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The World's Top 25 Most Endangered Primates – 2002

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In January 2000, Conservation International and the IUCN/SSC Primate Specialist Group released a report - "The World's Top 25 Most Endangered Primates" - a list of threatened prosimians, monkeys and apes whose survival beyond the present century will depend heavily on actions taken now by our own species (Mittermeier *et al.*, 2000). The impetus for the original report came from two realities, one being the lack of any documented primate extinctions during the 20th century – a remarkable record in light of recorded losses among other groups of animals during the same period – and the other being the results of an assessment that identified approximately 120 of the world's estimated 640 species and subspecies of primate as being in serious danger of extinction within the next few decades. The Top 25 named in 2000 were merely the tip of the iceberg.

Two years later, we released a new report based on updated information, especially with regard to Asian primates. Since the 2000 report, the Species Survival Commission (SSC) of IUCN - The World Conservation Union launched a program of ongoing conservation status assessments for the world's threatened plant and animal species (Hilton-Taylor, 2002). As many experts had feared, the number of species threatened with extinction continues to rise despite our best efforts to ensure their survival. This new report considers preliminary results from primate workshops and assessments that have recently been conducted in Coimbatore, India for South Asia (Zoo Outreach Organisation / Conservation Breeding Specialist Group (CBSG) South Asia, in prep.), Indonesia (Supriatna *et al.*, 2002), Madagascar (Razanahoera-Rakotomalal *et al.*, 2002), and Vietnam (*A Conservation Action Plan for the Primates of Vietnam: 2001-2006*, in prep.), which recommend listing as many as 195 primate species and subspecies as endangered or critically endangered. New assessments indicate that, from approximately 20% only a few years ago, more than 30% - close to one in every three – of all primates are "Endangered" or "Critically Endangered". The increase from 120 taxa to almost 200 taxa largely reflects new information available from Asian countries. It is not surprising, therefore, that Asia now accounts for almost 45% - only slightly less than half – of the world's most endangered primates, or not many less than the three other major regions where primates occur (the Neotropics, Africa and Madagascar) combined (Table 1).

Within these four regions, a total of 49 countries harbor wild populations of the world's most endangered primates: eight countries in the Neotropics, 24 in Africa, 16 in Asia, and Madagascar (a major primate region as well as a country). According to the most recent assessments, the top 10 nations, in terms of endangered primates, are shown in Table 2.

Madagascar and Brazil have long led the list of countries having the highest number of most endangered primates, but both have now been overtaken by Indonesia. Included on the new list of threatened primates are six endangered tarsier species found only in Indonesia. Prior to the Indonesian Conservation Assessment and Management Plan (CAMP) workshop, none had been considered endangered. However, all six of the newly-added species represent small, isolated, island populations; three of the six are new to science and as yet un-named. Firmly in the middle of the pack of nations are China, India and Vietnam, each with 15 endangered primate species and subspecies. Such significant levels of primate endangerment have been recognized for China and Vietnam for a number of years, but India's elevated standing stems from the Coimbatore CAMP workshop in March 2002 (Zoo Outreach Organisation / CBSG South Asia [affiliate of the IUCN/SSC Conservation Breeding Specialist Group] in prep.). The results also placed Sri Lanka on the Top 10 list, as the island nation's primates are largely endemic, and nine are critically endangered or endangered. Four Sri Lankan lorises, in fact, represent the only members of the primate family Lorisidae that are categorized as endangered at this time.

The larger primates, especially the colobines and small apes, represent the majority of Asia's most threatened species. Forty-eight members of the Asian colobine genera *Nasalis*, *Presbytis*, *Pygathrix*, *Rhinopithecus*, *Semnopithecus*, *Simias* and *Trachypithecus* are either endangered or critically endangered, representing just over half of their 90 species and subspecies. This situation parallels that of the gibbons, of which 15 of 28 taxa are now considered among the world's most endangered primates.

