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Conservation of the Maned Wolf (*Chrysocyon brachyurus*):  
Carnivore and People Relationships in the Southeast of Brazil

by

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Thesis submitted to the University of Kent, Canterbury for the degree of Doctor of  
Philosophy

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I dedicate this work

to my parents Renato and Josi, who provided me with a base and background,

to my husband Robert, for his presence,

to my sons Francis and Felix, for their inspiration, looking towards the future.

## ABSTRACT

Maned wolves are endangered carnivores endemic to Brazil. This research aimed to compare the attitudes of interest groups towards the conservation of the maned wolf in urban and rural areas; to investigate how such attitudes may influence the maned wolf's status and conservation; and to recommend ways to incorporate such knowledge into strategies to conserve both wolf and habitat.

The methodology used questionnaires and interviews. Questionnaires targeted people living in the neighbourhood of conservation areas, staff and students (year 8 and sixth-form) of local schools; staff and visitors to conservation areas and zoos in three main research locations: Greater São Paulo, the Low Mogiana region and São Carlos city. Other conservation areas and zoos within the São Paulo state contributed further data. The relationship between socio-demographic factors and attitudes towards the maned wolf conservation was also investigated to identify the most positive and negative profiles of respondents.

Overall, results indicate a lack of antagonism between urban and rural populations. Results suggest that negative attitudes towards the maned wolf related to: misconceptions about feeding habits and to a lack of clear differentiation between the maned wolf and *Canis lupus*; perceptions of threat connected to the presence of the maned wolf on people's properties; and possibly values undermining local wildlife. Results, however, consistently indicated local people's tolerance towards the species and towards occasional predation events. Results also indicate discrepancies existing between bio/education professionals' expectations of local people's attitudes and the actual attitudes displayed by the latter. Recommendations addressed misconceptions and values regarding the maned wolf, inclusion of the local community and their issues, and relationships between interest groups for the benefit of maned wolf conservation.

The positive attitudes of a majority towards the maned wolf suggest they may support actions favourable to the species and maintain their position in case of conflict. However, further investigation is advised into local people's awareness of the causes of the decline of the maned wolf and of how their behaviour may affect populations of wolves.

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## CHAPTER ONE: Introduction

### ***1. Research topic***

My early research interests were the study of captive mammals and conservation; these were refined by two apprenticeships. While working towards my degree in Biological Sciences I took every opportunity to study animal behaviour and was tutored in this by the eminent Prof. Lucia Prado, from the UFSCar Psychology Department. During my final year at university I undertook an apprenticeship in the Mammals Sector of São Paulo Zoo (which had fascinated me since childhood) and was offered an option to carry out research on the maned wolf. This I readily accepted. Maned wolves were endangered canids then, and were notoriously difficult to breed in captivity (1986). At the same time I took a one-month apprenticeship at the groundbreaking Golden Lion Tamarin Reintroduction Project, in Poço das Antas, Rio de Janeiro State. These experiences allowed me to encounter conservation in practice both *in-situ* and *ex-situ*. Being in close contact with experts helped me to gain an encompassing awareness of the many factors involved in trying to preserve endangered wildlife. That awareness was then taken further when preparing my MSc in Conservation Biology in the UK, and in research on behavioural training of captive mammals for reintroduction into their native habitats that I developed then.

However, during all the time I have worked in animal conservation I have felt that research and conservation efforts were inevitably crashing against a recurring ‘problem’ outside of my domain as a researcher: the anthropogenic factors that could not be avoided when considering strategies for wildlife conservation.

I wanted to work further with the conservation of the maned wolf, and when I was asked to develop a research project to work with the ‘Carnivore and People Group’ at the Zoological Society of London I felt it was time to take on a new challenge and to investigate the role of people’s attitudes in the conservation status of the maned wolf in Brazil, my country of birth. This was when the present research began to take shape. At that time, in 2002, the issues of wildlife and people conflict, and their implications for wildlife conservation were finding their way

into scientific meetings and publications. Many interesting questions were being raised, and interesting discussions were taking place. My own concerns about the uniqueness of the maned wolf's ecology, when compared with other carnivores, and about the idiosyncrasies of the nature of the relationship between local people in the southeast of Brazil and the species, began to give focus to this research topic and to generate particular research questions.

## ***2. People/carnivore conflict and conservation, in rural and urban settings***

Conflict between people and wildlife are universally found but more so in the areas surrounding the boundaries between natural habitats and areas occupied by humans (Knight, 2000; Fascione, Delach and Smith, 2004). There, farms or settlements encroach into natural habitats, and are often connected with habitat depletion (hence the focus of the research on areas adjacent to natural reserves). Conflicts between people and wildlife arise from territorial proximity and involve competition for the same resources (food, territory), and/or threats to the well-being of or predation on both parties involved. In this section I will introduce various elements that contribute to the construction of the relationship and also to the potential conflict between people and wild animals, and particularly carnivores where possible, from studies carried out around the world. This should provide a backdrop to the specific reality of people's attitudes towards the maned wolf within the context of my study.

### ***2.1. Human encroachment and decline in predator populations***

Human encroachment into natural habitats will often result in habitat disturbance or destruction. Habitat destruction results in depletion of wild carnivores' territories, food sources, mating opportunities and restricted access to water supply. Habitat destruction also exposes them to contact with human occupied environments, to hunting, to domestic disease and competition

with domestic animals for food sources, commercial markets for body parts, and their possible displacement towards human territory (Kruuk, 2002; Miranda, 2003; Treves and Karanth, 2003; Treves, 2003; Fascione, Delach and Smith, 2004, Boitani, Asa and Moehrensclager, 2004). Research points to a global decline in large predator populations (Weber and Rabinowitz, 1996). The size of their ranges and their diet needs require wild carnivores to have a large undisturbed habitat. They are therefore especially vulnerable to human population growth at the expense of natural areas (Fascione, Delach and Smith, 2004).

## **2.2. The value of predators**

Research (Estes *et al.*, 2001, in Miller *et al.*, 2001:206) suggests that predators have a pivotal role in ecosystems, as “the process of predation has dramatic impacts at organizational levels ranging from individual behaviour to system dynamics, and on time scales that range from ecological to evolutionary.” The defence by carnivore biologists of these wild predators is supported by many arguments (Clark *et al.*, 2001; Miller *et al.*, 2001; Kruuk, 2002; Fascione, Delach and Smith, 2004): in ecological terms, carnivores are *keystone species* that are instrumental in maintaining populations balance within ecosystems (predator control on herbivores benefits plant growth and regeneration), and are often the sign of a healthy ecosystem; carnivores are *flagship species* engendering public interest in conservation in general, and financial support for conservation of their habitats; carnivores are large and wide ranging and may function as *umbrella species*, as the protection of a predator and its (usually large) range results in the protection of all species within such ecosystems.

In European cultures canids have been persecuted continually for many centuries and although some populations and species have been successfully exterminated, others persisted and are even on their way to recovery. Conflicts continue possibly because of canids' capacity to bounce back after population reductions (Macdonald and Sillero-Zubiri, 2004), because of their high productivity under favourable conditions; their dispersal and their re-colonisation ability, and eclectic diet. This versatility allows them to flourish in anthropogenic landscapes, bringing them into close contact and into conflict with people, beyond the borders of protected areas.

### ***2.3. People and carnivore's multifaceted relationship***

In people, carnivores elicit a variety of responses which sometimes conflict with each other: fears of 'child-snatching' and ideas of 'killers in the night' may co-inhabit people's imagery alongside the heroic images of automobiles or sport emblems (Kruuk, 2002; Fascione, Delach and Smith, 2004). It can be said that carnivores afford a rich cultural and historical heritage since people derive emotional value from their existence. They are beneficial to people in other ways (Clark *et al.*, 2001; Miller *et al.*, 2001; Kruuk, 2002; Fascione, Delach and Smith, 2004): evidence from case studies suggests that predators can limit numbers of 'pest' species (such as rabbits and rodents) which attack crops, especially when operating in conjunction with other factors (disease, control operations) (Kruuk, 2002); for game species, canids target the sick and infirm animals that are not desirable targets for hunters; economists are discovering that carnivores can benefit wildlife-related tourism, bringing money into visitor parks; healthy ecosystems and wildlife-related tourism can create new jobs. Kruuk (2002) also suggests that the domestication of carnivores as pets (cats and dogs) enables people to relate to, and appreciate, the character of their wild ancestors.

It has been suggested that wild predators may inspire sympathy in rural people, who will accept occasional crop raiding as a sign of necessity on the part of the animal (Knight, 2000). Such tolerance may indicate traditional integration with and knowledge of the natural environment and its cycles. In this scenario, wild predators, and rural people, or forest dwellers, are all victims of the changes to their habitat and way of life imposed by a high-growth economy (Candido, 2001). Research also shows that indigenous people and ranchers are prepared to suffer a level of uncompensated losses that are unmatched in developed countries, in order to coexist with wild predators (Frank, Woodroffe and Ogada, 2005; Karanth and Gopal, 2005).

In 1985, in his work on public perceptions of predators, Kellert suggests that negative perceptions of the wolf and coyote relate to "fears regarding their dangerousness, responsibility for causing human property damage, predatory and carnivorous nature, wilderness association, and cultural and historical antipathies" (Kellert, 1985:174). Bath's review of his own research on

attitudes towards wolves shows fear to be amongst the “strongest predictors of attitudes” (Bath, 2009:191).

Positive perceptions relate to “their large size, advanced intelligence, phylogenetic relatedness to human beings, and complex social organization” (Kellert, 1985:174). Some authors suggest large charismatic carnivores have benefited from technological developments in the media (TV and films), which helped modify their image from threatening to vulnerable (at least for urban people who overall are more exposed to the media); it has also been proposed that wolves have particularly benefited because of their large size, dog-like features, social structure, interest to people, and the fact that most people have not experienced conflict derived from co-existence with them (Bangs *et al.*; 2005; Knight, 2000).

#### **2.4. People’s livelihoods and carnivore and people conflict**

Wild carnivores may be responsible for raids on crops and livestock affecting people’s livelihoods and for carrying diseases into rural or urban areas (Fascione, Delach and Smith, 2004).

An increasing number of conservation biologists are promoting the mitigation of the harmful impact of carnivores on people and their livelihoods, searching for potential solutions to conflicts, and advocating a long lasting coexistence (Fascione, Delach and Smith, 2004). For Weber and Rabinowitz (1996) initiatives that focus on the coexistence between carnivores and humans have helped carnivores in the wild, by combining individual, organisational, and government coordinated efforts with the implementation of programmes that included applied research, training, education, law enforcement, and wildlife management. However, it is evident that there are no easy solutions where so many conflicts of interest are concerned.

Surplus killing behaviour is observed in canids (e.g.: wolf *Canis lupus* and red fox *Vulpes vulpes*) and seems to be triggered by the presence of abundant prey in movement within the predator's reach. There are many descriptions recorded of wolves' attacks as "bloodthirsty", "wasteful", "savage and cruel" where a quantity of prey is left half-eaten (Bush, 1995; Kruuk, 2002). Research on predation on free-range poultry in Europe suggests that carnivores, predominantly canids and particularly foxes, are responsible for most losses due to surplus killing, rather than losses due to avian predators (Stahl, Ruetten and Gros, 2002).

In England, as in many European countries, large carnivores were hunted to extinction for many centuries. Marvin (2000:189) suggests that foxes (*Vulpes vulpes*) continue to be hunted because they kill livestock and game birds "which should only be killed by human beings". Foxes are not perceived as a threat so long as they kill only other wild animals (taken as legitimate and natural behaviour). Hill (2004) suggests that African farmers will not tolerate damage caused by wildlife, as the wildlife is the responsibility of the state. Both lines of thinking could be extended to other predators and scenarios.

#### **2.4.1. Hunting issues**

Historically hunting predators has been a common practice as a defensive measure against attacks on settlements and stocks, to make use of their body parts and other substances, and also as a sport (Freefy, 1983; Bush, 1995; Kellert *et al.*, 1996; Knight, 2000; Kruuk, 2002). There are suggestions that in some cultural traditions the hunting of carnivores may combine the exercise of individual empowerment with fear of the animal (Miranda, 2003) and may address social needs.

According to records dating from 1400 BC (Guggisberg, 1962, in Kruuk, 2002) the hunting of large carnivores for sport seems to be an ancient tradition associated with privileges that can only be given away by the owner of the land and its wildlife. This has culminated in a lucrative business that employs safari organizers, hunter guides and game managers.



There have been suggestions that farmers and landowners will justify the hunting of certain species for sport with claims of 'pests' and 'vermin' (Marvin, 2000) however, although they are blamed for livestock losses landowners do not demonstrate hatred or despise for them, even appreciating some of their qualities and the experience of seeing them in the countryside. Earl (2009, personal communication) suggests that where hunting is outlawed hunters would need to produce a valid reason to justify their action.

Daigle, Hrubes and Ajzen (2002) have found that hunters in the Green Mountain National Forest in Vermont were exclusively male, less educated, with lower incomes and were more likely to be Native American or mixed race, rather than other visitor groups. For them hunting was associated with an enjoyment of scenery, nature, the observation of wildlife behaviour and "experiencing excitement", stress-relief and "feeling a sense of belonging and familiarity to nature", as suggested by Candido (2001), as well as with the tightening of social bounds (Daigle, Hrubes and Ajzen, 2002:10-11), playing an important role in community dynamics.

Considering the reasoning behind hunting, some authors suggest that bans on hunting *per se* may not contribute to cease conflict between people and carnivores. Bans must be accompanied by a public relations and support programme so that local people are enabled to make the transition from depletion to protection of wildlife without killing animals illegally (Hill, 2004; Kaczensky, Blazic and Gossow, 2004; Rabinowitz, 2005). Killing problem animals that are responsible for damage may also reflect wider feelings of loss of control over resources and decision making power (Hill, 2004), including a lack of satisfaction in the failure of governmental control to prevent conflict with wildlife.

As an added dimension, wolves in general have been particularly associated with "bad attitudes" and have been singled out for extermination (Mishra, 1997, in Knight, 2000) because of their cultural symbolism, while other species, capable of the same actions, have been ignored (Kellert *et al.*, 1996).

Indiscriminate hunting affects carnivore populations directly by killing and indirectly by depletion of prey stocks: as a result predators may be driven to seek out livestock and themselves be killed by farmers (Weber and Rabinowitz, 1996). In many studies (Naughton-Treves *et al.*, 2003) hunters have shown the motivation to take part in community-based conservation initiatives and sustainable-hunting, coupled with an awareness of the ecological importance of predators and with an admiration for some of their qualities (Kellert *et al.*, 1996, Knight, 2000). Hunters, therefore, have been considered as an important group in terms of wildlife conservation not only for their invested interest in the long-term future of the quarry but also because they commonly cherish an intimacy of contact with nature, and its conservation.

Seddon and Khoja (2003), however, have found that cultivating great familiarity with wildlife through hunting may reinforce biased attitudes. They suggest that public access to protected areas would be a more productive way of increasing their exposure to wildlife providing opportunities for environmental education programmes to address conservation issues.

Moreover, the use of such practices as trophy hunting and hunting privileges as a way to generate income by engaging local people and boosting conservation strategies (Kruuk, 2002; Treves and Karanth, 2003) has been criticised as it reinforces the same utilitarian logic that selects some species for conservation “for their usefulness” to the detriment of others (Knight, 2000).

Hunting is not favoured by all landowners and farmers (Marvin, 2000), not even as a form of pest control, and many people, especially in urban areas consider hunting an immoral practice (Knight, 2000). In recent times, hunters are becoming more associated with gun-culture raising concerns about public safety, as the symbolism of wild predators shifts. Whilst wild predators are no longer seen as “criminals”, their hunters often are (Knight, 2000).

## **2.5. Conflict and discourse over time**

In historical terms, both conflict and discourse may alter over time, following changes in economies and land use (Ingold, 1992; Boitani, 1995). Carnivores once seen as equals, as partners, in a nomadic subsistence economy, become the enemy, livestock pests, as expansion of intensive farming into their original territories occurs (Boitani, 1995; Kellert *et al.*, 1996). The advent of agricultural technology and higher investment in agriculture can also lower the threshold of tolerance towards an expected amount of *commensalism* or loss of produce to wildlife (Knight, 2000; Hill, 2004). As pointed out by social scientist Antonio Cândido de Mello e Souza (Cândido, 2001), new technology creates short cuts in labour and pressure to increase production and, in turn, lowers farmers' tolerance to damage and also distances them from nature. As a result previous perceptions of the wild animal and its needs change, and it can be seen as a "pest".

## **2.6. Human occupied environments and carnivores**

As with the case of the fox (*Vulpes vulpes*), the pressures of habitat impoverishment, fragmentation and destruction imposed by agriculture, timber harvesting, road building and urbanisation, have encouraged some less specialised carnivores with opportunistic habits to explore human occupied landscapes, even expanding their populations. Despite the risks for those animals that show flexibility in their feeding habits, human occupied environments can provide an opportunity not to be missed for commensalism, where they can benefit from readily available food, in concentration, in the minimum possible time. However, this may not be achieved without conflict. In urban areas, this conflict can develop when carnivores investigate rubbish (property damage, noise, odour), approach pets (preying on them, causing injuries, transmitting disease and parasites), or prey on other favoured wild species (songbirds) (Fascione, Delach and Smith, 2004, Gehrt, 2004; Messmer, 2000). Roads are responsible for a high percentage of deaths of wild carnivores as is disease transmitted by domestic animals.

Incursions by carnivores into populated areas are welcomed by some people and seen by others as a nuisance. This can be observed in Gehrt's (2004) study of striped skunks, raccoons and coyotes in the vicinity of a reserve in Chicago, USA, and in studies of bears in Japan (Knight, 2000). There is a fine line between commensalism and competition as carnivores may

also feed on domestic stock and raid or damage crops. In human occupied landscapes, the onset of conflict often depends on the tolerance of the people who are visited by carnivores in their personal territory.

## **2.7. Framework for carnivore conservation**

Humans can also be credited with positive impacts on carnivores' populations. Although protected areas were not originally created for this purpose, from the mid-late 20<sup>th</sup> century many places have assumed the role of protecting biodiversity. Government initiatives have restored the population of native ungulates (carnivore prey) to wild areas (Bangs *et al.*, 2005) in European countries and in the USA. Research into the ecological role of predators has contributed to the breakdown of negative images and beliefs. From the mid 20<sup>th</sup> century, changing beliefs and attitudes have helped raise public support for the implementation of laws, and hunting on carnivores (Breiteinmoser, 1998; Bath and Farmer, 2000; Fascione, Delach and Smith, 2004).

Boitani *et al.* (2004) argue that although most protected areas cannot meet the needs for long term conservation of large canid species, they are nonetheless vital for the conservation of wild canids, as part of more comprehensive conservation strategies catering for the entire range of wild populations and their points of contact with human elements.

Some studies about people's attitudes towards the wolf (*Canis lupus*) have found positive relationships between support for wolf conservation, lack of extreme views against the wolf, and the perception that wolves are not compromising the local economy or human settlements (Kellert *et al.*, 1996; Andersone, 2005; Randveer and Mãe, 2005). It has been suggested that areas with low primary productivity (too dry, or too cold), which are poor in cultivation and that do not support high human densities are more conducive to a higher degree of co-existence between humans and carnivores (Woodroffe, Thirgood and Rabinowitz, 2005). The fact that an

area 'can' sustain more people seems to infuse competition between people and wildlife for space resulting on pressure being put on the size of protected areas.

In a recent review of research on attitudes towards wolves in Europe and North America, Bath (2009:185) suggests that "acceptance and tolerance" has consistently increased with coexistence with this large carnivore. A long-lasting, uninterrupted coexistence with people, vast areas of wild habitat and low population density are cited as contributing factors to positive attitudes towards the wolf, and within such a picture there is an indication that a trusting relationship may be formed between local people and scientists and forest service staff.

According to Kaczensky, Blazic and Gossow.'s research (204:662), "people who hold a strong positive attitude towards (wild carnivores) will most likely:

1. support actions favourable to them;
2. tolerate damage caused by them, and;
3. maintain their position in case of conflict."

Daigle, Hrubes and Ajzen (2002:5) suggest that taking part in wildlife related recreation "is relatively stable over time" and may predict future endeavours. However people do not have to participate actively to have strong feelings about wildlife conservation (Mankin, Warner and Anderson, 1999).

## ***2.8. Relationship between local people and conservation areas***

Natural areas designated as conservation units are often islands of natural habitat surrounded by a human occupied landscape of farmland and human settlements. Worldwide, it is at this interface that much of the wildlife-people conflict develops.

Knight (2000) raises the concern that community-based conservation initiatives that emphasise involvement by and the participation of local people through incentives and benefits may reinforce a utilitarian logic. This utilitarian view would have difficulties justifying/promoting the conservation of animals that are viewed as a nuisance and as dispensable ('pests should be eradicated'), which may or may not be targeted by the conservation programme. Trophy hunting and hunting privileges as a way to improve income may fall into such utilitarian logic.

Sometimes conservation initiatives can be seen as taking the one-dimensional view that local people are the cause of conflict and that the solution is their removal from protected areas in favour of wild populations (Knight, 2000, Diegues, 2000). The attitudes of conservation professionals may vary in the face of conflict between people and wildlife at the forest edge.

Campbell (2000), Guha (2000), Kohler (2000) and Diegues (2000) suggest that many conservation projects in the developing world are fuelled by prejudice and hostility against traditional local populations who once inhabited natural areas that are now protected. They trace this model back to the North American ideology of "de-human occupied wilderness" in relation to the creation of national parks (Olwig, 1993, in Guha, 2000:95) where "all human intervention is necessarily negative for the conservation of biodiversity." Arruda (2000) suggests that the adoption of such a model in conservation units in São Paulo state fuels the rural vs urban conflict, increases the illegal exploitation of natural resources, and thus hinders the achievement of conservation objectives because of the difficulties in the management of the conservation areas.

According to Colchester (2000:234) the legislation for National Parks in South American countries follows the World Bank's model of compulsory exclusion of local people through relocation "(...) when the activities of the local population are fundamentally incompatible with the conservation objectives of the protected areas". However he stresses that social, economic and ecological problem may arise from the process of relocating people outside protected areas, and the accompanying environmental impacts on the newly occupied habitat. It is conceivable that the expulsion of traditional people, who have always lived in a sustainable way

allowing wildlife to persist in such areas in the first place, opens up the area to illegal hunting and logging (Arruda, 2000; Guha, 2000).

In some traditional cultures rural communities can be seen as “direct custodians of biodiversity” (Campbell, 2000:139; Guyer and Richards, 1996, in Knight: 2000) and their knowledge of biodiversity displays an understanding of the uses and the meanings that wild species have to their custodians (Campbell, 2000).

In 1975 the IUCN recognised the “value and importance of traditional ways of life and skills that allow people to live in harmony with their environment” (Colchester, 2000:243), recommending that governments must “maintain and encourage traditional ways of life” and “find ways to allow traditional communities to conserve their land without losing their rights of property and use.” This resolution was also approved by the World Congress of Parks (Bali, Indonesia, 1982). Colchester (2000) suggests that many traditional communities nowadays also welcome partners with scientific expertise in the search for sustainable solutions to the management of natural resources.

## ***2.9. Conflicts between urban and rural interests***

Conflict between people and carnivores, in both rural and urban areas, may not be simply the result of direct or perceived damage to either party. Anthropologists studying people-wildlife conflict have noticed that many such conflicts can be understood as people-people, or people-state conflicts. Conflicts between people and wild animals are affected by tensions and divisions in human society (Knight, 2000), so the understanding of the social-cultural dimensions of such conflicts is essential for any attempts at mitigation. Knight identifies three distinct possible relations between natural and social enemies (2000:20):

- 1) human social divisions emerge in conflicts *with* wildlife: some groups within society are more exposed to damage caused by predators than others: poorer, small forest-edge farmers are usually the most affected; culling of wild predators may be condemned by

non-locals but endorsed by local people;

- 2) human social divisions emerge in conflicts *over* wildlife: people's interest in wildlife depends on their relation to wildlife: a wild predator may be seen as a pest by shepherds and livestock farmers and as an ally by the crop farmer (controls crop-raiding herbivores); it may also result from antagonism between local farmers and urban conservationists;
- 3) conflicts with wildlife are a projection of human conflicts: the magnitude of the damage or threat caused by predators may be exaggerated or unfounded; conflict with wildlife may be a symbolic expression of social conflict, of reaction against values that are imposed by the industrialized world, by urban society and by the state. These conflicts can unite people from local communities (vehicles for social aggregation) around certain values.

People-state conflict is an important determinant in people-wildlife conflict. In both developed and underdeveloped countries the political power has been shifted progressively to the urban society, thus some distance is put between policy makers and the sources of carnivore-people conflicts. Social tensions may arise from failure to include local communities in the decision making process when attempting to address conflict reduction. This results in a feeling of being marginalised, of not being heard by urban centres and the state (Knight, 2000; Hill, 2004). Reserves and parks are in a delicate position as the local representatives of environmental values and law enforcement in boundary regions where conflicts may arise. Conservationists often hold dialogues with policy-makers, seeking legal support for conservation measures (Richards, 2000; Colchester, 2000); such approaches may reinforce already existing divisions between local people and the government, fuelling alienation and conflict.

Although the intensity of wildlife raids on crops can be a heavy toll on the livelihood of local people (Campbell, 2000), it is possible to achieve a minimal balance (Cândido, 2001). The situation changes when local people find that the forested where or near where they live has become protected. Protection usually results in an increase in the wildlife population, which may intensify conflict (Messmer, 2000). Imbalance results with local people becoming more vulnerable to wildlife pressures, as the populations of protected species increase. This may result in insufficient production to live on, exacerbated by restrictions on traditional ways of



supplementing their livelihood with hunting, fishing, and gathering. The relationship between reserves and local people may become unsustainable (Campbell, 2000) once people begin to feel that the state favours wildlife over local people. Farmers in Uganda, where hunting is illegal, state that ‘they are being forced into illegal activities to protect their livelihoods’ (Hill, 2004:281). Western and Waithaka (2005) suggest that the exclusion of rural communities in developing countries, who bear the brunt of conflict, from the economic use of wildlife is responsible for the intensification of conflict.

Messmer (2000:99) differentiates between rural agricultural producers and rural residents, in respect to their attitudes towards wildlife, and suggests that since many people have been leaving cities to live in rural areas, ‘the views of rural residents about wildlife may not differ substantially from urban residents except that they personally experience more of the benefits and problems caused by wildlife.’ He cites amongst the rural residents’ reasons for choosing a rural lifestyle as ‘the opportunity to live close to nature’. Farmers, on the other hand, tend to view wildlife in ‘utilitarian terms’ and are more concerned with the economic impact of wildlife (also Kellert *et al.*, 1996).

## ***2.10. Perceptions of conflicts between local people and wildlife***

Kvaalen (1998) suggests that people who have experienced livestock predation by wild carnivores can maintain a position against carnivores’ extermination, as long as they are kept in conservation areas and places where they can pose no threat to domestic animals. In reality, such ‘confinement’ of wild carnivores proves hard to achieve, and the success of conservation efforts depends on promoting the conservation of populations of the target species beyond the boundaries of the conservation units and onto neighbouring private land.

Although conservation on private land is pivotal to the success of carnivore populations, problems may rise from different perceptions of biodiversity between conservationists and landowners. It is essential for the promotion of local conservation that those involved strive to

understand the landowners' perceptions of conflict, since it is likely that their beliefs will influence their attitudes and behaviour towards wildlife (Hill, 2004; Bueno, 2005). Landowners near protected areas may have to contend with inflexible regulations and with authorities that are restricted by low budgets. This may be reflected in low morale and lack of training and knowledge about carnivore ecology and mitigation strategies among park officials (Maehr, 2004). Being aware that carnivores will most likely disperse beyond the limits of the protected areas, efforts must be made to ensure their protection outside reserve boundaries. The cooperation of landowners is essential for conservation efforts on the edge of public land and at the urban-wilderness interface and must be enlisted using all available resources.

The anthropologist Catherine Hill (2004) highlights a series of factors that contribute to farmers' perspectives:

1. economic losses as a direct consequence of conflict with wildlife may not be high, but may have a cascade effect generating disruptions and increased work for household members;
2. although losses may be small at local or district level, individual farmers may suffer considerable losses to depredation by wildlife;
3. tolerance of wildlife varies depending on many circumstances; eg: although significant damage caused by domestic animals may be often tolerated, small losses caused by wildlife (owned by the state) may not: governments may be seen as 'bad neighbours' who do not look after its stock responsibly;
4. conflict with wildlife can be perceived as part of a larger process of 'loss of control over resources or particular aspects of their lives': where farmers are not allowed to take action against problem wildlife, there may be expectations of governmental control to prevent wildlife causing damage and conflict may rise when these expectations are not met (Hill, 2004:280).

As an added dimension, attacks by large carnivores on livestock can be felt by the producers not only as an economic but also as an emotional burden (Knight, 2000; Breck, 2004) promoting a general feeling of insecurity and anxiety in remote areas.

Alternatively, the conflicts are not always as real as the discourse about the conflict might lead others to believe. Claims of “wildlife pestilence” (Knight, 2000) or damage may be made by inefficient farmers to justify losses, to attempt to maximize compensation, to justify the established traditions that regard hunting as a sport (see Marvin, 2000, on foxhunting in the UK), or because exaggerated fears of what could happen cloud the recognition of what actually happens. In a similar way, wild predators may be mistakenly blamed for attacks that are actually caused by domestic or feral dogs or other culprits.

Social and cultural constructs, influenced by previous experience, help to define individual perceptions of the risk of damage caused by wildlife. The ‘visibility’ of a species (in relation to size and habits – diurnal, etc), the degree to which wildlife is considered to be ‘dangerous’, and the extent to which the individual feels in control of wildlife activities may influence people’s perception of risk in relation to a particular species (Hill, 2004). When comparing people’s attitudes towards wolves, mountain lions and bears in Euro-America, Kellert *et al.* (1996) concluded that European carnivores provoke much stronger reactions and more negative images: the wolf is the number one animal associated with bad attitudes. Such attitudes suggest that the fear of wolves comes from European settlers and is transferred to their relationship with the corresponding native species.

### **2.10.1. Socio-demographic determinants**

Socio-demographic conditions also influence people’s attitudes towards carnivores, as groups are not homogenous in the way that components experience conflict (Kellert *et al.*, 1996; Kaltenborn and Bjerke, 2002; Hill, 2004). Research suggests that socio-economic variables, people’s cultural upbringing and environment, and personal experiences are largely responsible for their attitudes towards wildlife and towards carnivores (Kellert, 1985; Bath and Buchanan, 1989; Kellert *et al.*, 1996; Kaltenborn, Bjerke and Vitterso, 1999; Mankin, Warner and Anderson., 1999; Bath, 2000; Messmer, 2000; Mattson, 2004; Kleiven, Bjerke and Kaltenborn, 2004; Kaczensky, Blazic and Gossow, 2004; Mattson, 2004; Bath, 2009). Pronounced differences in attitudes may be found amongst and between groups within a society, according to age, gender, place of residence, employment sector and education (Kellert, 1985; Mattson,

2004). All of these influence wildlife-related knowledge and attitudes. Such attitudes may vary over time in response to increased knowledge of wildlife and conservation issues (Mankin, Warner and Anderson., 1999), and may be influenced by socio-economic changes (Ingold, 1992), and by the introduction of new cultural values (Candido, 2001).

According to Kellert *et al.* (1996:980) the profile of people who tend to be more positive towards large carnivores is:

- young adults;
- college-educated;
- urban residents;
- higher income;

Kaczensky, Blazic and Gossow's (2004:662) review of the works of Hook and Robinson, 1982 (Kaczensky, Blazic and Gossow, 2004); Bath, 1991; Kellert, 1994; and Kellert *et al.*, 1996 indicates a profile of people who tend to be more negative towards carnivores:

- older people;
- females;
- lower education level;
- working in natural resource dependent professions;
- living in rural areas;
- living within the carnivore's range.

Kaltenborn, Bjerke and Vitterso (1999) have also found similar correlations in their study of attitudes towards large carnivores in Norway. Kleiven, Bjerke and Kaltenborn (2004) confirm that negative attitudes are higher in older people, women, those with low level education, rural residents and those who suffer from economic loss due to carnivores.

There are suggestions that group membership and 'socialization' are strong predictors of people's attitudes towards carnivores (Bath and Buchanan, 1989; Kaltenborn and Bjerke, 2002; Bath, 2009). These can influence attitudes even more than occupation, distance from species range and education levels: people who grew up on livestock farms (no matter what their present occupation) and stock growers belonging to highly educated groups (no matter how distant from carnivore habitat) may oppose carnivore conservation while people affiliated to wildlife conservation societies (no matter their education level) may support it.

Kaltenborn and Bjerke (2002:55) have also found that positive attitudes amongst biologists suggest "concern for the ecocentric values, but also to values like curiosity, excitement, and variation in life." They suggest that at the root of the farmer's negative attitudes towards large carnivores in Norway there is a 'concern for personal and family security, health, respect and loyalty for elders and traditions, and for economic income and social power'. Bath (2009) suggests that associations between age and attitudes may be a result of "the era in which attitudes were formed, rather than attitudes changing over time" (Bath, 2009:191).

