on the following reasons:
    a. An area proposed as Ramsar site (wetland conserved areas).
    b. Still a forested area.
    c. 2 km in distance.

    Barriers:

    With the unification, Jambi regional government might lose the grip on administering Berbak NP.

2. Bukit Rimbang - Bukit Baling Wildlife Reserve – Tesso Nillo (proposed as conservation areas for an elephant reserve) – Kerumutan Wildlife Reserve – Bukit Tigapuluh NP.

    Considerations:
    a. Home range of elephants and tigers.
    b. Similarity of ecosystem and habitats.
    c. To save isolated elephants.

    Barriers:
    a. The distance from one area to another is quite far.
    b. Conflicting area utilization, particularly with local people and regional government.
    c. High cost to develop a corridor.
    d. Inadequate administration and management.

3. Bukit Tigapuluh NP

    Considerations:
    a. Existing logging companies might jeopardize the unity of NP.
    b. Habitats for TRE.
    c. Similarity in ecosystem.
    d. To save isolated elephants.

    Potential Problems:
    a. Need complicated procedures to stop logging operation with the consequence of providing compensation for the logging companies.
    b. It might conflict with the socio-economic needs of the local people.

South Sumatra Corridor
The locations of South Sumatra corridors were divided into four clusters.

Cluster 1: Kerinci Seblat NP – Bukit Barisan Selatan NP and surrounding protected forests
Cluster 2: Berbak NP – Sembilang nature reserve
Cluster 3: Way Kambas NP and the nearby protected forests
Cluster 4: Small nature reserves and game reserves, and the surrounding protected forests.

Potential problems

The existing land use plans for the remaining habitats present the major obstacle to the establishment of corridors, since this process will undoubtedly lead to land tenure conflicts with local stakeholders. Illegal logging and lack of law enforcement are the major problems in protecting the remaining habitats.

Recommended Action Plan

No.	Activities	Institutions	Problems	Measurable Outputs
A	Building understanding and commitment among stake-holders about the benefit of corridors.	PHKA, NGOs, local govt, universities, businessmen, etc.	Conflict of interest among stakeholders, especially between the regional plan and conservation purposes. The conflicts are also due to conflicting policies on natural resources management.	Regional regulation that support conservation efforts
1	Socialization of corridor concept to all stakeholders that enables them to share the same vision of the benefit of corridors.	Idem ditto		More participants to support the development
2	Awareness campaign on participatory conservation initiatives for TRE.	NGOs, universities		Commitment and action plan
B	Invite and encourage the private sectors to be involved in corridor management activities	NGOs, universities		
1	Community development. The idea of this activity is to protect the proposed corridor from human exploitation as a result of economic needs. Therefore, efforts to create alternative sources of income for people who live nearby and within the	NGOs, universities		

	corridors are deemed necessary. Among many conservation initiatives are:			
1a	Identify program to encourage utilization of non-timber forest products in sustainable manners.	MoF, NGOs, universities		Documents and maps
1b	Help local community with the understanding of the corridor concept. Work together with them using demonstration plots.	NGOs, universities	Existing land use planning	Concrete plans and locations
C	Propose conservation status for the remaining habitats in North Sumatra region.	PHKA, local leaders, NGOs		Documents and maps
D	Stop logging operations activity (moratorium).	MoF, Dishut, Pemda	Prolonged dispute	Law enforcement takes place
E	Land compensation.	MoF, local NGOs		Agreement on money settlement among all those concerned

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APPENDIX I

References
IUCN Red List Categories

Sumatran Threatened Species CAMP

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IUCN RED LIST CATEGORIES
Version 3.1

Prepared by the

IUCN Species Survival Commission

As approved by the
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IUCN RED LIST CATEGORIES

I. INTRODUCTION

1. The IUCN Red List Categories have been developed as an easily and widely understood system for classifying species at high risk of global extinction. The general aim of the system is to provide an explicit, objective framework for the classification of the broadest range of species according to their extinction risk. However, while the Red List may focus attention on those taxa at the highest risk it is not the sole means of setting priorities for conservation measures for their protection.

Extensive consultation and testing in the development of the system strongly suggests that it is robust across most organisms. However, it should be noted that although the system places species into the threatened categories with a high degree of consistency, the criteria cannot take into account the life histories of every species. Hence, in certain individual cases, the risk of extinction may be under- or over-estimated.

2. Before 1994 the more subjective threatened species categories used in Red Data Books and Red Lists had been in place, with some modification, for almost 30 years. Although the need to revise the categories had long been recognised (Fitter & Fitter 1987), the current phase of development only began in 1989 following a request from the IUCN Species Survival Commission (SSC) Steering Committee to develop a more objective approach. IUCN Council adopted the new Red List system in 1994.

The new IUCN Red List Categories and Criteria have several specific aims:

- to provide a system that can be applied consistently by different people;
- to improve objectivity by providing users with clear guidance on how to evaluate different factors which affect risk of extinction;
- to provide a system which will facilitate comparisons across widely different taxa;
- to give people using threatened species lists a better understanding of how individual species were classified.

