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Amphibian Ark and the *2008 Year of the Frog* Campaign

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The world's amphibians are disappearing. More than 100 species may have already gone Extinct and thousands more are threatened with extinction. Many of the threatened species cannot be safeguarded in the wild and require *ex situ* management if they are to persist. The Amphibian Ark (AArk) draws together diverse stakeholders to save select species until *in situ* threats can be mitigated. AArk work includes species prioritization, husbandry training, capacity building, fostering partnerships, fundraising and education. A campaign entitled *2008 Year of the Frog* is helping to raise awareness among governments, media, educators and the general public, and to support a capital campaign to fund amphibian conservation programmes worldwide.

Key-words: Amphibian Ark; amphibian declines; captive breeding; endangered species; *ex situ*; extinctions; Year of the Frog campaign.

INTRODUCTION

Amphibian species, genera and even families are becoming extinct at an alarming pace. For the first time, scientists have gathered ample evidence to assert that we might be facing the biggest extinction crisis in the history of humanity (Pounds & Crump, 1994; Houlahan *et al*., 2000; Kiesecker *et al*., 2001; Blaustein *et al*., 2003; Carey & Alexander, 2003; Daszak *et al*., 2003; Stuart *et al*., 2004; Beebee & Griffiths, 2005; Mendelson *et al*., 2006; McCallum, 2007; Roelants *et al*., 2007). In 2004, the Global Amphibian Assessment (GAA) conducted by the World Conservation Union (IUCN) revealed that between one-third and one-half of the world's *c*. 6000 amphibian species are currently threatened with extinction and over 120 have already disappeared (Stuart *et al*., 2004; Moore & Church, 2008).

It is widely believed that many more species may go extinct before we react sufficiently and the current generation will be held responsible for this loss. It is of the utmost importance that we raise awareness among national governments, world media, school educators and the general public regarding the fragility of amphibians and the enormous responsibility that each of us has for trying to safeguard the highest number of species from extinction.

The global conservation community has come forward with a response to this crisis in the form of the *Amphibian Conservation Action Plan* (ACAP; Gascon *et al*., 2007), the *ex situ* components of which will be addressed by the Amphibian Ark (AArk: www.AmphibianArk.org). The AArk is an initiative started by a group of concerned conservation organizations, including the IUCN/SSC Conservation Breeding Specialist Group (CBSG), the World Association of Zoos and Aquariums (WAZA) and the IUCN/SSC Amphibian Specialist Group (ASG), to support *ex situ* actions around the world whereby select species will be maintained in captivity until they can be secured in the wild. Zoos, aquariums and botanical gardens will play a crucial role as part of the immediate response by providing *ex situ* breeding facilities for some of the most threatened species (Pavajeau, 2005; Zippel, 2005). The *ex situ* conservation community

includes other currently under-utilized components; for example, universities, natural-history museums, government and the private sector. A response from the *ex situ* community that is proportional to the crisis will require financial and political support from all corners of the world. Zoos, as committed advocates of conservation, are at the forefront of a worldwide effort and face the challenge of generating awareness that translates into resources and good will towards amphibian safekeeping.

Consequently, the AArk has launched a global campaign under the name of '*2008 Year of the Frog* (YOTF)' with the aim of generating support for global and regional amphibian conservation initiatives. Individual and collective support for this campaign will help develop the capacity to coordinate crucial *ex situ* programmes implemented by partner organizations around the world. In the absence of an immediate and sustained conservation effort of this kind, hundreds of species could become extinct in our lifetime.

CAPTIVE MANAGEMENT AND THE ROLE OF ZOOS

The GAA alerted us to the fact that hundreds of species face threats that cannot be easily or quickly mitigated in the wild. The diverse delegation of the ACAP noted that these species require *ex situ* programmes to save them until adequate conservation measures can be developed to secure wild populations. Amphibians are often suitable candidates for captive-breeding programmes as they are relatively inexpensive to maintain compared with other animal groups, many show high fecundity rates and face few behavioural problems under captive conditions (Wiese & Hutchins, 1994; Bloxam & Tonge, 1995; Marsh & Trenham, 2001; Trenham & Marsh, 2002; Pavajeau, 2005). This conservation initiative is one that the *ex situ* community is uniquely capable of addressing.

Fortunately, a thriving industry already exists that specializes in captive management of animals. Zoos and related facilities worldwide include over 1200 institutions, employing more than 100 000 staff and receiving about 600 million visitors per year, equivalent to one in every ten people in the world! Zoos can assist with initiatives such as rapid response rescues, survival-assurance populations, providing animals for release and research, conservation education, capacity building, fundraising and helping to develop species recovery plans.