### ***2.10.2. Further cultural issues***

Another facet of the political dimension of the people/carnivore conflict is that wild predators, as synonymous with conservation of wilderness, may come to symbolise rural 'backwardness' or 'primitiveness' (Knight, 2000; Miranda, 2003). The eradication of wild predators is in many cases part of a process of modernisation and urbanisation, within a political-economic agenda for rural development. In this context, the possibility of attacks by large predators is hardly attractive to outsiders moving to, or visiting or investing in residential, commercial or industrial development.

Diegues (2000:3) points out that globalization may give the illusion that "relationships between diverse societies and the natural world are the same everywhere", but solutions seeming to work for conservation in developed countries often do not yield the same results in developing countries. In this case, lack of success, rather than being caused by lack of funding, technical

expertise, or vigilance, is more likely to be the consequence of an inadequate model. Chicchón and Painter (2005:41) also draw attention to problems resulting from ideas of “working with a community” as a homogenous and concise group. They suggest a more productive approach “that identifies entities characterized by compatible interests and builds shared agendas based on those interests.” Although conservation issues may have global implications, conservation problems are a consequence of local societal relationships with nature making cultural particularities and people’s attitudes even more relevant to research.

Diegues (2000) finds that traditional societies are not the only ones with a role to play in biodiversity conservation, but rather they must be seen as allies in the process<sup>1</sup>.

### ***2.11. Considering the human dimensions in people-carnivore conflict and mitigation***

Research and knowledge on a given species biology is not enough to shift public perceptions about its impact (Woodroffe, Thirgood and Rabinowitz, 2005). Internationally there is a growing need for information from the social sciences to enable investigation of local people’s perceptions of conflict with wildlife and of what might constitute an effective solution for them. This might enable an understanding of the context of the conservation problem, and promote the finding of permanent solutions (Clark *et al.*, 2001; Macdonald and Sillero-Zubiri, 2004; Michelle *et al.*, 2005; Woodroffe, Thirgood and Rabinowitz, 2005).

Macdonald and Sillero-Zubiri (2004) strongly suggest that conservation biologists ought to take past experiences of conflict between rural people and canid into consideration. They suggest

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<sup>1</sup> They mustn’t be mistaken with “born conservationists”, as they form heterogeneous groups, with varied interests, qualities and setbacks, and many of such communities are going through a process of social and cultural unravel, and loss of traditional values and technologies, as a consequence of being absorbed into urban-industrial societies (Diegues, 2000:41).

that conservation biologists should “acknowledge the inconvenient reality that canids can be a bloody nuisance”, and consider the consequences of such reality in canid conservation projects (Macdonald and Sillero-Zubiri, 2004:366). There are suggestions that research into the human dimensions of people-carnivore conflicts can help build partnerships as it works towards an understanding of the issues of a variety of interest groups, as well as the interests of wildlife (Bath and Majic, 2001; Hill, 2004). As suggested by Bath and Majic (2001:23) ‘identification of types of conflict (cognitive, values, costs/benefits, and behavioural conflicts) (is) the first step toward conflict resolution’.

Some suggest education may be used in conjunction with other forms of mitigation and market mechanisms to “enhance the positive values of biodiversity and reduce the negative” (Western and Waithaka, 2005:367). According to Taylor (2009) education programmes for the conservation of wild carnivores tend to target three distinct audiences: children; adult groups in favour of carnivore conservation and adult groups opposed to carnivore conservation. It is necessary to understand the human dimensions (beliefs, attitudes, socio-political and cultural dimensions) of target groups, before negative aspects can be effectively targeted for change (Bath, 2009; Taylor, 2009). Identifying the groups biased against conservation should also help to avoid wasting precious time “preaching to the converted” (Taylor, 2009:165).

Bath (2009:191) suggests that education campaigns to change people’s attitudes (which must be based on an assessment of local people’s beliefs and attitudes) should target “elements of fear” of carnivore’s behaviour through factual information (number of attacks on people and property and population trends), in combination with messages that target people’s values towards wildlife and conservation (Bath, 2009:189).

Kellert *et al.* (1996) and Kaczensky, Blazic and Gossow. (2004:662) propose that awareness of characteristics such as “threatened species status and declining population trend generally result in a more positive attitude towards large carnivores, as do financial or emotional incentives”. It has been suggested that movies can be a vehicle for deep and long-lasting changes in people’s attitudes towards wildlife conservation. Macdonald and Sillero-Zubiri (2004:116) suggest that education about the rarity of a species, its life style and ecological

context can affect people's tolerance, as "knowledge is the route to understanding, and understanding is the basis of appreciation and thus value." They also suggest that education affects value, by "recalibrating the perceived costs and benefits that give a measure of conflict", thus making the combination of biological knowledge and economic knowledge a powerful tool in education.

### ***3. Aims and Objectives***

- to study and compare the attitudes of people who play a part in the conservation of the maned wolf in rural and urban areas of the southeast of Brazil, within the domain of the species;
- to investigate how such attitudes may influence the maned wolf's status and conservation in such areas;
- to suggest how conservation strategies may be improved by incorporating such knowledge into their efforts to conserve both wolf and habitat.

### ***4. Research Questions***

1. What are the attitudes of the various interest groups towards the maned wolf, conservation and towards other interest groups?
2. Are these attitudes compatible with conservation biologists' views of maned wolf conservation?
3. What attitudes must be addressed by conservation programmes to improve compatibility between people's attitudes and the conservation of the maned wolf, and to decrease any conflict between local people and the maned wolf?
4. Do conservation professionals address local people's concerns about living with the maned wolf?



5. What conservation views must be addressed/adapted to improve compatibility between those initiatives intended to protect the maned wolf and the attitudes of local people, and to decrease conflict between local people and the maned wolf?

According to Kellert *et al.* (1996:978), peoples' attitudes towards large, charismatic ("having charisma: having compelling attractiveness or charm, from the Greek *kharis*: favour, grace"-Oxford Dictionaries online, 2010) carnivores depend on four interacting variables:

1. Physical and behavioural characteristics of a species, such as its size, perceived intelligence and personality, hunting techniques;
2. Peoples' basic values about animals and nature affecting their perception of individual animal species;
3. People's knowledge and understanding of a species, including facts, concepts and conservation awareness;
4. Past and present experiences of interaction with a species, including conflict, recreation, material use, etc.

The perceptions of people towards each of these variables will be investigated by the research with the aim of identifying their attitudes towards the maned wolf.

Demographic and social-economic factors may play a role in people's positive/negative attitudes towards carnivores (Bath, 1991, Kellert, 1994; Kellert *et al.*, 1996, Kaczensky, Blazic and Gossow, 2004), and act as stimuli in the development of attitudes (Rosenberg and Hovland, 1960, in Semin and Fiedler, 1996). The relationship between demographic and social-economic factors and observed attitudes towards the maned wolf conservation will also be investigated in the study with the aim of identifying profiles of people with the most positive and negative attitudes towards the conservation of the maned wolf.

## CHAPTER TWO: Study area and species

The maned wolf was already established in South America when the first human settlers arrived during the last Ice Age (Dietz, 1984), and it apparently experienced no significant impact from the time of the arrival of the Portuguese settlers in 1500 until the mid 20<sup>th</sup> century (Miranda, 2003). This time was marked by human population growth and deforestation intensification involving large areas of the southeast of Brazil. Since the proclamation of the Republic (1889) a *march towards the west* (Villas Boas and Villas Boas, 1994) began the dissemination of ideas of urbanization as *progress*; in opposition to this, wild habitats were seen as *backwardness* (Miranda, 2003). At this point, intensive pressures and the interaction of many factors (as described in Chapter One after Kruuk, 2002; Miranda, 2003; Fascione, Delach and Smith, 2004) resulted in the local extinction of a variety of carnivore species populations and in the endangerment of others. The present chapter is divided into the following sections: The Cerrado; The maned wolf; The southeast of Brazil; and People and maned wolf conflict and conservation. Sections one and two convey relevant information to characterize the biome where the maned wolf is found within the research areas, its socio-economic history and environmental problems; and to characterize the species, its ecology, habits and issues surrounding its conservation. Section three conveys relevant information about the social and economic development of the region where the research took place and about the development of its people's relationship with nature. In Section four I will transpose the scenario set up in Chapter One to the specific reality of people's attitudes in south-eastern Brazil, based on science, legislation, research focussing on local people, and on their impact on maned wolf conservation. I will also indicate, when appropriate, the position of conservation biologists about the maned wolf status, its ecology, threats to it and the wolves' relationship with people.

### 1. The Cerrado

Cerrado is the Portuguese name given to Brazil's central plateau. It is characterized by gallery and dry forests, savannas, grasslands and woodlands (Eiten 1977, Ribeiro *et al.* 1981, in Klink

and Machado, 2005). The Cerrado plateau extends from the Amazon rainforest in the north and northwest to the Atlantic rainforest on the east coast, and from the wetlands of the Pantanal in the West to the arid Caatinga of the northeast, including part of São Paulo State (MMA, 2009).



**Figure 1.** The Cerrado in the Low Mogiana region, with *lobeira* plant (photo by the author, 2007)

The expansion and modernization of the agriculture in the Cerrado has resulted in great revenue generation: soybeans and soy products are some of the largest exports from Brazil and the cattle herds kept in this biome are the largest in the country (Klink and Moreira, 2002, Klink and Machado 2005). Agricultural expansion, however, has had strong social and environmental impacts, creating habitat fragmentation, loss of biodiversity, biological invasion, soil erosion, water pollution, land degradation, change in the fire regime, imbalances in the carbon cycle and modification of the regional climate with a consequent decrease in rain fall (Klink and Moreira 2002; Klink and Machado, 2005). Knowledge about the drivers of habitat fragmentation and other environmental impacts becomes essential to facilitate decision making in conservation

and management initiatives within the Cerrado. This section will provide a concise picture of the processes involved in the development of the Cerrado, the impacts of these on the maned wolf's habitat, and responses of conservation initiatives to them.

### **1.1. History of Occupation**

When European settlers arrived in Brazil in the 16<sup>th</sup> century the Cerrado was occupied by a number of indigenous groups who made use of plants and animals for subsistence (Maybury-Lewis, cited by Klink and Moreira, 2002, suggest that Xavante and Xerente people were the most numerous). Fire was commonly used as a hunting aid (Leeuwenber and Salimon, 1999, cited by Klink and Moreira, 2002). The occupation of the Cerrado by the Portuguese crown was guided by a frontier perspective (similar to the image of the “expansion westward with its new opportunities” in the West of North America, in Watson and O’Riordan, 1976:5): campaigns inland (the *bandeiras*) leaving from São Paulo village were organized in search of precious minerals and indigenous people for enslavement. In the early 18<sup>th</sup> century such campaigns established settlements along their way, originating the cities known today. Farming followed and where mines dwindled cattle ranching developed (Klink *et al.*, 1993, 1995, in Klink and Moreira, 2002). Major development of the Cerrado was however hindered by its distance from the main centres and the coast and by the lack of a transportation system. The construction of the first railways (1905) linking the port of Santos to São Paulo city and to the states of Minas Gerais and Mato Grosso, combined with the newfound wealth generated by the “coffee boom” in São Paulo, provided the means for a more intensive exploitation of the Cerrado. The so called “coffee oligarchy” encouraged a growing market for Cerrado cattle (Hees *et al.* 1987, in Klink and Moreira, 2002), which enabled the first major Cerrado economic growth during the 1920-30. After the Second World War railways were replaced by roads as the main transport system linking all regions in Brazil. Brasilia was constructed in the heart of the Cerrado in the 1960s promoting the development of new and better access routes to connect the new capital with São Paulo (Klink and Moreira, 2002).

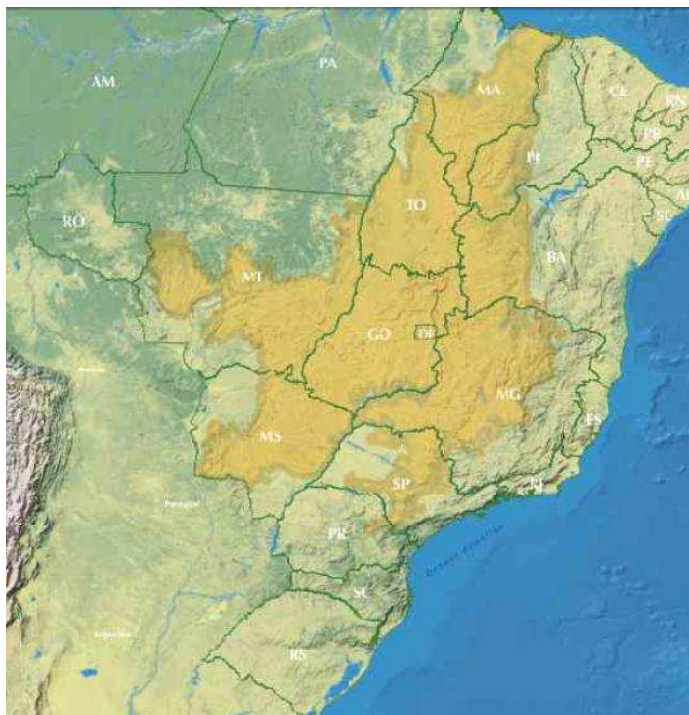
Between 1870 and 1960 the Cerrado population grew twice as fast as that of the rest of Brazil, as a consequence of internal migration (Klink and Moreira, 2002). The Cerrado land use was

greatly impacted by the population growth and by the development of agriculture, particularly after the 1960s. Klink and Machado (2005) estimate that by 2005 over 50% of the Cerrado natural cover had been turned into planted pasture and plantations (mainly soybeans and corn). Tax incentives and low-interest farm loans were used by the Brazilian government as instruments for the promotion of agricultural development in the Cerrado between 1960-1980 (Klink and Moreira, 2002). Concomitantly new technologies (fertilizer, heavy use of herbicides and pesticides, machinery) enabled the improvement of the Cerrado nutrient-poor, acidic soils for agricultural use. As a result, the greatest agricultural expansion occurred between 1970 and 1985 (Klink and Moreira, 2002). However revenue originated from such expansion is not equitable. Incentives have favoured large land holdings and wealthy farmers and developments in technology and machinery have resulted in a decline in employment and in the rural population (Cunha *et al.*, 1994, in Klink and Moreira, 2002). Those who did not benefit were the small farmers and indigenous groups and social inequality was fomented. Klink and Moreira (2002:84) suggest that the Cerrado is “appropriate for sustainable agricultural activities” and they point out that some are already in use. Due to the environmental variability of the Cerrado habitat, where some systems are resilient in the face of change and others are highly sensitive to human usage, some authors suggest the implementation of agro-environmental zoning (with areas for conservation, areas for cattle, areas for planting, etc) (Goedert, 1990; Cunha *et al.*, 1994; Klink *et al.*, 1995; Mueller and Pufal 1999, in Klink and Moreira, 2002).

## 1.2. The Biome

The Cerrado (figure 1.2.) is characterized by a mosaic of vegetation types, including tree and scrub savannah, grassland with scattered trees, occasional patches of a dry, closed canopy forest called “Cerradão”, and grasslands (Kronka, 1998; CI, 2009). The vegetation shows adaptations peculiar to the dry climate: trees have twisted trunks covered by thick bark, with broad and rigid leaves, and many herbaceous plants store water and nutrients in special subterranean organs (Kronka, 1998; CI, 2009). The Cerrado is the second largest biome in Brazil (after Amazonia) and South America (Juarez and Marinho-Filho, 2002). It is considered to be one of the world's 35 biodiversity “hotspots” (richest in endemic species, where more than 70% of original habitat has been destroyed, Mittermeier *et al.*, 2005), and it occupies an area of 2 million km<sup>2</sup> (21% of the country, Klink and Machado, 2005). It is home to the most diverse

savannah florals in the world and to a large number of endemic species, presenting a high degree of richness in birds, fishes, reptiles, amphibians and insects (Klink and Moreira, 2002; Klink and Machado, 2005; Mittermeier *et al.*, 2005). Only 2.2% of its domain is protected, and natural areas are highly fragmented and subject to pressure from the invasion of exotic animals and plants, hunting, and fire near urban areas (Rodrigues, 2002; Klink and Machado, 2005). Habitat fragmentation is one of the major threats to the endemic species of the Cerrado, such as the maned wolf needing large home ranges. Estimates suggest that at least 137 species in the Cerrado are threatened with extinction (IBAMA, 2003; Hilton Taylor 2004, in Klink and Machado, 2005) due to habitat loss and human exploitation of forest products. Klink and Machado suggest that in spite of its richness the biodiversity of the Cerrado is “generally unappreciated” thus it is the object of less conservation efforts than the Amazon and the Atlantic Rainforests (2005:708). They also suggest that 20% of its endemic and threatened species remain outside protected areas (Machado *et al.* 2004a, in Klink and Machado 2005).



**Figure 1. 2. The Cerrado biome. Cerrado Biome Programme (MMA, 2004)**

The Cerrado has been called “the upside-down forest” because up to 70% of its biomass is underground (Castro and Kauffmann 1998, cited by Klink and Moreira, 2002) in roots reaching deep down into the subsoil to find water. The Cerrado is a fire adapted ecosystem, although frequent burning to stimulate new growth for pasture has caused environmental problems such as erosion. Fires are commonly used to clear land and affect negatively the establishment of trees and shrubs, changing the composition of the environment. Savannas are cleared, burned and seeded with invasive African grasses for pasture, while fertilizers and lime are used in intensive agriculture, causing the eutrophication of waterways (Klink and Machado, 2005). The impact of habitat destruction and disturbance is felt by endemic species, such as the maned wolf and its food sources, provoking decline and endangerment of wildlife populations.

### **1.3. Conservation**

Changes imposed on the Cerrado in the last 40 years have led to the upsurge of conservation initiatives from varied sources, such as local and international NGOs, research institutions and the private sector. Their initiatives have promoted the creation of biodiversity corridors, the establishment of biosphere reserves, projects supporting the participation of indigenous communities in management plans, and the creation of alternative economic activities, such as ecotourism and the sustainable use of Cerrado products, etc (Klink and Machado, 2005). A work group was set up by the Brazilian Ministry of the Environment (MMA), and it produced the Sustainable Cerrado Programme in 2004 (MMA, 2004). The aim of the programme was to facilitate an open dialogue between “society and government” and to create the basis of “consistent public policies aiming at the conservation, restoration and sustainable development” of the Cerrado biome (MMA, 2004:5). The elaboration of action plans for endangered species such as the maned wolf is amongst the main actions suggested by this programme.

### **2. The Maned Wolf**

Information about the ecology of the maned wolf is an essential tool in the understanding of the decline of populations and the relationships between the maned wolf and people. Some authors (Boitani *et al.*, 2004) consider the one species approach to conservation inadequate for reaching long-lasting results, and suggest that conservation efforts must be focussed on ecosystems. However they emphasize that the single species approach “might be justified when the species plays the role of keystone or umbrella species...” (Boitani *et al.*, 2004:158). The maned wolf is, arguably, a charismatic carnivore species with a wide home range, qualifying it to fit both roles.

The maned wolf (*Chrysocyon brachyurus*, Illiger, 1815) is a large endemic South American canid (up to 90cm tall at the shoulder, averaging 23.3 kg) (Dietz, 1984). Maned wolves are



easily identifiable by their long dark legs, orangey brown coat and dark mane (Consorte-McCrea, 1994a). In captivity longevity has been recorded as up to 16 years (Sillero-Zubiri, Hoffman and Macdonald, 2004).

**Figure 2. The maned wolf (The Ark Gallery, 2005)**

## ***2.1. General Characteristics and Ecology***

In spite of its large size the maned wolf is atypical in habits. In canids, social systems and diet usually correlate to body size, and large canids (over 13Kg) are commonly found in large groups, with monogamous or polyandrous mating systems, large litter sizes, offspring care shared by non-parental individuals, and cooperative hunting allowing large prey to be caught and shared (Bestelmeyer, 2000). Maned wolves are solitary and monogamous and have small litter sizes (2-3 in the wild, Rodrigues, 2002), however individuals are capable of hunting large prey (such as Pampa's deer) (Dietz, 1984; Bestelmeyer, 2000).

In evolutionary terms, canid species are all derived from a single pair organisation, and amongst most of the canid family pair bonding is still the norm, with males helping to rear the offspring (Kruuk, 2002). This has been observed in maned wolf breeding pairs (Dietz, 1984; Paula, Medici and Morato, 2008). It is possible that, despite their size, maned wolves have retained such ancestral traits as there was a lack of selective pressure for cooperative hunting (Dietz, 1984) and that monogamy, mutually exclusive foraging and strict territoriality are adaptations fulfilling the energetic demands of a large size body in an environment with scattered food



resources. Studies of the maned wolf in the wild and also of the Cerrado habitat, however, have shown that large prey is available and is occasionally consumed by maned wolves (Bestelmeyer, 2000) and that the Cerrado supports a greater abundance of small prey and fruits than predicted (Bestelmeyer, 2000).

According to Mattson (2004:164), generalists like the maned wolf are amongst the “most robust carnivores to human impacts”. Carnivores within this category, however, are usually small and have large litter sizes that can compensate for high rates of mortality. They explore a wide range of food items and habitats, and are able to make use of alternative prey and habitat (better than specialists) including human occupied areas.

Other traits are very similar in all canid species, for example sounds, scent marking, visual displays, hunting and prey catching behaviours and others (Macdonald and Sillero-Zubiri, 2004). Therefore, a general knowledge of some better-researched canid species can be extrapolated to a certain extent to species where research is lacking, as can be the case with the maned wolf.

### ***2.1.1. Distribution and abundance***

The maned wolf is monotypic, no geographic races are recognized (Dietz, 1984). The absence of the maned wolf's fossil remains outside the Brazilian Central suggest that the species evolved in that region, possibly during the Pleistocene Age, or even earlier (Langguth, 1975, in Dietz, 1984).

Each monogamous pair occupies a territory of about 25-100 km<sup>2</sup> (Dietz, 1984; Rodrigues, 2002), encompassing a variety of vegetation types. Their original distribution covers the open areas of Paraguay, north Argentina, Bolivia, Peru and possibly Uruguay, central and southern Brazil, inhabiting Cerrado, wetlands and swamps (Pantanal) (Dietz, 1984; Campanilli, 2005; Paula, Medici and Morato, 2008).

In 1930 Miller, from the Colorado Museum of Natural History, described the “red wolf” as “by no means abundant (but) fairly common” in the Mato Grosso region of Brazil (Miller, 1930:13). In 1946, Vieira stated: “although not common anywhere, (the maned wolf) is well known inland in São Paulo state, where it inhabits preferentially grasslands and Cerrado.” (Vieira, 1946:151). This was endorsed by Coimbra-Filho (1972). Maned wolves are found in low densities throughout their range, and are not abundant anywhere due to their solitary habits and large home ranges that commonly do not overlap.

The most likely population estimate is of 21,746 individuals occupying an area of 394,000 km<sup>2</sup> (estimated density equals between 0.03 and 0.010 individuals per km<sup>2</sup>, depending on the population, after Paula, Medici and Morato, 2008). A recent population viability analysis concluded that, generally speaking “a population of 25 or less maned wolves decreases and has a high probability of extinction within 100 years and a population of 50-100 wolves may persist though displaying a low degree of genetic variability” (Paula, Medici and Morato, 2008:105). These results indicate how vulnerable maned wolf populations are to even small declines in number and the figures are useful as guidelines for the management of wild populations in face of threats.

### **2.1.2. Habitat**

The maned wolf’s geographical distribution includes a variety of habitats: grasslands, Chaco, Pantanal, Pampas, Cerrado, Caatinga (Dietz, 1984). Favourite habitats are tall grassland, shrub, woodlands with open canopy (Cerrado) and wet fields (Pantanal), which may be seasonally flooded. The maned wolf is also present in cultivated lands (agriculture and pasture) and where the rainforest has been cut down and replaced by conifer and eucalyptus plantations (Dietz, 1984; Santos,1999; Santos, Setz and Gobi, 2003; Paula, Medici and Morato, 2008) possibly indicating some adaptation to environmental change. Pasture and areas previously used by people such as sugar cane, soy, coffee and corn plantations may also be used by maned wolves for resting and foraging (Santos, 1999; Mantovani, 2001; Rodrigues, 2002; MMA, 2008). Typical habitat is however preferred by them (MMA, 2008), and it is feared that such niche displacement may result in changes in population dynamics, dispersal patterns and activity cycles, with unforeseen consequences to the future of the species (Paula, Medici and

Morato, 2008). This will also bring them closer to contact with people.

### **2.1.3. Diet and Feeding habits**

The maned wolf is considered to be an omnivorous generalist, seasonally opportunistic for fruits and insects (Dietz, 1984; Motta-Junior *et al.*, 1996; Bestelmeyer, 2000; Ferraz, 2000; Motta-Junior, 2000; Queirolo and Motta-Junior, 2000; Aragona and Setz, 2001; Bueno, Belentani and Motta-Junior, 2002), with the consumption of such items varying throughout the year, although seasonality is reduced at higher altitudes (Aragona and Setz, 2001).

The main items of the maned wolf's diet have been frequently identified as wolf's fruit, or *lobeira* fruit (*Solanum lycocarpum*) (figure 2.1.3.), and small rodents (Dietz, 1984; Motta-Junior *et al.* 1996; Juarez, 1997; Jácomo, 1999; Motta-Junior, 2000; Aragona and Setz, 2001; Belentani, 2001; Bueno, Belentani and Motta-Junior, 2002; Santos, Setz and Gobi. , 2003). While the consumption of *lobeira* fruit and armadillos seems to be aseasonal, rodents are mostly eaten during the dry season (April to September) and miscellaneous fruit and insects during the wet season when they are more abundant (Dietz, 1984; Motta-Junior *et al.*, 1995; Ferraz, 2000; Motta-Junior, 2000; Bueno and Motta-Junior, 2004).

Dietz (1984) suggests that the predator-prey interaction between maned wolves and cricetid rodents has evolved since the late Pleistocene, when both were dispersing throughout South America.

The maned wolf includes a large spectrum of prey size in its diet (0.02g to 16,300.0g), and although it may take prey as large as deer occasionally (Bestelmeyer, 2002; Bueno and Motta-Junior, 2004) most of the animal food content of its diet comes from small mammals. A trend has been suggested linking an increase in food size with body size in carnivora (Rozenzweig, 1966, cited in Bueno and Motta-Junior, 2004), and Bueno and Motta-Junior (2004) suggest that maned wolves' high consumption of small vertebrates results from its solitary hunting strategy

and from the low density of ungulates in South America. Compared with smaller carnivores, the maned wolf can travel over larger areas, increasing its chance of meeting a broader variety of prey.



Figure 2.1.3. *Solanum lycocarpum* (*lobeira*, or “wolf’s” fruit) in Cerrado (photo by the author, 2007)

Lombardi and Motta-Junior (1993:127) suggest that the maned wolf is ‘an efficient disperser of the *lobeira* *S. lycocarpum*’ because of its habit of patrolling extensive ranges, including trails, roads (Bestelmeyer, 2002) and other disturbed areas, which seem to be favoured by adult *lobeira* plants. Dietz (1984) suggests that the *lobeira* prefers more organic soils and for that reason it is commonly located near corrals and along horse trails. Courtenay (1994), Ferraz (2002) and Santos, Setz and Gobi. (2003) suggest that seeds, once passed through the maned wolf’s digestive tract are significantly more viable than control seeds. Maned wolves seem actively to seek out *lobeira* fruits (Motta-Junior, 1995, Santos, Setz and Gobi., 2003), as they exude a typical smell when ripe all year round. Such preference may account both for maned wolves ‘patrolling’ of disturbed areas and for their extensive ranges.

Silva and Talamoni (2003) observed that the scarcity of *lobeira* fruit and the supplying of bovine meat and the availability of human rubbish were responsible for a major consumption of animal

items (88% of total mass of scats) in the maned wolf' diet in the Serra da Caraça private reserve (hotel and ecotourism facility). They suggest that such a diet may be deleterious to their health (lacking carbohydrates and fibre). Amongst the anthropic items consumed by maned wolves within this supplemental feeding regimen they found bovine meat, chicken, and pig, prunes, beans, orange peel, papaya, watermelon, corn, and many inorganic items such as aluminium foil, stones and plastic. They also suggest that their pattern of space utilization (location and centre of activity, size of core area) was 'strongly influenced by the anthropic interference' after maned wolves had been fed bovine meat by people in that sanctuary for over 20 years (Silva and Talamoni, 2003:342). It is possible that the supplying of meat made it unnecessary for the wolves to use a more extensive area. Aragona and Setz (2001:131) also show concern for high amounts of "potentially harmful tourists' garbage" in parks where maned wolves make regular visits to camping areas and consume the left-overs found in rubbish bins (in their research 40% of scats in summer and 25% in winter contained inedible anthropic material).

The percentages of food items of both animal and plant origin are essentially similar in different parts of the maned wolf's range in Brazil (Dietz, 1984; Motta-Junior *et al.*, 1996; Juarez, 1997; Jácomo, 1999; Queirolo and Motta-Junior, 2000), although the proportions and variety of items consumed within such categories may vary. Local conditions (vegetation type, altitude, management practices, fire, grazing, farming and humanised areas) determine the composition and distribution of fruits and animals in space and time, thus affecting the composition of the maned wolf's diet.

Miller *et al.* (2001) relate the fact that prey species can detect predators at a distance in open habitats, consequently fleeing or entering burrows, in open habitats. They suggest that large body size may limit the number of prey species available but the fact that they specialise in the capture of a few prey species (such as rodents) may increase the probability of capturing prey. The population of specialised predators fluctuate with the population of prey. Interestingly, the very conspicuous maned wolf seems to have developed a close ecological relationship with the *lobeira* fruit, which has benefited both, possibly allowing the issue of specialisation on prey species to be bypassed.

Opportunistic predatory behaviour is typical of carnivores living in structurally complex systems, where they hunt by ambush and with access to a variety of prey species. As suggested by Miller *et al.* (2001:207) “because the diet of an opportunistic predator is broad, it can be expected to exert broader top-down community effects than a species of specialist predator” (characterizing the maned wolf as an umbrella species). The population of opportunistic predators should be stable, as they can switch to alternative prey, according to its abundance.

#### 2.1.4. Predation on domestic stock and crops

Although known to take poultry, table 2.1.4. shows that such remains were only found in 0.3-1.5% of analysed scat samples of maned wolves under no supplementary feeding regime (Bueno, Belentani and Motta-Junior, 2000; Motta-Junior 2000; Bueno and Motta-Junior, 2002; Anic, 2002; Rodrigues, 2002) or not at all (Aragona and Setz, 2001; Juarez and Marinho-Filho, 2002; Santos, Setz and Gobi, 2002). Bueno, Belentani and Motta-Junior (2000) have found domestic chicken remains in the droppings of maned wolves in disturbed areas of Itapira, SP. Juarez and Marinho-Filho (2002) have no identifiable traces of chicken or other livestock in the maned wolf's faeces in a Cerrado region bordering Bahia and Goiás states. Nor were such remains found by Santos, Setz and Gobi (2003:206) in a cattle farm in Minas Gerais state: “wolf tracks were never observed approaching domestic animals in the pasture.”

Author/location	Food item	Occurrence within the samples of faeces %	Estimated biomass within the sample of faeces %
Bueno, Belentani and Motta-Junior (2000) Itapira, SP	chicken	1.5%	2.8%
Silva and Talamoni (2003). Serra da Caraça, MG	chicken bovine meat pig	3.8% 0.8% 1.0%	0.12% 0.013% 8.0%
Motta-Junior (2000) Jataí, SP	chicken	0.3%	0.79%
Anic (2002) SP, MG	chicken	0.8%	
Bueno and Motta-Junior (2004), SP	chicken	0.44%	1.21%
Juarez and Marinho-Filho (2002), Jaborandi, BA	livestock	0	0
Santos, Setz and Gobi. (2002), Matias Barbosa, MG	livestock	0	0
Aragona and Setz (2001), Ibitipoca, MG	livestock	0?	0?

Table 2.1.4. Incidence of chicken (and other domestic meat) remains within maned wolf scats

Silva and Talamoni (2003) have noted bovine, chicken and pig meat in scat samples, which were included in the category of anthropic items consumed by maned wolves in a supplemental feeding regimen (Serra da Caraça Natural Reserve, Minas Gerais state).

In Jataí Ecological Station, São Paulo, surrounded as it is by sugar-cane plantations, Motta-Junior (2000) observed indications of low predation on chickens. This he characterizes as “one chicken for each 67 predated rodents- wouldn’t this be a fair trade?” Motta-Junior (2000:337). Small amounts of orange (*Citrus sp.*) and sugar cane (*Saccharum*) were also found in maned wolf faeces in the area.