3. Since their adoption by IUCN Council in 1994, the IUCN Red List Categories have become widely recognised internationally and they are now used in a whole range of publications and listings produced by IUCN as well as by numerous governmental and non-governmental organisations. Such broad and extensive use revealed the need for a number of improvements and SSC was mandated by the 1996 World Conservation Congress (WCC Res. 1.4) to conduct a review of the system. This document presents the revisions recommended by the SSC Criteria Review Working Group.

The proposals presented in this document result from a continuing process of drafting, consultation and validation. It was clear that the production of a large number of draft proposals led to some confusion, especially as each draft has been used for classifying some set of species for conservation purposes. To clarify matters, and to open the way for modifications as and when they became necessary, a system for version numbering is as follows:

Version 1.0: Mace & Lande (1991)
The first paper discussing a new basis for the categories, and presenting numerical criteria especially relevant for large vertebrates.

Version 2.0: Mace *et al*. (1992)
A major revision of Version 1.0, including numerical criteria appropriate to all organisms and introducing the non-threatened categories.

Version 2.1: IUCN (1993)
Following an extensive consultation process within SSC, a number of changes were made to the details of the criteria, and fuller explanation of basic principles was included. A more explicit structure clarified the significance of the non-threatened categories.

Version 2.2: Mace & Stuart (1994)
Following further comments received and additional validation exercises, some minor changes to the criteria were made. In addition, the Susceptible category present in Versions 2.0 and 2.1 was subsumed into the Vulnerable category. A precautionary application of the system was emphasised.

Version 2.3: IUCN (1994)
IUCN Council adopted this version, which incorporates changes as a result of comments from IUCN members, in December 1994. The initial version of this document was published without the necessary bibliographic details such as date of publication and ISBN number, but these were included in the subsequent reprints in 1998 and 1999. This version was used for the *1996 IUCN Red List of Threatened Animals* (Baillie and Groombridge 1996) and *The World List of Threatened Trees* (Oldfield *et al* 1998)**.**

Version 3.0: IUCN/SSC Criteria Review Working Group (1999)
Following comments received, a series of workshops were convened to look at the Red List Criteria following which, changes were proposed.

Version 3.1:
The IUCN Council adopted this latest document, which incorporates changes as a result of comments from the IUCN and SSC memberships and from a final meeting of the Criteria Review Working Group, in February 2000.

All new assessments should use the latest adopted version and cite the version number.

4. In the rest of this document the proposed system is outlined in several sections. Section II, the Preamble, presents basic information about the context and structure of the system, and the procedures that are to be followed in applying the criteria to species. Section III provides definitions of key terms used. In Section IV, the categories are presented, while Section V presents the quantitative criteria used for classification within the threatened categories. Section VI is the bibliography. Annex I provides guidance on how to deal with uncertainty, Annex II suggests a standard format for citing the Red List Categories and Criteria, and Annex III outlines the documentation requirements for taxa to be included on IUCN's global Red Lists. It is important for the effective functioning of the system that all sections are read and understood to ensure that the definitions and rules are followed (Note: Annexes I, II and III are not part of the approved rules and will be updated on a regular basis).

II. PREAMBLE

The following information presents important information on the use and interpretation of the categories (= Critically Endangered, Endangered, etc.), criteria (= A to E), and sub-criteria (= 1, 2, etc.; a, b, etc.; i, ii, etc.):

1. Taxonomic level and scope of the categorisation process

The criteria can be applied to any taxonomic unit at or below the species level. The term 'taxon' in the following information, definitions and criteria is used for convenience, and may represent species or lower taxonomic levels, including forms that are not yet formally described. There is sufficient range among the different criteria to enable the appropriate listing of taxa from the complete taxonomic spectrum, with the exception of micro-organisms. The criteria may also be applied within any specified geographical or political area although in such cases special notice should be taken of point 14 below. In presenting the results of applying the criteria, the taxonomic unit and area under consideration should be made explicit in accordance with the documentation guidelines. The categorisation process should only be applied to wild populations inside their natural range, and to populations resulting from benign introductions (defined in the IUCN Guidelines for Re-introductions (IUCN 1998) as "...an attempt to establish a species, for the purpose of conservation, outside its recorded distribution, but within an appropriate habitat and eco-geographical area. This is a feasible conservation tool only when there is no remaining area left within a species' historic range").

2. Nature of the categories

Extinction is a chance process. Thus, a listing in a higher extinction risk category implies a higher expectation of extinction, and over the time-frames specified, more taxa listed in a higher category are expected to go extinct than in a lower one (without

effective conservation action). However, the persistence of some taxa in high-risk categories does not necessarily mean their initial assessment was inaccurate.

All taxa listed as Critically Endangered qualify for Vulnerable and Endangered, and all listed as Endangered qualify for Vulnerable. Together these categories are described as 'threatened'. The threatened categories form a part of the overall scheme. It will be possible to place all taxa into one of the categories (see Figure 1).

