

Conservation news

New hope for Chinese wild orchids

Orchid conservation issues are acute in China. The country's rapid economic growth and rural development have often been at the expense of the environment, resulting in the loss of, and damage to, orchid habitat. China is also a country with a 2,000-year tradition in ethnobotanical use of orchid species as herbal medicine and a 1,000-year tradition of orchid horticulture. Cultivating fragrant *Cymbidium* orchids was one of the refined pursuits of Chinese gentlemen scholars, and this practice remains popular today. In addition, more recent demands from international markets have led to illegal international trade of Chinese orchids such as the lady's slipper orchids *Paphiopedilum*. These cultural, horticultural and ethnobotanical pressures, coupled with shrinking wild habitats and primitive horticultural techniques, have subjected wild populations to destructive collection and local extinction, both from farmers who want quick cash and from breeders in pursuit of new colours and forms.

In 2004 > 130 species of orchids were found in Yachang, a relatively small 220 km² state forestry reserve in a remote area of Guangxi Zhuang Autonomous Region, south-west China. Populations of many of the terrestrial and lithophytic orchids are extremely large with, for example, an estimated 100,000 individual plants of *Paphiopedilum hirsutissimum*. In this natural orchid garden, orchids dominate the forest understorey in large monotypic or mixed-species stands, with orchids of horticultural importance that have been poached to near extinction elsewhere. Yachang is also very biodiverse, with at least 2,400 vascular plant species. A total of 14 *Cymbidium* species occur at Yachang, many of which are the dominant components of the forest herbaceous layer. Among these are an estimated 12,000 individuals of *Cymbidium cyperifolium* growing in an area of 6,000 m², the largest known population of this species. The Guangxi Provincial Government approved a proposal in 2005 to make the former state forestry station a Provincial Nature Preserve, a status with greater legal habitat protection, including a complete logging ban. The Preserve was elevated to a National Nature Preserve in December 2008, a status that brings national level funding for protection and management.

To develop science-based conservation of the orchids at Yachang and other orchid-rich areas in Guangxi, the Guangxi Provincial Government is taking proactive steps. A proposal is being evaluated to establish Guangxi International Orchid Research Institute, with an international field research station in Yachang, to draw and promote international collaborative conservation research. The Research Institute's primary goal will be to promote basic

research on the ecology of orchids and their habitats but with applied research to develop and promote sustainable orchid cultivation and viable orchid markets to help local livelihoods. The latter is essential to the long-term success of orchid conservation in the region as poverty is a prominent issue locally. Illegal orchid markets trading poached orchids are active around Yachang. Because the reserve properties are interspersed among villages, guarding the reserve to prevent poaching and illegal farming is difficult.

The existence of such an abundance of orchids in Yachang is surprising, given the decimation of orchids and their habitats elsewhere in China. The Yachang Orchid Nature Reserve and the proposed Guangxi International Orchid Research Institute will help ensure the long-term survival of these unique plants as long as the complex problems of poverty and resource exploitation in the area can be solved.

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Reconfirmation of snow leopards in Taxkurgan Nature Reserve, Xinjiang, China

China may hold a greater proportion of the global snow leopard *Panthera uncia* population than any other country, with the area of good quality suitable habitat, estimated at nearly 300,000 km², comprising > 50% of that available across the species' entire range. We can now reconfirm the presence of snow leopard in the Taxkurgan area of Xinjiang Province in north-west China after a period of 20 years.

The Pamir Mountains form a hub across Tajikistan, Kyrgyzstan, Afghanistan, Pakistan and China, connecting the major mountain ranges of Central Asia. In China these mountains lie in Xinjiang Province, at the junction of two biodiversity hotspots: the Mountains of Central Asia and the Himalayas. The Taxkurgan Reserve was established here in 1984 along the border with Afghanistan and Pakistan, adjacent to the latter's Karakorum National Park, offering the potential of transboundary conservation to

benefit threatened species such as snow leopard and Marco Polo sheep *Ovis ammon polii*.