There are only three Asian great apes, the monotypic Sumatran orangutan (*Pongo abelii*) found on the Indonesian

Table 1. Numbers of Critically Endangered (CR) and Endangered (EN) primates (Hilton-Taylor, 2002).

Region	CR	EN	Total
Neotropics	17	17	34
Africa	10	33	43
Madagascar	10	21	31
Asia	18	69	87
Totals	55	140	195

Table 2. Top ten countries in terms of numbers of Critically Endangered (CR) and Endangered (EN) primates (Hilton-Taylor, 2002).

Country	CR	EN	Total
Indonesia	4	31	35
Madagascar	10	21	31
Brazil	10	9	19
China	5	10	15
India	2	13	15
Vietnam	5	10	15
Equatorial Guinea	0	11	11
Nigeria	1	9	10
Sri Lanka	1	8	9
Cameroon	1	7	8

island of Sumatra (reduced to as few as 2,500 individuals), and two subspecies of Bornean orangutan (*Pongo pygmaeus*), but all are endangered. This also holds true for all 10 species and subspecies of African apes – the four subspecies of common chimpanzee, the bonobo or gracile chimpanzee, and five types of gorilla. We humans (*Homo sapiens*), by contrast, represent the only species in the family Hominidae that is not endangered (With a global distribution and a population exceeding six billion, far from it!)

Our activities, in fact, are the principal cause for the decline of our closest living relatives. We have long cleared forests to support agriculture, degraded habitats by collecting fuelwood, logged to extract valuable timber, and hunted to provide meat for the table. Wild primate populations – as well as the populations of many other species - have suffered as a result. Live capture for the pet trade and export for biomedical research have become lesser concerns in recent decades, but still pose a threat to some species. Today, however, the most insidious threat is that of commercial hunting, which goes far beyond the subsistence needs of rural populations to supply major cities and international markets, where it fetches a premium. In Central and West Africa, commercial hunting is largely to supply food, and in Asia, especially in Indochina and China, to produce salves, balms and potions as well as food. In both cases, over-exploitation is creating an "empty forest syndrome" and contributing to the demise of wild primates in many countries.

We are not surprised, therefore, to find the overwhelming majority of endangered and critically endangered primates to be in the world's 25 biodiversity *hotspots*, that have been identified by Conservation International as covering merely 1.4% of Earth's land surface but holding more than 60% of all terrestrial plant and animal diversity (Myers *et al.*, 2000). Fifteen hotspots harbor populations of non-human primates, and the 195 critically endangered and endangered species and subspecies are in a dozen of them (Brooks *et al.*, 2002). Also, 48 (87%) of the 55 critically endangered primates and 124 (89%) of the 140 endangered primates are endemic to the hotspots, for a total of 172 (88%) of the current 195. Of the hotspots, six should be considered the highest priorities for the survival of the world's most endangered primates – Indo-Burma, Madagascar, Sundaland, the Guinean Forests of West Africa, the Atlantic Forest of Brazil, and the Western Ghats/ Sri Lanka. These hotspots cover approximately 500,000 km² - just over 0.3 % of Earth's land surface - yet hold 137, or roughly 70%, of the world's most endangered primates.

Information from this report will help to update the *IUCN Red List of Threatened Species*, though we realize that our assessment efforts to date have not examined all primate habitat regions sufficiently and still probably underestimate the number of threatened species, as well as their degree of threat. We recognize that new information continues to appear regarding the conservation status of threatened taxa and we do not consider any single document to be the final determinant of such a list. Also, we appreciate that our ability to safeguard primate diversity will depend not only on developing comprehensive lists of those species and subspecies we consider to be threatened, but also on drawing attention to those whose situation is most critical, highlighting the kinds of efforts that are being undertaken to save them, acknowledging both our successes and our failures, and continually re-examining the situation on a global scale so that we remain confident in establishing priorities for action.

