

When “Not Extinct” Is Not Good News: Conservation in the Sangihe Islands

The Sangihe Islands, Indonesia, are a volcanic arc that encompasses at least four biogeographic subregions, each one of which requires subregion-specific conservation management. Whitten (2006) recently reported the good news that the Cerulean Paradise-Flycatcher, which graced the first cover of *Conservation Biology* and had been considered extinct (Whitten et al. 1987), has been re-discovered and is living in a protection forest of 940 ha of mixed primary and old secondary forest on the steep flanks of an extinct volcano of Sangihe Island. Here, we supplement the excellent points made by Whitten about the seriousness of the threat in the Sangihe Island chain with recent findings from other islands and from threatened primates.

The Sangihe Islands consist of several clusters of small volcanic islands that are separated from each other by deep ocean (>180 m). The four principle clusters (each of which has been surveyed by either M.S. or M.I.), in order of distance from Sulawesi, are (1) Biaro, (2) Tagulandang and Ruang islands, (3) Siau, and (4) Sangihe islands. Given this geology, high levels of endemism within clusters are expected. Indeed, at least two tarsier taxa (one of which is among the most endangered primates in the world) are present within the chain. *Tarsius sangirensis* is endemic to Sangihe Island. A second population on Siau Island, only one-fifth as large as Sangihe Island, was suspected to be taxonomically distinct (Brandon-Jones et al. 2004), a claim verified by

subsequent field surveys (M.S. et al., unpublished data).

The conservation situation on Sangihe Island, as dire as it is, is not the worst case within the Sangihe Islands chain. Two of us (M.S. & A.S., unpublished data) are using GIS data and field surveys to evaluate the conservation status of tarsier populations on Sangihe and Siau islands. In nearly every variable examined, the Siau population was at greater risk than the Sangihe population. Threats on Siau include a smaller extent of occurrence, a more active volcano (which is currently erupting), higher human density, and even hunting for bushmeat (for animals of only approximately 120 g). This precarious conservation situation led to the inclusion of the Siau Island tarsier on the list of the top 25 most endangered primates during 2006–2008, and it now serves as a flagship species to promote awareness of the conservation crisis on Siau Island (R.A. Mittermeier et al., unpublished data). Genetic evidence indicates that the Sangihe Island tarsier has a high degree of taxonomic uniqueness (Shekelle 2003). It is a monophyletic clade, sister to other Sulawesi tarsiers, with a sequence divergence of about 80% as great as the divergence between humans and chimpanzees, a result consistent with a divergence time of a few million years.

The current situation should provoke concern among conservation biologists about the urgent need for action to preserve biodiversity in the Sangihe Islands and contemplation about the risks facing other volcanic arc island chains. Whitten’s (2006) “good news” that the Cerulean Paradise-Flycatcher is not extinct and that the severely threat-

ened endemic avifauna of Sangihe Island may have some protection in a 940-ha patch of remnant forest is tempered by the fact that “not extinct,” in this case, implies nearly extinct. Furthermore, the available evidence indicates that Sangihe Island may be the best case in what is a very bad situation. Nowhere else in the Sangihe Island chain is conservation benefited by anything like a 940-ha protection forest (Riley 2002).

Furthermore, factors unique to each island cluster, such as the habit of hunting tarsiers for bushmeat on Siau, indicate that an individually tailored conservation plan is required for each cluster. Multiplying the situation in the Sangihe Islands by all the other volcanic-arc island chains that are characteristically of small size, high endemism, and high human density produces a situation where the probability of ongoing human-caused extinctions rises toward near certainty.

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Literature Cited

- Brandon-Jones, D., A. A. Eudey, T. Geissmann, C. Groves, D. J. Melnick, J. C. Morales, M. Shekelle, and C. B. Stewart. 2004. Asian primate classification. *International Journal of Primatology* 25:97–164.
- Riley, J. 2002. Mammals on the Sangihe and Talaud Islands, Indonesia, and the impact of hunting and habitat loss. *Oryx* 36:288–296.
- Shekelle, M. 2003. Taxonomy and Biogeography of Eastern Tarsiers. Ph.D. thesis. Washington University, St. Louis, Missouri.
- Whitten, T. 2006. Cerulean Paradise-Flycatcher not extinct: subject of the first cover lives. *Conservation Biology* 20:918–920.
- Whitten, T., S. D. Nash, and K. D. Bishop. 1987. One or more extinctions from Sulawesi? *Conservation Biology* 1:42–48.