The last published surveys of snow leopard in this area, in the 1980s, revealed few signs of the species. The exception was in the vicinity of the Mariang community, where the population size was estimated by George Schaller and his team to be 50–75. In the more than 2 decades that have passed since these initial surveys social and economic conditions in China have changed markedly and the status of snow leopards is uncertain. We therefore undertook a survey to determine the current status of snow leopards in Mariang and other communities in Taxkurgan.

During June 2008 we conducted an intensive survey for snow leopards throughout an area of 36 km² in the vicinity of Mariang, set within a more extensive survey for wild prey in the surrounding 237 km². Sign surveys and reported sightings by livestock herders confirmed the presence of snow leopards in the area. None of the signs were fresh, and we estimate they date from the previous winter. Smaller snow leopard prey species such as marmot *Marmota caudata* and snowcock *Tetraogallus himalayensis* were sighted and remains of dead prey species, principally blue sheep *Pseudois nayaur*, were recorded. No living wild ungulates were observed, however.

Interviews with herders in three Taxkurgan communities (Mariang, Kukshilik and Chalachiga) revealed differences in husbandry practices that may have consequences for wildlife and conflict with livestock. Within the Kukshilik community, for example, yaks are released to range freely during the spring; herders relocate their yaks only in early summer when they accompany goats, sheep and other livestock to higher grazing habitats and it is then that any depredation is discovered. In Mariang and Chalachiga yaks are accompanied to pastures later in the season. Members of all communities reported that the seasonal timing of livestock movements to higher altitude grazing areas has become earlier in recent years. Our limited observations suggest that snow leopard and their natural prey are being excluded from this region during summer by livestock farming activities, as has been observed elsewhere.

Livestock numbers in Taxkurgan County rose from c. 12,000 animals in 1983 to nearly 18,000 in 1998, and declined to c. 14,500 by 2007. Local government records of livestock attacks revealed no change in the number of snow leopard attacks on livestock, with approximately 15 animals taken per year, mostly yaks. By contrast, livestock predation rates attributed to wolf *Canis lupus* rose from 96 animals attacked in 2000 to 146 animals attacked in 2007, mostly goats and sheep.

Our team continues to develop the programme of work in Taxkurgan by providing training for local community conservation officers and building capacity within the Reserve and local communities. We will conduct more detailed surveys during 2009, including camera trapping.

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Ramsar Convention on Wetlands: 10th Conference of the Parties

The 10th meeting of the Conference of the Parties to the Ramsar Convention on Wetlands convened in Changwon, Republic of Korea, from 28 October to 4 November 2008. It was attended by c. 2,000 participants, including representatives of 129 of 158 Parties, UN agencies, intergovernmental and non-governmental organizations and the business sector.

The COP adopted an updated Strategic Plan for 2009–2014 that identifies strategies and key result areas for five goals on wise use, Wetlands of International Importance, international cooperation, institutional capacity and effectiveness, and membership. After lengthy negotiations a budget increase of 4% was agreed for 2009–2012, with those African countries whose contributions are assessed at the minimum level additionally announcing a 100% increase in what they would pay. Intense negotiations also took place on the legal status of the Ramsar Secretariat, which is currently hosted by IUCN. Two options will be further considered by an intersessional working group: staying with IUCN under improved conditions, or moving to be hosted by the UN Environment Programme. A total of 32 resolutions adopted by the COP include measures to strengthen bodies and initiatives under the Convention. This includes a list of tasks for the Convention's Scientific and Technical Review Panel, a third Ramsar programme on communication, education, participation and awareness, operational guidelines for regional initiatives in the framework of the Ramsar Convention, guidance for integrating wetland conservation and wise use into river basin management, guidance on responding to the continued spread of highly pathogenic avian influenza H5N1, as well as principles for partnerships between the Ramsar Convention and the business sector. The Convention has had a long-standing partnership with the Danone-Evian Group, and the COP saw the launch of a new wetland-focused Danone-Evian Fund for Nature.