The *World's Top 25 Most Endangered Primates - 2002* is more than a tally of those species with the fewest numbers of individuals remaining. We also recognize the importance of:

- Primate species recently discovered or rediscovered and known from only a few localities;
- species whose populations may have been considered stable only a few years ago but are now under severe pressure, in rapid decline and under serious threat of extinction; and
- varieties of primates that traditionally have not been recognized as distinct but are likely to be so as the result of ongoing genetic and field research.

In addition, it is important to remove species from the Top 25 list as their situation becomes less urgent or we feel that sufficient efforts and resources are being directed to their survival. While their conservation status and numbers may not change appreciably because of our efforts, we

Table 3. Numbers of Critically Endangered (CR) and Endangered (EN) primates (Hilton-Taylor, 2002) in six biodiversity hotspots (Myers *et al.*, 2000).

Hotspot	CR	EN	Total
Indo-Burma	11	20	31
Madagascar	10	21	31
Sundaland	5	23	28
Guinean Forests	5	20	25
Atlantic Forest	8	3	11
Western Ghats/ Sri Lanka	2	9	11
Totals	41	96	137

Table 4. The 25 Most Endangered Primates –2002 (listed in taxonomic order).

Prolemur simus[1]	Greater bamboo lemur	Madagascar
Propithecus perrieri	Perrier's sifaka	Madagascar
Propithecus candidus	Silky sifaka	Madagascar
Leontopithecus caissara	Black-faced lion tamarin	Brazil
Cebus xanthosternos	Buff-headed capuchin	Brazil
Brachyteles hypoxanthus	Northern muriqui	Brazil
Procolobus badius waldroni	Miss Waldron's red colobus	Ghana and Côte d'Ivoire
Cercopithecus diana roloway	Roloway guenon	Ghana and Côte d'Ivoire
Cercocebus atys lunulatus	White-naped mangabey	Ghana and Côte d'Ivoire
Cercocebus galeritus galeritus	Tana River mangabey	Kenya
Procolobus rufomitratus	Tana River red colobus	Kenya
Cercocebus galeritus sanjei	Sanje mangabey	Tanzania
Presbytis natunae	Natuna banded leaf monkey	Indonesia
Simias concolor	Pig-tailed snub-nosed monkey	Indonesia
Trachypithecus delacouri	Delacour's langur	Vietnam
Trachypithecus poliocephalus[2]	Golden-headed langur, Cat Ba langur	Vietnam
Trachypithecus leucocephalus[2]	White-headed langur	China
Pygathrix nemaeus cinerea	Gray-shanked douc	Vietnam
Rhinopithecus avunculus	Tonkin Snub-nosed monkey	Vietnam
Rhinopithecus bieti	Yunnan Snub-nosed monkey	China
Rhinopithecus brelichi	Guizhou Snub-nosed monkey	China
Nomascus nasutus	Eastern black crested gibbon	China and Vietnam
Gorilla beringei beringei	Mountain gorilla	Democratic Republic of Congo, Rwanda, Uganda
Gorilla gorilla diehli	Cross River gorilla	Nigeria and Cameroon
Pongo abelii	Sumatran orangutan	Indonesia

[1] Formerly in the genus *Hapalemur*.
[2] The form *leucocephalus* is also considered to be a subspecies of *T. poliocephalus*, in which case the nomenclature would be *Trachypithecus poliocephalus poliocephalus* and *T. poliocephalus leucocephalus*.

may remove them in favor of other species to which we feel more attention should be given, or whose situations highlight conservation techniques or accomplishments that need to be shared with broader audiences. To arrive at the current list, we decided to drop species such as the golden lion tamarin (*Leontopithecus rosalia*), black lion tamarin (*L. chrysopygus*), yellow-tailed woolly monkey (*Oreonax flavicauda*) and golden-crowned sifaka (*Propithecus tattersalli*), since we consider that good progress has been or is being made to ensure the survival of each.

The original *World's Top 25 Most Endangered Primates* was well received. We have seen cases where a species' presence on the list has been used effectively by conservation organizations to raise funds to put researchers in the field, to train and supply forest guards, to conduct local public awareness campaigns, and to create new parks and reserves. In fact, the Margot Marsh Biodiversity Foundation, established in 1995, has rapidly become one of the world's most important sources of support for primate conservation, and actively solicits and supports proposals that focus on species appearing on this list.