In Anic’s study in the southeast of Brazil, one chicken for every 62 rats was found on average. Anic’s (2002) conducted 99 interviews with local people and analysed 1451 maned wolf’s scats and from this she suggested that local people’s convictions about the maned wolf’s consumption of chicken does not correspond to the components actually found in their diet (table 2.1.4a.):

Percentage of food components in diet:		
Food items	Interviews	Faeces
Fruits	24.1%	37.45
Rats, hares, marsupials	12.1%	26.6%
Insects	0.4%	4.0%
Chickens	18.0%	0.8%
Other livestock	5.0%	0.0

Table 2.1.4a. Percentage of believed and observed food components in the maned wolf’s diet (Anic, 2002)

### 2.1.5. Social behaviour

Maned wolves are solitary and highly territorial animals, having little tolerance for conspecifics outside their breeding pair. Their appearance is very conspicuous and they stand out on the grassland landscape. Scent marking and roar-bark vocalisations are used not only to communicate with neighbouring maned wolves and keep boundaries but also as a form of communication between the pair (Carvalho, 1976; Dietz, 1984; Consorte-McCrea, 1994a and

1994b). They live in monogamous pairs (although one male may overlap the territory of more than one female) sharing a territory but perhaps only meeting during the breeding season (Carvalho, 1976; Dietz, 1984).

Studies of maned wolf home ranges have shown a variation between averages of 27km<sup>2</sup> in Serra da Canastra National Park (Dietz, 1984); and 54.66 km<sup>2</sup> in Águas Emendadas Ecological Station (Rodrigues, 2002). Home ranges are not restricted by reserve boundaries and may cover unprotected, inhabited rural areas, where wolves may rest, care for the young, and possibly search for food. The extent of maned wolves' home ranges may reflect the abundance and distribution of the *lobeira* fruit (Rodrigues, 2002).

The dynamics involved in the dispersal of carnivores like the maned wolf have important implications in their conservation, as illustrated by Maehr (2004):

- 1 They are programmed to seek out and colonize vacant ranges;
- 2 Their dispersal effort and the distance moved is determined by population density;
- 3 Females have philopatric tendencies, but may disperse on occasion.

Furthermore, the young and inexperienced maned wolves are compelled to search unfamiliar habitat for vacant territories: this makes them more vulnerable to road accidents and to coming into contact with human occupied areas (Rodrigues, 2002).

### **2.1.6. Competition**

Maned wolves share their habitat with many other carnivores, including the bush dog (*Speothos venaticus*), crab-eating fox (*Cerdocyon thous*), hoary fox (*Pseudalopex vetulus*), Pampa's fox (*P. gymnocercus*), puma (*Puma concolor*), jaguar (*Panthera onca*), Pampa's cat (*Oncifelis colocolo*), jaguarundi (*Herpailurus yaguarondi*), crab-eating racoon (*Procyon cancrivorus*), hog-



nosed skunk (*Conepatus semistriatus*), and grison (*Galictus cuja* and *G. vittata*). The diet of the maned wolf overlaps with that of the crab-eating fox, hoary fox, Pampa's fox (all smaller than the maned wolf) and with domestic dogs (Juarez and Marinho-Filho, 2002; Bueno and Motta-Junior, 2004; Sillero-Zubiri, Hoffman and Macdonald, 2004) although no direct competition has been observed. Some of these animals have a more carnivorous diet than the maned wolf, possibly making them the true culprits of predation of poultry commonly attributed to the maned wolf. However, in a study comparing feeding habits, Bueno and Motta-Junior (2004) found indication of chicken (*Gallus gallus*) in maned wolves' diet in Itapetininga Experimental Station, SP, while the same item was not found in the crab-eating fox's diet.

Santos, Setz and Gobi (2003) suggest that in heavily farmed regions during the dry season when pasture is scarce, cattle will compete with maned wolves for the *lobeira* fruit.

### **2.1.7. Disease and parasites**

Evidence of tuberculosis has been found in a wild animal; hemo-parasites have also been recorded. In captivity maned wolves are susceptible to canine viruses, such as canine distemper, parvovirus, rabies, and adenovirus (Sillero-Zubiri, Hoffman and Macdonald, 2004), which can be transmitted by stray dogs and add to the threats they pose to the maned wolf. The giant kidney parasite *Dioctophyma renali* is very common in wild animals and may inhabit a kidney for long periods of time (Carvalho, 1976; Rodden and Blakely, 1987).

## **2.2. Conservation**

### **2.2.1. Threats**

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. Other threats are: presence of domestic and feral dogs in the vicinity of protected areas; retribution killings and hunting; killing for the harvesting of body parts, and loss of genetic variability (more details in section 4.5.).

### **2.2.2. Protection status and conservation measures**

In Brazil the maned wolf is on the National List of Threatened Species from the Brazilian Fauna (MMA, 08). In recent years its status has moved from *vulnerable* to *near threatened* by the IUCN Red Data Book (IUCN, 2009), and it is included in CITES – Appendix II.

The threatened status of the species makes it very unlikely that the IBAMA (Brazilian Institute of the Environment and Renewable Resources) would authorize the sacrifice of a maned wolf unless under three extreme circumstances:

1. for scientific research, when the need is properly justified;
2. where there are health complications, if the animals is ill, or carries disease and therefore represents a threat to public health;
3. in legitimate defence, in response to animal attack. In this case an authorization is not required, however evidence of the danger has to be presented to justify the killing.

Although no conservation measures are specifically aimed at the maned wolf, it benefits from programmes to protect the Cerrado biome and wild fauna (Sillero-Zubiri, Hoffman and Macdonald, 2004). Maned wolves fall within the governmental managerial strategy of *preservation*, which aims to protect carnivores by monitoring of their numbers and by preventing poaching or illicit killing (Treves and Karanth, 2003). Under such a form of protection, animals that are found in human areas or caught killing livestock may be trapped but not killed, while authorities from the nearest park are called upon to deal with the situation. This was reported by rural people during Anic's interviews (2002) and in personal communications.

Should wild carnivores take livestock the proprietor may file a claim for compensation from the government; this implies bureaucracy and is little used in response to maned wolf attacks on poultry (rural interviews and personal communication, 2007). Translocation may be used in such cases (Rodrigues, 2002; personal communication, 2007), but results vary. Treves and Karanth (2003) suggest that *preservation* is beneficial since it has saved carnivore populations from impending extinction. It has also made possible the systematic study of carnivore species, critical for wildlife management and public involvement in conservation. However *preservation* involves high “investments of personnel, time and resources” (Treves and Karanth, 2003:1493): boundaries have to be demarcated and patrolled, poachers must be intercepted and prosecuted, claims for damage have to be verified and importantly, the community must be engaged; non-lethal methods of carnivore control can be expensive to install and to maintain. There are also political costs in the opposition of farmers, hunters and members of the local community.

The ‘Action Plan for Canid Conservation into the 21th Century’ (Sillero-Zubiri, Hoffman and Macdonald, 2004:310) considered amongst priorities for canid conservation over the next 10 years: education and public relations, aiming to ‘investigate education strategies in relation to conservation goals – lessening human-canid conflict; reducing disease transmission; explaining ecological role of carnivores – which provides a framework to help the planning and effective implementation of conservation campaigns, through the use of ‘literature review, interviews, questionnaire surveys to define primary conservation goals, target groups, geo-political, social and cultural contexts affecting peoples’ attitudes to wild canids.’

Working in partnership with academics, NGOs and local and national governmental offices (CENAP-IBAMA, 2008), the IBAMA has established action plans for a variety of endangered carnivores. The first Maned Wolf Action Plan (Paula, Medici and Morato, 2008) was published in 2008 following the first International Workshop for the Conservation of the Maned Wolf – Analysis of population viability and habitat (CENAP-MMA, IUCN Canid Specialist Group). The plan proposes to “recognise the main threats to the maintenance of the species and to identify the socio-economic questions involved in its conservation” and presents new data on population estimates and management proposals for species and habitat (Paula, Medici and Morato, 2008).

The CENAP (National Centre for Research and Conservation of Wild Predators) also promotes initiatives aimed at addressing conflict between local people and wild predators through a national programme; a detailed data bank associated with GIS for the control and monitoring of predation occurrences; capacity building and environmental education courses about conservation of wild carnivores for biologists, education professionals and students (CENAP-IBAMA, 2008). The maned wolf is amongst the main species targeted by the programme.

### ***2.2.3. Legal Framework***

Brazil abides by three international conventions that provide the legal framework for conservation of endangered species: the American Countries' Convention for the Protection of Flora, Fauna and Natural Scenic Beauty (since 1965) and CITES (since 1975). Both are concerned with traffic and trade regulations to protect endangered species while the CDB (1994) establishes criteria for the restoration of degraded ecosystems and endangered populations (MMA, 2008).

Nationally, the Forestry Code (Law nº 4.771, 15/09/1965) concerns areas of permanent protection for the preservation of wild endangered species of fauna and flora; the Law for the Protection of Fauna (nº 5.197, 03/01/1967) defines any species of wild animal, including their nests, shelters and natural nurseries, as the property of the State and establishes that their use, persecution, destruction, hunting or collection are prohibited. The Brazilian Constitution of 1988 also promotes the protection of fauna and flora and “prohibits any actions that may jeopardize their ecological function, provoke the extinction of species, or submit animals to cruelty.” The implementation of the Law of Environmental Crimes (1999) aims to better regulate the application of the latter (MMA, 2008).

According to the IBAMA, punishment for unlawfully killing a maned wolf is covered by the Law of Environmental Crimes: The Law of Life (Lei da Vida), no. 9605 of the 12<sup>th</sup> of February 1998 (Decree no. 3179 of the 21<sup>st</sup> of October 1999), chapter V, section I, of the crimes against fauna<sup>2</sup>.

The protection of biodiversity is further detailed in the National Policy for Biodiversity plan directives (Decree: 4339, 22/08/2002), and the law 10683 (of 8/05/2003 attributes to the MMA the responsibility for policies concerning the conservation and sustainable use of biodiversity, ecosystems and forests (MMA, 2008).

### ***3. The Southeast of Brazil***

#### ***3.1. Social development and impact on biodiversity***

The south-east of Brazil is comprised of the states of Minas Gerais, Espírito Santo, Rio de Janeiro and São Paulo. The region is the most developed in Brazil and concentrates most of its economic wealth, thereby contributing the most to the nation's GDP. Localities within the region share some socio-economic development traits. Understanding the implications of the forces driving the development of the region and understanding the local people's relationships with the natural environment is necessary for the comprehension of their attitudes towards

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<sup>2</sup> Article 29. Killing, persecuting, hunting, catching, making use of species of wild fauna, native or in migratory routes without the appropriate permission, license or authorization from the competent authority, or in disagreement with the one obtained:

Sentence: fine and detention (6-12 months)

Paragraph 4o: the sentence is increased by half if the crime is committed against a species that is considered threatened with extinction.

biodiversity conservation and for the empowerment of informed conservation strategies. This section will explore such elements.

In Brazil traditional<sup>3</sup> populations are fishing and riverside communities (*caiçaras*), small and traditional farmers (*sitiantes*), communities of slaves' descendents (*quilombolas*), gatherers (*extrativistas*), and indigenous populations, which are found in different concentrations in the whole of the south-east. In São Paulo State the majority of the traditional population is called *caipira* (Candido, 2001), the result of the miscegenation between the Portuguese and the indigenous people. The *caipira culture*, maintained by rural people, refers to cultural and ethnical models resulting from the contact between the Portuguese and the new environment (Candido, 2001; Arruda, 2000).

In São Paulo State the Portuguese and the indigenous peoples were thrown together during the *bandeiras* movement (between the 16<sup>th</sup> and 18<sup>th</sup> centuries, anticipating the "march towards the west" movement of the 20th century). This group originated the small farmers in the areas of mineral extraction and coffee expansion (Darcy Ribeiro, 1995, in Arruda, 2000). The Portuguese culture lost ground in favour of the indigenous culture, which was more adapted to the environment and to mobility (Candido, 2001).

At the end of the 17<sup>th</sup> century small plantations (corn, beans, manioc, pumpkin, mostly Amerindian traditional crops) were established along the inland penetration routes to feed the colonizers and explorers (Candido, 2001). Such crops formed the bases for the *caipira* subsistence plantations, complemented by gathering, hunting and fishing, all adopted indigenous techniques that reinforced bonds between the *caipira* and the natural environment. Chickens, and occasionally pigs were common livestock.

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<sup>3</sup> Arruda (2000:278) defines "traditional societies" as "human groups culturally differentiated that historically reproduce their ways of life, in a more or less isolated way, based on forms of social cooperation and specific forms of relationship with nature, which are traditionally characterised by sustainable management of the environment."

The establishment of agriculture as a central occupation in the 18<sup>th</sup> century (especially sugar cane) was responsible for promoting sedentary habits and the “softening” of character and customs of the *caipira* (Candido, 2001). With this expansion came the advent of villages and large farms in São Paulo and Minas Gerais States, bringing plenty: food, including livestock, was more varied and more available and better equipment was used. The closed-economy circle was broken and new ways to adjust to the environment were developed. New social stratification into layers was formed in line with the new economic and cultural levels: the landowner was followed by the small farmer (*sitiante*), who in turn was followed by aggregates without stability (Candido, 2001).

By the mid 20<sup>th</sup> century, rural people had grown to depend more on villages and cities for manufactured goods and for food. Gathering was in decline, as fruits became rarer, and hunting was almost totally limited to the defence of plantations and livestock. The new “march towards the west” that started with the institution of the Republic (1889), was a march towards urbanization connected to accelerated industrialization and the opening of markets. As a consequence of the capitalist expansion the *caipira* had to work harder: the pressure resulted in individualization and detachment from the social and economic harmony with the local environment towards a regional and national context (Candido, 2001). The relationship between the group and the natural environment was thus altered and with it the knowledge and use of natural resources. The previous ecological balance was tipped.

Conflicts between urban and rural interests are a recurring theme in the conservation of carnivores. Integration into the political/economic context of urbanized areas denied the *caipira* their original self-sufficiency and alienated them from the decision-making process, now centralised in urban governments (Cândido, 2001). The implications of such separation between rural and urban interests in the Brazilian scenario will be explored further in Section four.

### **3.2. Research Locations**

2006 (IBGE, 2009)	Mogi Mirim	Mogi Guaçu	São Carlos	Franco da Rocha	São Paulo
<b>Cattle heads/establishments</b>	8,746/198	12,601/268	32,509/225	102/7	502/19
<b>Pigs and hogs</b>	17,486/87	1,670/125	13,559/75	307/9	3,970/39
<b>Poultry</b>	1,398,046/158	399,666/245	1,917,083/125	1,090/9	3,278/43
<b>Honey production</b>	2,000kg	2,700kg	105,000kg	340kg	0

Table 3.2a. Livestock production per municipality. Source Censo Agropecuário 2006 (IBGE, 2009)

Field work was based mainly on three locations of São Paulo State (Greater São Paulo; São Carlos; and the Low Mogiana region), with complementary data from a number of other localities within São Paulo State. The socio-economic composition of the areas, as well as the pressures placed on their natural environment relate to particularities of their history and development. The revenue, generated by the coffee boom of the late 19<sup>th</sup> early 20<sup>th</sup> centuries, was centralized in São Paulo city, today a cosmopolitan megalopolis.

2007 (IBGE, 2009)		Mogi Mirim	Mogi Guaçu	São Carlos	Franco da Rocha	São Paulo
<b>Agricultural establishments</b>	<b>Number</b>	652	629	367	27	193
	<b>workers</b>	2709	2661	2522	134	767
	<b>Area hectares</b>	27,542	68,436	51,315	621	7,285
<b>Permanent crops</b>	<b>Orange plantations hectares</b>	5,571	13,644	6,600	0	0
	<b>Value</b>	R\$63,086,000	R\$155,005,000	R\$33,578,000	0	0
<b>Temporary crops</b>	<b>Sugar cane plantations hectares</b>	4,900	8,000	23,000	0	0
	<b>value</b>	R\$17,199,000	R\$24,960,000	R\$81,144,000	0	0
<b>Cereals, legumes and oils seeds</b>	<b>Corn plantations hectares</b>	4,282	7,898	2,900	0	0
	<b>value</b>	R\$5,035,000	R\$8,356,000	R\$4,815,000	0	0
<b>Vegetable extraction and silviculture</b>	<b>Production of timber for paper &amp; cellulose</b>	4,424 cubic metres	487,003 cubic metres	480 cubic metres	0	0
	<b>value</b>	R\$177,000	R\$ 19,480,000	R\$34,000	0	0
	<b>Eucalyptus</b>	–	12,000 hectares			
	<b>Pinus</b>	–	6,000 hectares			

Table 3.2b. Agricultural production per municipalities. Source IBGE, Produção Agrícola Municipal 2007; Censo Agropecuário 2006 (IBGE, 2009)

This wealth, invested in services, in trade and industry, owed much to the input and expertise of migrants from Europe, Asia and the Middle East. The other municipalities were born from small settlements used by the *bandeiras*. Their development was also a result of the expansion of coffee plantations in tandem with the expansion of the railways, which connected them primarily



to São Paulo city and the port (Santos) and were used to circulate the coffee production. With the end of the slave trade in 1850 and the end of slavery itself in 1888, migrants were primarily recruited to work in the plantations and so played an important role in the development of trade and industry.

This section contains details about the different municipalities and the places visited during the research (CUs, zoos, and schools). This should help when examining the local people's attitudes investigated in this study and when placing them in the wider context of local socio-economic structure and environmental pressures. Tables 2.3a, b and c provide a comparison of the livestock, agricultural and commercial make up of the different research areas.

2006 (IBGE, 2009)	Mogi Mirim	Mogi Guaçu	São Carlos	Franco da Rocha	São Paulo
<b>Mining and quarrying industry</b>	7	22	23	0	242
<b>Employees</b>	109	55	172	0	1765
<b>Manufacturing industry</b>	429	488	1080	200	55686
<b>Employees</b>	8598	10591	22196	3565	605693
<b>Vehicles/white goods sales &amp; repair</b>	1895	2797	5807	945	245125
<b>Employees</b>	6390	8676	17967	3633	970040
<b>Production and distribution of electricity, gas and water</b>	3	4	3	5	354
<b>Employees</b>	215	228	421	87	19879
<b>Construction</b>	49	72	215	49	14769
<b>Employees</b>	467	501	1760	396	199801
<b>Real estate activities, rents and services rendered to enterprises</b>			1473		147232
<b>Employees</b>			8396		968096
<b>Public administration, defence and social security</b>				15	546
<b>Employees</b>				1719	832753
<b>Agriculture, livestock, silviculture and logging</b>	52	92	179	5	2298
<b>Employees</b>	450	2687	1444	4	6321

Table 3.2c.: Enterprise structure of the municipalities. Source Cadastro Central de Empresas, 2006 (IBGE, 2009)

### 3.2.1. Greater São Paulo

**Figure 3.2.1.: Satellite image of Greater São Paulo and Santos (coastal port) (Landsat7, 2009)**

São Paulo city metropolitan region, or Greater São Paulo (see figure 3.2.1.), is comprised of 39 adjacent municipalities covering an area of 7,943.818 km<sup>2</sup>, and inhabited by 19,616,060 people (IBGE, 2008). It is the largest urban area in South America, and the 6<sup>th</sup> largest in the world. São Paulo city is the capital of São Paulo State; the Franco da Rocha municipality belongs to the Greater São Paulo.



#### 3.2.1.1. São Paulo city

##### **History**

Founded by Portuguese Jesuit monks in 1554, it became the city of São Paulo in 1711 by decree of the Portuguese king. São Paulo was then the starting point of the crown expeditions inland- the *bandeiras* (Prefeitura de São Paulo, 2009).

With the creation of the law faculty in 1826 the city became an important political and academic centre in Brazil and with the expansion of the coffee plantations it turned into an important economic focus point. The influx of migration from all over the world converged there, firstly employed to work in the plantations, and then in the expansion of industry. In the 1940s industry had become the main economic force and combined with expansion of the transport system a new influx of migrants was attracted, particularly from the northeast of the country

(Prefeitura de São Paulo, 2009). In the 1970s services had become the main economic force in the city, as industry moved to the Greater São Paulo.

### General Information

In São Paulo annual temperatures average 19°C, with altitudes of 760m above sea level and it occupy an area of 1,523 km<sup>2</sup> (IBGE, 2009). São Paulo has a very diverse population of 10,886,518 inhabitants (IBGE, 2009) and is one of the most populated cities in the world (Brazil has a total of 183,987,291, IBGE 2009). Table 3.2.1.a. gives general information about all research locations.

2007, (IBGE, 2009), Wikipedia 2009	Mogi Mirim	Mogi Guaçu	São Carlos	Franco da Rocha	São Paulo	Brazil
Population	87,800 (2008)	138,494 (2008)	212,956 (2007)	121,451	10,886,518	194,227,984
Area km <sup>2</sup>	499	813	1,141	134	1,523	8,514,876
Urban Area km <sup>2</sup>		43.48	67.25			
Rural area km <sup>2</sup>		839.85				
inhabitants/km <sup>2</sup>	166.87		186.7			
Urban population (estimated)	73099	118,848	183,433			
Rural population (estimated)	8,368	8,044	9,565			
Green areas		167,956 km <sup>2</sup>				
Native forest		1,400 ha				
Woodlands hectares	8,258	10,313	10,749	128	3,862	
		Cerradão: 4,000 ha Cerrado: 500 ha				
Natural pasture hectares	1,118	37,472	13,018	157	604	

Table 3.2.1.a. General information on municipalities (IBGE, 2009; IBGE, 2008; Wikipedia, 2008)

### Economy

2006 (IBGE, 2009)	Mogi Mirim	Mogi Guaçu	São Carlos	Franco da Rocha	São Paulo	Brazil
GDP per capita	R\$ 18,975	R\$ 14,649	R\$ 14,344	R\$ 10,489	R\$ 25,675	US\$6,852
GDP Agriculture/livestock	R\$ 73,837,000	R\$ 159,449,000	R\$ 90,207,000	R\$10,403,000	R\$19,912,000	
GDP Industry	R\$ 650,268,000	R\$ 967,502,000	R\$ 864,488,000	R\$ 595,531,000	R\$ 54,428,484,000	
GDP Services	R\$ 816,469,000	R\$ 967,502,000	R\$ 1,820,197,000	R\$ 588,183,000	R\$ 181,192,940,000	
Poverty Incidence (2002/03)	53.60%	18.06%	12.08%	54.46%	28.09%	

Table 3.2.1.b.: GDP and poverty incidence of the municipalities. Source IBGE, Diretoria de Pesquisas, Coordenação de Contas Nacionais 2006 (IBGE, 2009).

São Paulo is considered to be the financial heart of Latin America (Prefeitura de São Paulo, 2009; Cidade de São Paulo, 2009), with its largest part generated by services; its GDP per capita is possibly the highest in the country (see table 3.2.1.1b.). According to IBGE (2005) São Paulo State is the largest contributor to Brazil's GDP (31.8% in 2003). Table 3.2.1.1b. shows the GDP and poverty incidence in the municipalities covered by the research.

São Paulo is the most important communication and media centre in Brazil (competing only with Rio de Janeiro) making it vital as an originator and distributor of opinions, with strong decision making powers (Ministry of Communications, 2009). Attitudes that are current in São Paulo may reflect the main trends in other urban centres in Brazil, and may also influence them.

21% of the city is covered by green areas (Atlas Ambiental de São Paulo, 2009), including parks and conservation units managed by the government either local or São Paulo State.



São Paulo  
Zoo

Figure 3.2.1.1. São Paulo zoo, maned wolf street (photo by the author, 2008)

São Paulo Zoo Park Foundation first opened in 1959, created by the São Paulo State government. It is the largest zoo in Brazil and it is considered by IBAMA (Brazilian Institute of the Environment and Natural Renewable Resources) as a category “E” zoo, the highest level in terms of quality. Lying within the CU Ipiranga State Park, it occupies an area of 900,000m<sup>2</sup> covered by Atlantic rainforest, and it is served by the Ipiranga River head, which forms lakes used by the zoo and by migratory birds. The river water is treated as part of a programme to limit impact and to preserve the integrity of the river system (Fundação Parque Zoológico de São Paulo, 2009).

The zoo houses more than 3,200 animals and has approximately 1,600,000 visitors per year from a variety of places of origin. It also has its own conference centre and library (Fundação Parque Zoológico de São Paulo, 2009), which are used by the scientific community.

São Paulo zoo is engaged in research and is active in environmental education and conservation projects. These include the re-introduction of native species, environmental enrichment for captive animals, captive breeding, veterinary and behavioural studies. It has links with other research institutions and universities in Brazil and abroad. It promotes courses for teachers, monitored visits, educational presentations, research programmes, apprenticeships and work placements (Fundação Parque Zoológico de São Paulo, 2009).

### 3.2.1.2. Franco da Rocha

#### **History**

In the 19<sup>th</sup> century Franco da Rocha was a small conglomerate of farmlands serving *bandeirantes* from São Paulo city on their way inland to Minas Gerais State. In 1888 the São Paulo Railway inaugurated the Franco da Rocha-Juquery station, thus facilitating local development. Mining was the first local industrial activity (Prefeitura de Franco da Rocha, 2009).

### **General Information**

Franco da Rocha has a population of 121,451 inhabitants distributed within an area of 134 km<sup>2</sup> (table 3.2.1.1a.). Its largest GDP is generated by industry, closely followed by services (table 3.2.1.1b.). Economic development focuses on programmes to improve the existing local commerce and micro enterprises (Prefeitura de Franco da Rocha, 2009).

The city was awarded recently a “Model-Municipality” title in recognition of the work carried out to preserve green areas and conservation units. Franco da Rocha has been commended by the IBAMA on both a regional and a national level (Prefeitura de Franco da Rocha, 2009).

### **Juquery State Park**

The park (figure 3.2.1.2a.) is considered to be the last remaining fragment of Cerrado in the metropolitan region of São Paulo city. It was created in 1993 to conserve important remnants of native vegetation existing in the Juquery Farm, as well as to preserve the nearby water system serving the metropolitan region. Juquery State Park is located in the northeast region of Greater São Paulo, occupying areas of the Franco da Rocha and Caieiras municipalities. It extends over 1,927.7 hectares where previously existed the Psychiatric Hospital and Agricultural Colony of Juquery. The park is an extension of the Cantareira mountain range and has an average altitude of 900 metres. It is formed by a mosaic of Cerrado islands, grasslands and Atlantic rainforest remnants. Most of its coverage is “campo limpo” grassland, possibly due to the frequent fires that affect the area and help to maintain this characteristic landscape (Instituto Florestal, 2009).

As a State Park, Juquery’s main objectives are the preservation of ecosystems and genetic diversity. Its aims are scientific, cultural and educational as well as recreational (Parque Estadual do Juquery, no date). The Park is under permanent preservation status and it is open to visitors who enjoy local waterfalls, lakes, ponds and rivers and engage in trekking and observation of fauna and flora (Instituto Florestal, 2007).

**Figure 3.2.1.2a.: Juquery State Park's location within São Paulo state (Instituto Florestal, 2009)**



Although there are no recent records of maned wolves in the park, other species endemic to Cerrado are found there, for example cariamá (*Cariama cristata*), egret (*Egreta thula*), owls, wood-pecker, howler monkey (*Alouatta fusca*), armadillo, opossum, capybara (*Hydrochaeris hydrochaeris*), deer (*Ozotoceros bezoarticus*), ocelot (*Felis pardalis*), coati (*Nasua nasua*), crab-eating-fox (*Cerdocyon thous*), many arthropods, rodents, snakes and lizards. 250 flowering plant species have already been catalogued in the park (Instituto

Florestal, 2009) including the wolf's fruit (figure 3.2.1.2d.).

The park has an auditorium and a visitors' centre. It offers environmental education talks to local schools, as well as guided visits accompanied by tutors (figure 3.2.1.2e.). The park also employs and houses researchers (biologists, geographers) working on surveys of local fauna and who investigate a variety of themes such as invasive species, erosion, environmental education, plant reproduction.



Figure 3.2.1.2b. Entrance to the Juquery State Park (photo by the author, 2007)



Figure 3.2.1.2c. View of adjacent Franco da Rocha from CU (photo by the author, 2007)





Figure 3.2.1.2d. Cerrado habitat in the Juquery State Park (photo by the author, 2007)



Figure 3.2.1.2e. Educational facilities in the Juquery State Park (photo by the author, 2007)

Located within a region of great urban expansion (see figure 3.2.1.2c.) the park suffers constant anthropic attacks, according to the Parks management and to the Forestry Institute (personal communication, 2007; Instituto Florestal, 2009). The park also suffers other pressures, for example (personal communication, 2007) stray dogs; poaching – hunting and fishing; escape of prisoners/inmates from the adjacent jail; the invasion of heavy off road vehicles: jeeps, motorbikes; breeders and riders of domestic horses using the conservation unit; and forest fires caused

by stray balloons, burning rubbish and leaves, and arson.

Environmental education has been used as a tool to make visitors aware of the importance of the reserve and of its problems. Environmental education targets students from neighbouring areas and aims to include the local population.

## Education

2007 (IBGE, 2009)	Mogi Mirim	Mogi Guaçu	São Carlos	Franco Rocha	da São Paulo
Primary schools (“ensino fundamental”)	38	50	63	37	2,725
High schools (“ensino médio”)	13	27	34	19	1,199
Pre schools	34	66	51	30	2,998
Higher education	2	2	3	0	146

Table 3.2.1.2. Educational institutions in the municipalities. Source INEP Ministry of Education, 2007 (IBGE, 2009)

Table 3.2.1.2. allows a comparison between numbers of schools in each of the municipalities involved in the research.

### 3.2.2. São Carlos

#### History

The original village was also a result of the *bandeiras* moving inland towards the gold mines of Goiás e Mato Grosso States. The city was founded in 1880. The region participated in the coffee expansion of the late 19<sup>th</sup> and early 20<sup>th</sup> centuries, an event which took São Paulo State by storm. Income generated by coffee was invested in the creation of banks and schools, in electricity distribution, sanitation, communications, transport and other infrastructures powering urban expansion and priming the city for the development of industry. From the 1930s the

manufacturing industry became the main economic force. Today small and medium sized industries together with many multinational businesses are based in São Carlos (Prefeitura de São Carlos, 2009). The city is also an important regional centre for commercial enterprise.

In the second half of the 20<sup>th</sup> century academic and technological development was boosted by the foundation of the São Carlos Faculty of Engineering, and by the Federal University of São Carlos- UFSCar. These were followed by other higher education and research institutions. It is believed that at present the city has a ratio of one PhD researcher for each 180 inhabitants (national ratio is one PhD for each 5,423 inhabitants) (Prefeitura de São Carlos, 2009).

### General Information



Figure 3.2.2a. São Carlos city (Google maps, 2009)

São Carlos (see figure 3.2.2a.) is located in the geographical centre of São Paulo State, 231km from São Paulo city. Average temperatures reach 19.6°C and the average altitude is 856

metres. The predominant biome is Cerrado on the sandy high plain soils, and Atlantic rainforest on the rich soil patches. Remnants of these are preserved by the local CUs (Prefeitura de São Carlos, 2009). The total population numbers 220,425 inhabitants occupying an area of 1,132 km<sup>2</sup> (table 3.2.1.1a.).

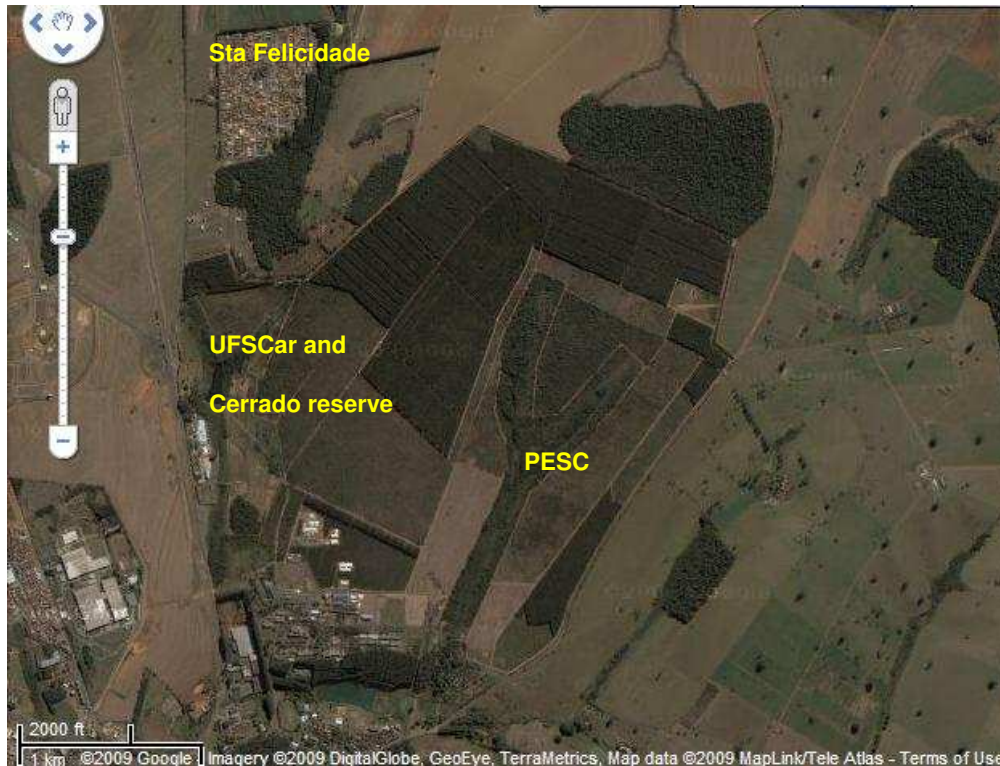


Figure 3.2.2b. Northern São Carlos – UFSCar, PESC, Sta Felicidade (Google maps, 2009)

The most important agriculture and livestock products are: milk, sugar cane, oranges, chickens, beef and corn. In recent years orange plantations have been replaced by sugar cane producing both sugar and fuel (personal communication, 2007). Sugar cane plantations are also known as the “green desert” because of the detrimental effect they have on biodiversity. Nevertheless, according to local people the maned wolf is frequently seen in such plantations (interviews, 2007).

