



THE FROZEN ARK

THE FROZEN ARK BUSINESS PLAN

Saving the DNA and viable cells of the world's endangered species

Introduction

The Frozen Ark is a UK based charity whose vision is to conserve the genetic heritage of endangered animals, both wild and domestic species, before they are irretrievably lost. Led by a group of ambitious Trustees, the Frozen Ark seeks to secure this heritage by collecting and conserving genetic material of endangered animals and providing coordination, infrastructure and advice on managing and maintaining these materials through working with UK and international partners.

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The Frozen Ark was set up in 2004 and whilst the charity has remained relatively small, operating through donations and grants as well as in-kind backing from partners, it has an expert and well-connected Board of Trustees, part-time staff and committed volunteers. All bring a range of scientific expertise and contacts throughout the sector.

As a small charity, the Frozen Ark faces funding challenges, particularly in the context of significant change within the partners and institutions that it interfaces with. Much of the proposed activity to develop the charity into a resilient organisation is being tried for the first time, shaped through this Business Plan, with the support and goodwill of Trustees, partners and volunteers.





Vision

"To safeguard the genetic material of endangered animals for their conservation and as a resource for the benefit of future generations."

"To collect, preserve and conserve tissue, gametes, viable cells, and DNA of animal species facing extinction by providing infrastructure, expertise, partnership and coordination for endangered animal biobanking."

The Frozen Ark
Vision, Mission
Statement & Key
Aims

Facilitation



- to facilitate the collection and promote the conservation of tissue, cells and DNA from endangered animals.

Access



- to provide a portal where information can be accessed on samples already stored and available and where advice on biobanking for endangered species is provided.

Improvement



- to improve methods of collecting, storing, preserving and providing samples.

Conservation



- to make biological material available to help combat genetic erosion in conservation programmes.

Safeguard



- to safeguard important genetic material for scientific research, for the advancement of knowledge and for the benefit of humankind.

Disseminate



- to disseminate information about the current extinction crisis, its consequences for genetic biodiversity and on how genetic management of endangered species can help their fight for survival.

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Context

The context for the Frozen Ark's work is both in the UK and worldwide. The WWF Living Planet Report 2018 shows an overall decline of 60% in species population sizes between 1970 and 2014, whilst current rates of species extinctions are 100 to 1,000 times higher than the background rate (the extinction before human pressure became a prominent factor). Other indicators measuring different changes in biodiversity all demonstrate dramatic, continued loss. However, sadly the future of millions of species has not captured the attention of world leaders sufficiently to date to catalyse the necessary action.

In the UK, according to the latest State of Nature 2019 report, "Statistics demonstrate that the abundance and distribution of the UK's species has, on average, declined since 1970 and many metrics suggest this decline has continued in the most recent decade. There has been no let-up in the net loss of nature in the UK."

"In order to understand the consequences of this catastrophic decline in biodiversity, scientific research needs access to current and historic information and biological material for species in decline."



Together with the ever-growing deforestation and industrialisation, these trends have left the UK "among the most nature-depleted countries in the world", with most of the country having gone past the threshold at which "ecosystems may no longer reliably meet society's needs".

In order to understand the consequences of this catastrophic decline in biodiversity, scientific research needs access to current and historic information and biological material for species in decline. Many institutions have frozen collections of biological materials, including museums, zoos, wildlife organisations, breed societies, universities, research institutes and individuals. Biobanks such as the Frozen Ark and those of its partners/consortium members worldwide allow scientists to organise, manage and protect those samples. The Frozen Ark's Vision and Mission is to ensure that this material is made available and utilised for vital conservation of the planet.

Extinctions

not only wipe out whole species, but also the important biological information contained within their genomes. Biobanking offers unique opportunities to advance the basic knowledge of biological systems and their evolution, including supporting conservation efforts for endangered species.

A cornerstone in conservation is the identification and understanding of genetic diversity. To support conservation breeding programmes, DNA samples are needed for keeping healthy gene-pools. Most captive breeding programs rely on these samples, both to maintain healthy populations in captivity and to provide new genetic material to dwindling wild populations.

Access to high-quality biomaterials is a major obstacle that limits the success of conservation programmes. Careful preservation of samples stored between -80°C and -196°C satisfies the requirements of modern biology and conservation breeding. Viable cell lines set up from small tissue samples contain the whole genome that is required and can be sampled in a non-destructive way by regenerating the material whenever it is used.

Biobanking of sperm, eggs and embryos offers the possibility to exchange genetic information within and between populations. This increases the genetic health of wild populations, helps to counter the loss of genetic diversity and prevent loss of fitness and higher disease prevalence through inbreeding effects.

Standardised sampling and preservation techniques need to be developed and biobanked samples must be supported by an accessible database. The Nagoya Protocol for access and benefit sharing of genetic resources has inhibited movement of materials across international borders and as a consequence, the UK needs to develop its own biobanks for endangered animal species.