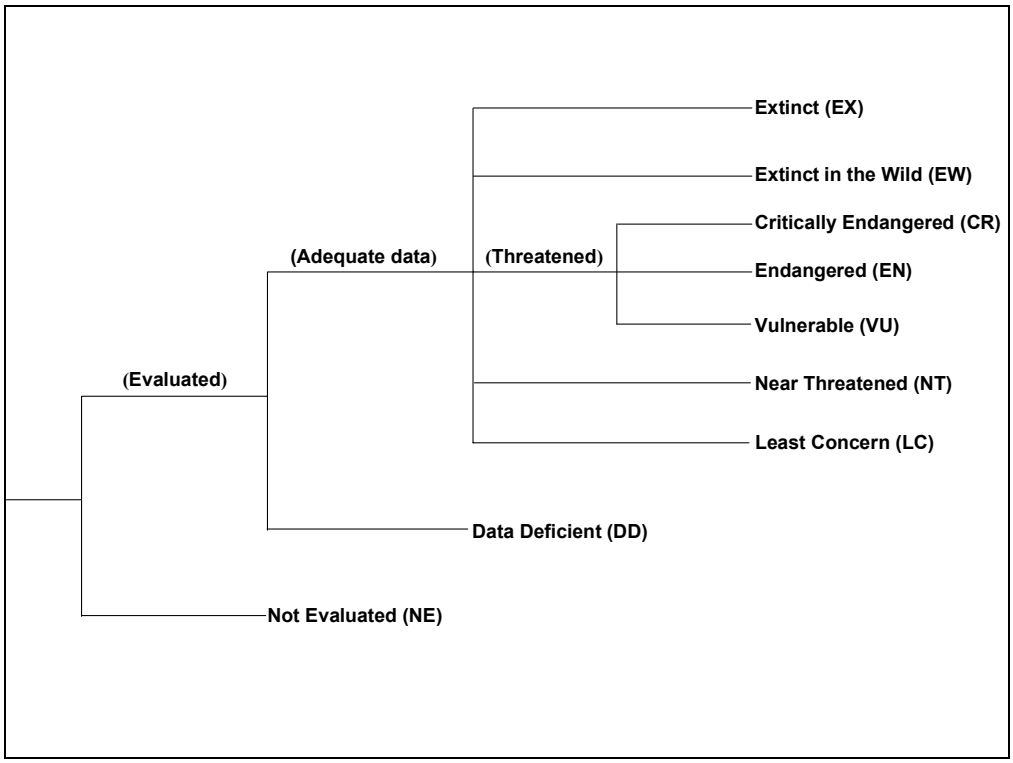

Figure 1. Structure of the categories.

3. Role of the different criteria

For listing as Critically Endangered, Endangered or Vulnerable there is a range of quantitative criteria; meeting any one of these criteria qualifies a taxon for listing at that level of threat. Each taxon should be evaluated against all the criteria. Even though some criteria will be inappropriate for certain taxa (some taxa will never qualify under these however close to extinction they come), there should be criteria appropriate for assessing threat levels for any taxon. The relevant factor is whether any one criterion is met, not whether all are appropriate or all are met. Because it will never be clear which criteria are appropriate for a particular taxon in advance, each taxon should be evaluated against all the criteria, and any criterion met should be listed.

4. Derivation of quantitative criteria

The different criteria (A-E) are derived from a wide review aimed at detecting risk factors across the broad range of organisms and the diverse life histories they exhibit. The

quantitative values presented in the various criteria associated with threatened categories were developed through wide consultation and they are set at what are generally judged to be appropriate levels, even if no formal justification for these values exists. The levels for different criteria within categories were set independently but against a common standard. Some broad consistency between them was sought.

5. Conservation actions in the listing process

The criteria for the threatened categories are to be applied to a taxon whatever the level of conservation action affecting it. It is important to emphasise here that a taxon may require conservation action even if it is not listed as threatened. Conservation actions which may benefit the taxon are included as part of the documentation requirements (see Annex 3).

6. Data quality and the importance of inference and projection

The criteria are clearly quantitative in nature. However, the absence of high quality data should not deter attempts at applying the criteria, as methods involving estimation, inference and projection are emphasised to be acceptable throughout. Inference and projection may be based on extrapolation of current or potential threats into the future (including their rate of change), or of 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 as part of the documentation.

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 distributions, few locations). Some threats need to be identified particularly early, and appropriate actions taken, because their effects are irreversible, or nearly so (pathogens, invasive organisms, hybridisation).

7. Problems of scale

Classification based on the sizes of geographic ranges or the patterns of habitat occupancy is complicated by problems of spatial scale. The finer the scale at which the distributions or habitats of taxa are mapped, the smaller the area will be that they are found to occupy, and the less likely it will be that range estimates exceed the thresholds specified in the criteria. Mapping at finer scales reveals more areas in which the taxon is unrecorded. Conversely, coarse-scale mapping reveals less of the unoccupied area causing larger range estimates that are more likely to exceed the thresholds for threatened categories. The choice of scale at which range is estimated may thus, itself, influence the outcome of Red List assessments and could be a source of inconsistency and bias. It is impossible to provide any strict but general rules for mapping taxa or habitats; the most appropriate scale will depend on the taxa in question, and the origin and comprehensiveness of the distribution data.

