Which amphibians should qualify for the ark?

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The problem of which species should be prioritised for ex situ conservation programs has long preoccupied zoos. This has led to a proliferation of prioritisation schemes to help the decision-making process. Indeed, IUCN technical guidelines on the management of ex situ populations for conservation were first published in 2002 and have recently been expanded and updated (IUCN/SSC, 2014). These guidelines have subsequently formed the basis of collection planning for many zoos. A fundamental step in the collection-planning process is the 'role' that ex situ management will play in the conservation of the species. Such roles are diverse, and include, for example, insurance populations, temporary rescue, and providing source animals for restoration, ecological replacement or assisted colonisation. Additionally, the species may play a role in education, training, raising awareness and research (IUCN/SSC, 2014). Although keeping amphibians in captivity as insurance against extinction and/or for reintroduction are traditionally viewed as the main reasons for ex situ programmes, the potential roles are actually much broader than this. In fact, the primary role that amphibians play in captive breeding programmes is conservation-related research rather than reintroduction (Griffiths & Pavajeau, 2004; Harding et al., 2015). Indeed, there is a growing list of examples of ex situ amphibian breeding programmes that have provided research that has informed in situ conservation programmes (e.g. Kraaijeveld-Smit et al., 2006; Antwis et al., 2014; Becker et al. 2015).

Biega et al. (2016) provide a scholarly analysis of how zoos may not be focusing on amphibian species that are conservation priorities. This analysis is based on a set of eight ecological and biogeographical criteria related to extinction risk. In this respect, their findings are similar to those of Dawson et al. (2015) who also found that the representation of globally threatened amphibians in zoos was less than might be desirable for ex situ management. Amphibian Ark (2014) provides a list of 20 criteria for assessing the conservation needs of amphibians that embrace many of the additional roles identified by IUCN/SSC (2014) for species in ex situ programs. Although these include ecological and biogeographical considerations, they also include broader criteria associated with ex situ research, developing husbandry methods using analog species, and conservation education. Consequently, many of the species in zoos that do not meet the criteria defined by Biega et al. (2016) may still be serving valuable conservation roles associated with criteria not included in their analyses.

Zoos in Europe have been criticised by focusing on charismatic species from regions of high biodiversity at the expense of species in their own backyard. To counter this, many zoos now have native species initiatives, where zoo expertise and facilities are applied to species of local or regional conservation importance. Although such species may not be global conservation priorities – and consequently not listed as threatened on the Red List – there may be strong political, strategic and educational reasons to prioritise them. A good example is the agile frog, which has been subject to a highly successful head-starting and reintroduction programme on the Channel island of Jersey (Ward

et al., 2016). The species is widespread on mainland Europe, but is the most threatened amphibian on Jersey and arguably within the British Isles. The focus on this species has raised awareness of the more general problem of amphibian declines locally and regionally.

The role that amphibians play in capacity building within the ex situ community and in public education is also often overlooked when it comes to assessing conservation roles. This is possibly because these are activities which are difficult to evaluate. Although still underrepresented in zoos, there are more amphibians in more zoos than ever before (Dawson et al., 2015). Although many of these species are hardy, common species of low conservation concern, as acknowledged by Biega et al. (2017), they are providing much-needed material for developing husbandry skills in a new generation of zoo keepers. As expertise and capacity builds, these species can be replaced by species facing a higher extinction risk that have more poorly understood and challenging husbandry needs (Tapley et al. 2015). Likewise, through imaginative visitor experience and interpretation, the large-bodied, hardy and low conservation priority 'display' species in zoos can provide considerable opportunities to introduce amphibian conservation narratives to the general public.

What also emerges from Beiga et al.'s (2017) analysis is that non-traditional organisations (e.g. specialist breeding centres, Universities and botanic gardens) may be making significant contributions to ex situ conservation of amphibians. This has always been the case. Over two decades ago Beck et al. (1994) showed that less than 60% of reintroduction projects involved zoo-bred animals, leading them to the conclusion that 'State and federal wildlife agencies are the major proponents and managers of reintroduction'. Likewise, more recent work on amphibians showed that just under half of captive breeding and reintroduction programmes are carried out by government and non-government agencies rather than zoos (Harding et al. 2015). This does not belittle the roles that zoos play, but emphasises the diversity of ex situ approaches and facilities that are needed, and the fact that zoos are often not the best places to carry out ex situ amphibian work. Bringing together amphibian species from all over the world to an out-of-range captive breeding facility can raise significant disease and biosecurity issues (Walker et al., 2008). As Biega et al. (2016) acknowledge, if an ex situ approach is needed, it is frequently safer and much more cost-effective to carry it out at a dedicated single-species unit within the species range (and well away from a zoo with other amphibians).

We should certainly continue to review and modify prioritisation tools as new data emerge from both the field and ex situ conservation programmes. However, final decisions on which species join the ark should be based on the various roles that different species can play in a broad landscape of potentially beneficial conservation activities. The Amphibian Ark Conservation Needs Assessment (Amphibian Ark, 2014) continues to provide valuable tools and criteria to assist practitioners striving towards that goal.

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