The Ramsar Convention, adopted in 1971, started as a small international treaty focused on the habitats of waterbirds. Since then the Convention has considerably widened its focus and has now found its place among the modern

environmental agreements that address conservation and wise use in the context of sustainable development. This is mirrored by the fact that the COP addresses a wide range of issues beyond the initial preoccupations of the Convention, such as human health, poverty eradication, food security and climate change. At COP 10, draft resolutions on climate change and wetlands, wetlands and biofuels, wetlands and extractive industries, and enhancing biodiversity in rice paddies as wetland systems, proved to be particularly contentious and were adopted only after several rounds of informal and formal discussions. In line with the motto of COP 10 (Healthy wetlands, healthy people) the Changwon Declaration on human well-being and wetlands highlights the central role that wetlands play in the delivery of ecosystem services.

The resolution on the status of sites in the Ramsar List of Wetlands of International Importance puts emphasis on threatened wetlands. The host country found itself the centre of much debate inside and outside the meeting room. Korean and international NGOs highlighted the impacts on wetland biodiversity of large reclamation projects on the coast of the Yellow Sea. Just a year ago a 33-km seawall at Saemangeum on the west coast of Korea was closed, reclaiming 40,000 ha of tidal flats—one of the biggest such projects in Asia. Just before the COP a symposium held in Changwon announced that shorebird counts conducted by Korean and Australian researchers at Saemangeum and along the East Asian waterbird flyway had documented dramatic declines in 19 species over the past few years. There are indications that the great knot *Calidris tenuirostris* has lost up to 20% of its global population as a result of this single reclamation. With Saemangeum, the Critically Endangered spoon-billed sandpiper *Eurynorhynchus pygmeus* has lost one of its most important remaining staging sites. Figures like this are a reminder that, despite all efforts by the Ramsar Convention, governments and organizations, many of the Earth's wetlands are still in dire straits. For more information, see http://www.ramsar.org/index_cop10_e.htm and <http://www.iisd.ca/ramsar/cop10/>.

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Kenya launches national strategy to conserve Grevy's zebra

On 25 June 2008 Kenya Wildlife Service (KWS) launched a 5-year conservation plan (available from [http://www.kws.org/Grevy's Zebra June 2008.pdf](http://www.kws.org/Grevy's%20Zebra%20June%202008.pdf)) to recover the Kenyan population of Grevy's zebra *Equus grevyi*. Fewer than 2,500 Grevy's zebras remain in the wild, of which > 95% are in Kenya's northern arid savannahs. The conservation strategy aims to halt population decline whilst fostering ecological,

economic and social conditions that promote the long-term coexistence of Grevy's zebras and people.

In the last 4 decades Grevy's zebras have undergone a catastrophic decline in both abundance and distribution. The total population has declined from 15,000 in the 1970s to < 2,500 today. The most recent estimate in 2007 suggests that there are 2,100–2,300 Grevy's zebras in Kenya. Once widespread in the Horn of Africa, Grevy's zebras have been extirpated from Somalia, Eritrea and Djibouti and are now restricted to northern Kenya and three small areas in Ethiopia.

As a wide-ranging, large vertebrate that inhabits human dominated ecosystems, Grevy's zebra exemplifies the conservation challenges and opportunities faced by many threatened species. Grevy's zebras move across areas that vary in intensity of land use and they must share meagre forage and water resources with pastoralists and their livestock. Yet they remain an important tourist draw, providing an economic incentive for their conservation. Kenya's Grevy's zebra conservation strategy harnesses these opportunities and addresses the challenges to ensure a more promising future for the species.

The need for a country-wide conservation strategy was identified by IUCN's Equid Specialist Group in 2002 (*Equids: Zebras, Asses, and Horses: Status Survey and Conservation Action Plan*, available from <http://www.iucn.org>). A national task force was constituted during a workshop held in March 2004, the first of many widely-attended stakeholders workshops, with extensive participation from pastoral communities in Grevy's zebra range, local NGOs, research organizations and government agencies. The strategy was developed through engaging all stakeholders in a participatory process to ensure ownership of the document and thus strengthen its implementation.