The *ex situ* conservation community faces many challenges in order to meet these expectations. First and foremost is the need of rapidly increasing capacity. It is estimated that the world's zoos can currently manage viable populations of *c.* 50 amphibian species, amounting to perhaps 10% of those requiring *ex situ* intervention. A dramatic increase in resources is therefore needed urgently and would include construction of additional biosecure facilities wherever they are needed, training keepers and ensuring that resources are appropriately allocated to support these requisite actions. Of course, some zoos are already making valuable contributions to amphibian conservation by, among other things, constructing dedicated facilities in their own and other regions of the world. Zoos are also leading dozens of amphibian conservation programmes, including habitat restoration, translocations, conservation education and research (Zippel, 2005) and region-wide amphibian community rescues (Gagliardo *et al*., 2008). Additionally, there are now several zoo-led courses designed to develop husbandry expertise, including the Amphibian Biology and Management course of the Association of Zoos and Aquariums (Zippel, 2007), which has generated similar courses in Mexico, Ecuador and Colombia, and the Amphibian Biodiversity Conservation course at Durrell Wildlife Conservation Trust (Gupta, 2006).

ACAP

During the 2005 Amphibian Conservation Summit (IUCN, 2005) convened by the IUCN and Conservation International, the ACAP was drafted (Gascon *et al*., 2007). While the ACAP's greatest conservation priority is *in situ* action, some threats like

chytrid fungus *Batrachochytrium dendrobatidis* cannot currently be addressed in the wild. The 2005 IUCN ACAP white papers state that 'survival assurance colonies are mandatory for amphibian species that will not persist in the wild long enough to recover naturally once environments are restored; these species need to be saved now through *ex situ* measures so that more complete restoration of ecosystems is possible in the future'. Comparable calls to action are included in the GAA and other IUCN documents. The ASG specifically tasked the CBSG with implementation of the *ex situ* aspects of ACAP's goals.

THE AARK

In 2006 CBSG, WAZA and ASG founded the AArk to develop, promote and guide short-term *ex situ* management thus making possible the long-term survival of amphibians for which adequate protection in the wild is not currently feasible.

The AArk is rapidly developing capacity to coordinate *ex situ* programmes implemented by partners around the world, with emphasis on programmes within the range countries of each species, and combining *ex situ* conservation measures with efforts to protect or restore species in their natural habitats. AArk's vision is *the world's amphibians safe in nature*. AArk's mission is *working in partnerships in order to ensure the global survival of amphibians – focusing on those that cannot be safeguarded in nature*.

The urgent need for the existence of an organization such as the AArk has been recognized for almost 2 years. During that time, many additional amphibian species have probably been lost and the survival of other species has become increasingly uncertain. While traditional threats like habitat destruction, pollution and climate change continue to erode away at amphibian biodiversity, the spread of chytrid fungus is alarmingly fast and the imperative to act is stronger now than ever (see Pessier, 2008). The AArk solution is to create survival-assurance populations in zoos, aquariums and other institutions but that requires engagement and investment on an unprecedented scale.

AArk partners are WAZA members and WAZA-affiliate members, members of regional or national zoo associations, ISIS (International Species Information System) and AArk-approved partners from museums, universities wildlife agencies and the private sector. AArk is led by a Steering Committee made up of a representative from each of the associations of the organized zoo world, aquariums, botanical gardens, museums and private sector. An Executive branch of the Steering Committee has Co-Chairs from each of the three principal partners (CBSG, WAZA, ASG) and provides strategic guidance and ensures excellent communication with all stakeholders. Advisory Committees are being formed to consult on specific issues; for example, reintroduction, gene banking and veterinary, legal and ethical concerns. Four officers coordinate all aspects of AArk activity; they assist AArk partners in identifying priority taxa and regions for *ex situ* conservation work; lead development and implementation of training programmes for building capacity of individuals and institutions; and develop communications strategies, messages and materials to promote understanding and action on behalf of amphibian conservation. The AArk officers make it much easier for all AArk partners to contribute effectively to the global effort. The AArk activities are just one part of the comprehensive ACAP, the *ex situ* component which will help stave off many extinctions, but safeguarding these species *in situ* will be the ultimate measure of success.

2008 YOTF

In 2008, AArk will help lead the *ex situ* community in a globally coordinated public awareness and fundraising campaign 'Year of the Frog' (YOTF). The main goal of this campaign is to generate public awareness and understanding of the amphibian extinction crisis and ensure sustainability of the survival-assurance populations by creating a

cash fund for this conservation work that will extend beyond 2008. The money raised from this campaign will help fund AArk global coordination activities and regional initiatives such as rescue operations, training workshops, cooperatively managed centres and coordination of activities within each region.