The main revenue is produced by services and industry followed by agriculture (table 3.2.1.1b.).



Figure 3.2.2c. Sugar cane plantation and UFSCar Cerrado reserve in the distance (photo by the author, 2007)

## Education



Figure 3.2.2d. Dr. Alvaro Guião State School, São Carlos city centre (photo by the author, 2007)

The State Schools Dr Alvaro Guião and the Prof Gabriel Félix do Amaral where questionnaires were distributed are run by São Paulo State Government and provide education from the 5<sup>th</sup> year of fundamental school up to (and including) sixth-form. The State School Dr. Alvaro Guião is located in the city centre and serves mostly urban residents, while the State School Prof. Gabriel F. do Amaral is

located in the western outskirts (Botafogo neighbourhood) where many students from rural locations attend. The Municipal School Carmine Botta, where questionnaires were also distributed, provides fundamental (equivalent to up to year 10) education and it is located in the neighbourhood of Jardim Beatriz (south-western outskirts) and also serves rural areas.

The UFSCar, its Cerrado reserve and the rural neighbourhood covered in this research (“Vale da Santa Felicidade”) are all situated in the northern region of São Carlos (figure 3.2.2b.).

The Federal University of São Carlos (UFSCar) is a prestigious institution run by the state. It was founded in 1968 and occupies an area of 645 hectares, including a build up area of 105,000 m<sup>2</sup>. The CEMA (Special Office for the Natural Environment) was created in 1993 in response to Rio 92. It coordinates UFSCar’s projects and programmes related to its natural areas and water treatment and it is responsible for the management of UFSCar’s Cerrado Reserve (UFSCar, 2009).

### **UFSCar’s Cerrado Reserve**

The reserve (figure 3.2.2a.) occupies an area of 150 hectares, inhabited by endemic plant and animal species. It is used by the departments within the Biological Sciences division for research and practical activities, as well as for preservation purposes. Monitored visits along a nature trail of 1.8km of Cerrado are organized by the department and led by graduate students. Local primary and secondary schools benefit from such visits. The Reserve impacted by many things (personal communication, 2007):

- Visitors- walking, jogging, cycling;
- Unrestricted access is allowed to the public by the university;
- There is no control and indiscriminate access is detrimental to reserve;
- Fires are started on the road bordering the reserve, during the draughts;

- Fires are a great problem; precautions need to be in place to avoid fires in areas surrounding the reserve;
- Watchmen patrol the area on motorbike;
- Only cars belonging to UFSCar are allowed in;
- There is pressure to convert more areas of the university into reserve;
- There are no pressures to eliminate the reserve.

Eucalyptus has been planted around the reserve (figure 3.2.2f.). This is a common species used for reforestation in the region and it has been used, with pine trees, in large areas of the university grounds.



Figure 3.2.2e. "Santa Felicidade" rural neighbourhood (photo by the author, 2007)



Figure 3.2.2f. Road next to UFSCar reserve: edges were planted with eucalyptus (photo by the author, 2007)

## PESC

São Carlos Ecological Park Dr. Antonio T. Vianna (PESC) was founded in 1976. The zoo occupies an area of 72 hectares characterized by Cerrado and gallery forest running along the Espirado stream, which serves the park (figure 3.2.2b.). Part of this area is under permanent preservation. It has about 120,000 visitors per year. The park houses 650 animals belonging to 94 species, many endangered, endemic to Brazil and South America (PESC, 2009) within 84 enclosures. Most enclosures are naturalistic and make use of native vegetation and features (Roque *et al.*, no date), thus making it a unique zoo in Brazil, specializing as it does in South American fauna. It also boasts the largest Cerrado enclosures.





Figure 3.2.2e. Entrance to PESC (photo by the author, 2007)

There are 25 people working in the park (figure 3.2.2e.), including one vet, two biologists and one educator, as well as a number of volunteers, apprentices and work placements specializing in of biology, veterinary medicine and education (PESC, 2009). Since its reform in 1989 the park has maintained close links with the UFSCar and its students from the Biological Sciences division. The park offers school monitored visits and an Environmental Centre where talks, courses and scientific meetings take place (Roque *et al.*, no date). Its Environmental Education Centre (CEAPESC) produces publications for schools and visitors, including a series of booklets on the ecology and conservation of endemic species. According to CEAPESC (2005) the staff is involved in:

- Research on animal behaviour and reproduction
- Captive breeding
- Species conservation

- Conservation awareness and environmental education
- The exhibition of animals for knowledge and leisure

### 3.2.3. Low Mogiana region

#### 3.2.3.1. History and General Information



Figure 3.2.3.1. Low Mogiana region (Google maps, 2009)

The municipalities of Mogi Mirim and Mogi Guaçu are located in the north-eastern region of São Paulo State (“Low Mogiana region”, figure 3.2.3.1.). They too were founded by *bandeirantes* involved with the inland Portuguese crown expansion towards Minas Gerais State in the 1700s. Together they made up the Mogi do Campo neighbourhood until 1849 when each became an individual city.

Industry, civil construction, and retailing are now the three biggest employers in the region. Agriculture is also important, centred on orange and sugarcane plantations.

### 3.2.3.2. Mogi Mirim

#### **History and General Information**

Mogi Mirim (“small river of the snakes” in the native Guarani language) is located at 611 metres above sea level, 150 km from São Paulo city (figure 3.2.3.1.). Average annual temperatures vary between 18 and 28°C. The Mogi Mirim River cuts across the city. The Mogi Guaçu River marks the city’s boundaries with Mogi Guaçu city and provides its reservoirs with water. The municipality and its 87,800 inhabitants (IBGE, 2008) occupy an area of 499 km<sup>2</sup> (Seade Foundation, in Prefeitura de Mogi Mirim, 2009), with demographic density of 166.87 inhab/km<sup>2</sup> (ACIMM, 2009) (Table 3.2.1.1a.).

#### **Economy**

There are two industrial districts in the city. A new Directive Plan for the Development of the Municipality aims at the implementation of a third. Industry, small and large, is diversified (metallurgic industry dominates, supplying car parts), some industries are international. The commercial sector is also diversified. Services provide the largest revenue, followed by industry and agriculture (Table 3.2.1.1b.). Data on agricultural production (IBGE, 2007) indicate that orange plantations generate most of the agricultural revenue followed by sugarcane plantations (table 3.2d.).

#### **Experimental Station – Botanical Gardens (“Horto Florestal”)**

The preservation area covering 145.65 hectares was created in 1929 to preserve primary Cerrado remnants. It is open to visitors for both leisure and environmental education activities (Brasil Channel, 2009).

### **Municipal Zoo**

The Luiz Gonzaga de Amoedo Campos Municipal Zoo was created in 1988 and is located inside the Botanical Gardens (Horto Florestal), in the “Aterrado” neighbourhood. It covers an area of 20,000 m<sup>2</sup> of woodland, planted with native and exotic species. There are trails and a 3,000 m<sup>2</sup> pond. The zoo houses around 150 animals (Zoológico Mogi Mirim, 2007).

The zoo aims to promote leisure, conservation and environmental education. The Environmental Education programme develops activities such as: monitored visits; visits to schools; drama workshops related to garbage and the environment; exhibitions and didactic materials for schools (Zoológico Mogi Mirim, 2007). The zoo has links with the Mogi Mirim’s local council through its Environment Office.

### **Education**

The State School Monsenhor Nora where questionnaires were distributed is located in Mogi Mirim’s city centre and provides education from the 5<sup>th</sup> year of fundamental school up to (and including) sixth-form. The school is managed by São Paulo State government. Its students are mostly urban residents.

#### 3.2.3.3. Mogi Guaçu

### **History and General Information**

Mogi Guaçu (“big river of the snakes” in native Guarani language) is located at 166 km from São Paulo city. Mogi Guaçu is a municipality of 138,494 inhabitants (IBGE, 2008) divided between an urban population estimated at 118,848 inhabitants and a rural population of around 8,044 (Prefeitura Municipal de Mogi Guaçu, 2008). It has an estimated annual growth of 2.03% and demographic density of 152.66 inhab/km<sup>2</sup> (Prefeitura Municipal de Mogi Guaçu, 2008) (table 3.2.1.1a.).

## Economy

The development and expansion of industry and retailing seems to be very prominent in the local government's agenda. New laws and incentives, including tax reductions, have been established by the local government to facilitate the implementation and expansion of industries, (Prefeitura Municipal de Mogi Guaçu, 2008). Services provide the largest GDP followed by industry (Table 3.2.1.1b.).

Most rural economic activities centres around mixed livestock production, aviculture, fruticulture (mainly oranges and tomatoes), and the production of eucalyptus for paper and cellulose (planted and maintained by private enterprises) (tables 3.2a. and 3.2b.) (Prefeitura Municipal de Mogi Guaçu, 2008).



Figure 3.2.3.3a. Orange plantation in the Low Mogiana region (photo by the author, 2007).

In economic terms, agricultural production is very important (Table 3.2.1.1a.), particularly that of tomatoes and oranges<sup>4</sup>. Both cultures are highly dependent on pesticides, which are spread from the air (interviews, 2007). In the “Sete Lagoas farm” district, where the interviews and questionnaires were distributed, orange production dominates (Prefeitura Municipal de Mogi Guaçu, 2008) (figure, 3.2.3.3a.). Harmful substances (tiamexotan) deriving from the pesticides that are used to combat “greening” in citrus plantations have been found in a large number of bees, which are being decimated by the use of pesticides with unforeseen consequences to the local ecosystems. In 2004 the state government attempted to promote the correct application of pesticides over citric’ plantations to “improve safety, increase efficiency, and protect the environment” (EMBRAPA, 2008).

Livestock is mainly cattle for meat and milk production and aviculture for eggs and meat but pigs, sheep, goats and beehives are also farmed (IBGE, 2008). There are about 1.400 rural producers in Mogi Guaçu (Prefeitura Municipal de Mogi Guaçu, 2008) (tables 3.2a. and 3.2b.).

### **Mogi Guaçu Experimental and Ecological Stations**

The Experimental Station and the Ecological Station of Mogi Guaçu (figure 3.2.3.3b.) are conservation units managed by the Forestry Institute (IF), itself part of the Environmental Office of São Paulo State (Instituto Florestal, 2008). These stations are characterized by the Atlantic Rainforest and the Cerrado biomes at altitudes ranging from 600 to 700 metres.

Originated in the old Campininha and Capitinga farm, the area has pine and eucalyptus plantations producing timber and resin for extraction, and a nursery for native and exotic plants. Seeds are also commercialized by the CU (Instituto Florestal, 2008). The CUs are open to visitors, whose interests lie in trekking and visiting the lakes and rivers within the unit (personal communication, 2007).

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<sup>4</sup> The production of tomatoes is the 2nd largest in the São Paulo State (annual production = 2,250,000 boxes of 25 kg) and the largest irrigated farm for citric fruits is also located having 2 million orange plants (annual production= 11,250,000 boxes of 40.8 kg) (IBGE, 2008).

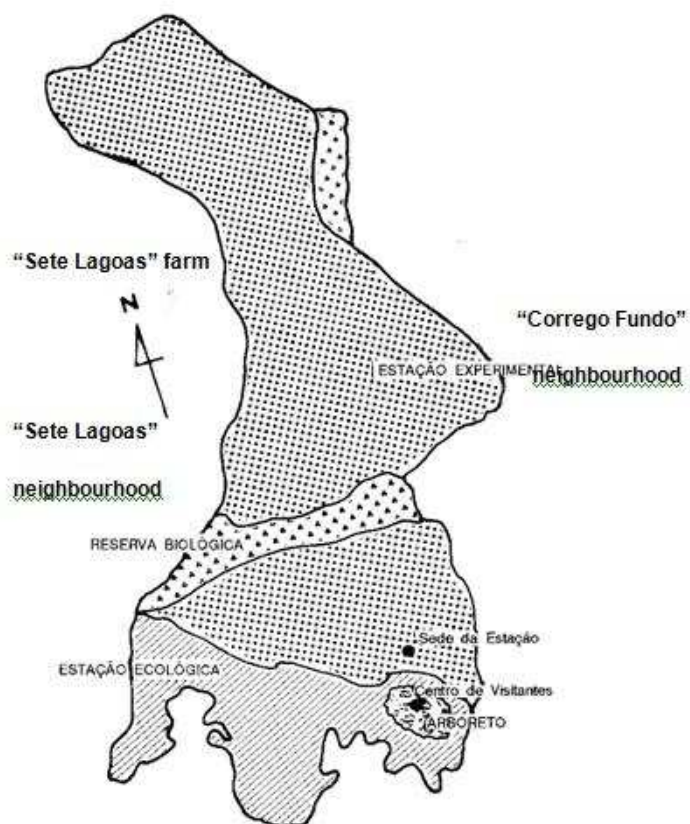


Figure 3.2.3.3b. Mogi Guaçu conservation units:

Experimental station; Biological Reserve; Ecological Station; rural neighbourhoods where questionnaires were distributed (IF, 2008).

The Experimental Station (figure 3.2.3.3b.) occupies an area of 3,050 ha (of an area known as “Campininha Farm”, in the Martinho Prado District). The main activity developed by the Station is research on forest species, mainly pine and eucalyptus (Instituto Florestal, no date).

The Mogi Guaçu Ecological Station (figure 3.2.3.3b.) occupies an area of 980 hectares. In 1984 it was separated from the Mogi Guaçu Experimental Station to offer integral protection to the ecosystems along Mogi Guaçu River, including temporary lagoons formed during the flood season in the summer (IF, no date).

The Mogi Guaçu is the most important and largest local river extending over 75km from its source in Minas Gerais State (figure 3.2.3.3c.). Almost its entire basin is occupied by intensive plantations of sugar cane, oranges, corn, and eucalyptus. There are also mining activities for the extraction of bauxite and sand, as well as industries such as food, leather, paper and cellulose, metal, sugar and alcohol, and chemical industries. They all benefit from the river. In São Paulo State the loss of the original natural cover comprised of Atlantic Rainforest and Cerrado along the river system has reached 80% (Prefeitura Municipal de Mogi Guaçu, 2008). A small hydroelectric station feeds water and energy to Mogi Guaçu and the nearby city of Mogi Mirim. It also acts as a flood monitoring system. This hydroelectric plant is part of a much larger complex of the Tietê River, which supplies for 20% of the energy in São Paulo State.



**Figure 3.2.3.3c. Mogi Guaçu River (photo by the author, 2009).**

The Mogi Guaçu Ecological Station is characterized by the Cerrado biome, dominated by a variety of arboreous-arbustive species. The Cerrado follows the course of Mogi Guaçu River for 17km. The temporary lagoons are important for the reproduction of fish and provide nesting for varied species of birds, such as partridges (*Rhynchotus rufescens*), egrets (*Egretta thula*) and nothuras (*Nothura maculosa*), psitacides, moorhens and wild duck. The Cerrado is home to endangered species such as cariamas (*Cariama cristata*), greater rhea (*Rhea americana*), toucans, and a variety of mammals such as the maned wolf, deer (*Ozotocerus bezoarticus*), howler monkey (*Alouatta fusca*), crab-eating-fox (*Cerdocyon thous*), jaguar (*Panthera onca*), coati (*Nasua nasua*), armadillos, puma (*Puma concolor*), otter (*Pteronura brasiliensis*), irara (*Eira barbara*), ocelot (*Felis pardalis*), and many caviomorphs such as capybaras (*Hydrochaeris hydrochaeris*), agoutis and cotia (Instituto Florestal, 2008; Instituto Florestal a, no date).

An arboretum was created in an area of 100ha, where native species are systematically introduced. It aims to function as a genetic bank for native species, as well as being a visitor attraction and research centre (Instituto Florestal b, no date).





Figure 3.2.3.3d. “Fazenda Campininha”, Mogi Guaçu CU, main building (photo by the author, 2007)

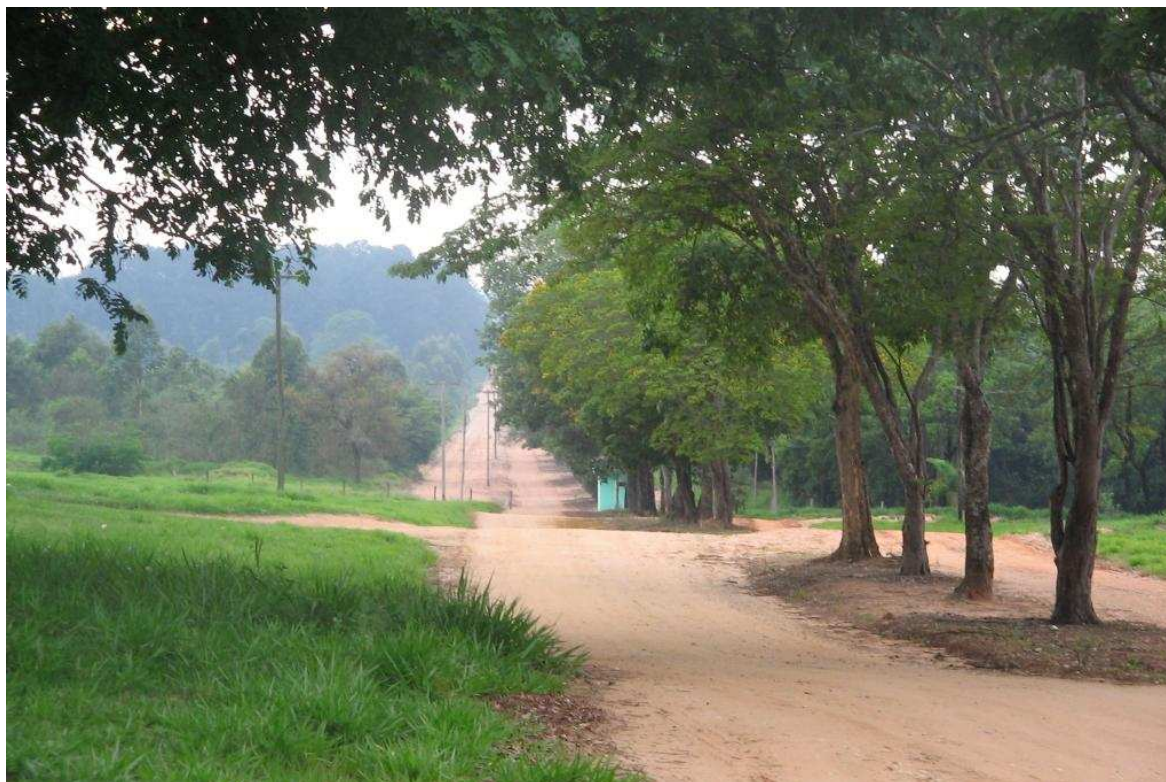


Figure 3.2.3.3e. “Fazenda Campininha”, Mogi Guaçu CU, main access road (photo by the author, 2007)

**Socio-economic aspects**

Members of the CU staff live inside the reserve with their families. The main threats to the CU are invasions organized by “The Landless Movement” (the “MST”) (personal communication, 2007) the latest one taking place in mid 2010.

The CU promotes guided visits for schools and organized groups, as well as courses for university students (Instituto Florestal, 2008) (figure 3.2.3.3d.). Environmental Education courses are offered to students and teachers (personal communication, 2007). Themes include local fauna and conservation.

**Education**

The State School Prof. Geraldo Sorg where questionnaires were distributed is located in the Martinho Prado Jr. neighbourhood of Mogi Guaçu and provides education from the 2<sup>nd</sup> year of fundamental school up to (and including) sixth-form. The school is managed by São Paulo State government and serves rural residents by providing them with a van service to collect and to return them home.

***4. Relationships between people and maned wolf: conflict and conservation***

In this section data derived from research about the relationships between wild carnivores and people were merged with data concerning the maned wolf and the southeast of Brazil. The data were sourced from current and past research, to address questions raised in Chapter One, section 2. During this process questions have arisen as to the adequacy of the conservation biology approach in addressing the reality of the different groups involved in maned wolf conservation in the southeast of Brazil, and whether the needs of local people and beliefs about

their relationship with the maned wolf are met. My own ideological position in relation to the research is also expressed at the end of this section.

#### **4.1. Human encroachment and habitat protection**

According to western beliefs, during the Middle Ages in Europe civilization and order were maintained by conquering the wilderness, which represented a chaotic natural world, inhabited by savages and witches who harnessed its “unholy powers” (Colchester, 2000; Bangs *et al.*, 2005). Fundamentalist Christian missionaries carried such beliefs with them in their contact with indigenous populations (non-believers) in the New World (Kellert *et al.*, 1996; Colchester, 2000).

Miranda (2003) describes the first human settlers, indigenous hunters, as being hunter and prey, and competitor. All over Brazil indigenous people had been hunting for food, ornaments, ritual objects while also cultivating certain annual crops. The Portuguese adopted many of their agricultural techniques, making use of fire (“slash and burn”), and establishing both pastures and cattle in the same cultivated areas (Miranda, 2003). From the 1500s European settlers intensified changes in the carnivore’s habitat: low impact deforestation of coastal areas and the introduction of hunting dogs together with herbivorous livestock may have reduced some local populations of carnivores but conversely may have benefited others by making more food available to them (Kellert *et al.*, 1996; Miranda, 2003). The increasing eradication of habitat and the destruction of the food chain of carnivores progressively eliminated their natural sources of food and drove them to attacking livestock (Miranda, 2003).

Since the Earth Summit of Rio 1992 there has been an escalation of bioscentric ethics and concerns for biodiversity together with an increase in actions to defend and preserve the environment both at local and international level. This rising concern, promoted extensively by NGOs, has gained increasing support from the public and private sectors and from the population as could be seen by the extensive presence of NGOs in Rio 92. The consequence

has been the establishment of new environmental legislation (Miranda, 2003). Mittermeier *et al.* (2005) consider Brazil as a leader in conservation biodiversity due to the increasing quality of its conservation professionals, the creation of protected areas and systems and the emergence of influential conservation NGOs. The growth in conservation awareness can also be measured by the proliferation of parks and reserves since the 1970s, at municipal, state, federal and private levels.

Hunting has been illegal in Brazil for over 35 years (Costa *et al.*, 2005). However, only 6.3% of Brazil is protected by federal conservation units and only 2.8% has integral protection. Costa *et al.* (2005) believe that most parks are under inadequate management making them vulnerable to illegal hunting, human settlement and logging. Although Miranda (2003) points to the lack of evidence that any species of carnivore has ever become extinct in Brazil, today many terrestrial carnivores within the four families found in the country (felids, canids, mustelids and procionids) are threatened with extinction because of the destruction, fragmentation or reduction of habitat, and hunting (IBAMA, 2003).

Although environmentally friendly scientific and technological solutions have been achieved in developed and industrialized nations, their dissemination in developing nations seems full of obstacles. Miranda (2003) suggest that lack of funding for technological and professional development is coupled with the urgent concerns of starvation, poverty, unemployment, housing, sanitation and public health, concerns which take priority over environmental action. Necessity is often cited as justification for environmental exploitation. As mentioned in Chapter One, section 2.8, imported models for nature conservation may also be flawed when applied to local social/cultural landscapes.

Clark *et al.* (2001), working with jaguar conservation, also suggest globalization has drastically influenced carnivore decline in Central and South America through a direct relationship between decline, the value that people place on resources, and human activities. Although economic incentives to halt deforestation may come to fruition because of the most recent international agreements to slow down climate change, so far the relationship is illustrated by a combination of factors that can be applied to the maned wolf scenario (Clark *et al.*, 2001:226):

1. deforestation rates are amongst the highest in the world;
2. natural areas are occupied by people due to human population growth, poverty, declining economies, and social conflicts;
3. resource extraction is associated with huge international debts, leaving little alternative to the destruction of the environment for short-term survival;
4. economic globalisation encourages conversion of habitat to fulfil export demands for fruit and produce;
5. persecution of wild carnivores is not penalized, even when under protection;
6. maned wolves are sometimes viewed as a threat to domestic stock;
7. bureaucratic problems: wildlife agencies are understaffed, positions filled by government appointees lacking expertise; delays in process impair conservation; changes in government may set back programmes and their funding

Social needs are often coupled with cultural traditions which combine the fear of carnivores with the mythical exercise of individual empowerment experienced in the hunt (Miranda, 2003).

Protected areas of natural habitat more often than not cannot meet the survival needs of large canid species, such as the maned wolf (Boitani, Asa and Moehrensclager, 2004). Conservation strategies must rely on neighbouring land to accommodate the large territorial demands of such species, thus to guarantee the success of such strategies rural landowners and residents must play a pivotal role in conservation (Amend and Amend 1995, in Colchester, 2000; Arruda, 2000). It has therefore been suggested (Jeanrenaud, 2002) that, although large international conservation institutions have changed their discourse to embrace the people's participation in management decisions in conservation, leaning towards people-centred conservation, this is not necessarily reflected in changes in organisational procedures, allocation of resources or professional practices. Jeanrenaud warns of the dangers of the use of an updated discourse of community inclusion to legitimize "a global access and control over nature".

To counterbalance the anti-participatory character of “contemporary models of economic growth and modernisation”, Pimbert and Pretty (2000:204) suggest that the management of protected areas in South America should make decisions and take into consideration all aspects of local people’s lifestyle, rights, knowledge and social organization.

## **4.2. The value of the maned wolf**

As mentioned in Chapter One, section 2.2., the defence of wild predators is supported by many arguments (Clark *et al.*, 2001; Miller *et al.*, 2001; Kruuk, 2002; Fascione, Delach and Smith, 2004). These can be also applied to the maned wolf, although this potential may have not yet been realised in the case of the maned wolf in Brazil. Carnivores are cited as potentially good for tourism, being an important part of cultural heritage; as a ‘keystone’ species the maned wolf plays an important role in ecosystem dynamics; as a ‘flagship’ and ‘umbrella’ species it has the potential to champion efforts to protect its whole ecosystem where the species is found. The species seems to play an important role in the dispersal of various species of fruit in the Cerrado, especially the “wolf’s fruit” (*Solanum lycocarpum*), which shows improved germination rates after passing through the maned wolf’s digestive system (Lombardi and Motta-Junior, 1993; Courtenay, 1994; Ferraz, 2002; Santos, Setz and Gobi., 2003) and gabioba (*Campomanesia pubescens*) that are enjoyed by cattle and by people. The maned wolf provides a service by feeding on insects and rats that are carriers of diseases such as *hantavirus* and *leptospirosis* (Dietz, 1984; Motta-Junior, 2000; Anic, 2002)<sup>5</sup>.

## **4.3. The maned wolf within the universe of local people.**

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<sup>5</sup> The loss of food grains or crops to rodents has been estimated somewhere between 2 and 200 million tons worldwide per year (Conover, 2001). In South American countries the loss of sugar cane production to rodents has been estimated between 1 and 12,500 tons (in case of rodent outbreak) per year (Conover, 2001).

In the first treaty describing the Brazilian fauna (Gabriel Soares de Souza, 1587, in Ribeiro, 2003) many of the indigenous names were adopted, followed by a description of the animal. The first descriptions of the maned wolf appear in many records about canid species made by the Jesuit monks: they called it *yaguaraçú* (Anchieta (1534-1597), 1988, in Miranda, 2003). The indigenous name combines the Guarani words for dog/jaguar (*jagua/yagua*), for the colour red (*guará*) and for large in size (*açu*), while the Portuguese/European name 'lobo guará' (*lobo=*wolf) associates it with the European wolf (*Canis lupus*). Ribeiro (2003) reports that the maned wolf was included in the category of 'common species', which were described by naturalists and travellers in colonial Brazil, who used Portuguese names that referred to similar species found in Europe. Little attention, if any, was given to such species in their reports as they were already 'known'. The maned wolf was only described in later colonial records as the colonisation of the Cerrado regions took place during the 17<sup>th</sup> and 18<sup>th</sup> centuries (the *entradas e bandeiras* movement).

Kruuk (2002) suggests that we have evolved innate anti-predator responses, which may manifest themselves towards 'look-alikes' – similar carnivores to the ones known by previous experiences to have caused harm or material loss. In addition, negative values related to experiences of attacks on poultry (by foxes and wolves in Europe) might have travelled with the European settlers and been transferred to their relationship with the maned wolf. This might also be true in the attribution of magical and pharmaceutical value to some of its body parts (similar to fox and wolf in Europe, in Freefy, 1983; Bush, 1995; Kruuk, 2002).

All over the world the cultural institutionalisation of the conflict with carnivores can be found in an array of manifestations, rituals, festivals, songs and games. The anthropologist John Knight (2000) elaborates that the conflict with wild animals is experienced by people in two ways: directly through confrontation and defence; and indirectly through assorted cultural practices, which might include the attribution of magical powers to the animal.

In South America the attribution of magical properties to parts of the maned wolf occurs in various places, in some areas up to the present time. Sillero-Zubiri, Hoffman and Macdonald (2002) suggest that native folklore and superstitions contribute to attitudes that vary between

tolerance, fear and dislike of the maned wolf throughout its range. As an example, they cite the medicinal uses of certain body parts in some parts of Brazil. Biologists suggest that such beliefs must be discouraged through the development of a *conservation ethic*, which may halt the use of parts of wild carnivores for amulets and other purposes (Macdonald and Sillero-Zubiri, 2004), which contributes to the endangerment of species such as the maned wolf.

Many records exist which describe a range of traditional beliefs about the use of maned wolf body parts and other powers associated with the species:

#### **4.3.1. Popular medicinal and magical uses**

- 1 “... certain parts of the maned wolf are used in local medicines to cure bronchitis and kidney disease or as a treatment for snakebite (Sillero-Zubiri, Hoffman and Macdonald. 2002:42).
- 2 A maned wolf bitten by a poisonous snake survives, while the snake dies (Figueira, 1995).
- 3 Dietz met a spiritual healer (*curador*) in the Serra da Canastra, who uses maned wolf ingredients in many medicinal preparations (Dietz, 1984:27):
  - “a canine tooth from a maned wolf is tied around neck of a child to cure or protect against dental problems.
  - A piece of hide from a wolf is attached to a saddle or belt to cure the user of kidney or back-related problems.
  - Ingestion of 2 small pieces of the heart of a freshly killed maned wolf will protect a snake bite victim from death.”
  - Hot tea prepared with the maned wolf’s dried faeces cures persistent coughs.
  - “A large snake can be found in the kidney of a freshly killed maned wolf” (possibly the giant kidney worm, commonly found in maned wolves)
- 4 Anic (2002:25) reports from her interviews of rural people in the southeast of Brazil:



- Keeping a piece of pelt in the pocket protects against snakes
- an eye taken from a live maned wolf can bring luck with “women and hazard games”
- the maned wolf can attract chicken with its eyes/gaze
- In Bolivia, cowboys believe that sitting on the pelt of a maned wolf will protect them from bad luck.
- if people want to shoot at the wolf with a gun, the maned wolf’s gaze makes people miss their shot

5 The Villas Bôas brothers’ accounts of beliefs within members of their work force, during the “march towards the west” from 1943 report that (Villas Bôas and Villas Bôas, 2004:62-63):

- “If a person wants to conquer whatever it might be, he must look at the desired thing through the eye of the wolf.”
- “there is no escape from the magic of the wolf’s eyes ”
- “gunshots cannot hit this animal”
- The call of the maned wolf brings bad luck

6 Rodrigues (2002:77) refers to popular beliefs that parts of the wolf have magical properties or bring luck: eyes, teeth, pelt, and anus.

7 The tip of the tail is used as a lucky charm (*amuleto*) (Puglia, 1978:3)

In Tanzania, where witchcraft is illegal, a hyena killed by a car may be taken away, cut up and divided amongst the townspeople “to be used as charms” (Kruuk 2002:187). Puglia (1978:3) describes common scenes following a maned wolf’s capture in Goiás, central Brazil:

“All who know about its capture soon come to see it. They are not content to just approach the trap where (the maned wolf) was captured and after molesting it they attempt to cut off the tip of its tail as an amulet. It is not uncommon to pluck out its left eye, which local people believe to have extremely miraculous powers.”

(“Todos que souberam de sua captura virão logo vê-lo. Não se contentam em se aproximar da armadilha onde foi capturado e além de molestá-lo procuram cortar-lhe a ponta de sua cauda como amuleto. Não raro arrancarem-lhe, a frio, o olho esquerdo, que segundo o povo da região possui poderes extremamente milagrosos.”)

In several parts of Africa people may eat parts of a lion, or wear lion charms (claws, teeth) to protect themselves against witchcraft and to acquire strength and courage (Kruuk, 2002). Saami folklore says wolves can cast spells on the hunters' bullet “so that it misses or on the rifle so that it fails to fire” (similar to beliefs attached to the maned wolf in Brazil), and the wolf can read a man's mind (they have the “strength of one man and the intelligence of ten”) (Lindquist, 2000).