The national task force produced a draft strategy document in January 2007, which was discussed at the final Grevy's Zebra Conservation Strategy Workshop held in Naivasha in April 2007. At this workshop stakeholders agreed upon a vision for the future of Kenya's Grevy's zebra and outlined strategic objectives deemed necessary to meet it. Nine objectives formed the basis of a framework for conservation actions. For each objective the strategy specifies actions that will be pursued and indicators that will be used for evaluation. The strategy prioritizes actions regionally. By identifying relevant stakeholder organizations and delineating their roles, the strategy sets clear guidelines for a unified approach to conserving Grevy's zebra.

Administratively, Grevy's zebras will be managed by local communities and other land owners who will report to the national decision making bodies. The technical committee will advise, fundraise and help implement best available science. The Grevy's Zebra Liaison Office established by the Kenya Wildlife Service is the central coordinating body responsible for oversight of the strategy's implementation.

Ecologically, the conservation strategy addresses questions of habitat management, competition with livestock, predation by lions, and hybridization with Burchell's zebra *Equus burchelli*. A further objective is to upgrade the species' legal status from a game species to a protected species. The strategy identifies the need for a monitoring system to estimate population size and status, track movements and determine causes of mortality. A Disease Response Committee will be established to ensure effective mitigation of disease outbreaks. The majority of Grevy's zebras occur on community lands where the future of both Grevy's zebras and human livelihoods are inextricably linked to fragile semi-arid and arid ecosystems. The strategy therefore lays emphasis on community partnerships, sustainable livelihoods and development of management capacity amongst stakeholders. We believe that this strategy denotes a successful new beginning for Grevy's zebras in Kenya, and others may find the strategy a useful model to emulate for conserving other threatened species.

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Conservation in action: restoring seabirds in the Aleutian Islands

Hope has been given to the native wildlife of Rat Island in the Aleutian Island archipelago, Alaska, USA, following a recent campaign to remove introduced Norway rats *Rattus norvegicus*. Globally, islands represent a fraction (3%) of the earth's surface area but contain 15–20% of the world's bird, reptile and mammal species. Introduced rats (*Rattus* spp.) have both direct and indirect negative impacts on island ecosystems. They are opportunistic feeders and prey readily on native island species. This has accounted for nearly half of global bird and reptile extinctions. Burrow-nesting seabirds and their offspring are particularly vulnerable as they lack natural defences to predation. Indirectly, rats shift the trophic relationships within island plant and intertidal communities by altering abundances of intermediary predators. To restore natural ecosystems, rats

have been targeted by land managers as a key species for eradication.

The Aleutian Island archipelago, spanning 3,400 km, straddles the Pacific Ocean and the Bering Sea, where regional oceanographic patterns create a highly productive marine food web. Twenty-six seabird species use these abundant food resources and are found breeding on many of the 2,000 islands. The archipelago is of global significance to seabirds and supports nearly half of the populations in the northern hemisphere. The biological distinction of this region has been formally recognized as an International Biosphere Reserve by UNESCO. Rats, however, have been introduced to at least 12 large islands. Bird populations have been depleted on certain islands and threatened on others, including Kiska Island, which supports c. 3 million auklets. Simple, cost-effective solutions are available to facilitate the restoration of important native wildlife habitat by eliminating rat-imposed threats.

In September 2008 The Nature Conservancy, Alaska Maritime National Wildlife Refuge, and Island Conservation collaborated to restore 2,800 ha of habitat on Rat Island by removing Norway rats. Rat Island is among the smallest of the rat-infested Aleutian Islands but the remote location and potentially hostile regional weather patterns presented considerable challenges. Project logistics were planned to respond to severe weather events, and funding was sufficient to support a crew on the island for up to 45 days. Two helicopters and two research vessels transported 30 team members and 80 t of cargo the 2,500 km from Anchorage.