THE MAIN GOALS FOR THE 2008 YOTF CAMPAIGN

- To educate our visitors about the threats facing amphibians and raise global awareness and concern.
- To engage the public in amphibian conservation by highlighting ways in which they can make positive contributions through activities in their daily lives.
- To draw the attention of zoos and aquariums to the importance and urgency of amphibian *ex situ* conservation.
- To create partnerships among zoos, aquariums, botanical gardens, private and public institutions (universities, museums, etc.) around the world to ensure the global survival of amphibians.
- To raise funds for implementing the *ex situ* aspects of the ACAP through AArk activities, and other amphibian conservation initiatives.
- To stimulate a sustained and long-term interest in amphibian conservation and related interactions with the wider environment.
- To raise increased awareness about the protection of biodiversity through the conservation of amphibians.
- To strengthen zoo communities as fund raisers and global promoters of conservation.

The 2008 YOTF campaign launch process began with an internal launch within the zoo and aquarium community at the WAZA Conference in August 2007, with internal regional and national zoo association launches to follow. A globally coordinated, external public launch will take place on New Year's Eve 2007. Members of regional associations of zoos, botanic gardens and aquariums are encouraged to join the YOTF campaign. While we expect individual institutions to target their campaigning to their normal donor base (public, local corporations, etc.), AArk will engage in a higher-level simultaneous programme targeting governments and international corporations.

POSSIBILITIES FOR LONG-TERM RELATIONSHIPS/PARTNERSHIPS

The 2008 YOTF campaign participants are also invited to commit themselves to *ex situ* conservation programmes beyond the campaign year. The organizers set high hopes on the success of this scheme. A long-term commitment by individual institutions could consist of efforts to raise and donate money for an *ex situ* amphibian conservation programme over a fixed time period of several years to be carried out in specific locations across the world. In return, donating institutions can be expected to receive valuable and up-to-date information related to these programmes.

Long-term engagements of this kind enrich institutional conservation activities and lead to worldwide cooperation. The reality of conservation both *in situ* and *ex situ* will expand into new domains and the contribution thus made to nature conservation will boost the institution's credibility and may lead to further donations.

INVOLVEMENT OF ORGANIZATIONS NOT HOLDING AMPHIBIANS

All zoos and aquariums can link their collections to the story of amphibians and the 2008 YOTF campaign, not just those that actually house amphibians. The YOTF campaign information pack (available at www.2008YearoftheFrog.org) includes essential information and graphics to help develop creative displays and activities focusing on, for example, amphibians in danger, threats, extinctions, Red List status, chytrid fungus, amphibians as indicators of environmental health, climate change, geographical patterns, endemism, etc.

CONCLUSION

Addressing the amphibian extinction crisis represents the greatest species conservation challenge in the history of humanity. The global conservation community has formulated a response in the ACAP. An integral part of that response is the AArk, in which select species that would otherwise go extinct will be maintained in captivity until they can be secured in the wild. Without immediate captive management as a stopgap component of an integrated conservation effort, considerable biodiversity will be lost. The outcome of the AArk will be that we will have saved many species from extinction, developed capacity both within our institutions and globally to continue to provide amphibian species with care and protection when needed, formed true partnerships between *ex situ* and *in situ* components of conservation, established a model framework for responding to future species conservation crises and demonstrated to the world that zoos and aquariums are essential and unique conservation organizations.

REFERENCES

Beebee, T. J. C. & Griffiths, R. A. (2005): The amphibian decline crisis: a watershed for conservation biology? *Biological Conservation* **125:** 271–285.

Blaustein, A. R., Romansic, J. M., Kiesecker, J. M. & Hatch, A. C. (2003): Ultraviolet radiation, toxic chemicals and amphibian population declines. *Diversity and Distributions* **9:** 123–140.

Bloxam, Q. M. C. & Tonge, S. J. (1995): Amphibians: suitable candidates for breeding-release programmes. *Biodiversity and Conservation* **4:** 636–644.

Carey, C. & Alexander, M. A. (2003): Climate change and amphibian declines: is there a link? *Diversity and Distributions* **9:** 111–121.

Daszak, P., Cunninngham, A. A. & Hyatt, A. D. (2003): Infectious disease and amphibian population declines. *Diversity and Distributions* **9:** 141–150.

Gagliardo, R., Crump, P., Griffith, E., Mendelson, J., Ross, H. & Zippel, K. (2008): The principles of rapid response for amphibian conservation, using the programmes in Panama as an example. *International Zoo Yearbook* **42.** DOI: 10.1111/j.1748-1090.2008.00043.x

Gascon, C., Collins, J. P., Moore, R. D., Church, D. R., Mckay, J. & Mendelson III, J. (2007): *Amphibian Conservation Action Plan*. Gland, Switzerland, and Cambridge, UK: IUCN/SSC Amphibian Specialist Group.

