Genetics to Save Rhinos

Wildlife Conservation International (WCI) has begun a landmark genetic study of the African black rhino as part of intensive conservation efforts to save the last wild black rhinos from extinction. Dr. David Western, WCI Resource Ecologist in Kenya and Vice-Chairman of the African Elephant and Rhino Specialist Group (AERSG) of the IUCN, is working with Dr. Don Melnick of Columbia University in New York City, to determine both the taxonomic and population genetic bases of the seven recognized subspecies of African black rhinoceros (Figure 1). Dr. Western is coordinating efforts in Kenya, Zimbabwe and other African nations to collect rhino tissue and blood from wild populations. Dr. Melnick is performing genetic analyses in his Columbia laboratory of these wild samples and captive black rhino samples donated by several US zoos through the efforts of the New York Zoological Society.

Rhinoceroses have been disappearing faster than any other large land mammal – down 40 percent in Africa in just the past three years – and their decline is almost solely due to poaching. African rhinos now exist in scattered populations, posing short-term conservation problems and long-term biological hazards. Small populations are more difficult and expensive to protect from poachers than larger ones, and more vulnerable to the genetic risk of inbreeding. Conservationists are therefore considering strong measures – for instance, translocation to protected sanctuaries – to save the remaining rhinos. Before such steps can be taken, however, scientists must identify the evolutionarily significant units within the species – that is to say, subspecies distinct enough and of sufficient population size and genetic diversity to merit separate conservation strategies to ensure their long-term future.

A primary goal of conservation is the maintenance or increase of genetic variability, which is a species' protection against disease and adverse environmental changes. With a severely limited gene pool, the ability to adapt in an emergency may be lost.

Genetic analysis can determine whether the recognized subspecies of black rhinos are actually different, and therefore whether it is a necessary conservation action to maintain genetically viable populations of each. Genetic analysis can also determine if and to what extent adaptations have affected each subspecies. Black rhinos are found in a tremendous range of habitats, from

Fig. 1. The African Black Rhinoceros (Photo. courtesy: New York Zoological Society).

scattered woodland to semi-desert, and could be uniquely adapted to each locale. These are important issues in the conservation management of wild populations.

"It has become clear that our knowledge of naturally occurring genetic diversity in a species or subspecies is critical to captive and wild management strategies," notes Dr. Melnick. "Beyond rhinos," Dr. Western adds, "genetical assay work can be applied to all endangered species." As zoos become "arks" for endangered species, and wild lands become increasingly isolated islands that need management in order to survive, this methodology will be an important tool for managers to use.

Wildlife Conservation International is the worldwide conservation research program of the New York Zoological Society. WCI currently has fifty-nine projects underway in thirty-one countries, and has helped to establish over fifty parks and reserves around the world. In addition to WCI, the New York Zoological Society operates the Bronx Zoo, the New York Aquarium, the Osborn Laboratories of Marine Sciences and the Wildlife Survival Center on St. Catherines Island, Georgia. Following their renovation, the New York Zoological Society will also operate the New York City zoos in Central Park, Flushing Meadows Park and Prospect Park.

A Satellite Eye on Australia's Rangelands*

An agricultural officer arrives for his first visit at one of Australia's remote cattle stations. Rainfall that season has been poor and the owner asks if he should reduce livestock. The officer takes a small, portable computer from his car. Not only does he have 100 years of rainfall history at his fingertips but the latest satellite data and expert farming knowledge of the district. He can advise the farmer where to put a water point to minimise erosion, where to build fences, where his best pastures will be and how many cattle he should carry. In short, he can identify which areas of the farm are at risk and suggest how the farmer can minimise damage and maximise production. This ambitious, decision-making system aims to combine all the available data about Australia's arid rangelands for the benefit of the land manager. Known as *Rangepak*, it is one of several products developed by Australian scientists to make satellite monitoring and data accessible to the non-specialist.

Barney Foran, whose office is next door to Australia's Landsat receiving station in Alice Springs, has been working at applying remote sensing to land management for almost 20 years (Fig. 1). As his master *Rangepak* system nears completion, he hopes Australia's grazing lands will be managed more realistically. "Many farmers don't appreciate the unpredictable nature of the environment," says Mr Foran, a scientist at the Commonwealth Scientific and Industrial Research Organization (CSIRO). "There's a high turnover of farm managers and government extension officers and their knowledge is being continually lost. Arid zones are generally managed over-optimistically." Landsat gives scientists a broad view of the extent of erosion and plant cover on grazing land, which can be invaluable to graziers with vast stations. *Rangepak* aims to be the focus of all such information to provide tools to deal with management problems. The agricultural officer can key into plant growth models, erosion models, advice on feed supplements, spraying, selling and buying stock. He can draw on knowledge gleaned from 30–40 years farming in the district and put the climatic year into perspective. The system gives people options and should

Fig. 1. Outside the Australian Landsat station at Alice Springs, Barney Foran, a scientist with the Commonwealth Scientific and Industrial Research Organization, takes vegetation measurements for use in the *Rangepak* system. (Photo. courtesy: Bill Payne, Promotion Australia).

*This article is based on information provided by *Promotion Australia*, G.P.O. Box 12, Canberra, 2601 Australia.