Rat eradications have been successful on at least 300 islands worldwide. The method used on Rat Island was similar to other eradications but the details were adapted to suit the Aleutian environment. A cereal grain pellet containing 25 ppm brodifacoum, a second generation anticoagulant, was applied in two concerted applications across the island from a specialized spreader bucket slung beneath a helicopter. Successful removal is contingent upon rodenticide exposure to every individual rat, therefore a helicopter differential global positioning system was used to ensure even coverage of bait. Directional deflectors placed on buckets precisely applied bait to land area adjacent to marine and freshwater environments, thereby limiting drift to potentially sensitive areas. Following application, 100% of the rats found dead or collected by snap traps displayed symptoms of anticoagulant poisoning.

The late autumn timing of the operation coincided with seasonal migration of birds from the island, and when rat populations are in decline because of diminishing food resources. This, together with the absence of endemic species, reduced the ecotoxicological risk to non-target species. Granivorous birds, notably song sparrow *Melospiza melodia*, were expected to be attracted to the bait but populations are low, probably due to rat predation. During

bait application no impacts on song sparrows were detected.

Visits to the island will occur for the next 2 years to confirm the eradication efficacy. There is limited potential for reinvasion given the remote location and almost non-existent human or vessel traffic. Long-term ecological monitoring will continue on Rat Island and adjacent islands to document ecosystem changes resulting from rat removal.

The expected eradication success will significantly improve habitat for native species, particularly burrow-nesting seabirds, which are known to breed on offshore rat-free islets. This project is an important step towards restoring habitat on Rat Island, and potentially on other rat-infested islands of distinct ecological importance within the Aleutian archipelago.

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Outbreak of yellow fever affects howler monkeys in southern Brazil

In 2001 an outbreak of sylvatic yellow fever affected the populations of black-and-gold howler monkeys *Alouatta caraya* in the west of the southern Brazilian State of Rio Grande do Sul. Since then, the Division of Environmental Vigilance of the State Centre of Health Vigilance has monitored the human population, collected mosquitoes, and captured black-and-gold howler monkeys and brown howler monkeys *Alouatta guariba clamitans* throughout the State, and especially from the affected region, for viral detection. Immunohistochemical exams confirmed the presence of the virus in several black-and-gold howler populations.

Despite the efforts of the governmental agencies to control the spread of the disease, a new and stronger outbreak began in 2008. This outbreak has also been observed to have a high impact on Argentinian howler monkey populations in forests near the border with Brazil. So far, several hundred black-and-gold howlers have been reported dead in >30 municipalities by local health and environmental authorities in western and central Rio Grande do Sul. In January 2009 mortality of eastern brown howler monkeys also began to be reported. Because of these outbreaks the State of Rio Grande do Sul was reclassified from a disease-free area to an area of transition of sylvatic yellow fever.

In addition to this disease-related mortality, recent media news has highlighted that ranchers, afraid of becoming sick, are killing monkeys in several places in the State. This is occurring despite frequent public statements by authorities and scientists on the impossibility of monkey-human yellow fever transmission. These professionals have also stressed in the media that, like humans, monkeys are victims of the disease and that the Brazilian Ministry of Health consider them important allies by acting as health sentinels. Because of their high susceptibility to yellow fever the death of howler monkeys gives the first warnings of the circulation of the virus within a region, allowing health authorities to take timely measures for promoting regional campaigns of human vaccination.

Both *A. caraya* and *A. guariba clamitans* are categorized as Vulnerable by the Environmental Secretariat of the State of Rio Grande do Sul (Decree # 41672, 10 June 2002) because of habitat loss and alteration, hunting and the illegal pet trade. These threats, together with sylvatic yellow fever and the reported killings, could produce a synergistic effect leading to local extinction, especially of isolated populations. A consequence of such local extinctions for the species at a regional level would be the rupture of metapopulation dynamics, resulting from an increase in the distance between subpopulations isolated by an inhospitable matrix.