In South-East Asia dog meat is used to cure fevers and stomach complaints (Corbett 1995, in Kruuk, 2004:121) and in medieval Europe the wolf had many uses: drowning a live wolf in oil provided cure for gout; its heart was a cure for epilepsy; the fat provided protection against arthritis; the blood was used to treat stomach pains; the liver was used against coughs; powdered wolf liver for the relief of birth pains, and the meat was a treatment for aching shins (Bush, 1995:88; Kuuk:122). Carrying a wolf's tooth as a talisman was believed to calm dementia and to help teething children (similar to uses of the maned wolf's teeth) and tying the right paw around one's neck was used for the relief of throat infections (Kruuk, 2002:122).

Anic (2002) has carried out researched among rural people in the southeast of Brazil, and reports an interview testifying that maned wolves' pelts are sold for high prices: 1.20m – 1.50m = 150 – 200 reais (= US \$150-200, in 2002), for use in embroidery and as part of belts. Killing the wolf to harvest parts is however illegal and local people are reluctant to give information

about such practices (Rodrigues, 2002). Although the harvesting of body parts is liable to prosecution, the practice is nevertheless part of the spiritual dimension of people's relationship with the maned wolf and is part of the value they place on the species (Anic, 2002). As seen earlier, criminalization of local people's popular traditions may escalate conflict with wildlife and result in decreased support for conservation (Hill, 2004). Anic (2002) suggests that research into the way local people use wildlife, for material or spiritual gain, would help conservation, even if the findings recommended the implementation of sustainable harvesting of maned wolves.

In 1976 (3), Cory Carvalho reported that people "persecute and kill every animal that crosses their path" due to a "total lack of information and a widespread habit in Brazil". As justification for their killing, species are identified as: "useless, pest, dangerous, good for eating, pelt for saddle, carriers to avoid snakes, lucky charms, etc."

#### ***4.3.2. Knowledge and perception of the maned wolf***

The maned wolf is one of the largest carnivores in the grasslands, and yet records show it fails to be recognised by people living in neighbouring areas (Bizerril and Andrade, 1999). Bizerril and Andrade stated that the maned wolf was the species most frequently unknown to visitors to Brasília Zoo, in central Brazil. The public was also unable to distinguish between native and exotic species or to identify those found in the local Cerrado habitat.

Knowledge about carnivore species is often associated with understanding the ecological value of a species and of the need to conserve it (Bath and Farmer, 2000; Sillero-Zubiri, Hoffmann, and Macdonald: 2004). Some suggest there is a widespread lack of information about the maned wolf's biology, ecology and importance to the ecosystem and about its conservation (Anic, 2002). A consequence of lack of knowledge about the maned wolf may be fear of its large frame and size of teeth and the belief that it carries "magical" properties and is capable of "bewitching" people (Macdonald and Sillero-Zubiri, 2004:359).

There are suggestions that the lack of knowledge among local people about the maned wolf in the south-east of Brazil comes from lack of direct contact with it because of its nocturnal habits

(Bestelmeyer, 2000; Anic, 2002) and to a general lack of value apparently given to the Brazilian fauna (Anic, 2002). On one hand the fact that maned wolves are timid and more active at dusk and dawn would put them in the category of 'less visible to people' (Hill, 2004:280), therefore less dangerous, and might contribute to a general lack of knowledge about the species. On the other hand, its association with the European wolf through its name, its large frame and stand out features (such as colour, black mane, eerie call, carnivore dentition and appearance) coupled with the rare but dramatic occurrence of attacks on chicken pens, may have helped to 'select the species for attention as pests' (Mishra 1997, in Knight, 2000).

Michelle *et al.* (2005:313) also suggest that encounters may reinforce a perception of danger. If encounters between local people and maned wolves are frequent, the perceived level of threat might also rise, even though an attack may be a rare event.

Nevertheless, Bestelmeyer (2000:140) reports that the inhabitants of farms and ranches around the Emas National Park, central Brazil "did not express any negative feelings about the species." Dietz (1984:27) also reports a generalised view of the maned wolf as timid and fearful of man, in the Serra da Canastra, promoting a successful co-existence between wolves and local people. Dietz (1986:40) suggests the maned wolf does not have a negative public image (unlike large carnivores in the USA) and believes in harnessing nationalistic feelings to "preserve an animal that is perceived to be part of their national heritage". It has been suggested that the development of local pride in relation to the species in question, where the community comes to see it as "their own", helps to decrease conflict (Sillero-Zubiri, Hoffman and Macdonald, 2004).

There seems to be a widespread notion that the maned wolf is cowardly and weak, especially when compared to the European wolf, as in Ihering (1968, 332):

"...if the true European wolf knew that here he is mistaken for this degenerated relative of his! Even for a dog, it must be painful when it is mistaken for a coward..."

Traditionally in the literature, the maned wolf has been described as timid, shy and scarce, cowardly, weak, frightened and not nearly as strong and brave as its European counterpart, except when defending pups (Magalhães, 1939; Ihering, 1968; Carvalho, 1976; Dietz, 1984; Ribeiro, 2003). Traditional people from Central Brazil (*sertanejos*) have been reported as associating the eerie sounding maned wolf's call with feelings of melancholy and sometimes of bad luck (Magalhães, 1939; Villas-Bôas and Villas-Bôas 1994). Maned wolves are commonly referred to as: "not as courageous and powerful as the European wolf", "excessively prone to escape and timid", "frightened" (Magalhães, 1939:280) and "scarce and cowardly" (Ihering, 1968:332). They are widely known as "too shy to attack people", avoiding contact with humans and dogs, attacking people only in exceptional cases (Magalhães, 1939; Ihering, 1968; Carvalho, 1976; Dietz, 1986). Dietz (1984:25) recorded reports from local people who have experienced aggressive attacks (threats, attempts to bite, barking, being followed) by single adult maned wolves in response to humans interfering with litters of pups.

Cinara Anic (2002) observed little awareness amongst local people about the importance of conserving the maned wolf and the Cerrado habitat. In the same research, Anic (2002) notes that local people have knowledge of some aspects of the habits of maned wolves (seasonal aspects of diet, territorial behaviour, reproductive behaviour, predation and competition with other carnivores) and their habitat, although their beliefs about the maned wolf's diet were inaccurate when compared with the field data collected from faeces.

In the literature review, references to medicinal and magical uses and beliefs come from rural people about the maned wolf. The few references to indigenous populations relate to their knowledge of the species:

- Kamaiurá indigenous people inhabiting the high Xingú River and grasslands in central Brazil, refer to the maned wolf, or 'auaratsim' (meaning "that which eats fruits"), in one of their traditional tales as an animal that only eat fruits (Carvalho, 1976:4).
- Miller (1930) also refers to indigenous knowledge about the maned wolf in the Mato Grosso region: "The Indians report that two is the usual number of young and that these are born in a nest concealed in the thick of the bush. Fruit is said to compose a large part of their diet and I was told that during the period of ripening figs they will return night

after night to feast on the fallen fruit under some favoured tree.” (...) “The wolf is also said to prey to a considerable extent on small armadillos, frequently digging them out”.

There is a point to be made in relation to people who possibly like a carnivore species, such as the maned wolf, but who cannot afford to live with any economic burden that might be attached to this. Furthermore, people may be unaware of the impact their way of life may have on the status of the species, which their voting choices, consumer habits, employment, land use, or lack of active involvement in conservation brings about.

#### **4.4. About *people's livelihood***

According to the ‘breeding pair’ hypothesis (Till and Knowlton, 1983, in Boitani, Asa and Moehrensclager, 2004:148) predation of livestock is significantly greater in canid pairs with young, when increases in energy demand induce the pair to switch to larger prey. The same dynamic may be true for the maned wolf with pups. However rare this may be, field research has recorded occurrences of maned wolves approaching chicken pens and causing great losses during the winter months and from September to November when pups are more likely to be at den sites (Puglia, 1978; Dietz, 1984). Of 23 reported incidents of predation on domestic stock by Dietz (1984), 14 (61%) took place within these months (Dietz, 1984:23). On such occasions wolves were reported to be trapped, poisoned, shot at, imprisoned or killed (Puglia, 1978). During these periods the difficulty in finding food is combined with the higher energy requirements imposed by the need to nourish young; there may also be relatively easy access to domestic stock. Free-ranging chickens, which are traditionally kept by local people for eggs and meat, are often not penned at night (Dietz, 1987; Puglia, 1978; personal communications, 2007). Aggressive attacks by single adult maned wolves are also rare occurrences and have been observed as a response to human interference with litters of pups (Dietz, 1984). Such bold ventures are indeed out of character for a species that is commonly referred to as shy, easily scared and fearful of humans (Magalhães, 1939; Ihering, 1968; Carvalho, 1976; Dietz, 1984).

Catherine Hill (2004:281) suggests that 'people's perceptions of risk are often strongly influenced by rare and extraordinary or extreme events', like 'worst case scenarios', rather than by the most common, everyday events. The widespread belief that maned wolves attack chicken pens with blind rage may fall into this category (Anic, 2002) even amongst people who have never witnessed such an event. There are reports of surplus killing behaviour by the maned wolf (Anic, 2002), though these accounts may be exaggerated becoming associated with experiences of such behaviour of the more carnivorous species in Europe. Accounts like these may have travelled to Brazil with the European settlers.

Cory Carvalho's research in São Paulo and literature review (1976), and James Dietz's (1984) research in Serra da Canastra (Minas Gerais State, south-east Brazil) suggest that maned wolves are considered harmless by people and do not cause losses to livestock keepers, although they may attack foals, lambs, sheep, and poultry under certain circumstances. People's beliefs about maned wolf predation on chicken, however, have proved to differ from evidence from their scats, as poultry remains were only found in 0.3-1.5% of analysed scat samples (see Chapter Two, 2.1.4.).

There are suggestions that alleged maned wolf attacks on livestock are carried out by less shy and more carnivorous species such as the crab-eating fox (*Cerdocyon thous*) and others (Carvalho, 1976; Bueno and Motta-Junior, 2004, Juarez and Marinho-Filho, 2002; Sillero-Zubiri, Hoffman and Macdonald., 2004) or domestic and feral dogs, which seem to constitute a problem in countryside areas of São Paulo (Rodrigues, 2002).

#### **4.5. Research into the maned wolf's ecology, conservation, and relationships with local people.**

There are several ecological and behavioural studies (home range, feeding ecology, reproductive behaviour) and studies on genetic variability, pathology, and species distribution being carried out in Brazil about the maned wolf. Studies are also being conducted in Argentina and Bolivia, on wild animals, and there are ongoing studies about the maned wolf in captivity

(see Sillero-Zubiri, Hoffman and Macdonald, 2004). Some research projects are concerned with conflicts between people and the maned wolf, and the role of the socio-cultural aspects of such conflicts in maned wolf conservation (Dietz, 1984; Figueira, 1995; Pontes-Filho *et al.*, 1997; Silva, 2000; Anic, 2002). The approach towards local peoples' involvement in maned wolf conservation in some cases seems limited to environmental education intervention to make conservation policies acceptable to them. These interventions fail to focus on local people's perspectives on real or perceived conflict with the maned wolf.

#### **4.5.1. Anthropogenic causes of maned wolf mortality.**

It has been suggested that maned wolf deaths caused by human activity and concentrated in densely inhabited areas surrounding reserves cause an edge effect severe enough to result in the extinction of local populations (Ogada *et al.*, 2003). The maned wolf depends on unspoiled Cerrado habitat to fulfil its ecological and social needs. The progressive fragmentation of this habitat during the last 50 years has made it more difficult and hazardous to access, through networks of roads, built up areas and agricultural fields, and these changes have altered its species compositions, thus interfering with the availability of food sources (Silva, 2000; Anic, 2002; Rodrigues, 2002). Decreases in the carrying capacity of the environment caused by the fragmentation often result in increasing competition for resources amongst co specific, wild animals of other species and even domestic animals, such as dogs and cattle (Sillero-Zubiri, Hoffman and Macdonald, 2004; Santos, Setz and Gobi, 2003; Juarez and Marinho-Filho, 2002; Bueno and Motta-Junior, 2004).

Fragmentation also alters the species composition of the Cerrado habitat, provoking changes in species' richness and density of most of the fruits and prey consumed by the maned wolf found in such an environment (Silva, 1999; Anic, 2002, Rodrigues, 2002).

Highways often surround protected areas. The tall vegetation at the edges, inhibiting a clear view of what comes out of this vegetation towards the roads, and disrespect for speed limits results in injury or death to many maned wolves (Pontes-Filho *et al.*, 1997; Anic, 2002; Rodrigues, 2002). In some conservation areas road deaths take 50% of the annual production



of pups (Rodrigues, 2002). Rodrigues (2002) states that most of the accidents involving wild animals in roads surrounding parks seem to be intentional, as drivers often do not avoid collision with wild animals and sometimes aim for them. The justification used is that such animals prey on domestic chickens, or are potentially dangerous, or can be consumed as food. Carnivores are particularly susceptible to being run-over when attempting to eat the carcasses of road-kills.

Other threats come from domestic and feral dogs in the vicinity of protected areas, which pursue and kill maned wolves, compete for their natural food sources, attack domestic stock, and transmit diseases and seem to limit the occurrence of maned wolves wherever they are present. (Anic, 2002; Rodrigues, 2002). They may also be responsible for some of the attacks on livestock attributed to maned wolves.

Purportedly farmers have been blamed for killing maned wolves because of attacks on free-range poultry (Dietz, 1984; Rodrigues, 2002). Sillero-Zubiri, Hoffman and Macdonald. (2002:42) however believe “maned wolves are not viewed as a serious threat to livestock, although they may occasionally be shot when caught raiding chicken pens.” Deaths by retribution, which are proportionate to carnivore predation on livestock, are amongst the main causes of mortality of protected species (together with accidental road deaths and snaring) in African carnivores (Ogada *et al.*, 2003).

It is also possible that wolves are killed for the harvesting of their body parts. Killing and mutilation as a consequence of popular beliefs is cited as an added reason for the decline of maned wolves (Puglia, 1978; Silva, 2000; Silva and Nicola, 1999; Anic, 2002).

Rodrigues (2002) detected that the genetic variability of maned wolves in the Brasilia region was very low; possibly a consequence of loss of habitat, fragmentation and inbreeding.

Some parallels can be drawn with Papouchis (2004) work with mountain lions in the USA, in reference to the maned wolf as a strong representative of its habitat, and to its relationship with habitat change. His research shows that a majority of the public sees the mountain lion as a sign of a healthy environment, and as an important part of the ecosystem and therefore they feel a responsibility to learn to coexist with them. The presence of residential and industrial developments forces individual animals to try to survive within human occupied areas, or to relocate and to dispute occupied areas with other individuals. Dispersal presents new dangers from roads and residential areas and many individuals, especially juveniles, will not live to see the next breeding season.

#### ***4.6. Changes in the relationship between local people and nature over time.***

In the southeast, the indigenous knowledge about animals' habits, and techniques to capture and kill them were incorporated into the *caipira* culture (Miranda, 2003). It is suggested that within the subsistence culture, adopted indigenous techniques such as hunting, fishing and gathering reinforced the bonds between the *caipira* and the natural environment (Candido, 2001), and that the relationship between hunter and hunted had ecological, religious and aesthetical dimensions. Pimbert and Pretty, (2000) also suggest that wild species may contribute to the lives of rural people not only as food but also as economic security, dietary supplements and prevention against harvest disasters; they also generate income, medicinal plants, building materials, livestock fodder and firewood.

With the modern hunter, for whom hunting is not part of a subsistence economy, such relationships are not present, and hunting has taken on different functions (Candido, 2001). With hunting bans in place, and an increasing dependence on urban centres for manufactured goods and food, rural people almost totally limit hunting to the defence of plantations and livestock (Candido, 2001). Modern day recreational hunters pursue wild carnivores, birds, and enemies of the plantations and of livestock, whose meat is not edible.

If urbanisation and inclusion in a global way of life and economy distances humans from nature it also expands their cultural horizon: culture is the tool that may bring humans and nature together again (Cândido, 2001). Mankin, Warner and Anderson. (1999), working on wildlife attitudes and perceptions in Illinois, USA, also suggest that economic development and urbanization is accompanied by an increase in information about wildlife conservation that may have a positive influence over people's interactions with wildlife.

#### ***4.7. Human occupied landscapes, and tolerance in relation to the maned wolf.***

In the southeast of Brazil the largest concentration of people is found together with some of the most populated cities in the country. Woodroffe (2000) has studied the connections between human densities and the decline of carnivores, and has concluded that such a relationship is most positive when the reasons for threat are mostly direct persecution and accidental killings by locals. Variations in local people tolerance of carnivores and in their ability to kill them, in government policies to exterminate or preserve carnivores through hunting bans, etc and any regional and international trade in carnivore body parts or products also affect the status of carnivore populations. Unlike density determinants, cultural, political and economic issues can be influenced by attempts to resolve conflicts, to change people's attitudes and policies, and can result in the overall improvement of conditions for carnivore conservation (Woodroffe, 2000).

There are no published data on public perceptions about encounters with the maned wolf within urbanized areas. However, research has been conducted in certain rural areas of the southeast:

- In Anic's research (2002) most people interviewed (64.6%, N=99) were in favour of the presence of maned wolves in their region while 26.3% were indifferent; the maned wolf

was described as a beautiful animal, and people voiced the wish of having more of these animals in their region.

- Figueira (1995) found that in 90% of interviews (N=29) people were not bothered by the presence of maned wolves;
- In Silva's (2000) research just over 50% of respondents (N=80, n=46) were in favour of the maned wolf's presence; a similar number (47) were indifferent; 29 had no positive feelings for the animal.

Dietz (1984:39) suggests that there is no evidence to support that human colonisation had direct negative effects on the maned wolf's population density, but the 'long-term indirect effects of human activities on maned wolves are potentially significant'. These include overgrazing by cattle, pasture management by annual burning, cutting of brush while erosion caused by agricultural practices may be having an impact on resource availability for the maned wolf. In their research about the environmental biology and conservation of the maned wolf in the Serra da Canastra National Park, Rodrigues and de Paula (2007) suggest that although maned wolves may tolerate low-level impact, high impact human activities such as farming and tourism might cause changes to the behaviour and ecology of their populations. Such changes were observed by Silva and Talamoni (2004), in their study of maned wolves that had been fed bovine meat by people in a sanctuary for over 20 years (see Chapter Two, 2.3.1.).

The maned wolf tolerates human occupied landscapes, making use of pastures, clearings and abandoned human inhabitations. This behaviour certainly helps the capacity of the species to disperse and not to depend exclusively on natural areas to cross between habitat patches. *Lobeira* plants are abundant in altered areas, especially pastures, allowing maned wolves to use such areas for dispersal (Rodrigues, 2002).The maned wolf expands its distribution in certain regions, making use of areas where native forests have been cleared (Dietz, 1984:26):

"Disturbance factors, such as annual burning, clearing of brush, and overgrazing throughout the entire area had no observable immediate effects on the movement and activity patterns of adult maned wolves" apart from pups being driven from dens by fires

and captured. “Wolves made no apparent attempt to avoid fences, planted fields, roads, or the vicinities of uninhabited houses”.

However maned wolves seem to be extremely shy and sensitive to the physical presence of humans on foot or on horseback, seeking cover, remaining immobile, fleeing or vocalising and when approached to within 2-3m by a person, erecting their mane (Magalhães, 1939; Carvalho, 1976; Dietz, 1984). Close encounters are therefore extremely rare.

It has been suggested that “being able to see and watch species in their natural environment seems fundamental to the importance they acquire” (Kvaalen, 1998:60), as people’s aesthetic experience of nature is often centred around living organisms (Kellert, 1994). “Aesthetic value orientation” would influence the perception of the species, and this value could contribute to attitudes and actions towards it (Kvaalen, 1998:60, Kellert, 1994). On the other hand, the presence of the maned wolf on people’s property may provoke feelings of “violation of personal space” and fear of attacks (Bangs *et al.*, 2005:350).

#### **4.8. Relationship between local people and conservation areas**

Canid education has focussed on fighting misinformation and improving people’s understanding of the biology and management of species, making use of the formal school system thus targeting younger generations to foster changes in negative views (Taylor, 2004). As conflicts between people and carnivores tend to centre on human dimensions there has been a movement towards their inclusion (Strauss, 2004).

Amend and Amend (1995, cited in Colchester, 2000) show that 86% of national parks in Latin America are inhabited by human populations, thereby reinforcing the importance of including communities in any conservation initiative. A similar picture is found in São Paulo state, where research conducted by the Forestry Institute shows that 73% of all conservation units of over 10.000 hectares, are inhabited by traditional populations (Arruda, 2000). Most of the inhabited conservation units in São Paulo state also house non-traditional populations.

The Brazilian educator Ligia Moreira da Rocha (1997:238) suggests that local people who work in or inhabit natural reserves must be treated as a separate category, since although they are in direct contact with the reserve they are often “not clear about the importance of the conservation units and about the reasons behind the restrictions on the use of resources”. She suggests that the relationship existing between local people and natural reserves is usually one of “a lack of awareness about the importance of the protected area”, an absence of public support in relation to their creation and maintenance and no public participation in the administration and management of the natural resources” (Rocha, 1997:238). However, she emphasises that both the success of conservation initiatives and the effective long-term conservation of natural resources both depend on public support (Wells and Brandon, 1992, in Rocha, 1997).

Fiori (2006:8) suggests that the anthropogenic forces that convert natural areas into agricultural land may relate to the “level of understanding and perception of society in the face of environmental issues and production activities in the region”. Therefore the investigation of people’s perceptions of the environment is an essential component of any research on the relationship between local people and land use. In her research she has identified that the majority of primary teachers in the area surrounding the Jataí Experimental Station (a Cerrado reserve in São Paulo state where maned wolves are found) view nature as “pure” and human beings as “mere observers” (Fiori, 2006:8). Even though teachers had experienced environmental impacts associated with land use, environmental education was still reduced to the “transmission of natural and specific knowledge, centred only on the preservation and conservation of nature” (Fiori, 2006:8). Her research suggests that the development of teacher training courses and changes to the current training curriculum would be a means of raising the awareness of teachers to the local environment and of improving teacher participation and thus appropriate student engagement in local environmental issues. She also noted an overall lack of awareness of the local CU.

Some of the problems faced by environmental education programmes relating to protected areas spring from the fact that local people (the programmes often target students from years 7 to 10, which are apt for both cognitive and affective gains) do not seem to be aware of the existence of neighbouring protected areas, or know very little about their aims or the benefits that they can generate, and are consequently uninvolved in their protection (Padua and

Tabanez, 1997; Fiori, 2006). Environmental education is seen as a tool for the resolution and prevention of conflict between people and the natural environment, and for developing initiatives to enable the sustainable use of natural resources (Padua and Tabanez, 1997).

On the avant-garde of the Environmental Education movement in Brazil, Suzana Padua and Marlene Tabanez (1997) advocate its practice as a way to increase knowledge, change values and improve skills; these are conditions considered as essential for the development of attitudes in tune with the natural environment. They associate this move by a variety of social segments to support and participate in conservation with a quest for an improved quality of life (Sorrentino, 1997).

Indrusiak and Padua (1997) recognise that environmental education programmes are often insufficiently planned, and not always in tune with the reality and needs of their target public. They suggest the use of extensive socio-economic and environmental diagnostics of the neighbourhood of the protected area, and the involvement of diverse local interest groups.

Some of the most successful and long-running conservation programmes in Brazil are associated with environmental education programmes, which over many years have worked in close contact with local people. The local people helped to determine these local needs and the definition of directives (Almeida, 1997; Castilhos, Alves and Silva, 1997; Dietz and Nagagata, 1997; Padua and Padua, 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 the protected area). They also suggest that, within this framework, appealing flagship species 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).

Research suggests environmental education initiatives must also concentrate on variables concerning "ownership" (personal involvement with issues) and "empowerment" (sense that one has the power to make important changes), as information alone is not enough to provoke long-

lasting changes in behaviour (Hungerford and Volk, 1990), or to facilitate the understanding of local people's behaviour.

Zoos can also contribute to the long-term construction of positive attitudes and opinions towards wild carnivores by bringing the plight of species to the public attention, by inspiring their appreciation of animals and by providing education programmes and accurate information about individual species and their ecology (Consorte-McCrea, 1994; Bowkett, 2009). Some zoos, aquaria and botanical gardens have developed educational programmes aimed at local people, to improve their relationship with local habitats (Projeto Cerrado Nossa Casa, Almeida, 1997) and native species. The use of zoos as educational tools is often explored, and some conservation programmes have attempted links with local zoos focussing on a particular species.

#### ***4.9. Conflicts between rural and urban interests***

Conflict between urban and rural interest is a recurring theme in the conservation of carnivores. Integration into the political/economic context of urbanized areas denies traditional peoples the original self-sufficiency of their subsistence culture, and alienates them from the decision-making process now centralised in urban governments. More often than not the values related to the preservation of natural predators as part of an ecological web, which is essential for the maintenance of balance within natural environments, come from academic, urban ideals, and so collide with rural concerns for personal safety and the protection of livelihoods (livestock and crops). Conservation officers may be seen as urban aliens and their ideas as part of the imposed traits of a city culture. Within such scenario, rural dwellers may persist with the traditional harvest of natural resources.

In São Paulo state Arruda (2000:280) suggests that “both within conservation units and in their neighbourhood, (the presence of local people) has generated conflicts with the administration of



the units, due to real or implied dilapidation of natural resources through intensive fishing, hunting, mineral and plant products extraction, agriculture and livestock ranching.”

Cândido suggests (2001) that, depending on the size of group, the duration and intensity of contact, and the usefulness of the proposed traits, people from traditional communities will reject, partially accept, or wholly accept the traits originating from this new culture.

#### **4.10. Conservation initiatives and local people**

Recent environmental issues have raised awareness about the sustainable character of traditional cultures, which through experimentation and observation have “developed extensive and detailed knowledge of natural processes and the only management practices adapted to tropical forests/environments to this day” (Arruda, 2000:278). As suggested by Arruda, such populations are “the first to be hit by environmental destruction, and the last to benefit from environmental conservation policies.” Predation affects landowners differentially according to their socio-demographic conditions (Knight, 2000; Breck, 2004; Hill, 2004). The importance of understanding landowners’ perceptions of conflict goes hand in hand with the importance of conservation on private land: support for the later cannot be enlisted without consideration of the former.

Michelle *et al.* (2005) suggest that the survival of large predators relies on tolerance, conflict mitigation, the reduction of risks to both carnivores and people, and on coexistence. According to Macdonald and Sillero-Zubiri (2004) the future of wild canids depends on a combination of conserving large, linked areas of healthy habitat with the development of tolerant human communities living alongside those areas. Within such a picture, rural people are not the problem, but are part of the solution.

Denise Taylor warns educators to “be aware of the dangers of indoctrination (propositions that are said to be certain, when the teacher knows they are uncertain, with disregard for any evidences to the contrary) by taking into account the beliefs, values and cultures of indigenous people” (Taylor, 2004:299; Taylor, 2009). This is especially relevant in canid conservation, when wild animals and habitat protection depends on the restriction of human activities. Communication, as opposed to indoctrination, may raise awareness through input of information, or by bringing about “behaviour modification through a process of reflection and criticality” (Taylor, 2004:299: Taylor, 2009).

Clark *et al.* (2001) view the conservation of carnivores as a system of decision making that demands of professionals the establishment of a standpoint that avoids unconscious bias. Instead of trying to sustain an objective/impartial position the problem-solver acknowledges her perspectives in relation to the problem. They suggest that “carnivores’ conservationists identify themselves as citizens of the global community who strive to maintain environment for a healthy, sustainable future for humanity and all life forms” (Clark *et al.*, 2001:233).

With this in mind, and within the context of the present discussion, I position myself as a conservation biologist, concerned for the future of the maned wolf as an element of the rich biodiversity of the Brazilian southeast, and I am eager to understand how the species fits into the universe of the diverse groups on which their future may depend, so that better informed conservation strategies for the species and habitat may be drawn up. Bearing in mind the achievement of such objectives, I believe it is crucial to understand people’s perceptions of the maned wolf and its conservation, and to comprehend people’s views of conflict with the species and to seek effective ways to resolve it. I also believe that different groups may have conflicting perceptions, and that such disparities must be also addressed for the benefit of local people as well as for conservation. That having been said, I believe that the conservation of biodiversity is an important vehicle in the improvement of people’s standards of living and in guaranteeing a sustainable future for all.

## CHAPTER THREE: Methodology

The data compiled by this research were gathered from a literature survey; from local research programmes and official records; and from fieldwork based on questionnaires and interviews. The methodology combined quantitative and qualitative elements: while data from the sample as a whole allowed for statistical analysis and generalized inferences that are representative of the sample, data from smaller groups inside the sample have been examined qualitatively. The analysis of the attitudes of smaller groups adds an extra dimension into the study of attitudes and beliefs, which, although subjective, allows for important insights that might suggest and explain associations presented in the larger group. To account for the strategy taken, details were given on the rationale behind the choice of social setting, research activities and themes investigated during the study.

### ***1. Research setting***

#### ***1.1. Choice of target groups (social setting)***

Target groups were identified according to their involvement in the conservation of the maned wolf either as opinion makers, supporters, or because of their potential exposure to contact and possible conflict with the maned wolf, in both rural and urban settings. The target groups were:

- sample of people living in rural areas in the neighbourhood of CUs
- local schools:
  - students aged 12-13
  - students aged 16-17
  - school professionals (teachers, head)

- local conservation unit- CU (wildlife reserve):
  - CU visitors
  - CU professionals (staff, biology/conservation/education professionals, researchers, trainee students, volunteers, management)
- local zoo:
  - zoo visitors
  - zoo professionals (staff, biology/conservation/education professionals, researchers, trainee students, volunteers, management)
- International Paper of Brazil staff

CUs and zoos were chosen for their roles in maned wolf conservation *in* and *ex situ*; their biology, conservation and education staff may be seen as responsible for the quality of the contact between the maned wolf and visitors and presumably may influence visitors' attitudes towards the species. Rural people were targeted because they may experience first-hand contact with the maned wolf be it as conflict or not. First (seeing the animals live in nature) and second hand experiences (information about the species mediated by media or another person) of the maned wolf may shape the attitudes of urban people (visitors, students) toward the species differently, making it another interest group. Schools located within the maned wolf's geographical range also have a potential role to play in their conservation, by the possibility they might influence the attitudes of pupils, and indirectly their families, towards them. Student age groups were chosen according to their 'readiness' in terms of developmental stage (following Jean Piaget Cognitive Theory; Lin 2002; Huitt and Hummel, 2003), where children aged 11-15 have already developed the ability to elaborate abstract concepts based on formal logic (Formal operational stage) though their cognitive development is not fully complete, and from 16 onwards they are already capable of reasoning as adults as their development matures.

International Paper of Brazil Ltd. (International Paper, 2009a) is a multinational cellulose processing company (paper and packaging) with USA capital, which also employs biology professionals. One of their sites (sales office, paper mill) is based in Mogi Guaçu (see figure

1.2.), as are some of their planted forests of eucalyptus. The company was primarily contacted because it appeared it used to keep maned wolves in a zoo collection. Although this is no longer the case, staff agreed to take part in the survey, and so were included.

## ***1.2. Choice of research locations***

The relevance of conducting this research within São Paulo state derives from its being the most populated state in Brazil and of high political and economic importance in the national context (see Study Areas and Species chapter, section 3.). Furthermore, it also houses some of the most significant remnants of maned wolf habitat within conservation areas. Information about CUs with Cerrado biome in São Paulo state was gathered through the IBAMA (Brazilian Institute of the Environment and Renewable Resources) website (IBAMA, 2007). Contact was attempted with all CUs, by letter sent via e-mail or fax, explaining the research and inviting their participation.

Information about all zoos that housed maned wolves in the southeast was gathered through the SZB (Zoos Society of Brazil) website (SZB, 2007) and by personal contact. Contact was attempted as with the CUs.

Personal access to and a relationship with two sites (São Paulo Zoo, São Carlos UFSCar and PESC) facilitated their response and the organization of the field work logistics.



Once the above criteria had been met, urban and rural schools were researched in the neighbouring area using the São Paulo state education office website (Secretaria da Educação, 2007). The regional education bureau was contacted to enquire about the possibility of conducting research and to ask for recommendations of which schools to contact (on two occasions direct contact with the schools was also attempted with no positive results). Most schools responded well to the bureau's recommendation.

3. Local urban schools (one year 8 class- ages 12-13, and one year 12 class, ages 16-17)
4. Local rural schools (one year 8 class, and one year 12 class)

Positive replies from both urban and rural schools within the same area as a CU and zoo with maned wolves defined a location as viable.

Arrangements to visit and interview rural residents living in the neighbouring rural area were made with the local CUs, due to the difficulty of access to rural properties. Arrangements included transport provided by the CU and a driver familiar with the neighbourhood.

