

## BIOTEC &amp; CONSERVATION

# Using Biotech to save Endangered Species

Incorporating advanced biotechnological techniques, we aspire not only to conserve species but also to chart a sustainable trajectory for ecosystems and their dependent communities.



STORY BY  
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## TOP

One of the most promising applications of biotechnology is genetic rescue. This involves introducing genetic diversity from related populations or species into the gene pool of an endangered species to increase its genetic fitness and adaptability. Techniques such as gene editing, in vitro fertilization, and artificial insemination can be used to achieve this.

The perilous condition of our planet's endangered species necessitates immediate intervention. Alarming, out of roughly 15,649 endangered species, an overwhelming 90 per cent are witnessing dwindling populations. A detailed examination reveals that this conservation endeavour transcends the mere protection of fauna and flora. It encapsulates the preservation of cultural lifestyles for numerous communities and the maintenance of ecological equilibrium.

The extinction of species resonates profoundly across human societies. Indigenous populations, for instance, are intricately intertwined with these species for sustenance and cultural practices. The loss of these crucial species can radically reconfigure their traditional ways.

Furthermore, the global economic structure, particularly sectors like fisheries and ecotourism, can be severely impacted. Beyond economic considerations, the potential collapse of ecosystems, characterized by intricate mutual relationships, poses substantial threats. A pertinent illustration is the decline of bee populations, a phenomenon that jeopardizes plant growth and reproduction.

### Factors Influencing Decline

Numerous detrimental forces are precipitating these declines, including climate change, industrial pollution, illegal trading of

endangered species, and emergent diseases. However, a frequently underestimated factor is genetics. The precarious situation of North America's red wolves provides an instructive example. Their near-extinction was not solely due to external threats like hunting or habitat destruction, but also their limited genetic intermingling. This revelation reshaped conservation strategies.

A species' genetic composition serves as its distinctive identifier. Genetic diversity equips a species with an expansive repertoire of adaptive mechanisms. A population with diverse genetic composition can be inherently more robust than a numerically superior, but genetically analogous, group.

### Biotechnological Advancements

Biotechnology offers a sophisticated array of tools that provide unparalleled insights into genetic composition:

**DNA Sequencing:** A procedure to delineate the genetic composition of organisms, pivotal for conservation initiatives.

**DNA Barcoding:** A method for rapid species identification based on genetic markers.

**Cryopreservation:** A technique allowing for the storage of genetic material at ultra-low temperatures.

**Genetic Engineering:** The controlled modification of DNA sequences.

**Gene Expression Analysis:** A study of gene functionality and interactions. These innovative methodologies are not mere theoretical constructs but are instrumental in shaping tangible conservation strategies. A nuanced understanding of genetic diversity can guide effective breeding programmes and highlight the importance of genetic variance as a buffer against multifarious threats.

### Contemporary Interventions for Perennial Issues

When natural reproduction is compromised, biotechnological interventions, such as in-vitro fertilization (IVF) and artificial insemination, become paramount. Additional methodologies, like embryonic transfer and cryopreservation, can amplify the population of endangered species. Moreover, when diseases imperil these species, biotechnology can provide diagnostic tools and remedial measures.

### Beyond Singular Species

The ambit of biotechnology extends beyond individual species, offering solutions for entire ecosystems. Current research explores the possibility of engineering flora capable of thriving in adverse environments or remediating polluted locales. These groundbreaking interventions invite ethical

deliberations. While we possess the capability to manipulate natural processes, the extent of our intervention remains debatable. However, passive observation of species extinction is not tenable. Furthermore, biotechnology offers invaluable forensic tools against poaching, with DNA serving as irrefutable evidence.

### Unified Endeavours for a Sustainable Future

Biotechnology's potential is vast, but its fruitful implementation necessitates collaborative endeavours. Financial support, rigorous research, collaborative ventures, comprehensive training, and ethical considerations form the multifaceted equation. An integrated approach, emphasizing knowledge dissemination, collaborative learning, and meticulous oversight, can ensure the congruence of our efforts with established objectives.

Ultimately, our endeavours are geared towards crafting a sustainable future for both endangered species and all co-inhabitants of this planet. ●

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### BELOW

Fatu (left) and Najin (right) are the last two Northern white rhinos left on the planet. They are both female and are a mother-daughter duo. The fate of the species now rest on assisted methods of reproduction. The subspecies has been pushed to the brink of extinction due to poaching for their horns and habitat loss. Efforts to save the Northern white rhinoceros from extinction included captive breeding and assisted reproductive technologies, such as in vitro fertilization, to potentially produce offspring.



PHOTO BY GURCHARAN ROOPRA