Gupta, B. K. (2006): Amphibian Biodiversity Conservation (ABC) course. *Solitaire* **17:** 11.

Houlahan, J. E., Findlay, C. S., Schmidt, B. R., Meyer, A. H. & Kuzmin, S. L. (2000): Quantitative evidence for global amphibian population declines. *Nature* **404:** 752–755.

IUCN (2005): *Amphibian conservation summit declaration*. IUCN. http://intranet.iucn.org/webfiles/doc/SSC/SSCwebsite/GAA/ACAP_Summit_Declaration.pdf

Kiesecker, J. M., Blaustein, A. R. & Belden, L. K. (2001): Complex causes of amphibian decline. *Nature* **410:** 681–684.

Marsh, D. M. & Trenham, P. C. (2001): Metapopulation dynamics and amphibian conservation. *Conservation Biology* **15:** 40–49.

McCallum, M. (2007): Amphibian decline or extinction? Current declines dwarf background extinction rate. *Journal of Herpetology* **41:** 483–491.

Mendelson III, J. R., Lips, K. R., Gagliardo, R. W., Rabb, G. B., Collins, J. P., Diffendorfer, J. E., Daszak, P., Roberto Ibanez, D., Zippel, K. C., Lawson, D. P., Wright, K. M., Stuart, S. N., Gascon, C., da Silva, H. R., Burrowes, P. A., Joglar, R. L., La Marca, E., Lotters, S., du Preez, L. H., Weldon, C., Hyatt, A., Rodriguez-Mahecha, J. V., Hunt, S., Robertson, H., Lock, B., Raxworthy, C. J., Frost, D. R., Lacy, R. C., Alford, R. A., Campbell, J. A., Parra-Olea, G., Bolanos, F., Domingo, J. J., Halliday, T., Murphy, J. B., Wake, M. H., Coloma, L. A., Kuzmin, S. L., Price, M. S., Howell, K. M., Lau, M., Pethiyagoda, R., Boone, M., Lannoo, M. J., Blaustein, A. R., Dobson, A., Griffiths, R. A., Crump, M. L., Wake, D. B. & Brodie Jr, E. D. (2006): Confronting amphibian declines and extinctions. *Science* **313:** 48.

Moore, R. D. & Church, D. R. (2008): Implementing the Amphibian Conservation Action Plan. *International Zoo Yearbook* **42.** DOI: 10.1111/j.1748-1090.2007.00041.x

Pavajeau, L. (2005): *Captive breeding and release of amphibians: an assessment of published data of breeding-release programmes*. MSc dissertation, DICE, University of Kent at Canterbury, UK.

Pessier, A. P. (2008): Management of disease as a threat to amphibian conservation. *International Zoo Yearbook* **42.** DOI: 10.1111/j.1748-1090.2008.00047.x

Pounds, J. A. & Crump, M. L. (1994): Amphibian declines and climate disturbance: the case of the golden toad and the harlequin frog. *Conservation Biology* **8:** 72–85.

Roelants, K., Gower, D. J., Wilkinson, M., Loader, S. P., Biju, S. D., Guillaume, K., Moriau, L. & Bossuyt, F. (2007): Global patterns of diversification in the history of modern amphibians. *Proceedings of the National Academy of Sciences of the United States of America* **104:** 887–892.

Stuart, S., Chanson, J. S., Cox, N. A., Young, B. E., Rodrigues, A. S. L., Fishman, D. L. & Waller, R. W. (2004): Status and trends of amphibian declines and extinctions worldwide. *Science* **306:** 1783–1786.

Trenham, P. C. & Marsh, D. M. (2002): Amphibian translocation programs: reply to Seigel and Dodd. *Conservation Biology* **16:** 555–556.

Wiese, R. J. & Hutchins, M. (1994): The role of zoos and aquariums in amphibian and reptile conservation. In

Contributions to herpetology. **11.** *Captive management and conservation of amphibians and reptiles*: 37–45. Murphy, J. B., Adler, K. & Collins, J. T. (Eds). Ithaca, NY: Society for the Study of Amphibians and Reptiles.
ZIPPEL, K. C. (2005): *Zoos play a vital role in amphibian conservation*. AmphibiaWeb: information on amphibian biology and conservation [web application] Berkeley, CA: AmphibiaWeb. http://www.amphibiaweb.org/aw/declines/zoo/index.html (26 July 2005).
ZIPPEL, K. C. (2007): Prepare your staff to aid in the amphibian extinction crisis. *Connect* **February:** 67.

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