Amphibian Conservation for Zoo Directors

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How bad off are amphibians?

	amphibians	birds	mammals
~ # described species	6000	9500	5500
~ # species threatened	2000-3000	1200	1200
~ % species threatened	32-55%	12%	23%

2000-3000 - the number of amphibian species that are threatened with extinction (32% are known to be threatened plus another 23% are Data Deficient but believed threatened). For every threatened bird or mammal there are ~2 threatened amphibians.

122 - the minimal number of amphibian species believed to have gone extinct since 1980, including 1 entire family with its unique reproductive mode (gastric brooding). With ~¼ of all species currently Data Deficient, this number is surely much higher.

10 - number (not percentage) of amphibian species AZA institutions are currently prepared to manage long-term. (based on 2001 RCP space survey).

60 - that same number extrapolated (extreme best-case scenario) to the global zoo community.

2-3% - portion of the 2000-3000 threatened amphibian species that the global zoo community is at best currently prepared to save. This is a drop in the bucket; unless the global zoo community changes its current practices, the world is set to lose 1/3-1/2 of this vertebrate class.

100% - required participation from global zoo community to redefine status quo!

What is the problem?

Amphibians face many of the same threats as all wildlife: habitat destruction, climate change, pollution, exploitation, introduced species, and disease. However, one emerging fungal disease is pushing many amphibian species rapidly toward extinction. Chytrid fungi were once thought to be predominantly free-living saprophytes (organisms that grow on and derive nourishment from dead or decaying organic matter), with a few species capable of infecting only invertebrates and vascular plants. In 1998, a new species *Batrachochytrium dendrobatidis* was described infecting amphibians. **Amphibian chytrid has now been identified in association with amphibian die-offs on every amphibian-inhabited continent**. In the mountains of Central America and Australia, it has generally spread from the site of its introduction in a wave-like fashion at 28-100km/yr, destroying entire amphibian communities as it progresses. Where it thrives, 50% of species and 80% of individuals can be expected to disappear within 1 year. In other regions it might be widespread but only decimate the amphibians in certain areas. In the US, it can be found across the country but seems to be devastating species only in the mountains of the west.

Amphibian chytrid currently cannot be stopped in the wild and it persists for an unknown period of time even after the amphibians disappear. A few species seem able to live with it as adults, likely serving as reservoirs and vectors for future outbreaks. It is thought to have originated in South Africa, where the earliest record occurs from 1938, and subsequently spread by the commercial trade in *Xenopus*, the African clawed frogs. Scientists now hypothesize that this is exactly how chytrid fungus was spread around the world initially, as infected wild African clawed frogs were globally distributed for pregnancy tests and embryology experiments.

Because in many cases chytrid and other uncontrollable pervasive threats like climate change are decimating populations from otherwise pristine habitats, **conventional *in situ* conservation techniques like habitat preservation are not sufficient to stop the current extinctions. The only immediate hope of survival for many hundreds of amphibian species is establishing *ex situ* assurance populations**.

What is being done?

From 17-19 September 2005, an Amphibian Conservation Summit was held in Washington, DC. The world's amphibian authorities from academia, zoos, government, veterinary medicine, and other diverse disciplines convened to conceptualize an **Amphibian Conservation Action Plan** (**ACAP**), outlining general responses required in the fields of research, assessment, conservation, and rapid response to stem widespread global amphibian extinctions. The IUCN/SSC **Amphibian Specialist Group** (**ASG**), the organization overseeing implementation of the ACAP, specifically tasked the IUCN/SSC Conservation Breeding Specialist Group (CBSG) with implementation of the *ex situ* aspects of ACAP's goals.

From 12-15 February 2006, CBSG and WAZA hosted an Amphibian *Ex Situ* Conservation Planning Workshop in El Valle, Panama. Unlike the prior meeting in DC, this group called upon only those amphibian biologists with expertise in the issues surrounding captive maintenance of amphibians. Fifty such people from 14 countries representing every amphibian-inhabited continent divided into four working groups to develop strategies for Organization of the *ex situ* community, Best Practices for husbandry and quarantine, developing objective criteria for Species Selection, and conceptually organizing Rapid Response Programs. The Working Group Reports were

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compiled into a single document representing the *ex situ* community's plan to address the *ex situ* conservation components of the ACAP. The plan will be implemented by the amphibian specialists of the *ex situ* community in a globally collaborative (yet unnamed). Thematic Working Group of the ASG modeled after the Turtle Survival Alliance, a successful working group of the Tortoise and Freshwater Turtle Specialist Group. We anticipate that the next steps in implementation will be for Panama workshop participants to present the plan concept for consideration at their regional meetings (for AZA, this just happened at the ATAG meeting in Cincinnati), followed shortly by regional species selection workshops in collaboration with ASG/GAA members (for AZA, this should happen at Brookfield Zoo in early summer).