Farming Endangered Turtles to Extinction in China

Turtles are facing a global extinction crisis that is particularly acute in Asia because of China's insatiable demand for their meat for soup and shells for traditional Chinese medicine (van Dijk et al. 2000; Turtle Conservation Fund 2002). International conservation efforts, still grappling with the scope of the crisis, are also faced with the revelation that large commercial turtle farms are operating in China. Our investigations reveal that the scale of these operations, especially that pertaining to endangered species, vastly exceeds all predictions (van Dijk et al. 2000; Shi & Parham 2001; Shi et al. 2004) and that there are over 1000 farms in China worth over a billion U.S. dollars (Shi & Provincial Forestry Bureau for Endangered Species Import and Export Management Office of China, unpublished data). We submit that these lucrative farming operations are a major threat to the survival of China's diverse turtle fauna.

Turtle farms are a problem mainly because they are the primary purchasers of wild-caught turtles. Apart from increasing their total stock of adult animals, farmers are always seeking wild breeders because suc-

cessive generations of farm-raised turtles show a marked decrease in reproductive capability. This reliance on wild-collected individuals indicates that turtle farming is not a sustainable practice. As the wild populations decline, it will become increasingly difficult to supplement farm stock from the wild. Nevertheless, established turtle farmers with enough capital are continuing to purchase turtles whenever possible, opting to earn profits while they can, apparently with little regard for the future. In the short term there may be some benefits in terms of deflecting pressure from imported species (in conjunction with stricter import regulations, e.g., Meng et al. 2000), but these gains can only be considered temporary, with a permanent cost to wild Chinese turtles. In the long term turtle farms serve no function beyond generating profit for a few entrepreneurs.

The existence of an enormous, largely unregulated, turtle-farming industry creates additional and serious challenges for turtle conservation. Wildlife collecting and trading stations can now launder illegally collected turtles as captive-produced fare. This kind of shell game is particularly obvious for species such as the big-headed turtle (*Platysternon megacephalum*), which does not breed readily in captivity. Another issue is that as Chinese turtles have become more scarce, some turtle farmers have started switching to North American species such as snappers (*Chelydra*, *Macrochelys*) and sliders (*Trachemys*), which are much easier to breed, but of course have no conservation value for China because they are non-natives.

Whether any part of the turtle-farming industry can ever be co-opted into conservation strategies remains to be seen, but at the present time the two efforts are heading in opposite directions. Even assuming that the farming of endangered, native turtles could be made sustainable, there is a cultural demand for wild-caught game. This is especially

true in China, where the nutritional properties of wild animals are promulgated by the practitioners of traditional medicine and deeply ingrained in the national psyche. Consequently, wild-caught turtles fetch significantly higher prices than farm-raised turtles, and no amount of captive breeding will decrease the desire for wild turtles. Therefore, after the inevitable crash in the farming of native turtles, the depleted wild populations will still face intense harvesting pressures.

China is developing rapidly, and the escalation of turtle farming has followed the path of other capitalist ventures following the economic reforms of the 1980s. The fusion of China's growth with China's utilitarian attitude toward nature emphasizes quick profit over sustaining biodiversity. Despite the fact that industrialization of the wildlife trade is often proffered as a salve for dwindling species, there is mounting evidence to suggest it can have a strong deleterious effect. In the case of Chinese turtles, the farms are wayward arks, gathering together the last vestiges of wild populations and then processing them for the soup pot. Only a massive effort by the Chinese government could curb or alter legal Chinese turtle-farming practices, and it is unlikely that the black market turtle farms could ever be controlled. The bleak future of Chinese turtles is mirrored in other commonly farmed wildlife such as crocodiles, snakes, and bears (Wan & Fan 1998; Thorbjarnarson 1999; Li 2004; Zhou & Jiang 2004). We predict that the gathering of these species into breeding facilities is an ephemeral phenomenon that will be replaced eventually by a permanent one: the extinction of wild populations.

