

## INTRODUCTION

Adriana Consorte-McCrea and Eliana Ferraz Santos

It is a great honour and a timely endeavour to gather leading researchers from every country within the maned wolf's distribution, together with leading researchers and practitioners from around the globe, in one book dedicated to the ecology and conservation of the maned wolf. The multidisciplinary nature of our book combines different aspects of the maned wolf *in* and *ex situ* together with innovative approaches for the future of conservation strategies. In doing so it makes a substantial contribution towards meeting the recommendations and targets set out by the Action Plan for Canid Conservation into the 21st Century (Sillero-Zubiri, Hoffmann, & Macdonald, 2004) and by the Maned Wolf Action Plan (Paula, Medici and Morato, 2008).

Wolves are considered controversial figures worldwide: mythical creatures as well as troublemakers, their conservation can polarize extreme views and it often is riddled with conflicts. In recent years much effort has focussed on the discussion of how to conserve large carnivores, such as wolves, while addressing public concerns. The maned wolf, however, has mostly eluded the discussion stage. With its solitary habits and unusual fruit-eating diet, the endangered maned wolf roams the grasslands of South America, playing a vital part in maintaining the integrity of this biodiversity hotspot. Compared to other large canid species, little is known about this unique species and the peculiarities of its relationship with local people and the environment, and the reasons for its decline, making research about the species an urgent concern.

Considering the maned wolf's uniqueness, issues discussed in this book are also relevant to the conservation of other large carnivores. The elements that contribute to the construction of the relationships and also to the potential conflict between people and wild animals, and particularly carnivores, are very similar worldwide. The ecological role of the maned wolf as a large predator is also similar to that of other predator species: like many

large carnivores maned wolves are keystone species, and also potential umbrella and flagship species for the conservation of their habitat. Like other carnivores, they have progressively strived to survive in human occupied environments, as their natural habitat is encroached by farms. Endangered species of carnivores face similar problems linking their decline with the value that people place on resources and human activities; protected areas are insufficient to guarantee their survival, and the importance of including local land owners in conservation becomes more evident. These common issues are discussed along the following chapters as researchers and practitioners from different fields disclose the maned wolf's compelling story.

Endangered species have been a major focus of conservation research and of the allocation of financial resources to implement them. The establishment of conservation priorities focusing on species such as the maned wolf however does not exhaust the problem of endangerment since most of it is caused by habitat loss and anthropic actions. Besides being rapidly destroyed, habitats that occupied large areas are now often divided into small fragments by roads, fields, cities, and a large number of other human activities. Habitat loss and fragmentation can reduce wild populations, causing local extinctions and genetic problems caused by inbreeding (Gaines et al. 1997). An ecological approach is often recommended to conserve ecosystems and habitats of a given region, including all associated biotic community.

Anthropic connections to the endangerment and to the conservation of wildlife are complex and multifaceted. The decline of carnivore populations in Central and South America seems to be directly related to the value placed on resources and human activities as a result of globalization (Clark et al. 2001). Research indicates that conflicts between people and wildlife are often better understood as people-people, or people-state conflicts, as they are affected by tensions and divisions in human society (Knight 2000; Hill 2004). A lack of understanding of the social-cultural dimensions of such conflicts may drive conservation initiatives to see local people as the cause of conflict and the solution as their

removal from protected areas, in an attempt to protect wild populations. Most recently, however, the way traditional populations manage wild areas have been linked with increases in biodiversity and wildlife conservation (Arruda 2000). Considering that a large proportion of conservation areas in Latin America are occupied by human populations (Colchester 2000) the exclusion of traditional people with a sustainable way of living can make conservation areas more vulnerable to poaching and logging (Arruda, 2000; Guha, 2000). Since 1975 the contribution of traditional communities to environmental protection has been recognised by IUCN, which recommends their involvement in conservation strategies without “losing their rights of property and use.” (Colchester 2000:243). Partnerships between traditional communities and scientific expertise may offer a way forward in the search for sustainable solutions to the management of natural resources and wildlife conservation.