8. Uncertainty

The data used to evaluate taxa against the criteria are often estimated with considerable uncertainty. Such uncertainty can arise from any one or all of natural variation, vagueness in the terms and definitions used, and measurement error. The way in which this uncertainty is handled can have a strong influence on the results from an evaluation. Details of methods recommended for handling uncertainty are included in Annex 1 and assessors are encouraged to read and follow these principles.

In general, when this uncertainty leads to wide variation in the results of assessments the range of possible outcomes should be made explicit. A single category must be chosen and the basis for the decision should be documented, and should be both precautionary and credible.

When data are very uncertain, the category of 'Data Deficient' may be assigned. However, in this case it is important to document that this category indicates that this category has been assigned because data are inadequate to determine a threat category, rather than the taxon is poorly known. In cases where there are evident threats to a taxon, through, for example, deterioration of its only known habitat it is important to attempt threatened listing, even though there may be little direct information on the biological status of the taxon itself.

9. Implications of listing

Listing in the categories of Not Evaluated and Data Deficient indicates that no assessment of extinction risk has been made, though for different reasons. Until such time as an assessment is made, taxa listed in these categories should not be treated as if they were non-threatened. It may be appropriate (especially for Data Deficient forms) to give them the same degree of protection as threatened taxa, at least until their status can be assessed.

10. Documentation

All assessments should be documented. Threatened classifications should state the criteria and sub-criteria that were met. No listing can be accepted as valid unless at least one criterion is given. If more than one criterion or sub-criterion was met, then each should be listed. Therefore, if a re-evaluation indicates that the documented criterion is no longer met, this should not result in automatic down listing. Instead, the taxon should be re-evaluated with respect to all criteria to indicate its status. The factors responsible for triggering the criteria, especially where inference and projection are used, should be documented (see Annexes 2 and 3). The documentation requirements for other categories are also specified in Annex 3.

11. Threats and priorities

The category of threat is not necessarily sufficient to determine priorities for conservation action. The category of threat simply provides an assessment of the extinction risk under current circumstances, whereas a system for assessing priorities for action will include numerous other factors concerning conservation action such as costs, logistics, chances of success, and even perhaps the taxonomic distinctiveness of the subject.

12. Re-evaluation

Evaluation of taxa against the criteria should be carried out at appropriate intervals. This is especially important for taxa listed under Near Threatened, Data Deficient and for threatened taxa whose status is known or suspected to be deteriorating.

13. Transfer between categories

There are rules to govern the movement of taxa between categories which are as follows: (A) A taxon may be moved from a category of higher threat to a category of lower threat if none of the criteria of the higher category has been met for five years or more. (B) If the original classification is found to have been erroneous, the taxon may be transferred to the appropriate category or removed from the threatened categories altogether, without delay (but see Section 9). (C) Transfer from categories of lower to higher risk should be made without delay.

14. Use at regional level

The IUCN Red List Categories and Criteria were designed for global taxon assessments. However, many people are interested in applying them to subsets of global data, especially at regional, national or local levels. To do this, refer to guidelines prepared by the IUCN/SSC Regional Applications Working Group (Gärdenfors *et al*. 1999). When applied at national or regional levels it must be recognised that a global category may not be the same as a national or regional category for a particular taxon. For example, taxa classified as Least Concern globally might be Critically Endangered within a particular region where numbers are very small or declining, perhaps only because they are at the margins of their global range. Conversely, taxa classified as Vulnerable on the basis of their global declines in numbers or range might be Least Concern within a particular region where their populations are stable.

III. DEFINITIONS

1. Population and Population Size (Criteria A, C and D)

The term population is used in a specific sense in the Red List Criteria that is different to its common biological usage. Population is here defined as the total number of individuals of the taxon. For functional reasons, primarily owing to differences between life forms, population size is measured as numbers of mature individuals only. In the case of taxa obligately dependent on other taxa for all or part of their life cycles, biologically appropriate values for the host taxon should be used.

2. Subpopulations (Criteria B and C)

Subpopulations are defined as geographically or otherwise distinct groups in the population between which there is little demographic or genetic exchange (typically one successful migrant individual or gamete per year or less).

3. Mature individuals (Criteria A, B, C and D)

The number of mature individuals is the number of individuals known, estimated or inferred to be capable of reproduction. When estimating this quantity the following points should be borne in mind:

- Mature individuals that will never produce new recruits should not be counted (e.g. densities are too low for fertilisation).

- In the case of populations with biased adult or breeding sex ratios it is appropriate to use lower estimates for the number of mature individuals which take this into account (e.g. the estimated effective population size).

- Where the population size fluctuates use a lower estimate. In most cases this will be much less than the mean.

- Reproducing units within a clone should be counted as individuals, except where such units are unable to survive alone (e.g. corals).

- In the case of taxa that naturally lose all or a subset of mature individuals at some point in their life cycle, the estimate should be made at the appropriate time, when mature individuals are available for breeding.