The *World's Top 25 Most Endangered Primates – 2002* is presented in conjunction with the International Primatological Society (IPS), which recently held its 19th Congress in Beijing, China. The list was discussed during a special session at the Congress. Among the participants were many of the dedicated individuals whose work contributes to the continued survival of these species and subspecies, and other threatened primates worldwide. The full report, dated 7 October 2002, with profiles of each of the taxa, is available as a pdf file at: <www.conservation.org/xp/CIWEB/newsroom/press_releases/100702>.

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Multiple Transects or Multiple Walks? A Response to Magnusson (2001)

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Line transect surveying has been an extremely fruitful method for the study of platyrrhine populations, especially in the Amazon (Peres, 1997; Pontes, 1997; Lopes and Ferrari, 2000; Ferrari *et al.*, 1999, 2000, 2002), but also in the Brazilian Atlantic Forest (Cullen Jr. *et al.*, 2001; Chiarello, 2002). Survey data provide useful information on species diversity and population density, in addition to complementary data on behavioural and ecological parameters. Reliable estimates of both diversity and population density are dependent on good sampling, i.e. number of sightings (Buckland *et al.*, 1993; Peres, 1999; Ferrari *et al.*, 2002), which is determined by transect length. Most recent surveys have been based on a total transect length of at least 100 km, and almost invariably involve repeated walks of transects of less than 10 km in length.

Magnusson (2001) questioned the validity of this procedure, arguing that a short transect will sample an inadequately small area in most cases, and that repeated walks are not only relatively vulnerable to factors such as non-random ranging behaviour, but also constitute a form of pseudoreplication. The author recommends walking transects only once, which would require establishing and measuring 100 km of trails for a 100 km transect. Whatever the validity of the theoretical basis for this recommendation, there are a number of reasons for supporting the procedure in which a single short transect is walked repeatedly until total transect length is reached.

The principal reason for the repeated sampling of short transects is a practical one. To begin with, the preparation of a single kilometre of transect, which includes selection, orientation, trail clearance, marking and measurement, typically requires at least a day, depending on the availability of manpower and logistics (primarily, the distance from camp sites). Setting up a 100 km transect line would thus require a period of approximately four to five months, and the investment of financial resources rarely available for studies of this type. In addition, depending on the characteristics of the study site, it may be either impossible to accomodate a trail system of this size, or impractical due to logistic considerations. In any case, a transect of 100 km may not provide an adequate number of sightings for some or even all species, depending on the study area (Ferrari *et al.*, 2002).

Given these questions, the repeated sampling of short transects is virtually unavoidable for the collection of samples of adequate size, although this does not necessarily mean, as Magnusson (2001) implies, that researchers are unaware of its theoretical limitations. It also does not mean that this type of procedure is inadequate for the collection of reliable data on primate abundance, especially in relation to the objectives of most studies. On the contrary, the standard method currently used in primate surveys would seem to provide more reliable data, overall, than a single transect, as will be argued below.

The independence of samples appears to be the fundamental question here. Whatever the length of the transect, a basic assumption is that it will be located randomly in relation to the distribution of primates and their movements at the study site. At any given moment, then, the location of a surveyor on the transect should be random in relation to that of the resident primates. When repeating the same transect, what is crucial is the maintenance of an adequate interval of time between walks, to guarantee the independence of the samples. Any field primatologist will know that individuals of even the most sedentary species rarely remain at the same location in the forest for more than two or three hours, even if that location is a large fruit-bearing tree, which Magnusson (2001) identifies specifically as a major problem in the repeated-walks procedure.

The random placement of transects relative to the spatial distribution of primates, and the use of adequate intervals between walks should guarantee the reliability of the data collected using the "repeated-walks" procedure. As the primates will have a different distribution on each occasion, repeated walks do not constitute sampling replication, but