What can my zoo do?
The amphibian extinction crisis is the greatest biodiversity threat in the history of humanity. The *ex situ* community has already accomplished some great work in amphibian conservation. But the time for status quo is far behind us: we must change our view and our approach to amphibian conservation now. We are on the verge of losing a huge part of an entire vertebrate class, one more speciose than the mammals that are currently consuming the lion's share of our resources. This epiphany comes with a charge - any organization that considers conservation a core goal must take immediate measures for significant action! Our response now must be in proportion to the crisis, lest we relegate ourselves to mere entertainment venues with at most only a facade of conservation, as our critics have long accused.

For several reasons — disease risks, political considerations, lack of adequate capacity, and expense (see attachment for more detail on these issues) — **the best place to work with any species is within its range country**. Your zoo should be focusing on working with your regional native taxa at your facilities and simultaneously working with exotic taxa in their range country by partnering with a zoo or other institution there. That said, some species will need to be maintained outside of the range countries either temporarily while in-country facilities are being built or as long term back up populations. Several strategies will need to be used to address this crisis; decision criteria are being developed to help to determine when a particular strategy should be employed. Remember: there are more than 1000 species of amphibians that need our help, so we will need to employ multiple, cost-effective strategies to be successful in stemming the losses.

Take Home Points:
1. Stay informed. The crisis and the conservation community's response to it are evolving. Visit the amphibian page of the CBSG website frequently to stay on top of the emerging information.

2. A global problem requires a globally coordinated response. Your institutional collection plans for amphibians should reflect the Amphibian TAG's Regional Collection Plan, which (when updated) will reflect the *ex situ plan* developed in Panama.

3. Conservation happens in the wild;
it can be complemented by effective *ex situ* programs. Where *ex situ* intervention is warranted to avoid uncontrollable threats, it is best done in range countries. Partner with zoos or other institutions in the range country. If capacity does not exist there, build it. Note: remember that US native species should be among AZA's highest priorities: if not ours, then who's? Parts of the US are amphibian biodiversity hotspots and several of our neighboring countries are areas of very high amphibian biodiversity and are asking for your help.

4. If animals intended for release programs must be removed from range countries, they should be kept in strict isolation. If we are to be responsible conservation organizations, we would not gamble on biosecurity issues and risk becoming the vector of the next epizootic. Ensure that your staff are trained and that you have adequate facilities if your institution intends to offer itself as a potential host for out-of-range country assurance populations.

5. Get your regional public concerned about amphibians. Follow Australia, New Zealand, and Canada's lead and organize region-wide amphibian celebrations! Use this platform to spread the word about the importance and critical plight of amphibians, and what your institution is doing to help. This is also an ideal time for fundraising efforts to support your institutional, regional, or global amphibian conservation organizations with activities such as behind-the-scenes tours, special talks, and field trips to local sites with amphibians.

6. *The CBSG, in collaboration with the Amphibian Specialist Group and WAZA, will assist you in all aspects of your contribution to this urgent fight to save the world's amphibians.*

Annexure : Reasons for working with species is their range countries.

1. Disease. Because they cannot easily disperse over saltwater barriers, amphibians in different parts of the world have likely been rather isolated from each others' pathogens during the course of their evolution. As such, they are apparently ill equipped to deal with novel pathogens. Due to the risk of exposing native amphibians to novel exotic pathogens, **the further you remove an amphibian from its range, the stricter your isolation must be**. For example, keeping Panamanian amphibians from a given region in a Panamanian facility with *only* other Panamanian amphibians from that region poses no threat to the captives or to the local amphibians outside the facility. All the animals inside, having lived together in the wild, have already been exposed to the same pathogens, and any pathogens exiting the building in their waste will be re-entering the same environment from which they came. Other than basic life-support systems, this facility needs only to prevent the native threat from entering, in this case, to treat the incoming water supply to eliminate chytrid fungus. This is exactly what the Houston Zoo is doing with its El Valle Amphibian Conservation Center. Other model programs include Zurich Zoo's work with Cali Zoo in Colombia, St. Louis Zoo's partnership with the laboratory of

Dr. Luis Coloma in Ecuador, and Omaha's Henry Doorly Zoo's support of Johannesburg Zoo.