- Re-introduced individuals must have produced viable offspring before they are counted as mature individuals.

4. Generation (Criteria A, C and E)

Generation length is the average age of parents of the current cohort (i.e. newborn individuals in the population). Generation length therefore reflects the turnover rate of breeding individuals in a population. Generation length is greater than the age at first breeding and less than the age of the oldest breeding individual, except in taxa that breed only once. Where generation length varies under threat, the more natural, i.e. pre-disturbance, generation length should be used.

5. Reduction (Criterion A)

A reduction is a decline in the number of mature individuals of at least the amount (%) stated over the time period (years) specified, although the decline need not still be continuing. A reduction should not be interpreted as part of a fluctuation unless there is good evidence for this. The downward part of a fluctuation will not normally count as a reduction.

6. Continuing decline (Criteria B and C)

A continuing decline is a recent, current or projected future decline (which may be smooth, irregular or sporadic) which is liable to continue unless remedial measures are taken. Fluctuations will not normally count as continuing declines, but an observed decline should not be considered as a fluctuation unless there is evidence for this.

7. Extreme fluctuations (Criteria B and C)

Extreme fluctuations occur in a number of taxa where population size or distribution area varies widely, rapidly and frequently, typically with a variation greater than one order of magnitude (i.e., a tenfold increase or decrease).

8. Severely fragmented (Criterion B)

Severely fragmented refers to the situation where increased extinction risks to the taxon result from the fact that most individuals within a taxon are found in small and relatively isolated subpopulations (in certain circumstances this may be inferred from habitat information). These small subpopulations may go extinct, with a reduced probability of recolonisation.

9. Extent of occurrence (Criteria A and B)

Extent of occurrence is defined as the area contained within the shortest continuous imaginary boundary which can be drawn to encompass all the known, inferred or projected sites of present occurrence of a taxon, excluding cases of vagrancy (see Figure 2). This measure may exclude discontinuities or disjunctions within the overall distributions of taxa (e.g. large areas of obviously unsuitable habitat) (but see 'area of occupancy'). Extent of occurrence can often be measured by a minimum convex polygon (the smallest polygon in which no internal angle exceeds 180 degrees and which contains all the sites of occurrence).

10. Area of occupancy (Criteria A, B and D)

Area of occupancy is defined as the area within its 'extent of occurrence' (see definition) which is occupied by a taxon, excluding cases of vagrancy. The measure reflects the fact that a taxon will not usually occur throughout the area of its extent of occurrence, which may contain unsuitable or unoccupied habitats. In some cases (e.g. colonial nesting sites, feeding sites for migratory taxa) the area of occupancy is the smallest area essential at any stage to the survival of existing populations of a taxon. The size of the area of occupancy will be a function of the scale at which it is measured, and should be at a scale appropriate to relevant biological aspects of the taxon, the nature of threats and the available data (see '6. Problems of scale' in the Preamble). To avoid inconsistencies and bias in assessments caused by estimating area of occupancy at different scales, it may be necessary to standardise estimates by applying a scale-correction factor. It is difficult to give strict guidance on how standardisation should be done because different types of taxa have different scale-area relationships.

11. Location (Criteria B and D)

Location defines a geographically or ecologically distinct area in which a single threatening event can rapidly affect all individuals of the taxon present. The size of the location depends on the area covered by the threatening event and may include part of one or many subpopulations. Where a taxon is affected by more than one threatening event, location should be defined by considering the most serious plausible threat.