5. Sample of rural residents in the area surrounding the CU.

When the above five criteria had been met, equivalent numbers of people within the same interest group categories, could then be consulted in each research location, providing data for the comparison of attitudes between interest groups and between locations. Two of the three core locations (São Carlos and the Low Mogiana Region) have allowed for the collection of data from rural people living in the neighbourhood of the CU as well as urban residents, making the comparison possible between the rural and urban settings. Additional data were collected from a number of Conservation Units and Zoos within the state of São Paulo, which although they did not meet all criteria to qualify as core research settings, added depth to the investigation of some interest groups. The remaining CUs and zoos that replied were grouped under "São Paulo state" (see table 1.2.).

		research location				Total
		Greater São Paulo	Low Mogiana region	São Carlos	São Paulo state	
target groups	students year 8	31	78	67	0	176
	students sixth-form	28	55	91	0	174
	zoo visitors	31	30	34	15	110
	CU visitors	19	20	0	0	39
	school prof	2	20	14	0	36
	zoo prof	15	7	5	39	66
	CU prof	11	8	5	7	31
	rural population	0	29	25	0	54
	International Paper	0	35	0	0	35
Total		137	282	241	61	721

**Table 1.2. Target groups by research locations.**

The three research sites and locations selected for the application of questionnaires were (see map in figure 1.2.):

1. Greater São Paulo: São Paulo Zoo and visiting schools; Juquery State Park and visiting schools
2. São Carlos: São Carlos Ecological Park, schools (EE Dr Alvaro Guião, EE Prof Gabriel Félix do Amaral, and EMEB Carmine Botta), UFSCar Cerrado Reserve, rural neighbourhoods.
3. Low Mogiana region: Mogi Guaçu Ecological Station, schools (EE Monsenhor Nora and EE Prof. Geraldo Sorg), Mogi Mirim Municipal Zoo, rural neighbourhoods, International Paper.



## ***2. Choice of research activities (data collection)***

### ***2.1. The Pilot study***

The pilot study aimed to pre-test the questionnaires in relation to the aims and objectives (see Introduction section 3.) of the research project. Questionnaires, as well as all communication with Brazilian organizations, were devised in Portuguese, the language spoken by both the respondents and researcher, and later translated into English. A cover letter to the organizations taking part in the study explained its purpose and assured respondents that the information provided in the questionnaires would be treated confidentially and anonymously and that the results of the research would be made available to their organization (a procedure maintained during the main part of the study). Respondents were also reassured in person of the anonymous and confidential nature of the questionnaires. The clarity and the lack of ambiguity of questions were verified by observing the way respondent's answered to questions and by talking to them about any difficulties found by them. Care was taken not to lead respondents in any direction or to raise expectations of there being a "correct answer". When asked about the purpose of the questionnaires, the researcher replied they were part of a research on "what people think about the maned wolf". Any emphasis on issues concerning conservation or conflict was avoided.

Questionnaires were administered to São Paulo Zoo, in December 2005. Questionnaires to visiting schools and zoo staff were sent by fax and were photocopied and distributed by the Education Department of the Zoo. Questionnaires to visitors were handed out and collected in front of the maned wolf's enclosure, by the researcher: a total of 181 questionnaires.

Target groups were:

- staff and volunteers at the "Conservation Centre" and the "Environmental Education Centre" of São Paulo Zoo

- students and teachers of visiting primary and secondary schools
- zoo visitors

The results of the exploratory study were analysed, and published in February 2009 (Consorte-McCrea and Rubin, 2009). These results contributed to the refining of the aims and to the design of the final questionnaires.

## ***2.2. The main study***

The final questionnaires were distributed and collected during the months of August and September, 2007, and October 2008.

Following a positive reply from the contacted institutions stating their interest in taking part in the research further dialogue was established by e-mail and/or telephone. Once the extent of their participation and the number of questionnaires were agreed on, a letter with further information about the research was sent out and the following were included, where appropriated:

- instructions about how to apply the questionnaires, plus questionnaires
- a pre-paid self addressed envelope for the return of questionnaires
- arrangements to visit the site and distribute the questionnaires in person

The general public in zoos and protected areas was approached by the researcher, asked if they were willing to respond to the questionnaire, and they were given a brief description of its contents and purpose. The sites chosen provided opportunity for the distribution of questionnaires to the largest number of people within the time constrains. Questionnaires were conducted orally with respondents from rural areas, using Questionnaire 4 (Appendix I) as template, to avoid difficulties related to lack of or low literacy amongst respondents. The

researcher or assistant would ask the questions and complete the questionnaire sheet according to the respondent's answers. Information was also recorded from informal unstructured interviews, personal conversations with CU and zoo's management (personal communications.). For people living in rural areas in the neighbourhood of the reserves questionnaires were distributed at home (residences were far apart and difficult to reach), or outside a local convenience store/bar (in the Santa Felicidade neighbourhood, São Carlos). These arrangements imposed constraints on time and allowed only a limited number of interviews. The sampling strategy regarding rural residents living in the areas neighbouring the reserves, was to visit as many of the rural properties as possible, aiming to cover 30 respondents per study area.

### ***3. Design of Questionnaires***

Based on the research questions, different questionnaires were devised to address different target groups according to their relationships with other groups and the maned wolf. Questionnaires 1 and 2 (Q1 and Q2) targeted people with general knowledge of the maned wolf (the general public and students); Questionnaire 3 (Q3) targeted professionals who worked in education, biology or conservation, either in contact with the maned wolf and its habitat or who were potential mediators of information about the maned wolf to the public and students. Questionnaire 4 (Q4) was devised for rural people living in the vicinity of conservation units, who could potentially have experienced or witnessed damage caused by the maned wolf, and were in closer contact with the species and its environment.

#### ***3.1. Questionnaires aims were:***

- 1 to address the research questions by identifying selected attitudes, beliefs and knowledge of target groups in relation to the maned wolf, wildlife, conservation and to other target groups;
- 2 to compare these factors in urban and rural areas amongst socio-demographic groups

and between different locations in São Paulo state.

Social psychologists see *attitude* as “a relatively enduring tendency to respond to someone or something in a way (expressed in a cognitive, affective, and behavioural manner) that reflects a positive or a negative evaluation of that person or thing.” (Manstead, 1996). Attitudes were therefore targeted as they convey positive and negative feelings about objects and they might be expressed in behaviour on appropriate occasions (Ajzen and Fishbein, 1980). Evaluative responses to an object may be expressed through beliefs about the object (cognitive response) (Ajzen, 1988, in Semin and Fiedler, 1996). Beliefs were targeted as they are guides for actions, they convey people’s knowledge about objects and may express desires, constituting essential elements in people’s attitudes. In the analysis of the questionnaires beliefs were considered *negative* if they implied connivance with actions that could damage individuals or deplete maned wolf populations, in accordance with the maned wolf conservation strategies (see Chapter Two). Beliefs were considered *positive* if they supported maned wolf conservation and welfare of individuals. Beliefs associating the maned wolf with negative attributes were also considered *negative* (threatening, scary, attacks chicken pens), while beliefs relating the maned wolf to positive attributes were considered *positive* (inspiring, fascinating).

Socio-demographic questions were asked to establish a profile of respondents in relation to their attitudes since it has been suggested attitudes are influenced by such variables (Kellert *et al.*, 1996; Kaltenborn and Bjerke, 2002; Hill, 2004).

### **3.2. Question categories**

Different sets of questions, containing a number of items each (see Appendix II) were devised to target the different components of attitudes, in order to address the research questions:

- knowledge about the maned wolf (five questions),
- attitudes towards the maned wolf (four questions) and its conservation (five questions),

- beliefs about the maned wolf (three questions),
- values towards wild animals, carnivore and nature (four questions),
- experience of contact and source of information about the maned wolf (four questions) and experience of local CUs and Zoos (two questions),
- relationship between bio/education professionals and local people (seven questions), and
- beliefs about the causes of the maned wolf's mortality (two questions).

For each questionnaire, questions relating to a certain question category were grouped and converted into points (a score, using the tool “computing variable” on SPSS) representing the number of questions answered correctly, positively or negatively (according to data from research sources seen in the Study Areas and Species chapter, section 2). Each answer was equivalent to one point in the score. Each score is a numeric representation of the respondent's level of each of the elements that compose and may influence attitudes towards the maned wolf (according to Kellert *et al.*, 1996). Scores were named:

- Knowledge score;
- Positive Attitudes, Negative Attitudes, and Neutral Attitudes scores;
- Positive Beliefs score;
- Positive Conservation and Negative Conservation scores;
- Value score;
- Positive People Relationship and Negative People Relationship scores.

The score points' scales will be detailed in the Results section. The number of questions in each category varied according to the type of questionnaire (see Appendix II).

### **3.3. Socio-demographic questions**

Questions to ascertain socio-demographic data about the respondents focussed on gender, age, rural or urban residence, occupation, and level of education completed. Ages were classified into five groups (up to 11, 12 to 18, 19 to 35, 36 to 50, 51 and over) than reorganized into four groups for statistical analysis (up to 13, 14 to 18, 19 to 40, and 41+). Occupations were grouped into five categories:

- students,
- people at home (home maker, retired, unemployed),
- people in urban occupations (professional, labourer, sales/office/desk job, business owner, technician),
- bio/education occupations (bio/education volunteer or apprentice, biology professional, education professional), and
- people in land related occupations (landowner, plantation worker, cattle rancher, chicken farm worker, subsistence farmer/*roceiro*, small holder/*sitiante*, fisherman).

Degrees of education were grouped into three categories:

- educated up to and including year 10,
- educated up to and including sixth-form, and
- educated up to and including tertiary education.

### **3.4. Question design**

Questions raised by similar studies have influenced the design of the present questionnaires (Mankin, Warner and Anderson, 1999; Silva, 2000; Anic, 2002; Lackey and Ham, 2003).

Most questions in the pilot and in the final questionnaires were close-ended (see Appendix I) and respondents were asked a question and offered multiple choice answers. Open-ended questions were included in the pilot to elicit information that could be used to complement existing questions and to formulate others. Some of the questions (namely Questionnaire 1, question 10, or Q1q10, Q1q12, Q2q9) were based on the Osgood's Semantic Differential Method (Ajzen and Fishbein, 1980) where respondents were asked to rate objects in terms of different bipolar adjectives, aiming to identify the most important aspects of the respondents' feelings and beliefs about the maned wolf. The language was simple (no technical or scientific terms). Questionnaires were two pages long. The pilot questionnaires 4 and 6 were preliminary questionnaires to elicit salient beliefs, based on Ajzen's Theory of Planned Behaviour (Ajzen 1991, in Lackey and Ham, 2003) and have a different format (open questions). These particular questionnaires sought to identify the target groups' behavioural beliefs, normative beliefs and control beliefs, with the aims of understanding the target groups' salient beliefs about maned wolf and conservation, and other interest groups. This was a means of identifying which of a variety of potential salient beliefs would be best to address in the final questionnaires for different target groups. The results can be seen in the final questionnaires, particularly in Q3Q7, Q3q8 (Appendix I).

#### **4. Data Analysis**

The data analysis combined a quantitative and a qualitative approach. Samples were not representative of the population as a whole, and were not randomly allocated so that the relationships between specific groups of interest and the maned wolf could be examined. As samples were not arbitrary and some of the interest groups were small (samples of the rural residents per interest groups, for instance), inferences are limited to statements of the strength of the evidence associated with a distribution of probability and further statistical analysis was mostly not applied. Identical questions from different questionnaires were analysed both individually and in combinations. Key questions and variables were checked against a selection of other questions and variables to examine possible correlations.

## Statistical analysis

Data entry and statistical analysis were carried out using SPSS (Statistical Package for Social Sciences, SPSS Inc.) versions 15,0, 16,0 and 17,0 for Windows. Crosstabs were used to test for statistical significance and to test the measures of association for two-way tables. Expected responses were compared with observed responses; responses were considered when expected counts were above 5.0, and when fewer than 20% of the cells had an expected count of less than 5.0. The difference between expected and observed values (standard residuals) were considered as particularly relevant when above 2.00 or below -2.00. The evidence for the statistical significance of relationships between variables was based on Pearson's chi-squared tests at the  $p=0.05$  level of significance. Bonferroni corrections have been applied to the alpha levels to account for the multiple tests conducted per each of the question categories (except for tests involving means, see Chapter Four, tables 1.5.; 2.1.7; 2.2.8.; 2.3.5.; 2.4.8.; 2.5.5.; 2.6.5.; 2.7.10. and 3.1.2.). However, while lowering the significance level reduces the possibility of committing Type I errors, it increases the possibility of committing Type II errors, dismissing the evidence for associations that may actually exist between variables. This is particularly evident on small and moderate sample sizes often found in the present samples. Therefore the relationships that are apparently strong between variables at the level of  $\alpha=0.05$  (though the Bonferroni correction might recommend a smaller value) remain of interest for future investigations.

The one way analysis of variance (ANOVA) was used to compare mean groups of scores and examine associations between score categories, target groups, and research locations; while the Two Way between groups ANOVA was used to compare the influence of 2 variables over score categories (Levene's test was applied to indicated the homogeneity of variance; Tests of Between-Subjects Effects was applied to indicate the significance of interactions between variables; Tukey and Bonferroni tests were applied to establish the strength of associations; and Tukey Homogenous Subsets were used, at 95% confidence interval, to identify significant differences between mean groups).



However the study is largely exploratory and aims to provide a preliminary investigation on a wide variety of issues. Although small sample sizes did not allow for the data to be representative of every target group, examining their attitudes and beliefs towards the maned wolves, conservation and other interest groups in a qualitative way allowed for the emergence of significant themes and provided valuable insight into these relationships, which are explored in the discussion sections.

## ***5. Ethical issues***

The cooperation and trust of respondents are important elements in the success of a questionnaire-based research (Asai, Nakayama and Naito, 2003) and the observation of ethical standards is essential for the establishment of such relationships between researcher and participants. The use of questionnaires implies considerations about the participants' rights and welfare, as well as about the validity of the data. The reasons behind people's answers, how the phrasing of questions may influence responses, how truthful responses are, and how people's perceptions of the subject may be influenced by the social impact of the research (Burningham, 1993; Holliday, 2007) are some of the concerns surrounding the use of questionnaires' data as accurate representations of a sample. It has been argued that difficulties deepen the closer the contact between the researcher and the participants (Holliday, 2007). Controlling the variables and careful phrasing and presentation were used to address such problems as much as possible.

Both methodology and questionnaires were approved by the Faculty of Business and Sciences Research Ethics Committee. Care was taken to conduct the interactions with research subjects responsibly by respecting both local customs and subjects, by avoiding intrusion into people's private spaces and by attempting to minimize any impact created by the presence of researchers (Vujakovic and Bullard, 2001; Asai, Nakayama and Naito, 2003). The protection of the rights of participants was assured by:

- Guaranteeing their anonymity: respondents were not named, questions were closed, and responses were aggregated;
- Guaranteeing the confidentiality of the data: questionnaires were handled only by the researcher and assistants, and were stored securely;
- Guaranteeing that only participants who had consented to respond to the questionnaires or to be interviewed took part in the research: clear language was used to inform potential participants of the nature of the research.

Although the research may benefit conservation programmes by helping them plan strategies for the conservation of the maned wolf, no other benefits and no conflicts of interest (Vujakovic and Bullard, 2001) were predicted regarding individual participants. Research results will be available to any interested party. No other incentives were offered to people willing to take part in the research.

### **5.1. Recruitment**



Figure 5.1a. Forestry Institute vehicle, Mogi Guaçu CU (photo by the author, 2007)



**Figure 5.1b. UFSCar vehicle, São Carlos (photo by the author, 2007)**

Questionnaires were given to respondents in a setting either chosen by or familiar to them and which was also relevant to the subject of the research (Holliday, 2007). The principle of informed consent was observed as people were informed of the nature of the research and their participation was voluntary (Homan, 2002; Asai, Nakayama and Naito, 2003) - see data collection in section 2.

Many of the people living in rural areas were approached on their own property. As a way to comply with local social customs (see also Anic, 2002; Zimmermann, 2000) the researcher was escorted and introduced by a local representative, who was familiar with the neighbouring area. In the Low Mogiana region the rural residents visited were familiar with the local reserve workers and accepted to take part in the research. Reserve workers drove the researchers in a reserve vehicle (figure 5a.). However, interviews were private and conducted without the presence of the reserve workers. In São Carlos, a technician from the university escorted the researchers in a university vehicle (figure 5b.). Although he was not familiar with the local residents he was local and the vehicle provided them with a recognizable reference. Refusal to take part was never challenged and there were no attempts to coerce people into participating. It must be considered that the support of government institutions such as conservation units,

universities and schools may have had a positive impact either reassuring or engaging potential participants in the research, or a negative impact resulting in coercion to participate, thus compromising the authenticity of their responses (Assai, Nakayama and Naito, 2003).

## **5.2. Inclusion**

Questionnaires were distributed to people from all ethnic and education backgrounds, genders, age groups and occupations within the constraints of the selected target groups.

## **5.3. Vulnerable groups**

Child participation in the research was mediated by family members or teachers (through *in loco parentis'* consent), with no direct contact with the researcher. Students were selected by the school, zoo or conservation area and questionnaires were distributed to them by a teacher or education officer (see data collection in section 2.). Although such approach to the consulting of underage participants bypasses unnecessary invasion of their space and disturbance of their routines by the researcher, it allows for the intermediation of head teachers, teachers and education officers as *gatekeepers* as their informed consent for the completion of the questionnaires was sought not that of the students (see Homan, 2002, for the ethics of "gatekeeping"). It has been suggested that students may feel "compelled" to participate in questionnaires distributed by their teachers within the classroom (Assai, Nakayama Naito, 2003:149). Questions were however devised responsibly to be appropriate for all target groups they addressed, including underage participants without infringing their privacy or welfare (as noted by Homan, 2002; Assai, Nakayama Naito, 2003).

## **6. Limitations of the study**

The following limitations have been identified during the course of the research:

<b>Limitations found:</b>	<b>Addressed by:</b>
Translation between Portuguese and English	Efforts were made to avoid literal translations and to remain true to the meaning of the questions that were first written in Portuguese, and then translated into English for use in the thesis. The same attention to detail was applied when adapting questions from the English language into Portuguese.
Sensitive nature of some questions about illicit activities, and relationships with government bodies	Reassurance of anonymity and confidentiality of questionnaires; data were aggregated.
Presence of CU officer during some of the interviews	No strong evidence of association was observed between responses and the presence of CU officer; questionnaires were completed away from the presence of the officer.
Not distributing all questionnaires in person	<p>Cover letter included with instructions trying to avoid teachers influencing students' responses; asking teacher not to prepare students to answer questionnaires "correctly"; reassuring there were no "correct answers" to questions.</p> <p>The assistants who delivered some of the rural interviews in both locations and distributed some of the questionnaires to the São Paulo zoo's public were trained on how to proceed.</p>
Limited number of some target group samples due to difficulty of access and time constrains	Although the sample was not highly representative of all target groups the information gathered raised important issues and has given an interesting insight into some of their beliefs and attitudes, which may be further investigated in the future

**Table 6. Limitations of the study.**

## CHAPTER FOUR: Results

### *Introduction*

Action plans (CENAP, 2004; Sillero-Zubiri, Hoffman and Macdonald, 2004; Canid Project Database, 2008; de Paula, Medici and Morato, 2008) have identified that questionnaire surveys of attitudes of local people towards maned wolves are a priority for conservation programmes. Questionnaire surveys are intended as a tool to enable understanding of the relationship between local people and the maned wolf for the sake of long term conservation.

In order to analyse and compare the attitudes of those people who may potentially influence maned wolf status (Aims and Objectives, p 21, Research Questions 1, 3 and 5 p 22) questions were aimed at identification of the four interacting variables outlined by Kellert *et al.* (1996, Research Questions p 22). These variables include attitudes and their components: common beliefs, values, knowledge and misconceptions regarding the maned wolf, its habitat and conservation, and past and present experiences of interaction with the species. In addition, attitudes and beliefs of target groups and how they regarded each other were investigated so that problem areas could be identified, and addressed by recommendations (Research Questions 2, 4 and 5 p 22). The Discussion sections explore how the attitudes identified may influence the conservation of the maned wolf, and include recommendations on how conservation strategies for the maned wolf and the Cerrado habitat may incorporate findings to help address problem areas (as proposed in Aims and Objectives, p 21, Research Question 5 p 22). The structure of the Discussion sections will follow the headlines introduced in chapters one (section 2) and two (section 4) and will debate those issues concerning people/maned wolf relationships in the light of the research findings, seeking to investigate the research questions (which are summarized in the Conclusions chapter). The socio-demographic characteristics of the respondents have been profiled relative to their responses to different question categories.

Tables and figures cited in this chapter can be found in Appendix III.

## **1. Characteristics of the sample**

### **1.1. Sample structure by questionnaires**

Table 1.1. shows the frequency and percentages of respondents for each separate questionnaire from the total of 725 individuals who completed the questionnaires

<b>Type of questionnaire</b>	<b>Frequency</b>	<b>Percent</b>
Q1-General public and students who recognized the maned wolf	451	62.2
Q2-General public and students who did not recognize the maned wolf	77	10.6
Q3-Biology, conservation and education professionals	143	19.7
Q4-Rural population	54	7.4
Total	725	100.0

**Table 1.1. Respondents by type of questionnaire**

### **1.2. Characteristics of the sample according to socio-demographic variables**

The sample was mostly urban (78.2% of respondents, n=567), with 15.3% of respondents residing in rural areas. There was an even ratio of males to females amongst respondents (table 1.2.). The most numerous age group in the sample (27.9%, n=202) was 14-18, followed by up to 13 (24.7%, n=179), since most questionnaires were distributed in schools. Accordingly, most respondents in the sample were students (56.1%, n=407), and most respondents were educated up to (and including) year 10 (36.6%, n=265), followed by those in sixth-form education (35.6%, n=258).

Socio-demographic data		Frequency	Percent
Gender	male	350	48.3
	female	351	48.4
	Total	701	96.7
	no answer	24	3.3
Total		725	100.0
Age	up to 13	179	24.7
	14-18	202	27.9
	19-40	157	21.7
	41 and up	97	13.4
	Total	635	87.6
	no answer	90	12.4
Total		725	100.0
Residence	urban	567	78.2
	rural	111	15.3
	Total	678	93.5
	no answer	47	6.5
Total		725	100.0
Occupation	students	407	56.1
	at home	27	3.7
	urban occupations	89	12.3
	bio/education occupations	125	17.2
	land related occupations	15	2.1
	Total	663	91.4
	no answer	61	8.4
	System	1	.1
	Total	62	8.6
Total		725	100.0
Education	no formal education	5	.7
	educated up to year 10	265	36.6
	educated up to sixth-form	258	35.6
	tertiary education	166	22.9
	Total	694	95.7
	no answer	31	4.3
Total		725	100.0

Table 1.2. Demographic characteristics of the sample.

### 1.2.1. Characteristics of the sample according to urban/rural residence

The majority of respondents from Greater São Paulo (95.2%, n=120), Low Mogiana region (75.7%, n=200), São Carlos (86.2%, n=200) and São Paulo state (83.9%, n=47) resided in



urban areas. The largest percentage of urban residents (table 1.4.) was aged 14-18 (34%, n=175), students (66%, n=355), educated up to sixth-form (37%, n=206).

Some of the relationships between place of residence, socio-demographic variables and location of respondents were statistically significant. Rural residents were mostly from the Low Mogiana region (N=678,  $\chi^2=25.3$ ; df=3;  $p<0.001$ ), and not from Greater São Paulo. Fewer rural residents tended to be aged 13 and younger and many tended to be aged 41 and older (N=610,  $\chi^2=18.1$ , df=3,  $p<0.001$ ), while fewer urban residents tended to be in this older bracket. Rural residents tended to be educated up to year 10 as opposed to being educated up to tertiary level (N=666,  $\chi^2=21.1$ , df=2,  $p<0.001$ ) (table 1.2.1, p 314).

### ***1.3. Characteristic of sample according to target groups***

The sample was classified according to target groups (table 1.3., p 315):

- year 8 students (24.4%, n=176) and sixth-form students (24.1%, n=174) comprised most of the sample;
- 15.2% (n=110) were zoo visitors, mostly aged 19-40 (54.5%, n=48), most in urban occupations (53.4%, n=39), and most educated up to sixth-form (44.5%, n=41);
- 5.4% (n=39) were visitors to Conservation Units, mostly female (60.7%, n=17);
- 5% (n=36) were school professionals, mostly females (77.7%, n=28), all in the group were aged 19 or over, all were educated up to and including tertiary level;
- 9.1% were zoo professionals, who were mostly female (60.3%, n=38), mostly aged 19-40 (85.4%, n=41), most were in bio/education occupations (73.8%, n=45), and most had or were in tertiary education (84.1%, n=53);
- CU professionals (4.3%, n=31) were mostly male (74.2%, n=23), most were aged 41 and up (61.9%, n=13), most were in bio/education occupations (65.5%, n=19), and most were educated up to tertiary level (56.6%, n=17);

- rural respondents (7.5%, n=54) were mostly aged 41 and up (70.4%, n=38), and most were at home (37.7%, n=20) or in land-related occupations (28.3%, n=15);
- International Paper respondents (4.8%, n=35) were mostly male (85.7%, n=30), most aged 19-40 (74.1%, n=23), most in bio/education occupations (62.5%, n=20), and most with or in tertiary education (77.1%, n=27).

#### 1.4. Characteristics of sample according to research locations

Socio/demographic characteristics of respondents by research locations		research location				Total
		Greater São Paulo	Low Mogiana region	São Carlos	São Paulo state	
male or female	male	58	140	122	30	350
	female	73	132	117	29	351
Total (24 missing values)		131	272	239	59	701
age group	up to 13	44	76	59	0	179
	14-18	31	66	102	3	202
	19-40	38	58	34	27	157
	41 and up	11	41	35	10	97
Total (90 missing values)		124	241	230	40	635
urban/rural residence	urban	120	200	200	47	567
	rural	6	64	32	9	111
Total (47 missing values)		126	264	232	56	678
occupation groups	students	79	148	174	6	407
	at home	2	12	11	2	27
	urban occupations	17	31	24	17	89
	bio/education occupations	24	51	23	27	125
	land related occupations	0	8	7	0	15
Total (62 missing values)		122	250	239	52	663
education groups	no formal education	0	4	0	1	5
	educated up to year 10	54	112	91	8	265
	educated up to sixth-form	47	88	115	8	258
	tertiary education	29	64	36	37	166
Total (31 missing values)		130	268	242	54	694

Table 1.4. Characteristics of respondents according to research location. Missing values refer to blank values, where respondents did not answer the question.

Rural questionnaires were distributed in both the Low Mogiana and São Carlos locations. São Paulo state had the highest percentages of respondents aged 19-40 (67.5%, n=27), bio/education professionals (51.9%, n=27) and respondents in or educated up to tertiary level (68.5%, n=37). São Carlos had the highest percentages of respondents educated up to sixth-form (47.5%, n=115).

As shown in table 1.2. (no answers), many respondents did not disclose some of their socio-demographic information (recorded as missing values in table 1.4.).

The data collected by the questionnaires offer scope for further investigation of the relationships between variables, which could be explored in future studies.

### 1.5. Summary of findings

The table below summarizes the most significant characteristics of the sample, which relate to residence, age structure and education

Aspect	Result	Chi squared Statistics Bonferroni correction $p=0.017$
Urban/rural residence	Rural residents in Low Mogiana region > Greater São Paulo	25.3; df=3; $p<0.001$
Age	13 and younger > 41 and older	18.1, df=3, $p<0.001$
Education	Educated up to year 10 > tertiary level	21.1, df=2, $p<0.001$

Table 1.5. Summary of results for Characteristics of the sample

## 2. Question Categories

## **2.1. Knowledge**

### ***Introduction***

According to Kellert *et al.* (1996) knowledge about a species of predator is one of the four interacting predictors of people's attitudes towards that species. Research indicates that the more people know about a species the more likely they are to be positive towards its conservation (Bath and Farmer, 2000; Sillero-Zubiri, Hoffmann, and Macdonald, 2004). Questions to ascertain respondents' knowledge about the maned wolf covered some key concepts about the maned wolf's ecology, behaviour and situation in the local area, so that levels of accurate knowledge could be compared to information gathered from scientific research on the species and translated into a Knowledge score. This section aims to address the research questions 1, 2, 3 and 5 by examining the knowledge component of local people's attitudes towards the maned wolf and testing for differences amongst interest groups.

### ***Results***

#### ***2.1.1. Recognizing the maned wolf***

General public and students in urban and rural locations were asked to answer one of two questionnaires according to their ability to recognize the maned wolf from a picture (figure 2, Chapter Two, section 2.) accompanying the screening question in questionnaire 1: *Do you recognize the animal in the photo? If your answer is NO, fill in only questionnaire 2* (see Q1q1, App I).

Most respondents were able to recognize the maned wolf by name or picture (86.7%, n=504), including all the respondents from São Paulo state (table 2.1.1., p 317). Some associations between responses and place of residence, socio-demographic variables and location of respondents were statistically significant. Amongst the respondents who did not recognise the

maned wolf there were disproportionately many from the Greater São Paulo (n=37), and disproportionately few from the Low Mogiana region (n=16) (N=581,  $\chi^2=53.5$ ; df=3;  $p<0.001$ ). While all rural respondents recognized the maned wolf, zoo visitors tended not to recognize the species (n=24, N= 577,  $\chi^2=20.6$ ; df=5;  $p=0.001$ ). Few rural residents (n=5, N=540,  $\chi^2=6.2$ ; df=1;  $p=0.012$ ) and many female respondents (n=48, N=540,  $\chi^2=11.1$ ; df=1;  $p=0.001$ , table 2.1.1., page 317) did not recognize the maned wolf.

### 2.1.2. Food preference in nature

The respondents of Q1 and Q4 were offered a list of food items and were asked to pick only one they believed was the maned wolf's favourite item in the wild (see Q1q2 in Appendix I). Items were regrouped as in table 2.1.2.:

The maned wolf's favourite food items in the wild	Frequency	Percent
rats/wolf's fruit/fruit	201	39.8
chicken	66	13.1
don't know	156	30.9
other answer	52	10.3
no answer	30	5.9
<b>Total</b>	<b>505</b>	<b>100.0</b>

Table 2.1.2. Q1+Q4 respondents' choice of the maned wolf's favourite food item in the wild.

Most respondents (60.2%) did not choose any of the items indicated by research to be the maned wolf's favourites in nature. However, 39.8% of respondents (the largest group of respondents, n=201) believed the maned wolf's favourite food item in the wild was either *wolf's fruit* (although the name of the fruit could be a 'give away'), *fruits* or *rats*: these are its favourite items according to field studies. Nevertheless, 13.1% (n=66) chose *chicken* as the maned wolf's favourite food item in the wild, reinforcing previous research (Dietz, 1984; Anic, 2002; Rodrigues; 2002) that points to popular misconceptions about maned wolves' preferences for livestock. The second largest percentage of respondents (30.9%, n=156) chose the option *don't know*.

There was no evidence of differences in choice of food items between urban and rural residents. Some associations between responses and socio-demographic variables and location of respondents were statistically significant. A majority of respondents from São Carlos ( $n=99$ ,  $N=475$ ,  $\chi^2=19.0$ ;  $df=9$ ;  $p=0.025$ ) chose *rats/fruits/wolf's fruit* as the favourite food items of the maned wolf in the wild, in comparison to a minority of residents of all other research locations. Many International Paper staff ( $n=17$ ) and few sixth-form students ( $n=33$ ) chose *rats/fruits/wolf's fruit*, while many respondents of the rural questionnaire ( $n=13$ ) chose *chicken* as the favourite item ( $N=472$ ,  $\chi^2=95.8$ ;  $df=15$ ;  $p<0.001$ ). Few respondents' educated up to sixth-form ( $n=60$ ,  $N=454$ ,  $\chi^2= 40.4$ ;  $df=6$ ;  $p<0.001$ ) tended to answer *rats/fruit/wolf's fruit*.

### 2.1.2.1. By information source

A majority of respondents of Q1 and Q4 who chose *chicken* as the maned wolf's favourite food item in the wild had heard of the maned wolf from *TV/radio* (62.1%,  $n=41$ ), while most who chose *rats/fruits/wolf's fruit* had heard of the maned wolf from *zoo/museum/CU* (65.1%,  $n=131$ , table 2.1.2.1.). However, some associations between responses and information sources were statistically significant. Respondents who heard of the maned wolf from the *school or environmental education course* tended to choose *rats/fruit/wolf's fruit* ( $n=55$ ,  $N=475$ ,  $\chi^2=12.3$ ;  $df=3$ ;  $p=0.006$ ). Sources of information will be further discussed in section 2.6. Experience, p 190.

Source of information about the maned wolf by choice of rats/fruits/wolf's fruit or chicken as favourite food item in the wild	rats/fruits/wolf's fruit	chicken	Other answer	Total responses per source of information
TV/radio	125	41	133	299
papers/books/magazines	76	21	82	179
zoos/museum/CU	131	33	144	308
school/environmental education course	55	8	32	95
Live in nature	84	19	63	166
parents/family/friends	10	1	15	26
Internet	39	6	29	74
<b>Total respondents</b>	<b>201</b>	<b>66</b>		<b>475</b>
<b>in their own property</b>	<b>6</b>	<b>3</b>	<b>7</b>	<b>16 (N=55)</b>

Table 2.1.2.1. Q1+Q4 source of information about the maned wolf by choice of the maned wolf's favourite food item in the wild.