The inclusion of local people is also advocated by some of the most successful and long-running wildlife conservation programmes in Brazil, associated with environmental education programmes, where local people helped to determine local needs and to define directives (Padua and Tabanez 1997). Emerging from their objectives is the need to promote self-esteem associated with the valuing of the locality, encouraging integration between its cultural and natural resources (including protected areas). Within this framework, appealing flagship species, such as the maned wolf, may be used to attract the attention of the population to the environmental cause, by eliciting support for the preservation of that species' habitat (Dietz and Nagagata, 1997).

Although endangerment and extinctions have been part of the dynamics of evolution we are witnessing an unprecedented decline in biodiversity as a result of the demands of ever increasing human populations. Within ecological communities there are certain species which exert a particularly important influence on the persistence of all others. Ecological communities evolve over millions of years providing unique opportunities for the development of intricate relationships between its biotic and abiotic components. All over the planet species living in centres of biodiversity and endemism, such as the Cerrado in

Brazil, have been impacted and reduced due to habitat loss and fragmentation, poaching and the action of new predators and competitors. Keystone species such as the maned wolf can influence the structure and dynamics of the community at a higher level than what it would be expected based on the quantity of individuals or on their biomass (Terborgh 1976; Janzen 1986). Even the removal of a small number of predators, although constituting a small portion of the biomass of the community, can potentially result in dramatic changes in vegetation and a large loss in biodiversity (Pimm 1991; McLaren and Peterson 1994).

We know that the drastic changes in the dynamic relationships of plant-herbivore interactions and between predator and prey can also result in losses, to a greater or lesser extent, in biodiversity and in quality of life of human populations, particularly those who require natural resources for their living. The services provided by biodiversity and inter-specific interactions should be seen as important tools in maintaining the biological diversity of fragments. Therefore taking action towards maintaining viable populations of terrestrial mammals at medium and long-term, including some species of canids such as maned wolf, is essential in the recovery of degraded or fragmented areas.

The population model created for Brazil by the Maned Wolf Action Plan (Paula, Medici and Morato 2008) suggests the major threats to the species lie in an increase in road mortality and reduction of the carrying capacity due to habitat loss. The model indicates that such threats may cause a significant drop in maned wolf numbers resulting in the local extinction of populations, with cascading effects that should contribute to the decline of local ecosystems. Other threats to the maned wolf are presence of domestic and feral dogs in the vicinity of protected areas, retribution killings and hunting, and killing for the harvesting of their body parts for traditional medicine or magical purposes. Threats to maned wolves populations are a recurring theme in this book, as are reflections and recommendations on how to target and address them to empower conservation strategies for the species.

The book is divided into three parts, preceded by a rare insight into the experiences of one of the pioneers in the study of the maned wolf, Dr Cory Carvalho, which should inspire newcomers to get to know the species in the same way his work has inspired many of us. The following chapters explore a wide variety of aspects but maintain a common structure based on what is known, or an overview of historical and recent research; and on next steps, looking towards future research and areas for further development.

Part One, *The Species and Ecology*, starts with *Species Status* to lay out some of the most general issues concerning the present situation of the maned wolf. In chapter one Claudio Sillero offers a general introduction to the species and talks about the maned wolf within the context of the conservation of canids worldwide; current findings about the population viability of the maned wolf are discussed in chapter two by Rogério de Paula and Arnaud Desbiez; in chapter three Adriana Consorte-McCrea reviews and discusses key issues related to the relationships between maned wolves and people; in chapter four the current keeper of the Maned Wolf Stud Book, Ruben Holland talks about the management of the worldwide population of captive maned wolves, its problems, trends and perspectives, and its role in the knowledge and conservation of the species; in chapter five related aspects linked to the maned wolf *ex situ* in Brazilian zoos are discussed by Cecilia Pessutti, Cleyde Chierragatto and Ralph Vanstreels.

