

## **BARCODE OF WILDLIFE PROJECT**

### **Project Narrative**

This pilot project will test the cost-effectiveness, scalability, and real-world impact of a DNA-based technology on the enforcement of species protection laws and treaties. The project is designed as a proof-of-concept for 'DNA barcoding' as a system that could be used in developing countries by border inspectors, park rangers and other regulatory officials to detect illegal trafficking in protected species. DNA barcoding is a technique for identifying species using the digital DNA sequence of a very short, standardized gene region. Species are normally identified by visual inspection using diagnostic morphological features. This is a slow and expensive process that can yield uncertain results when expert taxonomists are unavailable or the critical features aren't present. The project will focus on species protected under the UN Convention on International Trade in Endangered Species (CITES) and its enforcement by 6 countries: South Africa, Kenya, Nigeria, Mexico, Brazil, and a country in Southeast Asia (to be selected following initial discussions). These countries represent important biodiversity hotspots in different regions of the world and they are the developing countries that have been the most active and engaged in barcoding activities.

The project is comprised of three core components:

- 1 Construction of a public database of reference barcode records for endangered species and their close relatives, against which the barcode sequences of confiscated material can be compared. This project will assemble approximately 50,000 reference barcode sequence records in Genbank representing approximately 10,000 species. These well-identified 'voucher' specimens will be obtained from museums, herbaria, zoos and other repositories in industrialized countries and from equivalent institutions, nature reserves and conservation activities in the participating developing countries.
- 2 Training for researchers, technicians, border inspectors, game wardens, prosecuting attorneys and judges in the participating countries. This training will prepare them for their respective roles in using DNA barcodes for enforcing species protection.
- 3 Testing of barcodes as a real-world tool for enforcement through implementation of operational, cost-effective barcoding programs. These in-country programs will obtain barcodes from confiscated material, identify them using the reference database, and use the barcode data to prosecute those suspected of violating laws against trafficking in protected species.

The principal outcomes of the project will be:

- At least 400 confiscated objects in trade will be tested using DNA barcodes in at least four partner countries to detect illegal trafficking in protected species;
- Law enforcement officials in at least three partner countries will be trained to use DNA barcodes as part of the process leading to arrests and prosecution of suspected poachers and illegal traffickers in endangered species;

- Barcoding labs with trained technicians, networks of officials, and standard operating procedures will be established in at least three partner countries in which the feasibility and cost-effectiveness of DNA barcoding will be tested as a tool for species protection;
- DNA barcode data will be used as evidence in judicial proceedings in at least two partner countries;
- The process leading to formal adoption of DNA barcoding as a primary mechanism for enforcing species protection laws will be initiated in at least one partner country, and
- Awareness of this proof-of-concept of DNA barcoding in combating illegal poaching and trafficking will be increased within and among national governments through organizations such as CITES, Interpol and IUCN and through the media.

## **Project Participants**

Institutions in partner countries from which specimens and samples will be obtained, at which meetings and workshops will be hosted, and training events will take place:

- Universidad Nacional Autónoma de México, Mexico City
- University Sao Paulo, Brazil
- National Biotechnology Development Agency, Abuja, Nigeria
- International Institute of Tropical Agriculture, Ibadan, Nigeria
- National Museums of Kenya
- Kenyan Wildlife Services
- University of Johannesburg, South Africa
- South Africa National Biodiversity Institute, Pretoria and Cape Town, South Africa
- Institutions to be selected in southeast Asia

Museums and other repositories from which specimens and samples may be obtained:

- San Diego Zoo
- American Museum of Natural History
- New York Botanical Garden
- Natural History Museum London
- Museum National d'Histoire Naturelle, Paris
- Naturalis Museum, Leiden, The Netherlands
- Royal Museum of Central Africa, Tervuren, Belgium
- Royal Belgian Institute of Natural Sciences, Brussels, Belgium

Members of CBOL's Leading Labs Network, at which training fellowships may be hosted and from which instructors for training workshops may be sought:

- Australia Museum, Australia
- Royal Museum for Central Africa, Tervuren, Belgium
- Royal Belgian Institute of Natural Sciences, Brussels, Belgium
- Canadian Centre for DNA Barcoding, Univ. of Guelph, Canada
- Museum National d'Histoire Naturelle, Paris, France
- Botanic Garden and Botanical Museum Berlin-Dahlem, Germany
- Senckenberg Forschungsinstitut und Naturmuseum Frankfurt, Germany

- Zoologisches Forschungsmuseum Alexander Koenig, Bonn, Germany
- CBS-KNAW Fungal Biodiversity Centre, Centraalbureau voor Schimmelcultures, Netherlands
- National Centre for Biodiversity/Univ. Wageningen, Netherlands
- Naturalis National Museum of Natural History, Leiden, Netherlands
- Smithsonian Tropical Research Institute, Panama
- Natural History Museum, London, United Kingdom
- Royal Botanic Garden Edinburgh, United Kingdom
- American Museum of Natural History, NYC, US
- NY Botanical Garden, US