### 2.1.3. Trends in maned wolf numbers

Of the respondents of Q1 and Q4, 84.4% (n=426) believed the number of maned wolves is *decreasing* whilst 8.7% of respondents believed numbers are *staying the same* (n=44), and 5.5% (n=28) believed numbers are *increasing* (table 2.1.3). In spite of the low numbers of responses, a large statistically significant number of rural residents believed maned wolf numbers are *increasing* (N=445,  $\chi^2=15.4$ ; df=2;  $p<0.001$ ).

		Frequency	Percent
Valid	decreasing	426	84.4
	staying the same	44	8.7
	increasing	28	5.5
	no answer	7	1.4
	Total	505	100.0

Table 2.1.3. Responses in relation to trends in maned wolf numbers

#### 2.1.3.1. By source of information

Amongst the respondents of Q1 and Q4 who had heard about the maned wolf from *secondary sources* (TV/radio, news papers/books/magazines, school/environmental education course, from family/friends, internet), from seeing it *live in nature* or in *zoos, museums and CUs* most believed their numbers are decreasing (see table 2.1.3.1.). However, the largest percentage of respondents who believed maned wolf numbers are increasing were found amongst people who had seen the maned wolf *live in nature* (7.9%, n=14).

Source of information by knowledge of trends in maned wolf numbers		Do you think the number of maned wolves is:			
		decreasing	staying the same	increasing	Total
Live in nature	Count	152	11	14	177
	%	85.9%	6.2%	7.9%	100.0%
Secondary sources	Count	334	31	14	379
	%	88.1%	8.2%	3.7%	100.0%
Zoo/museum/CU	Count	281	26	15	322
	%	87.3%	8.1%	4.7%	100.0%
<b>Total</b>		<b>767</b>	<b>68</b>	<b>43</b>	<b>878</b>

Table 2.1.3.1. Q1+Q4 responses to trends in maned wolf numbers according to information sources.

Considering the small numbers in this sample, there may be an association between having close experiences of the maned wolf in nature and misapprehensions about their number trend and perception of threat. Most rural respondents who believed maned wolf numbers are increasing have seen it *live in nature* (90.9%, n=10), most *in their own property* (72.7%, n=8) (table 2.1.3.1.Q4, p 317, table 2.1.3.1a.Q4., p 318); there is a 90.9% match between this group and the belief that *maned wolves attack chicken pens and livestock* (n=10, table 2.1.3.1.Q4) though 41.6% (n=5) of rural respondents who have themselves or their family experienced damage allegedly caused by the maned wolf or another animal, believed numbers are increasing (table 2.1.3.1.Q4).

#### **2.1.4. Knowledge of the maned wolf's habitat and conservation needs**

Most respondents of Q1 and Q4 demonstrated a sound knowledge about the maned wolf in relation to its habitat and conservation needs (table 2.1.4.). Most respondents believed maned wolves benefit from remaining in their natural habitat (87.3%, n=441), which was identified as the grasslands and savannahs of Brazil (70.1%, n=345), and believed they should be protected (81.4%, n=411). These are fair statements based on the status of the maned wolf and research on its ecology (see Study Area and Species, section 2.). Most respondents acknowledged the maned wolf's role in preserving the local ecosystem (80%, n=404). A minority acknowledged the role that maned wolves play in eliminating crop pests, such as rodents (22.4%, n=113).

<b>Maned wolf and ecology</b>	Frequency	Percent of respondents who agree with statement
The maned wolf lives in grasslands and savannahs of Brazil	354	70.1
The maned wolf hunts rats that attack plantations	113	22.4
The maned wolf needs to be protected	411	81.4
The best place for the maned wolf is nature	441	87.3
Preserving the maned wolf helps to preserve the ecosystem	404	80.0
Total	505	100.0

**Table 2.1.4. Q1+Q4 respondents' knowledge of maned wolf and ecology**



There was a statistically significant association between respondent's knowledge and their place of residence. The great majority of rural residents believed *maned wolves live in grasslands and Cerrados of Brazil* (81.3%, n=74) and many (n=34) tended to believe that *maned wolves hunt rats that attack plantations* (N=470,  $\chi^2=13.2$ ;  $p<0.001$ ).

### 2.1.5. Differentiation between maned wolf and grey wolf's social behaviour and feeding habits

Out of the Q1 responses to statements related to the maned wolf's social behaviour and feeding habits only 39.5% were correct (n=320), and 60.5% were incorrect assumptions, as opposed to 75.3% (n=1191) correct responses related to the grey wolf (*Canis lupus*) (table 2.1.5.).

There were statistically significant associations between responses and some of the variables characterizing the respondents. Amongst the group of respondents who believed untrue statements about the maned wolf disproportionately many were from the Low Mogiana region (*maned wolf eats mainly meat*, n=79, N=440,  $\chi^2=17.7$ ; df=3;  $p=0.001$ ) and from Greater São Paulo (*maned wolves hunt in group*, n=21, N=440,  $\chi^2= 17.3$ ; df=3;  $p=0.001$ ) while few were from São Carlos (*maned wolf eats mainly meat*, n=37; *maned wolves hunt in group*, n=17). International Paper staff indicated the best overall knowledge about the two species.

Social and feeding ecology	Maned wolf	Grey wolf
lives in groups of 10 or more	87	341
eats mainly meat	143	281
in the absence of prey hunts livestock	166	258
hunts in groups	84	311
eats more rats than chicken	320	70
attacks children and elderly to eat	10	320
Total (451 respondents; 2391 responses)	810	1581
<b>Correct responses (totals in green)</b>	<b>320 (39.5%)</b>	<b>1191(75.3%)</b>

Table 2.1.5. Q1 respondents' knowledge about the maned wolf and the grey wolf.

No International Paper staff member believed that *maned wolves live in groups of 10 or more or hunt in groups*. Few sixth-form students also tended to believe in the latter ( $n=16$ ,  $N=437$ ,  $\chi^2=19.4$ ;  $df=4$ ;  $p=0.001$ ). Many respondents aged up to 13 ( $n=42$ ,  $N=404$ ,  $\chi^2=14.8$ ;  $df=3$ ;  $p=0.002$ ) and educated up to year 10 ( $n=47$ ,  $N=426$ ,  $\chi^2=10.4$ ;  $df=2$ ;  $p=0.006$ ) believed that *maned wolves hunt in groups*. Many respondents educated up to year 10 ( $n=47$ ) believed *maned wolves hunt in groups* and few with tertiary education ( $n=5$ ) tended to believe *the maned wolf eats mainly meat* ( $N=426$ ,  $\chi^2=14.9$ ;  $df=2$ ;  $p=0.001$ ).

There were also statistically significant associations between responses and beliefs about the maned wolf feeding habits. Respondents who believed *chicken* is the maned wolf's favourite food tended to believe *the maned wolf eats mainly meat* ( $n=28$ ), while few respondents who believed *rats/fruits/wolf's fruit* are their favourite items tended to agree ( $n=35$ ) ( $N=411$ ,  $\chi^2=22.4$ ;  $df=3$ ,  $p<0.001$ ). Few respondents in this group believed *maned wolves hunt livestock in the absence of prey* ( $n=42$ ,  $N=411$ ,  $\chi^2=26.4$ ;  $df=3$ ;  $p<0.001$ ). There were no strong associations between the above beliefs and sources of information about the maned wolf.

### **2.1.6. Knowledge Score**

For each questionnaire, questions concerning the knowledge of respondents about the maned wolf and its ecology were grouped and converted into points (or a score). Of the respondents of Q1 and Q4, 47.1% ( $n=238$ ) demonstrated moderate knowledge scoring 3-5 on a 9 point scale (bar chart 2.1.6., p 319), followed by a high score (43%,  $n=217$ ) of 6-8 (table 2.1.6, p 319). Scores were regrouped into low (0-4) and high (5-8) for statistical analysis, and most respondents of Q1 and Q4 scored high (65.3%,  $n=330$ ) in knowledge (table 2.1.6a., p 319). Of the respondents of Q1, 3.3% scored low (0-5 on a 15 points scale, bar chart 2.1.6.Q1, p.320) in knowledge levels ( $n=15$ ), 44.6% ( $n=201$ ) scored moderate (6-9) and 51.9% ( $n=234$ ) scored high (10-14) (table 2.1.6.Q1, p. 320). Scores were regrouped into low (0-7) and high (8-14) and most respondents scored high (80%,  $n=361$ ) (table 2.1.6a.Q1, p.320).

There was no strong evidence of differences between urban and rural residents, however there was very strong statistical evidence of difference between research locations relating to knowledge of the maned wolf and its ecology. São Carlos respondents demonstrated considerably high knowledge ( $n=105$ ) while respondents in São Paulo state ( $n=2$ ) demonstrated less (considering the low numbers,  $N=502$ ,  $\chi^2=29.9$ ;  $df=6$ ;  $p<0.001$ ). Tukey and Bonferroni tests, followed by *post-hoc* comparisons, indicate that knowledge about the maned wolf amongst respondents from São Carlos ( $M=10.30$ , 95%) is significantly more pronounced and accurate than that of respondents from São Paulo state ( $M=7.93$ , 95%,  $p<0.001$ ) and the Low Mogiana region ( $M=8.77$ , 95%,  $p<0.001$ ).

Amongst Q1 respondents, Tukey and Bonferroni tests (followed by *post-hoc* comparisons) suggest the knowledge displayed by International Paper staff ( $M=11.56$ , 95%) is significantly higher ( $p<0.001$ ) than that of all other target groups. Amongst Q1 + Q4 respondents, results suggest (based on Tukey HSD and Bonferroni tests) that the knowledge about the maned wolf amongst rural respondents ( $M=5.98$ , 95%) and International Paper staff ( $M=5.92$ , 95%) is significantly higher than that of zoo visitors ( $M=4.70$ , 95%,  $p<0.012$ ), sixth-form students ( $M=4.65$ , 95%,  $p<0.004$ ) and CU visitors ( $M=4.03$ , 95%,  $p<0.001$ ).

Amongst the respondents of Q1 and Q4 many who heard about the maned wolf from the *internet* ( $n=68$ ,  $N=505$ ,  $\chi^2=13.3$ ;  $df=1$ ;  $p<0.001$ ) had a good level of knowledge about the species. Also most respondents who had seen the maned wolf *live in nature* ( $n=42$ ,  $N=505$ ,  $\chi^2=23.9$ ;  $df=1$ ;  $p<0.001$ ) or had heard about it in *school or environmental education course* ( $n=20$ ,  $N=505$ ,  $\chi^2=11.8$ ;  $df=1$ ;  $p=0.001$ ) tended to display good knowledge levels.

Amongst the respondents of Q1 there was a positive statistical association between knowledge about the maned wolf and having heard about it from *papers/books/magazines* ( $n=161$ ,  $N=450$ ,  $\chi^2=17.5$ ;  $p<0.001$ ), *school/environmental education* ( $n=63$ ,  $N=450$ ,  $\chi^2=14.3$ ;  $p<0.001$ ), and having seen the maned wolf *live in nature* ( $n=82$ ,  $N=450$ ,  $\chi^2=13.5$ ;  $p<0.001$ ) (2.1.6d.Q1, p 324). There was strong evidence of a negative association between low knowledge about the species and the intention to know more about it ( $N=439$ ,  $\chi^2=13.2$ ;  $df=1$ ;  $p<0.001$ ).

Most respondents of Q1 and Q4 who believed that *carrying a piece of the maned wolf's pelt brings luck* displayed low levels of knowledge about the species ( $n=16$ ,  $N=505$ ,  $\chi^2=5.7$ ;  $df=1$ ;  $p=0.017$ ). Considering the low numbers, most rural respondents who did not care about the maned wolf displayed low knowledge about the species (66.7%,  $n=8$ ). Amongst Q1 respondents, few people who displayed low knowledge about the maned wolf tended to consider it harmless ( $N=450$ ,  $\chi^2=37.8$ ;  $df=3$ ;  $p<0.001$ ), good ( $N=450$ ,  $\chi^2=64.6$ ;  $df=3$ ;  $p<0.001$ ), beautiful ( $N=450$ ,  $\chi^2=40.4$ ;  $df=3$ ;  $p<0.001$ ), brave ( $N=450$ ,  $\chi^2=30.6$ ;  $df=3$ ;  $p<0.001$ ), strong ( $N=450$ ,  $\chi^2=33.6$ ;  $df=3$ ;  $p<0.001$ ), defensive ( $N=450$ ,  $\chi^2=33.3$ ;  $df=3$ ;  $p<0.001$ ), tame ( $N=450$ ,  $\chi^2=37.4$ ;  $df=3$ ;  $p<0.001$ ) or valuable ( $N=450$ ,  $\chi^2=52.2$ ;  $df=3$ ;  $p<0.001$ ). Many with low knowledge, however, considered it ferocious ( $N=450$ ,  $\chi^2=37.4$ ;  $df=3$ ;  $p<0.001$ ), worthless ( $N=450$ ,  $\chi^2=52.2$ ;  $df=3$ ;  $p<0.001$ ) and bad ( $N=450$ ,  $\chi^2=64.6$ ;  $df=3$ ;  $p<0.001$ ). There was also a significantly high percentage of no answers concerning these bipolar adjectives amongst respondents who scored low in knowledge ( $p<0.001$ ). No evidence of association was found between lack of knowledge and the belief that maned wolves scare and attack people or livestock. In fact 71.8% of people who believed the maned wolf is a threat to livestock scored high in knowledge.

### 2.1.7. Summary of findings

Aspect	Result	Chi squared Statistics Bonferroni correction= 0.0014 *not significant when Bonferroni correction is applied
<b>Identification</b>		
Positive identification of maned wolf	All respondents from São Paulo State Rural respondents > zoo visitors	20.6, $df=5$ , $p=0.001$
Misidentification of maned wolf	Rural residents < urban residents Males < females Greater São Paulo > Lower Mogiana residents	6.2; $df=1$ ; $p=0.012^*$ 11.1; $df=1$ ; $p=0.001$ 53.5, $df=3$ , $p<0.001$

Aspect	Result	Chi squared Statistics Bonferroni correction= 0.0014 *not significant when Bonferroni correction is applied
<b>Knowledge of food preference</b>		
Overall choice	No differences between rural and urban residents	
Correctly identified rats/fruits/wolf's fruit	São Carlos residents, International Paper staff > other target groups International Paper > other groups Information about the maned wolf came from school/environmental education courses> other source of information	19.0;df=9;p=0.025* 95.8;df=15;p<0.001 12.3;df=3;p=0.006*
Wrongly identified chicken	Educated up to sixth-form < other education groups Rural respondents> other groups	40.4; df=6; p<0.001 95.8;df.=15;p<0.001
<b>Knowledge of mw population trends</b>		
Wrongly believed numbers are increasing	Rural residents< urban residents	15.4; df=2; p<0.001
<b>Knowledge of mw habitat and conservation needs</b>		
Mw eats rats that attack plantations	Rural respondents > other target groups	13.2; df=1; p<0.001
<b>Misconceptions about mw</b>	No differences between sources of information	
maned wolf eats mainly meat	Low Mogiana > São Carlos Educated up to year 10> tertiary education Chicken favourite food > rats/fruits/wolf's fruit favourite food	17.7; df=3; p=0.001 14.9; df=2; p=0.001 22.4; df=3; p<0.001
maned wolves hunt in group	Greater São Paulo > São Carlos International Paper, sixth-form students < other target groups Aged up to 13> older age groups Educated up to year 10> more educated	17.3; df=3; p=0.001 19.4; df=4; p=0.001 14.8;df=3;p=0.002* 10.4;df=2;p=0.006*
maned wolf lives in groups of 10 or more	International Paper < other target groups	11.7;df=4;p=0.020*
maned wolves hunt livestock in the absence of prey	rats/fruits/wolf's fruit favourite food< other favourite food	26.4; df=3; p<0.001
<b>Knowledge scores</b>	No difference between urban and rural residents	
high	No association: mw attacks people and livestock São Carlos residents > São Paulo state Mean São Carlos > mean São Paulo state and mean Low Mogiana (Q1) International Paper staff > all other target groups (Q1) Mean International Paper staff > all other groups Mean rural respondents and International Paper > mean zoo visitors, 6thform students, CU visitors Information about the mw from internet> no use of this source (Q1) Information about the mw from papers/books/magazines> no use of this source (Q1) Saw maned wolf live in nature > no use of this source	29.9; df=6; p<0.001 p<0.001 p<0.001 p<0.012, p<0.004, p<0.001 13.3; df=1; p<0.001 17.5;df=1; p<0.001 13.5; df=1; p<0.001
low	Saw maned wolf live in nature < no use of this source Information from school or environmental education course < no use of this source Little intention to know more about the species Belief that carrying a piece of the maned wolf's pelt brings luck Few believed the mw was: harmless, good, beautiful, brave, strong, defensive, tame, valuable Many believed the maw was: ferocious, worthless, bad.	23.9; df=1; p<0.001 11.8; df=1; p=0.001 13.2; df=1; p<0.001 5.7;df=1;p=0.017* p<0.001 p<0.001

Table 2.1.7. Summary of results for the Question Category Knowledge

**Discussion**

Dietz and Nagagata (1997:140) claim that “to preserve a species, people must be able to recognize it and to associate itself with it”. Although how much local people associate themselves with the maned wolf was not investigated by this research (it would be a useful development in future research) the importance people place on the maned wolf and the knowledge about other benefits it brings to people was examined. The maned wolf was recognized by most of the respondents in this research, and particularly by rural people, and most respondents identified its habitat as being the Cerrado, fulfilling one of Dietz and Nagagata’s preconditions. Comparable with other research findings only a minority of zoo visitors and a minority of respondents from Greater São Paulo, recognized it (22% as opposed to 32% of respondents in Brasilia Zoo, Bizerril and Andrade, 1999) indicating that the potential of zoos to disseminate awareness about the maned wolf is yet to be fulfilled. However, most students were able to recognize the species (87.8%, compared to 96% in Anic, 2002). The fact that the maned wolf is timid, solitary and has crepuscular habits, which make it less visible to people (Hill, 2004), has apparently not hindered the knowledge about the species amongst respondents in this research’s sample. This contrasts with suggestions in the literature (Bizerril and Andrade, 1999; Bestelmeyer, 2000; Anic, 2002).

Candido (2001) argues that rural people’s relationship with and knowledge of the natural environment has been altered by the socio-economic pressures derived from the capitalist expansion. The data analysis shows, however, that rural respondents knew more about the maned wolf’s habits and ecology than most other target groups, suggesting that this trait might have persisted in the rural population. The same level of sound knowledge on most aspects of maned wolves’ ecology and behaviour by local people was also recorded by other researchers in the southeast of Brazil (Dietz, 1984; Anic, 2002) suggesting this may be a generalized trend that should be considered in the planning of conservation programmes.

The other group to consistently display a consistent high level of knowledge about the maned wolf was the International Paper staff, while CU visitors consistently demonstrated low knowledge about the maned wolf. International Paper staff comprised of a highly educated

group of mostly agro-forestry professionals, while CU visitors frequented the conservation areas mostly to jog and enjoy the scenery. The relationships between these two interest groups' knowledge about and attitudes towards the maned wolf could be further investigated in the future.

### **1. *The maned wolf within the changing universe of local people***

Research on the composition of the maned wolf's faeces in the wild shows a preference for wolf's fruit and rodents all year round (Dietz, 1984; Jácomo, 1995; Motta-Junior *et al*, 1996; Juarez, 1997; Motta-Junior, 2000; Aragona and Setz, 2001; Belentani, 2001; Bueno, Belentani and Motta-Junior, 2002; Santos, Setz and Gobi, 2003, see Study Areas and Species 2.1.3.). Many respondents (39.8%) in this research correctly identified the maned wolf's favourite food items correctly as wolf's fruit, fruits or rats, however many rural people (24%) erroneously chose chicken as its favourite item (in Anic (2002) 30-100% chose chicken). Nonetheless field research on maned wolves' feeding habits suggest that predatory behaviour towards chickens is not a frequent event (poultry remains were only found in under 1.5% of analysed scat samples- Bueno, Belentani and Motta-Junior, 2000; Motta-Junior 2000; Anic, 2002; Rodrigues, 2002; Bueno and Motta-Junior, 2004 ). This indicates a considerable level of misconception.

In fact, data indicated that respondents knew more about the European wolf (*Canis lupus*) than they knew about the native maned wolf in particular about its feeding habits; supporting literature suggests that, at least in some aspects, people's distinctions between exotic and native species may be weak, (Pacheco and Rojas, 1996; Anic, 2002;). Respondents wrongly assumed maned wolves eat mainly meat and hunt in groups just as European wolves do. However, confusion between the maned wolf and *canis lupus* may be connected to residence in the largest urban centre (in this case, Greater São Paulo), while in rural areas (as in the Mogiana region) and amongst rural residents misconceptions about the species related mostly to carnivorous diet. The image of predatory behaviour has not only been perpetuated by traditional storytelling, fairy tales and fables, but has been, for centuries, at the heart of movements to eradicate wolves from many European countries (Bush, 1995; Yalden, 1999; Kellert *et al.*, 1996; Bangs *et al.*, 2005, Grigorian, no date). Based on Kellert (1985), if the

maned wolf is identified with *Canis lupus* by local people, then cultural and historical antipathies towards the European wolf may be reflected in negative perceptions towards the maned wolf. Further research into the source of the beliefs about maned wolf as poultry predators and how these may be associated with beliefs about *Canis lupus*, as they relate to fairy tales, would be of interest.

Results also suggest a positive association between low levels of education and low levels of knowledge about the maned wolf's feeding ecology and behaviour; this may confirm suggestions linking knowledge and formal schooling (Kedu, 2003).

Although most local people in this research correctly assumed the maned wolf's numbers were decreasing (according to IUCN, 2009; CENAP-IBAMA, 2008), results indicate an association between people seeing the maned wolf in the wild (mostly in their own properties) and believing numbers were increasing. Such misapprehensions may indicate an increasing frequency of sightings in peopled areas of the countryside even although numbers overall are declining. Results also indicate a possible association between a high frequency of encounters and perceived threat, due to feelings of "violation of personal space" and fear of attack experienced by people who saw the animal in their own property (Bangs *et al.*, 2005; Michelle *et al.*, 2005).

The belief that populations of maned wolves are increasing may drive changes in attitudes (Bath, 1995), since an increase in the frequency of encounters could mean increase in risk of depredation and attacks to chickens, and the invasion of people's private spaces- both possibly associated with negative attitudes. On the other hand, the belief that populations are declining may provoke positive attitudes towards the species (see Theory of Wildlife Acceptance Capacity, Decker and Purdy, 1988).

## **2. Relationship between human occupied landscapes and the maned wolf**



In relation to the maned wolf's decreasing numbers, secondary sources of information (mainly TV and radio) seem to have provided an accurate picture to most respondents. For a minority the internet particularly was associated with high levels of knowledge, however computers may not be accessible to all households and other more widespread media must be considered.

Although respondents who had seen the maned wolf live in nature displayed the best knowledge regarding the maned wolf's behaviour and ecology, associated with positive attitudes and beliefs, this source of information was also associated with the misapprehensions that their numbers were increasing, which could be addressed by information campaigns.

### **3. Environmental awareness and people in the vicinity of conservation areas**

Results indicate the existence of the potential of environmental education courses to effectively address misconceptions in important areas of the maned wolf ecology. School and environmental education courses were effective, though limited in reach, as sources of accurate information about the maned wolf's feeding ecology (see 5.1.). In the literature, knowledge is often positively related to formal schooling and there are suggestions that conservation education campaigns organized by schools are effective in the improvement of students' knowledge about wild animals (Kedu, 2003). Education is also related to positive attitudes towards wildlife and support for conservation (Parry and Campbell, 1992; Heinen, 1993; Gillingham and Lee, 1999; White *et al.*, 2001, all in Kedu, 2003). Therefore, it can be suggested that educational initiatives aimed at increasing knowledge about the maned wolf and its habitat could be used to tackle misconceptions within problem groups and be a step towards the improvement of their attitudes towards conservation (Kedu, 2003).

Nevertheless, information alone is not sufficient to establish long-lasting behavioural changes, as suggested by Hungerford and Volk (1990). Environmental educators in the research areas must also develop strategies to facilitate the involvement of local people in conservation issues thus reassuring them that their involvement does matter and can cause real change.

Most local people considered the maned wolf conservation valuable for the natural environment and many local people believed in the maned wolf's cultural importance and potential source of tourism interest. A significantly large number of rural people recognised the maned wolf's role in eliminating rats that may be detrimental to plantations; this is important as it offsets occasional damages allegedly caused by them. Overall, local people's moderate to high knowledge concerning the maned wolf's ecological value and conservation needs are encouraging results, as suggested by Sillero-Zubiri, Hoffman and Macdonald (2004) and Bath and Farmer (2000), and fulfil one of the pre-requisites in the formation of positive attitudes towards the conservation of a species.

## ***2.2. Attitudes towards the maned wolf***

### ***Introduction***

Although *attitudes* cannot be measured directly, evaluative responses to an attitude object may be expressed in a verbal way, through feelings and beliefs about the object and through behavioural intentions towards the object (Ajzen, 1988, in Semin and Fiedler, 1996), and these can be measured by questionnaires. In order to address research questions 1, 2 and 3 feelings and beliefs about the maned wolf and some of its attributes, as well as behavioural intentions concerning its conservation are examined in this section to ascertain the levels of people's positive and negative attitudes towards the species. Differences in attitudes were tested amongst interest groups.

### ***Results***

#### ***2.2.1. Attitudes towards the maned wolf***

When asked about their attitudes towards the maned wolf a minority of respondents of Q1 and Q4 indicated they *don't care about the maned wolf* (6.5%, n=33, table 2.2.1., p 320). Some

statistically significant associations were observed between responses and socio-demographic characteristics of the respondents. Within this group there were disproportionately many rural residents ( $n=14$ ,  $N=470$ ,  $\chi^2=12.1$ ;  $df=2$ ;  $p=0.001$ ), as opposed to urban residents (table 2.2.1a., p 321), and respondents educated up to year 10 ( $n=24$ ,  $N=483$ ,  $\chi^2=23.2$ ;  $df=2$ ;  $p<0.001$ ). Considering the low numbers many rural respondents (22.2%,  $n=12$ ), respondents aged 41+ (20%,  $n=12$ ), and people at home (29.2%,  $n=7$ ) tended not to care about the maned wolf, while many rural residents (4.4%,  $n=4$ ) disliked the maned wolf, within a small minority (1.7%,  $n=8$ ) (table 2.2.1a, p 321).

### 2.2.2. Attitudes towards physical and character attributes associated with the maned wolf.

What do you think about the maned wolf?				
Evaluative factors	negative<4	neither	positive>4	No answer
Bad/good	22	52	300	77
Ugly/beautiful	38	51	297	65
Coward/brave	21	66	254	110
dangerous/harmless	77	78	193	103
aggressive/defensive	59	77	204	111
worthless/valuable	22	50	291	88
Ferocious/tame	109	90	162	99
<b>Evaluative factors total (respondents=451; responses=2513)</b>	<b>348</b>	<b>464</b>	<b>1701</b>	<b>653</b>
Potency factors	<4	neither	>4	No answer
weak/strong	27	88	253	83
powerless/powerful	105	85	142	119
small/big	70	119	163	99
<b>Potency factors total (respondents=451; responses=1015)</b>	<b>202</b>	<b>292</b>	<b>521</b>	<b>301</b>
<b>Total (respondents=451; responses= 3528)</b>				

Table 2.2.2. Q1 respondents' beliefs about the maned wolf according to evaluative and potency factors

Respondents of Q1 were asked to rate the maned wolf in terms of a selection of bipolar adjectives by marking an X in the space that best represented their opinion about the maned wolf on a seven spaces scale (Semantic Differential Method, Ajzen and Fishbein, 1980; see Q1q11, in Appendix I). Attributes had either an evaluative factor or a potency factor. In the case

of evaluative factors the object was rated on *good/bad/neither* and other attributes conveying attitudes (feelings) towards the maned wolf. Positive feelings were rated as values >4, negative feelings as values <4, and neutral feelings = 4.

Most feelings about the maned wolf were positive (67.8%, n=1701, out of a total of 2513 evaluative responses), and positive attributes were chosen over negative (13.8%, n=348) and neutral (18.4%, n=464) every time. Respondents believed maned wolves were mostly *good* (66.5%), *beautiful* (65.9%), *valuable* (64.5%), *brave* (56.3%), *defensive* (45.2%), *harmless* (42.8%) and *tame* (35.9%) (table 2.2.2.). A large percentage of respondents thought they were neither, in each of the categories and these responses will be analysed as part of a neutral attitudes score in section 2.2.7.

In the case of potency factors the object was rated on *strong/weak/neither* and other attributes conveying beliefs about the maned wolf. Respondents believed the maned wolf was mostly *strong* (56.1%), *big* (36.1%), and *powerful* (31.5%) (table 2.2.2.).

There was no evidence of a strong difference between urban and rural residents' responses, however there was strong evidence of a statistically significant association between feelings about the maned wolf and other characteristics of the respondents. In Greater São Paulo (n=19) and São Paulo (n=1) state fewer respondents considered the maned wolf *harmless* compared to a majority of respondents from São Carlos (n=91, N=451,  $\chi^2=39.2$ , df=9, p<0.001) who also found it *defensive* (n=95, N=451,  $\chi^2=22.9$ , df=9, p=0.006). Strong evidence suggested that year 8 students (n=88) and International Paper staff (n=18) tended to consider the maned wolf *harmless* (N=448,  $\chi^2=71.3$ ; df=12; p<0.001), while sixth-form students tended to consider it *dangerous* (n=36), *ferocious* (n=33, N=448,  $\chi^2=70.5$ ; df=12; p<0.001) and *small* (n=37, N=448,  $\chi^2=77.4$ ; df=12; p<0.001). A disproportionately large number of year 8 students also considered it *defensive* (n=94, N=448,  $\chi^2=80.6$ ; df=12; p<0.001), *tame* (n=80, N=448,  $\chi^2=70.5$ ; df=12; p<0.001) and *big* (n=76, N=448,  $\chi^2=77.4$ ; df=12; p<0.001), while disproportionately few zoo visitors considered it *defensive* (n=26, N=448,  $\chi^2=80.6$ ; df=12; p<0.001) or *harmless* (n=23, N=448,  $\chi^2=71.3$ ; df=12; p<0.001).

The majority of respondents aged up to 13 considered the maned wolf *brave* (74.4%, n=116), *valuable* (80.8%, n=126), and *strong* (72.4%, n=113) and disproportionately many considered it *defensive* (n=93, N=408,  $\chi^2=46.0$ ; df=9;  $p<0.001$ ) and *tame* (n=76, N=408,  $\chi^2=43.4$ ; df=9;  $p<0.001$ ), *powerful* (n=70, N=408,  $\chi^2=48.9$ ; df=9;  $p<0.001$ ) and *big* (n=75, N=408,  $\chi^2=42$ ; df=9;  $p<0.001$ ). Disproportionately few respondents aged 19-40 considered the maned wolf *powerful* (n=11, N=408,  $\chi^2=48.9$ ; df=9;  $p<0.001$ ) and *ferocious* (n=7, N=408  $\chi^2=43.4$ ; df=9;  $p<0.001$ ).

### 2.2.2.1. Value of the maned wolf in relation to use of body parts

Only 9.3% (n=27) of respondents who considered the maned wolf as *valuable* believed in the medicinal use of parts of its body and 2.4% (n=7) believed in their mystical properties (table 2.2.2.1., page 321). A higher percentage of respondents who considered the maned wolf as *valuable* believed in the use of its skin for fashion accessories (28.2%, n=82).

### 2.2.2.2. Value of maned wolf in relation to hunting

Only 0.3% (n= 1) of respondents who considered the maned wolf as *valuable* believed *it must be hunted* (table 2.2.2.2., p 321)

### 2.2.2.3. Value of maned wolf in relation to conservation and biodiversity

Most respondents who considered the maned wolf *valuable* believe that it needed protection (88.3%, N=451,  $\chi^2=39.3$ ; df=3;  $p<0.001$ ) or that it played a role in conserving the ecosystem (86.9%, N=451,  $\chi^2= 33.0$ ; df=3;  $p<0.001$ ). Of respondents who considered the maned wolf *valuable*, 49.5% (n=144) believed it plays a positive role in the country's tourism and culture, while 50.5% (n=147) of that group did not, showing divided opinions.

#### 2.2.2.4. Correlation between negative feelings and potency variables

The most popular negative feelings were that the maned wolf is *ferocious* (24.2%, n= 109), *dangerous* (17.1%, n= 77), and *aggressive* (13.1%, n=59). There was strong evidence of a statistically significant positive association between the above feelings and potency attributes: *dangerous* was associated with *strong* ( $\chi^2=174.5$ ; df=9;  $p<0.001$ ); *ferocious* was associated with *strong* ( $\chi^2=235.3$ ; df=9;  $p<0.001$ ), and *powerful* ( $\chi^2=261$ ; df=0;  $p<0.001$ ), and its opposite *tame* with *big* ( $\chi^2= 229.7$ ; df=9;  $p<0.001$ ); *aggressive* with *powerless* ( $\chi^2=285.$ ; df=9;  $p<0.001$ ); and its opposite *defensive* with *powerful* ( $\chi^2=285$ ; df=9;  $p<0.001$ ) and *big* ( $\chi^2= 259.7$ ; df=9;  $p<0.001$ ) suggesting that having a large size had no negative connotations amongst respondents.