An inter-institutional campaign, involving local and state governmental agencies, universities, NGOs, zoos and veterinary clinics, to improve public awareness, animal management and disease control is currently being discussed under the coordination of the Environmental Secretariat of Porto Alegre, the State capital. Projects to evaluate and monitor the impact of these yellow fever outbreaks on the size, structure and conservation status of howler monkey populations, and to study the ecology of sylvatic yellow fever spread are currently being developed at the Laboratory of Primatology of the Pontifical Catholic University of Rio Grande do Sul.

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Elusive highland pygmy tarsier rediscovered in Sulawesi, Indonesia

The world's smallest tarsier, *Tarsius pumilus*, commonly called the pygmy tarsier, was recently rediscovered in the highland mossy forest of Lore Lindu National Park, Central Sulawesi, Indonesia, after not being seen alive for more than 70 years. Named by Miller and Hollister in 1921, pygmy tarsiers have previously only been known from two museum specimens independently collected in 1917 and

1930. Over the past few decades there have been numerous attempts to locate a living population of this elusive species but all had hitherto been unsuccessful.

However, in August 2008 a group of pygmy tarsiers were located in the cold, wet, mossy cloud forest of Mt Rore Katimbu within Lore Lindu. One female and two male pygmy tarsiers from a group containing four identifiable individuals were successfully trapped and tracked at c. 2,100 m. The tarsiers were diagnosed as *T. pumilus* by their extremely small body size. Body weights were 48.1–52 g. These weights are less than half the average weight of both male and female *Tarsius diana*e and *Tarsius spectrum*, Sulawesi tarsier species that inhabit lower altitudes. The observed tarsiers exhibited additional morphological traits characteristic of *T. pumilus*, including no postauricular white patch, claws on all digits, elongated lower incisors, and distinctively shorter body lengths than other Sulawesi tarsiers.

Two of the captured individuals, one female and one male, were radiocollared. Based on radiotracking, female pygmy tarsiers have a home range that encompasses at least 1.2 ha, and the male range exceeded the capability of the radio equipment. The tarsiers were observed to return to the same sleeping tree each morning and left the tree before dusk had fallen completely. Scent marks and vocalizations, behaviours extremely characteristic of the lowland tarsiers, were rarely detected. The tarsiers did not duet at dawn when returning to their sleeping tree, nor did they consistently alarm call when birds of prey were observed circling above their sleeping tree. After several weeks of radio tracking, the partial remains of the female were found in the hollow of a tree stump. An act of predation probably occurred, given that her cranium and body were missing and birds of prey had been observed circling the sleeping tree.

Pygmy tarsiers appear to live at extremely low densities. With over 200 observation hours over a period of 60 nights, a total of 198 mist nets set up at 2,019–2,123 m captured only three tarsiers. The difficulty in locating pygmy tarsiers may be related to their apparently low population density. As the conservation status of *T. pumilus* is categorized as Data Deficient on the IUCN Red List there is currently no conservation plan specific to these tarsiers. A determination of the density at which they live is necessary to determine their level of risk.

Ecological and behavioural data on pygmy tarsiers will help identify specific threats to the population. The highland forest has a thick moss covering, decreased tree density and a lower canopy than the lowlands. Vegetation surveys revealed that tree density dramatically decreased to less than half the density of forest only 200 m lower down the mountain. Preliminary observations indicate pygmy tarsiers exhibit unusual behaviours. Further knowledge of their response to altitudinal habitat differences will help determine how conservation plans for the highland and

lowland tarsiers should differ. For example, given that an act of predation was documented in this relatively short study and the observed cryptic communication of the species, predation may be a significant threat to highland tarsier populations.

Human advancement into the tarsier habitat is another threat. Lore Lindu National Park was established in 1993 but the highland forest was previously disturbed by illegal logging in the 1970s. Recent political reform in Park policy has rapidly resulted in further deforestation and illegal encroachment of villages into the Park. While the local population depends on forest resources such as timber, rattan, and firewood, land encroachment may be a greater threat than the harvesting of resources. Villages near the Park are experiencing population growth, creating a higher demand for agricultural land. It is therefore critical to determine the specific threats to pygmy tarsier populations, to determine their conservation status and to conduct research before growth around the Park becomes unmanageable.