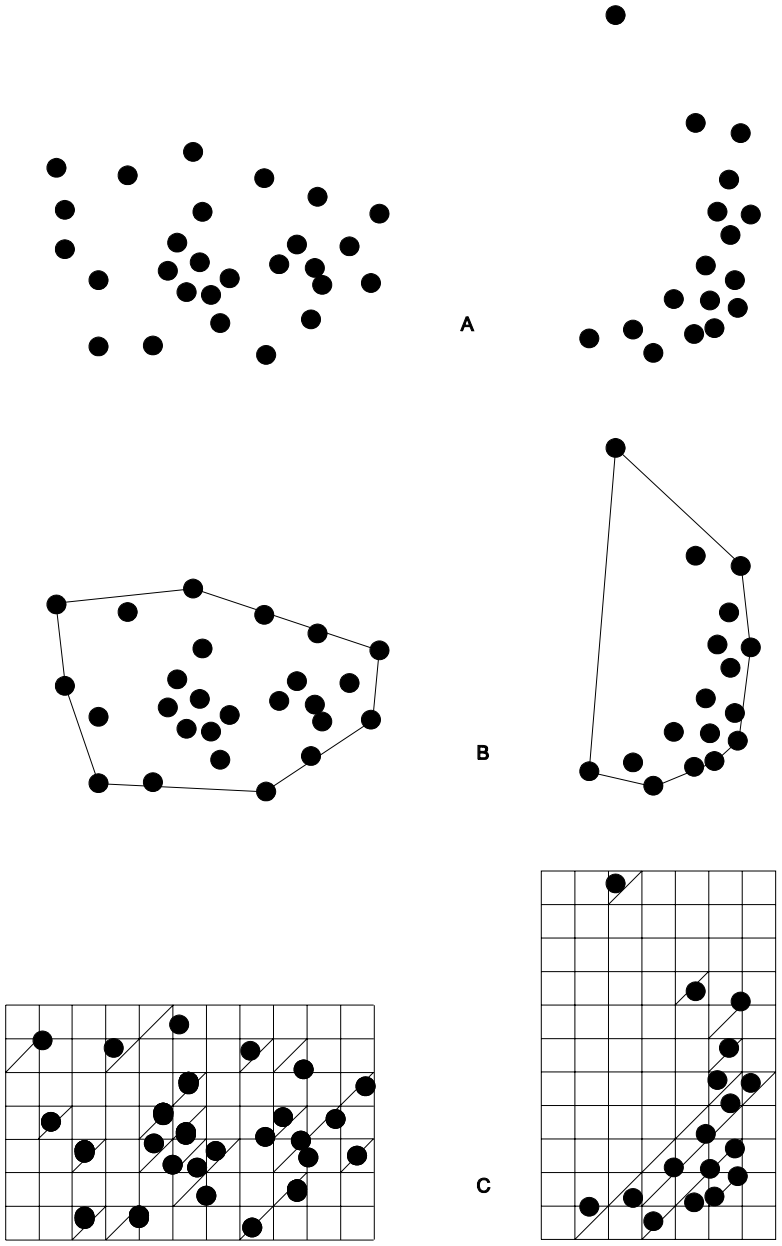

Figure 2. Two examples of the distinction between extent of occurrence and area of occupancy. (a) is the spatial distribution of known, inferred or projected sites of occurrence. (b) shows one possible boundary to the extent of occurrence, which is the measured area within this boundary. (c) shows one measure of area of occupancy which can be measured by the sum of the occupied grid squares.

12. Quantitative analysis (Criterion E)

A quantitative analysis is defined here as any form of analysis which estimates the extinction probability of a taxon based on known life history, habitat requirements, threats and any specified management options. Population viability analysis (PVA) is one such technique. Quantitative analyses should make full use of all relevant available data. In a situation in which there is limited information, such data as are available can be used to provide an estimate of extinction risk (for instance, estimating the impact of stochastic events on habitat). In presenting the results of quantitative analyses, the assumptions (which must be appropriate and defensible), the data used and uncertainty in the data or quantitative model must be documented.

IV. THE CATEGORIES [1]

A representation of the relationships between the categories is shown in Figure 1.

EXTINCT (EX)
A taxon is Extinct when there is no reasonable doubt that the last individual has died. A taxon is presumed Extinct when exhaustive surveys in known and/or expected habitat, at appropriate times (diurnal, seasonal, annual), throughout its historic range have failed to record an individual. Surveys should be over a time frame appropriate to the taxon's life cycle and life form.

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 naturalised population (or populations) well outside the past range. A taxon is presumed Extinct in the Wild when exhaustive surveys in known and/or expected habitat, at appropriate times (diurnal, seasonal, annual), throughout its historic range have failed to record an individual. Surveys should be over a time frame appropriate to the taxon's life cycle and life form.

CRITICALLY ENDANGERED (CR)
A taxon is Critically Endangered when the best available evidence indicates that it meets any of the Criteria A to E on pages 89 to 91, and it is therefore considered to be facing an extremely high risk of extinction in the wild.

ENDANGERED (EN)
A taxon is Endangered when the best available evidence indicates that it meets any of the Criteria A to E on pages 92 to 94, and it is therefore considered to be facing a very high risk of extinction in the wild.

VULNERABLE (VU)
A taxon is Vulnerable when the best available evidence indicates that it meets any of the Criteria A to E on pages 94 to 96, and it is therefore considered to be facing a high risk of extinction in the wild.

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[1] *Note: As in previous IUCN categories, the abbreviation of each category (in parenthesis) follows the English denominations when translated into other languages (see Annex II).*

NEAR THREATENED (NT)
A taxon is Near Threatened when it has been evaluated against the criteria but does not qualify for Critically Endangered, Endangered or Vulnerable now, but is close to qualifying for or is likely to qualify for a threatened category in the near future.

LEAST CONCERN (LC)
A taxon is Least Concern when it has been evaluated against the criteria and does not qualify for Critically Endangered, Endangered, Vulnerable or Near Threatened. Widespread and abundant taxa are included in this category.

DATA DEFICIENT (DD)
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. A taxon in this category may be well studied, and its biology well known, but appropriate data on abundance and/or distribution are lacking. Data Deficient is therefore not a category of threat. Listing of taxa in this category indicates that more information is required and acknowledges the possibility that future research will show that threatened classification is appropriate. It is important to make positive use of whatever data are available. In many cases great care should be exercised in choosing between DD and a threatened status. If the range of a taxon is suspected to be relatively circumscribed, and a considerable period of time has elapsed since the last record of the taxon, threatened status may well be justified**.**

NOT EVALUATED (NE)
A taxon is Not Evaluated when it is has not yet been evaluated against the criteria.