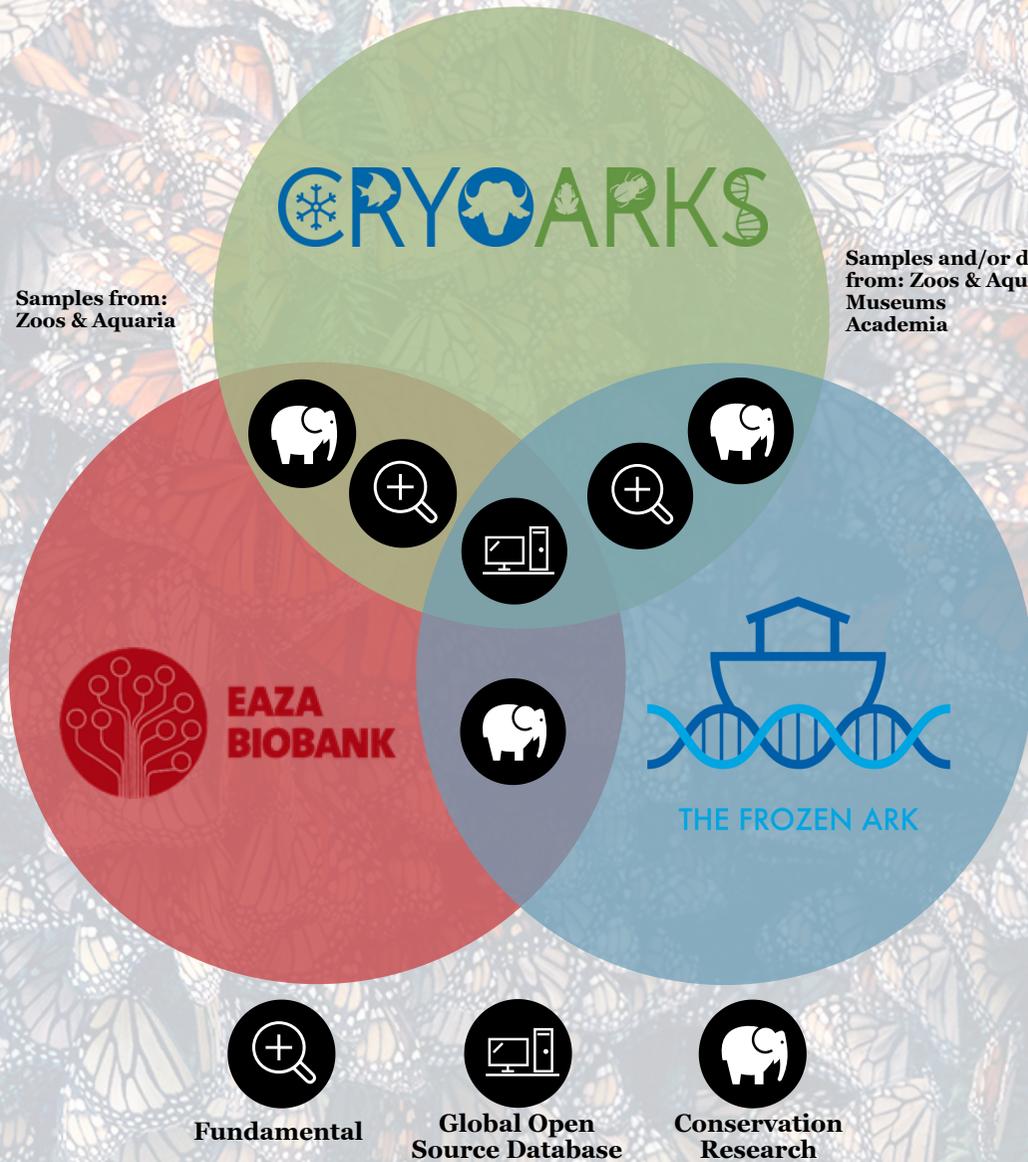
Implementation of a common database built through cooperation amongst institutions is essential. The Frozen Ark National Heritage Lottery Fund project in 2018 supports this work. By improving access to specimens by the research and conservation communities, the Frozen Ark helps society to understand the genetic basis of species biology in order to improve current and future biodiversity heritage and natural conservation efforts.



How We Work

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Focus of UK and European Zoological Biobanks



Samples from:
Zoos & Aquaria

Samples and/or data
from: Zoos & Aquaria
Museums
Academia

Geographic Focus

Samples

Geographic Focus	Samples
 UK based, all species, all locations (some prioritised).	 Blood, tissue, cells, gametes and whole bodies.
 World-wide, endangered and threatened species.	Blood, tissue, cells, gametes and whole bodies.
 European and Middle Eastern Zoo and Aquarium animals.	Blood, tissue and serum.

The Frozen Ark

works closely with Partners in the UK and worldwide. This network will be widened through both public outreach and wider awareness-raising within the conservation community, including emerging organisations that are focusing on climate change and its impact. We will continue to work with the British Association of Zoos and Aquaria (BIAZA), the UK scientific community (university laboratories and research institutes) and museums. The Frozen Ark continues to offer specialist advice and support to institutions who are establishing new biobanks around the world and it is planned that this is formalised into a 'hub and spoke' network.

Working With Others



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Partners work through a Memorandum of Understanding and a Partnership Pack includes protocols for sample collection. Frozen Ark members continue to work amongst the academic and scientific communities worldwide, where the importance of biobanking of endangered species is promoted. The Frozen Ark is a core element of a wider collaborative consortium supported by the £1.3M BBSRC Bioinformatics and Biological Resources Fund grant awarded to the CryoArks Biobank. CryoArks will provide cryopreservation infrastructure, databasing, a sampling initiative and public outreach in a coordinated effort to gather and curate genetic material for conservation and research for all animal species in UK collections, not just endangered species.

The diagram opposite sets out the inter-relationship of the UK and European Zoological Biobanks i.e. EAZA, CryoArks and the Frozen Ark biobanks. An important outcome of this partnership will be the formation of the Frozen Ark database of genetic samples from endangered and threatened species held in the UK and by our global partners.



THE FROZEN ARK

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