The relatively small island archipelago of the Philippines shares only with Madagascar the distinction of being both a megadiverse nation and also a global conservation hotspot. This combination of high concentrations of biodiversity, coupled with exceptionally high rates of forest loss and soaring human population, places the country at the top of regional and global lists for conservation urgency and action. Among the top priorities for land vertebrate conservation in the Philippines are the country’s strikingly diverse and highly endemic radiations of amphibians (1–4).

**Philippine amphibians**

The vast majority of Philippine amphibians occur nowhere else in the world. Because they are found in an archipelago of more than 7,100 small islands, many Philippine amphibians have naturally restricted geographic ranges. This becomes a particular challenge when assessing both amphibian species diversity and conservation status. With very small natural ranges (many endemic species occur on small islands, single mountain peaks, isolated limestone outcrops, etc.), Philippine species can be difficult to detect unless researchers visit the right place, at exactly the right time of year, when atmospheric conditions are perfect. Because so many species have restricted ranges and reproductive patterns that are tightly coupled to local microclimates, many secretive species are poorly known—even to the most determined of field biologists.

**Linnaean and Wallacean shortfalls**

The challenge of unknown Philippine amphibians is exemplified by terminology developed to describe our lack of understanding of biodiversity at a global level (5). The Linnaean shortfall (referring to our lack of knowledge of the existence of some species) in the Philippine amphibians is represented in our sense that the country’s amphibian fauna may be underestimated by as much as a third of the total species diversity. The Wallacean shortfall (our lack of knowledge of species distributions) is evident in our woefully incomplete understanding of distributions of Philippine frogs, toads, and caecilians. Both deficiencies represent major stumbling blocks for effective conservation.

**A Philippine amphibian systematic and biogeographic agenda**

The amphibian fauna is composed of caecilians (three species in two genera and one family) and anurans (with approximately 110 species in 23 native genera in eight families). We now recognize a total of 110 native taxa, with exceptionally high endemism (85% of the native fauna)—the highest of endemism estimates of the Indo-
malayan realm (2). Efforts to arrive at a total, comprehensive estimate of Philippine amphibian diversity have gone through several discrete historical stages of species accumulation in the archipelago (4, 6, 7), corresponding to the European age of Discovery (1800s), the works of E. H. Taylor (early 1900s), R. F. Inger (1950s), W. C. Brown and A. C. Alcala (1960s–1990s) and our current effort (3, 8–10). Species accumulation curves (plots of species discovery against the year of publication; 3, 10, unpublished data) now indicate that the current rate of species discovery is higher than at any earlier period (Fig. 1). Still, with so few workers describing Philippine species, and the threat of wide scale chytridiomycosis outbreaks, climate change and habitat destruction-induced extinctions looming, we are collectively experiencing a growing sense of urgency to document species diversity and distributions before they are lost and degraded beyond recognition. Aside from the continuing need for field surveys and systematic studies, a number of targeted, threat-specific, taxon-specific and site-specific conservation efforts are now underway. We summarize some of these, below.

**Philippine chytrid fungus research**

Over the past five years, together with colleagues Vance Vredenburg and Andrea Swei (San Francisco State University) we have screened Philippine amphibians for the infections of *Batrachochytrium dendrobatidis* throughout the archipelago. With the first published announcement of widespread occurrence of chytrid fungus in the country (11, 12), the myriad of new questions and concerns raised public concern among the country’s growing environmentally aware population. This concern resulted in this year’s well attended training workshop, held in conjunction with the annual Wildlife Conservation Society of the Philippines (WCSP) meetings (April 2012), where we developed the first outline of a national strategy for documenting, studying, and hopefully mitigating the effects of the emerging infectious disease (Fig. 2). Topics now (or soon to be) under study include the dynamics of infection (Fig. 3), Philippine chytrid strain genetic diversity, the possible natural resistance in some Philippine species, as well as the possibility of older, initial, infections that may have entered the archipelago years or decades ago. This last topic underscores the value of historical amphibian legacy collections (which can now be screened for chytrid fungus) at several museums around the world. Despite this progress, we are left with the burning and, as of yet, unanswered question: are any Philippine frog populations in decline?

**Species of particular concern**

Several Philippine species represent particular conservation challenges. First, a persistent portion (~15%) of the country’s species remains Data Deficient (13), largely because the species have not been studied since the original date of collection (9), are known from inaccessible portions of the archipelago, or are so secretive that they cannot be studied (6). The
Fig. 4: (Top row) “Critically Endangered” Philippine taxa, recently back from the apparent brink as a result of extensive field surveys that demonstrate they are reasonably common, abundant and widespread (left: Platymantis speleaus; right: P. polillensis). (Lower left) Given declines in the New World, cool, high elevation anuran communities are of particular concern. This flooded forest (1800 m, Mt. Palali, Nueva Vizcaya Province, Luzon Island) is typical habitat for six species of tree frogs and four stream frogs, including the newly discovered Sanguirana aurantipunctata. (16). (Right) Follow-up surveys at Pasonanca Natural Park in the southwestern Philippines resulted in rediscoveries and important new natural history information critical for conservation of Leyte swamp frogs (Limnonectes leyensis, middle right) and McGregor’s river toads (Ansonia mcgregori, lower right); this site was first surveyed by E. H. Taylor nearly 100 years ago and had not been revisited by biologists until being resurveyed by the authors in 2009. Photos: Rafe M. Brown.
numbers of species classified at some elevated level of conservation threat (~45%) (13) is a cause for concern in each case, although our sense is that many species’ conservation statuses are in dire need of revision and, in some instances, downgrading given newly available information on their distributions and habitat requirements (14). Recent field studies of taxa of particular concern have returned the reassuring news that several previously considered Critically Endangered species (the Negros cave frog Platymantis speleaus and the Polillo forest frog, P. poliiensis) are actually much more common, abundant and widely distributed than previously appreciated (Fig. 4). The “severely fragmented” (19) nature of many species’ distributions (which, in hindsight, is the norm for natural occurrence in an island archipelago) is no longer considered as dire as it once was. These developments, in our opinion, should be considered good news for long-term Philippine conservation efforts. Still, with several key species limited to tiny island (15) or mountain top (16) habitats, the prospects for long-term survival are tenuous given recent land-use changes and scenarios of climate change (17).

**Resurveys of Megadiverse Amphibian Areas**

One final focus of research and conservation efforts has involved a recent, multi-institution effort of partnership to resurvey regions of the archipelago long recognized as megadiverse amphibian areas (Fig. 4). Several islands or mountain ranges that were the subjects of early survey efforts by E. H. Taylor (central and western Mindanao), W. C. Brown and A. C. Alcala (Negros Island, eastern Mindanao, central Palawan) are now recognized as having supported the most diverse amphibian communities in the country—and yet many have not been revisited in the intervening years since the initial survey. Now, 30, 40 or 100 years later, the largest lowland forests have been removed and the onset of climate change may have begun. These areas are ripe for “before-and-after” surveys (Fig. 4) aimed at determining what effects human land use and climate change may have on long-term survival of viable amphibian populations (14).

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**FrogLog Schedule**

- **January** - Special Topical Edition
- **April** - The Americas
- **July** - Africa, West Asia, Madagascar, Mediterranean and Europe
- **October** - Asia, Russia and Oceania