V. THE CRITERIA FOR CRITICALLY ENDANGERED, ENDANGERED AND VULNERABLE

CRITICALLY ENDANGERED (CR)

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

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

1. An observed, estimated, inferred or suspected population size reduction of ≥90% over the last 10 years or three generations, whichever is the longer, where the causes of the reduction are clearly reversible AND understood AND ceased, based on (and specifying) any of the following:

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

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

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

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

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

1. Extent of occurrence estimated to be less than 100 km^2, and estimates indicating at least two of a-c:

a. Severely fragmented or known to exist at only a single location.

b. Continuing decline, observed, inferred or projected, in any of the following:

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

c. Extreme fluctuations in any of the following:

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

2. Area of occupancy estimated to be less than 10 km^2, and estimates indicating at least two of a-c:

a. Severely fragmented or known to exist at only a single location.

b. Continuing decline, observed, inferred or projected, in any of the following:

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

c. Extreme fluctuations in any of the following:

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

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

1. An estimated continuing decline of at least 25% within three years or one generation, whichever is longer, OR

2. A continuing decline, observed, projected, or inferred, in numbers of mature individuals AND at least one of the following (a-b):

(a) Population structure in the form of one of the following:
(i) no subpopulation estimated to contain more than 50 mature individuals, OR
(ii) at least 90% of mature individuals are in one subpopulation.

(b) Extreme fluctuations in number of mature individuals.

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

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

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

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

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

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

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

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

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

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

1. Extent of occurrence estimated to be less than 5000 km^2, and estimates indicating at least two of a-c:

   a. Severely fragmented or known to exist at no more than five locations.

   b. Continuing decline, observed, inferred or projected, in any of the following:

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

c. Extreme fluctuations in any of the following:

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

2. Area of occupancy estimated to be less than 500 km^2, and estimates indicating at least two of a-c:

a. Severely fragmented or known to exist at no more than five locations.

b. Continuing decline, observed, inferred or projected, in any of the following:

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

c. Extreme fluctuations in any of the following:

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

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

1. An estimated continuing decline of at least 20% within five years or two generations, whichever is longer, OR

2. A continuing decline, observed, projected, or inferred, in numbers of mature individuals AND at least one of the following (a-b):

(a) Population structure in the form of one of the following:

(i) no subpopulation estimated to contain more than 250 mature individuals, OR
(ii) at least 95% of mature individuals are in one subpopulation.

(b) Extreme fluctuations in number of mature individuals.

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

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

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

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

1. An observed, estimated, inferred or suspected population size reduction of ≥50% over the last 10 years or three generations, whichever is the longer, where the causes of the reduction are: clearly reversible AND understood AND ceased, based on (and specifying) any of the following:

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

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

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

4. An observed, estimated, inferred, projected or suspected population size reduction of ≥30% over any 10 year or three generation period, whichever is

longer (up to a maximum of 100 years), where the time period includes both the past and the future, AND where the reduction or its causes may not have ceased, based on (and specifying) any of the (a) to (e) under A1.

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

1. Extent of occurrence estimated to be less than 20,000 km^2, and estimates indicating at least two of a-c:

   a. Severely fragmented or known to exist at no more than ten locations.

   b. Continuing decline, observed, inferred or projected, in any of the following:

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

   c. Extreme fluctuations in any of the following:

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

2. Area of occupancy estimated to be less than 2000 km^2, and estimates indicating at least two of a-c:

   a. Severely fragmented or known to exist at no more than ten locations.

   b. Continuing decline, observed, inferred or projected, in any of the following:

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

   c. Extreme fluctuations in any of the following:

      (i) extent of occurrence
      (ii) area of occupancy
      (iii) number of locations or subpopulations

(iv) number of mature individuals.

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

1. An estimated continuing decline of at least 10% within 10 years or three generations, whichever is longer, OR

2. A continuing decline, observed, projected, or inferred, in numbers of mature individuals AND at least one of the following (a-b):

(a) Population structure in the form of one of the following:

(i) no subpopulation estimated to contain more than 1000 mature individuals, OR
(ii) all mature individuals are in one subpopulation.

(b) Extreme fluctuations in number of mature individuals.

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

1. Population size estimated to number less than 1000 mature individuals.

2. Population with a very restricted area of occupancy (typically less than 20km^2) or number of locations (typically 5 or less) such that it is prone to the effects of human activities or stochastic events within a very short time period in an uncertain future, and is thus capable of becoming Critically Endangered or even Extinct in a very short time period.