By comparison, bringing those same Panamanian amphibians to a US facility with a cosmopolitan collection and typical wastewater disposal system poses two significant risks. (a) There is a considerable chance that the Panamanian amphibians will be exposed to novel pathogens, either from the rest of the cosmopolitan collection, or even from local supplies (e.g., the tap water, plants, food items). If these animals are then returned to their range country, they might then introduce the novel pathogens to wild populations. [e.g., mycoplasma infection introduced to US wild tortoise populations] (b) Bringing the Panamanian amphibians to the US also risks exposing other collection animals and local amphibians outside the facility to novel Panamanian diseases. Does all of this facility's wastewater run into the sewer, or does some go into untreated storm drains? Does the local municipality sufficiently treat all wastewater to ensure that no pathogens (bacterial, fungal, viral, etc.) survive? These are risks that most (all?) zoo programs with exotic taxa are gambling on. Recall (from above) that such careless biosecurity is exactly how chytrid fungus is believed to have been spread around the world to begin with. **Any animals that must be maintained outside of their range country should be kept under the strictest isolation** (the Panama workshop report provides detailed recommendations about the facility and husbandry needs).

2. Politics. The US and other developed nations do not need to manage other countries' resources for them. In the case of amphibians and other threatened taxa, we should simply be enabling range countries to manage their own conservation programs by helping them build capacity in the form of facilities and expertise in husbandry, population management, research, and community education.

3. Capacity. We do not have enough capacity in the US to manage the world's threatened amphibians. Although the proximal action to save critical species from immediate extinction might be sending them to the nearest existing facilities with available space and resident expertise, **the ultimate goal is to enable the range countries currently lacking facilities and expertise to care for their own species**. This will allow outside experts to free up their time and space to begin the process anew with other species in other regions of the world. These two activities - **rescue and capacity building** - must occur together or at least sequentially. If outside institutions allow themselves to become inundated with specimens from their initial efforts, they will be unable to do anything meaningful elsewhere and we will fail to reach our primary goal. **Success in this program is achieved when a given species is sustainably managed by its own range-country experts and there is no longer a need for outside zoos to hold any specimens of that species.** Ultimately, every region should only have to manage their own species (although tropical regions might continue to require help from temperate due to overwhelming volume vs. infrastructure resources).

4. Expense. Working with species in their range country is also generally cheaper, in as much as facilities can be constructed with less strict isolation, general construction and labor costs might well be cheaper, and there will be less time and money spent on permits and animal transport. We can save many species of amphibians for the cost of saving one bird or large mammal, but we know that resources will still be limiting.

Learn about the global amphibian crisis:

Global Amphibian Assessment-- http://www.globalamphibians.org/
IUCN -- http://www.iucn.org/themes/ssc/programs/gaa/gaa_EN.htm
CBSG -- http://www.cbsg.org/amphibian.scd
WAZA -- http://www.waza.org/news/index.php?main=news
Declining Amphibian Populations Task Force-- http://www.open.ac.uk/daptf/index.htm
AmphibiaWeb -- http://www.amphibiaweb.org/declines

Learn about S. Asian Amphibians :

http://www.zooreach.org/Networks/Amphibian/Amphibian.htm
http://www.southasiantaxa.org/amphibians.htm (amphibians available in a few weeks)

The ABC Course

Amphibin Biodiversity Conservation

One of the important responses to the amphibian crisis and the mandate in the Declaration was to organise the first course on Amphibian Biodiversity Conservation. This was done by the Durrell Wildlife Conservation Trust (DWCT) which aimed to train amphibian biologists working around the globe. 19th June, 2006 Monday : The ABC Course ran from 19th - 30th June, 2006.

Brij Kishor Gupta, with unique experience in breeding amphibians in India was selected for the course and sponsored fully by the organisers. Brij has kindly agreed to write a full report on the course, which is included in the next pages of this issue.