Part One, continues with *Species Biology* where diverse aspects of current knowledge are reviewed. In chapter six Manoel da Fontoura-Rodrigues and Eduardo Eizirik review the development, current research and perspectives of the field of conservation genetics in relation to the maned wolf . José Carlos Motta Junior, Diego Queirolo and Adriana Arruda Bueno make a comprehensive revision of the maned wolf's feeding ecology, based on literature on diet and a quantitative analysis of the trophic ecology of the species in central and eastern South America in chapter seven; in chapter eight Nucharin Songsasen et al look at reproduction and stress and provide an overview of the current understanding of social structure, reproductive behaviors and biology, as well as factors influencing the

reproductive success of the maned wolf; in chapter nine Joares May Junior, and Paulo Anselmo N. Felipe examine the current knowledge about conservation medicine in relation to the maned wolf in captivity and in the wild.

Part two, *Case studies and Conservation Programmes*, offers an in depth view of some of the knowledge gathered from past and ongoing programmes and field research carried out on maned wolf populations in all countries where the species is currently found. In chapter ten Flávio H.G. Rodrigues et al evaluate the role of small reserves in maned wolf conservation, based on a case study of population viability analysis (PVA); in chapter eleven Eliana Ferraz, Nivar Gobbi and Paulo Anselmo Nunes Felipe present a case study in feeding ecology, disclosing the field work and analysis involved in determining the diet of the maned-wolf, its seasonal variation and its relationship to seed dispersal on a dairy cattle ranch in the State of Minas Gerais, Brazil; in chapter twelve Carly Vynne shows how measuring fecal hormone metabolites in scat samples from free-ranging maned wolves in and around a federal nature reserve in Brazil provides a window into the cost of making a living in areas where there is anthropomorphic disturbance or land use change; in chapter thirteen Rogério Cunha de Paula et al give an insight into the main challenges, findings and prospects of the remarkable Maned Wolf Project in Serra da Canastra.

The maned wolf is endemic to South America and its distribution has changed over time reflecting changes in landscape and habitat use. Although it is considered Near Threatened at global level (IUCN Red List) its status and perspectives change along its range. The next few chapters provide a comprehensive overview of the current knowledge and the challenges faced by maned wolf populations in each country, starting with Diego Queirolo et al's review of the species in the south of Brazil and Uruguay, in chapter fourteen; in chapter fifteen Lucia Soler discusses aspects of the maned wolf in Argentina; in chapter sixteen Louise Emmons discusses environmental factors that may influence resource levels, territory and population size of breeding maned wolves in a study area in Bolivia, which may

affect their geographic range; the maned wolf conservation in Paraguay is reviewed in chapter seventeen by José Luís Cartes, Anthony Giordano and Nathalia Mujica Cameroni.

In Part three, *Perspectives for the Future*, we invited professionals from diverse fields of research that may be presently under-explored in relation to the maned wolf but have increasing importance in its conservation. The next chapters explore challenges and opportunities connecting maned wolf conservation and local communities. Denise Taylor discusses education and communication as tools for the conservation of wild canids, with applications to the maned wolf, in chapter eighteen; in chapter nineteen Alistair Bath offers an overview of how to use Human Dimensions research to explore people's relationships with large carnivores, conflict and mitigation with local groups, and suggests how these could be applied to the conservation of the maned wolf; in chapter twenty Antônio Carlos Diegues talks about the Ethno-conservation perspective and reflects on how this approach may integrate local traditional communities into wildlife conservation plans; in chapter twenty one Carlos Klink talks about the ecology and socio-economics of the Cerrado biome and the challenges to its conservation, which are closely interconnected to the present status and to the future of the maned wolf.

Claudio Sillero, Adriana Consorte-McCrea and Eliana Ferraz close the book with an overview of the main lessons from each section and we attempt a synthesis of what is in stock for maned wolf conservation, in "Maned Wolf Ecology and Conservation: the Road Ahead".

We hope this book will contribute to a much more precise and global understanding of issues surrounding maned wolf ecology and conservation and its role in the conservation of biodiversity and to the planning of strategies to help guarantee a future for the species. The striking charisma and the essence of the "fox on stilts" have been brilliantly captured by the photos of Edu Fortes and by the drawings of Marcelo Pinto, perfectly embodying the spirit of the book. Thank you for joining us on this journey!

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