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

Conservation Assessment And Management Plan For Sumatran Threatened Species

Parapat, North Sumatra
24-28 February 2003

Workshop Report

Appendix II

Workshop Agenda
Participant List

Sumatran Threatened Species CAMP

Workshop Agenda

23 February 2003 (Sunday)

14:00-18:00	Registration and distribution of Briefing Book [LMU + CI]
18:00-19:00	Dinner
19:00-20:00	Overview of CBSG and the CAMP process [Sanjay Molur, CBSG-IUCN, Dr. Barita Manullang (CI-I)]
20:00-21:00	Formation of taxon-based working groups [Sanjay Molur, CBSG-IUCN, Dr. Barita Manullang (CI-I)]

24 February 2003 (Monday)

07:00-09:00	Breakfast
09:00-10:30	Opening ceremony Welcome and introduction by the Organizing Committee [Dr Barita Manullang (CI-I)] Welcome and introduction by the hosts [Dr. Kuswata Kartawinata (CI-I) and Dr. Yarrow Robertson (LMU)] Opening remarks by the Secretary of the Directorate General of Forest Protection & Nature Conservation, Ministry of Forestry [Ir. Kristanto] Overview of IUCN Red List categories and criteria [Sanjay Molur (CBSG-IUCN)] Group pictures [OC]
10:30-10:45	Coffee break
10:45-12:30	Taxon working group session I (All participants are divided into taxa-based working groups) Group Leaders: Flora: Dr. Dedy Darnaedi Mammals: Dr. Nico J. van Strien & Dr. Boeadi Birds: Drs Chaerul “Uyung” Saleh, MSi Herpetofauna: Dr Mumpuni Insects: Dr. Yayuk Suharyono Freshwater biodiversity: Drs. Sunarya Wargasasmita
12:30-13:30	Lunch
13:30-14:30	Plenary session: Working group reports [Sanjay Molur (CBSG-IUCN)]
14:30-15:30	Taxon working group session II
15:30-15:45	Coffee break
15:45-17:30	Taxon working group session III
18:00-19:00	Dinner
19:00-21:00	Taxon working group session IV

25 February 2003 (Tuesday)

07:00-08:00	Breakfast
08.00-10.00	Taxon working group session V
10.00-10.15	Coffee break
10.15-12.15	Taxon working group session VI
12.15-13.15	Lunch
13.15-15.15	Plenary session Taxon working groups reports [Sanjay Molur (CBSG-IUCN), Dr. Didi Wurjanto (CI-I)]
15.15-15.30	Coffee break
15.30-17.30	Working reports continued
18.00-19.00	Dinner
19.00-21.00	Taxon data sheet summary preparation

26 February 2003 (Wednesday)

07.00-08.00	Breakfast
08.00-08.30	Introduction of corridor-based working group process [Sanjay Molur (CBSG-IUCN), Dr. Didi Wurjanto (CI-I)] Corridor-based working group formation (All participants are divided into management unit-based working groups) Group Leaders: Northern Sumatra: Darmawan Liswanto, SSi and presented by Dolly Priatna, MSi Central Sumatra: Dr Dedy Darnaedy Irvan Sidik and Dudi Rufendi and presented by Syaidan. Southern Sumatra: Drs Chaerul Saleh, MSi and presented by Drs Tamen Sitorus, MSc
08.30-10.00	Corridor-based working group session I
10.00-10.15	Coffee break
10.15-12.15	Corridor-based working group session II
12.15-13.15	Lunch
13.15-15.15	Corridor-based working group session III Preparation of draft reports (Development of action steps, resources needed, measurable outcomes, and timelines)
15.15-15.30	Coffee break
15.30-17.30	Plenary session Corridor-based working groups reports [Dr. Didi Wurjanto (moderator), Sanjay Molur]
18.00-19.00	Dinner
19.00-21.00	Corridor-based working group session IV [Dr. Didi Wurjanto (CI-I), Sanjay Molur (CBSG-IUCN)].

27 February 2003 (Thursday)

07.00-08.00	Breakfast
08.00-10.00	Corridor-based working group session V Draft report revision
10.00-10.15	Coffee break
10.15-12.30	Final plenary session. Submission of draft hard and soft copies of taxon data sheets, taxon summary reports and Corridor-based reports Closing ceremony
12.30-13.15	Lunch.
13.15-15.15	Other meeting (on Northern Sumatra Corridor) [Dr. Didi Wurjanto (CI-I)]
15.15-15.30	Coffee break
15.30-18.00	Presentation and discussion session I on Siberut by Yunaidi + Universitas Andalas. Presentation and discussion session II on Ladia Galaska (road developments plan in Aceh province) by Dr Irvan (LMU) [moderator: Dr. Barita Manullang]
18.00-19.00	Dinner

28 February 2003 (Friday)

07.00-08.00	Breakfast
08.00-10.00	Draft report revision
10.00-10.15	Coffee break
10.15-12.30	Final plenary session Submission of final hard and soft copies of taxon data sheets, taxon summary reports and regional (corridor-based) reports Closing ceremony
12.30-13.15	Lunch
13.15-15.15	Presentation and discussion session III on Ketambe Research Station by Dr. Herman D. Rijksen and Dr Nico J. van Strien [moderator: Dr. Barita Manullang]
15.15-15.30	Coffee break
15.30-18.00	Closing ceremony [Dr. Barita Manullang (OC), Dr Kuswata Kartawinata (CI) and Dr Alibasyah (YLI)]
18.00-19.00	Dinner
21:00-22:30	Press conference

Sumatran Threatened Species CAMP

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