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Literature Cited

- Li, P. J. 2004. China's bear farming and long-term solutions. *Journal of Applied Animal Welfare Science* 7:71–80.
- Meng, X., Z. Zhou, and B. L. Stuart. 2000. Recent actions by the People's Republic of China to better control international trade of turtles. *Turtle and Tortoise Newsletter* 5:15–16.
- Shi, H., and J. F. Parham. 2001. Preliminary observations of a large turtle farm in Hainan Province, People's Republic of China. *Turtle and Tortoise Newsletter* 3:2–4.
- Shi, H., Z. Fan, F. Yin, and Z. Yuan. 2004. New data on the trade and captive breeding of turtles in Guangxi Province, south China. *Asiatic Herpetological Research* 10:126–128.
- Thorbjarnarson, J. 1999. Crocodile tears and skins: international trade, economic constraints, and limits to the sustainable use of crocodylians. *Conservation Biology* 13:465–470.
- Turtle Conservation Fund (TCF). 2002. A global action plan for conservation of tortoises and freshwater turtles. Conservation International & Chelonian Research Foundation, Washington, D.C.
- van Dijk, P. P., B. L. Stuart, and A. Rhodin, editors. 2000. *Asian turtle trade*. Chelonian Research Foundation, Lunenburg, Massachusetts.
- Wan, Z., and Z. Fan. 1998. Concern is needed for conservation and sustainable use on snake resources in China. *China Wildlife* 5:10–12.
- Zhou, Z., and Z. Jiang. 2004. International trade status and crisis for snake species in China. *Conservation Biology* 18:1386–1394.

Importance of the “Crocodile Hunter” Phenomenon

In the process of completing my graduate studies in herpetology, I have gained enormous respect for the great conservation biologists of our era and their contributions to the dis-

cipline. Nevertheless, I reserve my most profound respect and admiration for the contagious passion and enthusiasm that some people demonstrate toward wildlife and its preservation. In that regard the tragic death of Steve Irwin is a terrible loss for conservation biology. One of Irwin's colleagues from the Australia Zoo best summarized what I felt: “Steve Irwin made it cool to care for animals and wildlife.”

We recently celebrated the 20th anniversary of *Conservation Biology* and of the Society for Conservation Biology. As described by several authors in the June 2006 issue, the field has made tremendous strides over the past 2 decades. Nevertheless, there is widespread agreement that the single most important challenge that the discipline still faces is reconnecting people and nature (Balmford & Cowling 2006. *Conservation Biology* 20:692–695). The main difference between conservation biology—often described as a crisis discipline or a mission-driven discipline—and other scientific spheres is that its success depends on both its findings and its ability to influence the way people think and live. Influencing peoples' behavior is surely where the fewest battles have been won. Scientific papers remain the business of academics and managers; although unquestionably important, they are not intended for the general public, and they are certainly not cool. Conservation biology has a desperate need for good communicators who can popularize the cause through their palpable passion and dedication. In this regard the impact that the “Crocodile Hunter” had on the world is profound. Irwin's unique and colorful personality became a worldwide vehicle for wildlife knowledge. Although his unexpected stardom made him an easy target for criticism, some of which may have been justified, he never let these tarnish his enthusiasm and devotion for biodiversity and endangered species. Despite the controversy he always pled for wildlife con-

servation, a message heard by young and old alike.

Sadly, the academic community has never fully acknowledged (or understood) the importance of the “Crocodile Hunter” phenomenon. Too often, academics treat popular culture with disdain or contempt, despite the fact that it may serve the discipline's ultimate objective. On several occasions I have been ridiculed by colleagues for thinking that Steve Irwin was great. This is a testimony of a worrisome trend: in the course of becoming a recognizable scientific discipline with its own journals and conferences, conservation biology has moved away from its intrinsic reason for being. Undoubtedly, there is lack of recognition for popular communications, but I do not believe scholars are to blame. Between publishing papers, teaching, attending conferences, and writing grant proposals, is there any time left? Time invested in developing public awareness for conservation should never be considered wasted, even for the most eminent researchers, and should be deemed an important contribution. Unfortunately, the current system of academic evaluation often prompts conservation biologists to think otherwise.

I am not suggesting that conservationists should start performing life-threatening stunts with deadly creatures in front of television cameras. But if every conservation biologist was even a tenth as successful at communicating his passion and enthusiasm for conservation as Steve Irwin was, reconciling people and nature surely would not be such a difficult challenge. John Robinson (2006. *Conservation Biology* 20:658–669) argues that conservation biology needs to make the move to the real world. The “Crocodile Hunter” was as real as any conservation enthusiast will ever be.

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