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The South Nguru Mountains—a new jewel in the Eastern Arc

There have been adequate biological surveys of only three (East Usambara, Uluguru and Udzungwa) of the 13 mountain blocks of the Eastern Arc Mountains of Tanzania, a chain of topographically complex mountains (*Biological Conservation*, 134, 209–231). Conservation efforts are therefore inevitably concentrated in these areas. A broader understanding of species distribution throughout the Eastern Arc Mountains would provide a more balanced conservation appraisal. The Critical Ecosystem Partnership Fund (<http://www.cepf.net>) has therefore provided USD 7 million to conduct biological surveys across some of the poorly known areas of the Eastern Arc Mountains and their forests.

Some of the new surveys have made important discoveries in a range of taxonomic groups, with many new to science. We report here the findings of surveys of the South Nguru Mountain block and their relevance to conservation. Between October 2004 and February 2007 a total of 15 sites were surveyed for amphibians and reptiles in the South Nguru Mountain forests, nine sites in Nguru South Forest Reserve and six in Kanga Forest Reserve (*Acta Herpetologica*, 3, 107–127; *African Journal of Herpetology*, 57, in press). Sampling sites were in submontane and montane forests at 750–2,200 m. Of a total of 41 species of amphibians from 12 families and 51 species of reptile from 11 families now known from the area the majority (76 species) have been

found in forest, and their altitudinal and habitat distribution suggests a dependence on this habitat.

Our studies show that the South Nguru Mountains are exceptionally biodiverse, comparable to the previously three well-surveyed areas of the Eastern Arc Mountains. The number of undescribed species and the level of endemism is striking. Our assessment is that 15 amphibian taxa and two reptile taxa are sufficiently distinct (based on morphological and molecular data) to be considered new species. Furthermore, 23% of the herpetofauna species ($n = 18$) are strictly endemic to the South Nguru Mountains, of which only two are currently described. A further 33.3% ($n = 26$) of the species have ranges restricted to the Eastern Arc Mountains. The South Nguru Mountains should therefore now be considered one of the most important ranges for herpetofaunal diversity in Africa and, if herpetofauna are indicators of the biological value of this mountain forest, then there is probably hidden diversity in other taxonomic groups.

The need to describe the new species is linked to the need to conserve the South Nguru Mountains better. In Tanzania the available funding for conservation in the Eastern Arc Mountains has followed the biological priorities established across the 13 mountain blocks. At present the South Nguru Mountains are regarded as of medium importance, and have only received modest conservation attention. Our new discoveries make the South Nguru Mountains worthy of considerable conservation investment.

One potential way that the South Nguru Mountains could receive more attention is through the designation of this area as a Forest Nature Reserve and the protection within Tanzanian law that this gives. An assessment of the Eastern Arc Mountain blocks in July 2005 by the Forestry

and Bee-keeping Division provided a blueprint for a programme of expanding the network of Forest Nature Reserves. The four currently designated Nature Reserves are located in the East Usambara Mountains (Amani and Nilo), the Udzungwa Mountains, and the Uluguru Mountains. Amani Nature Reserve was designated in 1997; the remaining three are either gazetted or in the final stages of this process. These Forest Nature Reserves have already attracted significant funding from the German Government to assist in management. The Tanzanian Government's Nature Reserves plan from 2005 identified the South Nguru Mountains in the second tranche of sites that may qualify as Forest Nature Reserves because of their biological value. Our new discoveries further reinforce this view, and we believe that the Nguru South Forest Reserve and the Kanga Forest Reserve in the South Nguru Mountain Block are both worthy for consideration as Nature Reserves managed by the newly established Nature Reserves unit of the Forestry and Bee-keeping Division.

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