This suggestion is also supported by the evidence of strong statistically significant positive associations between the respondents' beliefs that the maned wolf is *big* and feelings that it is *good* ( $\chi^2=221.1$ ; df=9;  $p<0.001$ ), *beautiful* ( $\chi^2=227.9$ ; df=9;  $p<0.001$ ), *brave* ( $\chi^2=233.5$ ; df=9;  $p<0.001$ ), *strong* ( $\chi^2=266.5$ ; df=9;  $p<0.001$ ), *defensive* ( $\chi^2=259.7$ ; df=9;  $p<0.001$ ) *valuable* ( $\chi^2=234.8$ ; df=9;  $p<0.001$ ) and *powerful* ( $\chi^2=324.9$ ; df=9;  $p<0.001$ ). Believing the maned wolf was small also had strong positive associations with feelings that it was bad ( $\chi^2=221.1$ ; df=9;  $p<0.001$ ), cowardly ( $\chi^2=233.5$ ; df=9;  $p<0.001$ ) and weak ( $\chi^2=266.5$ ; df=9;  $p<0.001$ ) though numbers were low, and *ugly* ( $\chi^2=227.9$ ; df=9;  $p<0.001$ ) and *powerless* ( $\chi^2=324.9$ ; df=9;  $p<0.001$ ).

#### 2.2.3. Attitudes towards helping the maned wolf

Respondents of Q1 were asked what they would do to help the maned wolf. Most indicated the intention to find out more about the species and its habitat (66.3%, n=299) or to tell other people about the need to protect the maned wolf (64.1%, n=289) (table 2.2.3.). Although 54.5% of respondents (n=246) indicated their intention to join a conservation group for the maned wolf and other wild animals, only a minority indicated their intention to *contribute with money* (7.8%, n=35). Only 4.2% of respondents (n=19) had no intention of helping the maned wolf. There was no evidence of associations between urban/rural residents and variables.

<b>What would you do to help the maned wolf?</b>	<b>Frequency</b>	<b>Percent of respondents who agree with statement (Total=899)</b>
I would tell family and friends they need protection	289	64.1
I would join a group to help protect wild animals such as the maned wolf	246	54.5
I would contribute with money	35	7.8
I would do nothing to help the maned wolf	19	4.2
I would try to find out more about the maned wolf and where it lives	299	66.3
No answer	11	2.2
<b>Total (respondents=451)</b>	<b>899</b>	

**Table 2.2.3. Q1 respondents' attitudes towards helping the maned wolf**

#### **2.2.4. Attitudes towards maned wolves found attacking livestock**

Rural respondents (Q4) were asked what they would do if they found a maned wolf attacking livestock. Of the total, 15 respondents (27.7%) did not choose to take any action in response to this situation (table 2.2.4.).

<b>If a maned wolf is found attacking livestock, it must be:</b>	<b>Frequency</b>	<b>Percent of respondents who agree with statement (Total=54)</b>
<b>it must be trapped</b>	3	5.6
<b>it must be killed</b>	4	7.4
<b>it must be handed over to the authorities</b>	22	40.7
<b>body parts must be harvested</b>	0	0
<b>must set the dogs after it</b>	5	9.3
<b>must scare it away</b>	13	24.1
<b>reinforce chicken pen</b>	2	3.7
<b>Total</b>	<b>54</b>	

**Table 2.2.4. Q4 respondents' attitudes towards maned wolves found attacking livestock**

The largest percentage of respondents (40.7%, n=22) indicated that if a maned wolf was found attacking livestock it should be handed over to the authorities.

The next most popular response indicated respondents would use their dogs to scare the maned wolf away (9.3%, n=5). 7.4% (n=4) of respondents approved the killing of the culprit maned wolf, and although no respondents indicated its body parts should be harvested, 5.6% (n=3) indicated the culprit should be trapped.

Though these options were not listed in the questionnaire, a considerable percentage of respondents (24.1%, n=13) suggested that if a maned wolf is found attacking livestock it should be scared away, and 3.7% (n=2) suggested that in that situation people should reinforce their chicken pen.

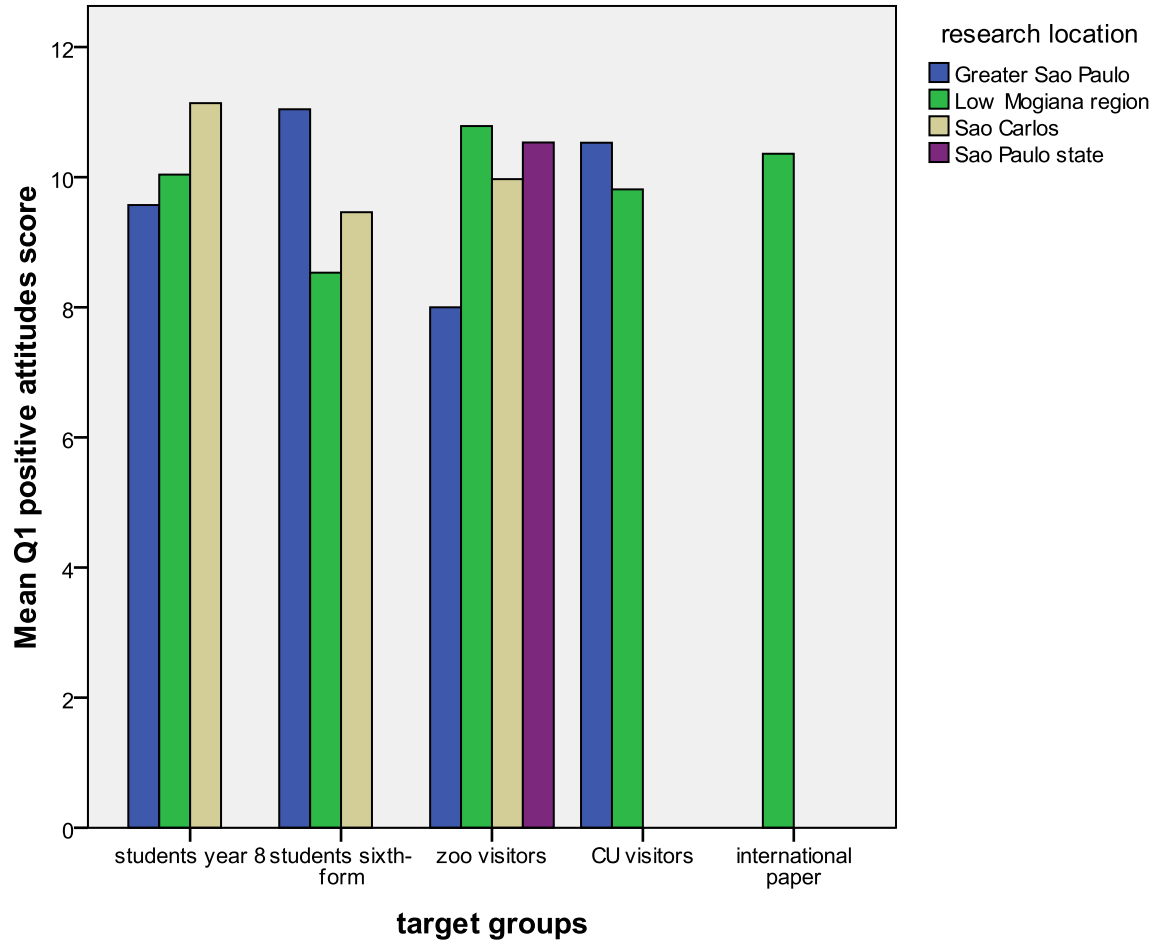
### **2.2.5. Positive Attitudes Score**

The Positive Attitudes' score for respondents of Q1 added up to 15 points (bar chart 2.2.5., p 322), which were divided into (0-5) low, (6-10) moderate and (11-14) high positive attitudes score, and regrouped into (0-7) low and (8-14) high for statistical analysis. The majority (84.7%, n=382) of respondents scored high in positive attitudes (table 2.2.5.Q1, p 322).

There was no evidence of strong association between positive attitudes and urban/rural residence. There were statistically significant associations between positive attitudes and certain characteristics of the respondents. Sixth-form students tended to display less positive attitudes than year 8 students ( $N=447$ ,  $\chi^2=16.1$ ;  $df=4$ ;  $p=0.003$ ). In general terms younger ( $N=407$ ,  $\chi^2=9.9$ ;  $df=3$ ;  $p=0.019$ ) and least educated ( $N=428$ ,  $\chi^2=11.3$ ;  $df=2$ ;  $p=0.004$ ) respondents tended to display a higher level of positive attitudes compared to the group aged 14-18 educated up to sixth-form.

Tests of Between-Subjects Effects indicate that positive attitudes of target groups are significantly ( $F=8.236$ ;  $df=5$ ;  $p<0.001$ ) influenced by research location.





Bar chart 2.2.5a. Q1 mean positive attitude scores by target groups in the different research locations.

Positive attitudes significantly varied amongst the respondents from Greater São Paulo, where sixth-form students and CU visitors had the highest positive attitudes, and amongst respondents from the Low Mogiana region, where zoo visitors scored the highest. The bar chart (2.2.5a.) indicates that sixth-form students and zoo visitors have opposing attitudes towards maned wolf and conservation in Greater São Paulo and Low Mogiana regions.

The positive attitudes score of rural respondents' (Q4) had 5 points divided into (0-2) low and (3-4) high. Most rural respondents (94.4%, n=51) scored high in positive attitudes (table 2.2.5.Q4, p 322). There was no evidence of strong associations between variables and attitudes scores for Q4 respondents.

### 2.2.5.1. Positive Attitude by interest to know more about the maned wolf

The majority of respondents of Q1 who displayed an intention to *find out more about the maned wolf and where it lives* (72.9%, n=218) also displayed high levels of positive attitudes towards the maned wolf. There was strong statistical evidence (N=440,  $\chi^2=32.8$ ; df=2;  $p<0.001$ ) of a negative association between such intentions and low levels of positive attitudes.

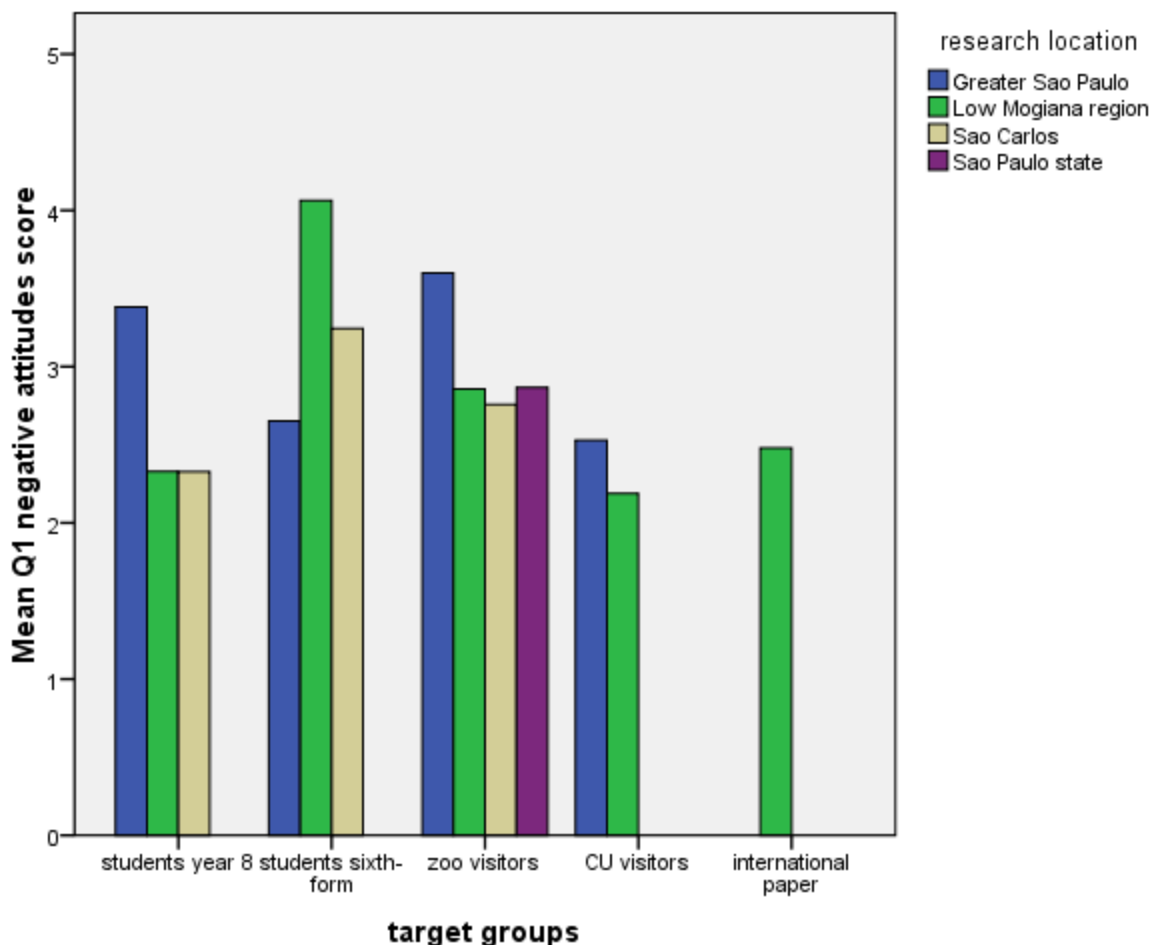
### 2.2.5.2. By Knowledge

There was strong statistical evidence (N=449,  $\chi^2=10.2$ ; df=1;  $p=0.001$ ) of a positive association between low levels of knowledge and low levels of positive attitudes amongst respondents of Q1. Most respondents however, scored high in both (70.4%, n=316).

### 2.2.6. Negative Attitudes Score

The Q1 respondents' Negative Attitudes score had 15 points (bar chart 2.2.6., p 323) divided into (0-5) low, (5-9) moderate, and (10-14) high negative attitudes score, which were regrouped into (0-6) low and (7-14) high. The great majority (96.5%, n=435) of respondents displayed low levels of negative attitudes (table 2.2.6., p 323).

Negative attitudes significantly varied amongst the respondents from Greater São Paulo, where year 8 students and zoo visitors had the highest negative attitudes, and amongst respondents from the Low Mogiana region, where sixth-form students scored the highest. The bar chart 2.2.6a. indicates that sixth-form students and zoo visitors have opposing attitudes towards maned wolf and conservation in Greater São Paulo and Low Mogiana regions.



Bar chart 2.2.6a. Q1 mean negative attitude scores by target groups in the different research locations.

Tukey and Bonferroni tests (followed by *post-hoc* comparisons) indicate that negative attitudes are significantly higher ( $p < 0.001$ ) amongst sixth-form students ( $M = 3.41$ , 95%) when compared to year 8 students ( $M = 2.47$ , 95%) and significantly higher ( $p = 0.007$ ) amongst sixth-form students ( $M = 3.41$ , 95%) when compared to CU visitors ( $M = 2.36$ , 95%).

### 2.2.6.1. Negative attitudes by intention to find out more

The great majority of respondents who displayed the intention to *find out more about the maned wolf and where it lives* also displayed low negative attitudes towards the maned wolf (91%,  $n = 254$ ).

### **2.2.7. Neutral Attitudes**

Neutral attitudes may be influenced by awareness campaigns but also by changes in circumstances that may bring the conflict with predators "closer to home" (Bath and Majic, 2001:69; Casey, Krausman, Shaw *et al.*, 2005).

The Q1 Neutral Attitudes score had 15 points divided into (0-4) low, (5-9) moderate, and (10-14) high neutral attitudes score, and regrouped into (0-6) low and (7-14) high neutral attitudes score for statistical analysis. The majority (82%, n=370) of respondents displayed low levels of neutral attitudes (table 2.2.7., p 323).

Only respondents in/with secondary education displayed a high degree of neutral attitudes in relation to the maned wolf and conservation (table 2.2.7a., p 324).

#### **2.2.7.1. Neutral Attitudes by intention to find out more**

There was strong statistical evidence (N=440,  $\chi^2=45.2$ ; df=1;  $p<0.001$ ) of a positive association between respondents' low levels of neutral attitudes and their intention to *find out more about the maned wolf and where it lives*.

### **2.2.8. Summary of findings**

Aspect	Result	Chi squared Statistics Bonferroni correction= 0.0013 *not significant when Bonferroni correction is applied
<b>Attitudes towards maned wolf</b>		
Don't care about maned wolf	Rural residents > urban residents Educated up to year 10 > more educated	12.1; df=1; $p=0.001$ 23.2; df=3; $p<0.001$
<b>Physical and character attributes of mw</b>	No difference between urban and rural residents	
Harmless	São Carlos > Greater São Paulo and São Paulo state Year 8 students, International Paper staff > zoo visitors	39.2; df=9; $p<0.001$ 71.3; df=12; $p<0.001$
Dangerous	Sixth-form students > other target groups	71.3; df=12; $p<0.001$
Defensive	São Carlos > other research sites Year 8 students > zoo visitors Aged up to 13 > older groups	22.9; df=9; $p=0.006^*$ 80.6; df=12; $p<0.001$ 46.0; df=9; $p<0.001$
Tame	Year 8 students > other target groups Aged up to 13 > older groups	70.5; df=12; $p<0.001$ 43.4; df=9; $p<0.001$
Ferocious	Sixth-form students > other target groups Aged 19-40 < other age groups	70.5; df=12; $p<0.001$ 43.4; df=9; $p<0.001$
Big	Year 8 students > other target groups Aged up to 13 > older groups	77.4; df=12; $p<0.001$ 42; df=9; $p<0.001$
small	Sixth-form students > other target groups	77.4; df=12; $p<0.001$
Powerful	Aged up to 13 > older groups Aged 19-40 < other age groups	48.9; df=9; $p<0.001$ 48.9; df=9; $p<0.001$
Value associated with biodiversity	Belief that mw needs protection it plays a role in conserving the ecosystem	39.3; df=3; $p<0.001$ 33.0; df=3; $p<0.001$
Association between – feelings and potency variables	Dangerous/strong Ferocious/strong Ferocious/powerful Tame/big Aggressive/powerless Defensive/powerful Defensive/big	174.5; df=9; $p<0.001$ 235.3; df=9; $p<0.001$ 261.; df=0; $p<0.001$ 229.7; df=9; $p<0.001$ 285.; df=9; $p<0.001$ 285.; df=9; $p<0.001$ 259.7; df=9; $p<0.001$
Associations between + feelings and size of mw	Good/big Beautiful/big Brave/big Strong/big Defensive/big Valuable/big Powerful/big Ugly/small Powerless/small	221.1; df=9; $p<0.001$ 227.9; df=9; $p<0.001$ 233.5; df=9; $p<0.001$ 266.5; df=9; $p<0.001$ 259.7; df=9; $p<0.001$ 234.8; df=9; $p<0.001$ 324.9; df=9; $p<0.001$ 227.9; df=9; $p<0.001$ 324.9; df=9; $p<0.001$
<b>Positive attitudes score</b>	No differences between urban and rural residents	
low	(Q1) Negative association with intention to know more about mw (Q1) Low levels of knowledge sixth-form > year 8 students	32.8; df=2; $p<0.001$ 10.2; df=1; $p=0.001$ 16.1; df=4; $p=0.003^*$
<b>Neutral attitudes</b>		
low	intention to know more about mw	45.2; df=1; $p<0.001$
<b>Negative attitudes</b>		
high	Mean sixth-form students > mean year 8 students and CU visitors	$p<0.001$ , $p=0.007$

Table 2.2.8. Summary of results for the Question Category Attitudes

**Discussion**

People with little knowledge of the maned wolf did not find it either strong or brave: this may also indicate a lack of fear of the animal, contrary to suggestions that fear of large carnivores relates to ignorance about the species (Kellert, 1985; Bath and Majic, 2001; Macdonald and Sillero-Zubiri, 2004). Bath and Farmer (2000) suggest an association between fear of carnivores and negative attitudes with the inclination to oppose their protection. The minority of respondents who knew little about the maned wolf considered it bad, ferocious and worthless, and did not find it harmless, good, valuable, defensive, tame or beautiful. Although lack of knowledge in this sample seems to be associated with a lack of valuing and a negative image of the maned wolf's attributes, rather than fear (although the association with the belief that the maned wolf is ferocious might deserve further investigation) its association with a low level of positive attitudes and beliefs may still postulate a lack of support for the protection of the maned wolf.

Most respondents who considered the maned wolf as *valuable* did not believe parts of its body were useful, however 33.3% did believe in at least one of the uses (fashion, medicinal, magical). This may indicate a possible conflict area for maned wolf conservation. Results also suggest that the maned wolf is not valued by respondents as game potential. The great majority of respondents who considered the maned wolf as valuable also believed that it need to be protected and that it helps to conserve nature. This suggests they awarded the species an intrinsic value that deserves protection. It also suggests the maned wolf was valued as a conservation champion for the local environment, possibly for its biodiversity value.

**1. The maned wolf within the changing universe of local people.**

Overall, the responses of the younger group of respondents aged up to 13, and the least educated, suggest they were the most favourably impressed by the maned wolf, while the responses of the groups aged 19-40 and most educated suggest they are not threatened by the maned wolf. Both perceptions may have positive connotations. Data indicate that the local

people's perception of the physical and behavioural characteristics of the species was mostly positive. According to Kellert *et al.* (1996) such perception could contribute to positive attitudes towards the maned wolf and its conservation. Perceptions of urban and rural residents were similar, although rural residents' percentages indicated they were more conservative about positive attributes. Such perceptions challenge some of the most negative traditional portrayals of the species in the literature and from earlier accounts but indicates a general view that the maned wolf, though brave, powerful and strong, is not perceived as a threat to people. The large size of the maned wolf was not associated with fear or dislike for the species, as some have hypothesized (Macdonald and Sillero-Zubiri, 2004), but quite the opposite: it could be suggested that respondents who considered the maned wolf big were positively impressed, perhaps proud of its qualities, as they also considered it good, beautiful, brave, strong, valuable and powerful, similar to the findings of Kellert (1985) (see Chapter One, 2.3.).

Positive perceptions towards the maned wolf and its successful coexistence with local people have been reported from field work carried out by other researchers (Carvalho, 1976; Dietz, 1984; Figueira, 1995; Silva, 1999; Bestelmeyer, 2000; Anic, 2002) and seem related in part to its overall shy behaviour in avoiding people. Only a small percentage of local people in this research's sample did not care about the maned wolf, however a significantly large percentage was comprised of rural residents (15.4%), compared to 0.5% of urban residents. Other research has found a considerable percentage of local people who are indifferent to the maned wolf (58.7% in Silva, 1999; 26.3% in Anic, 2002). Only 1.7% of local people in this research's sample did not like the maned wolf (36.2% in Silva's research in the south of the country, 1999), indicating a general lack of antipathy for the animal amongst local people within research sites.

Results show a positive relationship between low levels of knowledge and the display of low levels of positive attitudes towards the maned wolf. However there have been suggestions that the opposite may be true when knowledge about large wild carnivores (Kaczensky, Blazic and Gossow, 2004) is considered, where actual or perceived threats posed by large carnivores to people's lives and property have a strong negative impact on attitudes towards them. Although this association between perceived threat and lack of positive attitudes may be true for a minority of respondents within this research's sample it was not linked to knowledge *per se* but rather to misconceptions about the species. The lack of an association between knowledge

about the maned wolf and negative attitudes towards it may be due to a general absence of perceived threat in relation to the species.

### ***1. The maned wolf in respect to local people's livelihood***

Furthermore, attitudes amongst the rural respondents in this research indicated tolerance towards the likelihood of a maned wolf being found attacking livestock. Many suggested “nothing” should be done in retaliation but the most popular form of response (40.7%) was to hand the animal over to the authorities while many suggested it should be scared away. Only 7.4% suggested the animal should be killed, however, killing maned wolves is against the law and this could have influenced the responses. The fact that researchers were accompanied by a vehicle from the local reserve, and often introduced to respondents by their staff could have influenced their answer. However statistical analysis showed no evidence to suggest associations between research location and this set of attitudes, even though researchers were accompanied by CU workers and introduced by them to respondent mostly in the Low Mogiana region.

The tolerance observed amongst rural respondents towards maned wolf consumption of domestic stock may reflect an overall sympathy for it, and may be an indication of the remnants of traditional integration between local people and the natural environment as suggested by Knight (2000). It would be useful to research surviving cultural traditions, for instance stories, as these are rich sources of information about the human dimensions of the world where conservation takes place, and can be useful for conservation programmes when devising awareness campaigns.

The high level of tolerance towards maned wolves and their raids may also indicate that the conservation of the species is compatible with the local economy of the research sites. Although the Cerrado soil was originally poor, thus making the biome more conducive to being used by protected areas and wildlife (Woodroffe, Thirgood and Rabinowitz, 2005), investments in agriculture have increased the levels of production and the desirability of the area for



livestock and cultivation of certain crops (see Chapter Two, sections 1. and 3.). The fact that the heightened value of Cerrado habitat has apparently not lowered the threshold of tolerance towards carnivores' raids (Knight, 2000; Candido, 2001; Hill, 2004) is an indication that maned wolf raids do not affect production. Since small, subsistence farmers close to the forest edge may be the most affected by maned wolf eventual raids on crops and livestock (Campbell, 2000; Candido, 2001), further research on the perception of damage caused by the maned wolf in relation to size of property and income would be advisable.

## ***2. Relationship between human occupied landscapes and the maned wolf.***

### ***2.1. Sources of information about the maned wolf***

It is possible that where links with the indigenous culture have been severed, cultural expansion may provide a new bridge between human beings and nature through an increasing access to information on wildlife conservation, as suggested by Mankin, Warner and Anderson (1999) and Candido (2001) (see Chapter Two, 4.6.). Furthermore, where native knowledge about the maned wolf has faded it has been suggested that our innate curiosity about carnivores should provide us with the necessary encouragement to learn more about the predator; this may constitute an important element in conservation (Kruuk, 2002). Possibly due to a combination of these factors, a large percentage of local people demonstrated interest in finding out more about the maned wolf and its habitat, with the intention of helping the species. Such interest must be met by conservation strategies to stimulate maned wolf conservation.

## ***3. Environmental awareness and people in the vicinity of conservation areas***

Overall, a majority of both urban and rural residents (particularly younger people, i.e. year 8 students as opposed to sixth-form) in this research demonstrated a high degree of positive attitudes towards the maned wolf. In a minority of cases negative attitudes emerged as associations between the perceptions that maned wolves were dangerous, strong, ferocious and powerful, as suggested by Kellert (1985). Local people who displayed low levels of positive

attitudes also tended to know little about the maned wolf and had little intention of finding out more about the species and its habitat. The indifference indicates that this minority may demonstrate resistance against awareness programmes centred on the maned wolf and the Cerrado habitat. This resistance will need to be addressed by programmes, especially since results suggest that lack of positive attitudes relate to lack of knowledge and to misconceptions (cognitive in nature), rather than to negative experiences of the species or values about wildlife conservation. Therefore the circulation of accurate information about characteristics of the maned wolf, such as size, weight, and its ecology, feeding habits and population numbers should improve public attitudes towards it by creating cognitive dissonance<sup>6</sup> in people's minds, as suggested by Bath and Majic (2001).

While most respondents displayed positive attitudes towards the maned wolf's conservation, neutral attitudes were much more common than were negative attitudes, providing opportunities for advances in the coexistence between people and the maned wolf, as suggested by Bath, (2009). Therefore further questions targeting neutral attitudes and feelings about the maned wolf and conservation would be beneficial so that they may be particularly addressed by conservation programmes. Local people educated up to sixth-form displayed the highest levels of neutral attitudes, making this the group most likely to be influenced by opinion making campaigns. Bath and Majic (2001) also found many neutral feelings about the European wolf amongst high school students in Croatia, when contrasted with results from other European countries and from the USA where students demonstrated either a strong liking or a strong disliking for the animal.

#### ***4. Local people and support for the conservation of the maned wolf***

The display of positive attitudes towards maned wolf conservation may be a predictor of local people's choice in the face of potential changes to land usage that might have detrimental

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<sup>6</sup> The theory of Cognitive Dissonance was developed by Leon Festinger in 1957 and proposes that when two contradictory cognitions (ideas, beliefs, opinions) are held at the same time they cause an unpleasant mental conflict. The unpleasant experience motivates the individual to strive to reduce it by changing one or both cognitions, therefore changing their beliefs, attitude, or behaviour (Aronson, 1969)

effects on maned wolf populations. Positive choices may occur as long as local people are aware of the facts to enable the making of an informed decision in support of maned wolf conservation, as suggested by research on other carnivores (Kellert *et al.*, 1996; Kaczensky, Blazic and Gossow, 2004; Anderson, 2005; Randveer and Mäe, 2005; Bath, 2009).

Results from this research suggest that the great majority of local people in the sample believed the maned wolf must be protected across target groups, locations and demographic characteristics. The majority of local people in the sample who considered the maned wolf valuable, were aware of its ecological value and of its need for protection (only a small minority found it worthless). The fact that coexistence between local people and the maned wolf has been consistent and uninterrupted may also reinforce acceptance and tolerance towards the species, as suggested by Bath (2009). It is possible to suggest that in view of their positive attitudes towards the maned wolf local people may support actions favourable to them, tolerate damage caused by them (as it was indicated by rural respondents), and maintain their position in case of conflict, as suggested by Kaczensky, Blazic and Gossow (2004). However, further investigation would be advised into the extent to which local people associate direct and indirect causes of maned wolf decline with anthropogenic and economic pressures, and the extent to which they associate their own behaviour and decision making power to conservation or decline of the maned wolf populations.

A majority of respondents showed intentions to help the maned wolf, through finding out more about the species and habitat, by telling family and friends about it, and/or by joining a conservation group: these are supported by overall positive attitudes towards the species indicating a strong intent. Such positive attitudes must be incorporated into environmental awareness strategies in zoos and elsewhere. Peer group expectations and perceived control over such behaviours should also be examined in the future, to ascertain the strength of such intentions, as suggested by the Theory of Planned Behaviour (Daigle, Hrubes and Ajzen, 2002).

Interestingly the attitudes of some target groups from Greater São Paulo were directly opposed to the attitudes of the same groups in the Low Mogiana region. The reasons behind highly positive attitudes of sixth-form students and CU visitors from Greater São Paulo, as opposed to

highly negative attitudes of the same groups in the Low Mogiana region would be an interesting topic for further investigation. Also the highly positive attitudes of zoo visitors in the Low Mogiana region, when contrasted with the negative attitudes of the same group in Greater São Paulo deserve further investigation.

## **2.3. Beliefs**

### ***Introduction***

Many negative and potentially harmful attitudes towards carnivores are based on deeply ingrained beliefs, or prejudices. These need to be identified and de-mystified before attitudes can be targeted for change (Macdonald and Sillero-Zubiri, 2004).

According to Kellert *et al.* (1986) people's perception, or beliefs, about carnivores' physical and behavioural characteristics, intelligence and personality are some of the interacting variables responsible for predicting their attitudes towards wild carnivores. This section aims to address research questions 1, 2 and 3 by examining local people's levels of positive and negative beliefs about the maned wolf as they are "likely to influence attitudes, intentions and behaviours regardless of their accuracy" (Daigle, Hrubes and Ajzen, 2002:14).

Beliefs were attributed positive, negative or neutral values according to how they relate to the conservation of the maned wolf (see Methods, 3.1., p 107) and tested for differences amongst interest groups.

### ***Results***

### **2.3.1. Beliefs about uses of parts of the maned wolf's body**

Researchers have found an array of different beliefs concerning uses for parts of the maned wolf's body (see Chapter Two section 4.3.1.). The most popular were included in the questionnaire.

Although most of the respondents of Q1 and Q4 did not believe in any of the statements concerning the use of body parts, 31% (n=157) believed in at least one of the following: 8.3% of the respondents believed in the usefulness of parts of the maned wolf's body in traditional medicine, 5.7 % believed in the usefulness as talismans, to bring *luck* and a considerable 23% (n=116) believed the maned wolf's skin is valuable for fashion and decorative accessories.

Numbers were too small to confirm a reasonably strong association between the belief that carrying a piece of the maned wolf's pelt brings luck and rural residents (9.9%, n=9). There was, however, strong statistical evidence of an association between some beliefs about the use of parts of the maned wolf's body and target groups. A large percentage of year 8 (19.2%, n=30) and a small percentage of sixth-form students (3.4%, n=5) and no International Paper staff believed *parts of the maned wolf are good for remedies*; disproportionately many year 8 students (n=64, N=470,  $\chi^2=49.7$ ; df=5;  $p<0.001$ ) believed that *parts of the maned wolf make good accessories* as opposed to few rural respondents (n=1), making year 8 students the major group of concern in beliefs regarding the use-of-body-parts of the maned wolf.

#### **2.3.1.1. By source of information**

Comparing the respondents of Q1 and Q4' sources of information about the species few respondents who had heard about the maned wolf *from zoo/museum/CU* believed in the use of parts of its body as lucky charms (n=10, N=505,  $\chi^2=12.2$ ; df=1;  $p<0.001$ ).

### 2.3.2. Beliefs in relation to maned wolfs' ecology and behaviour

The majority of respondents of Q1 and Q4 agreed with the most positive statements about the maned wolf (90.2% of responses were positive, n=1765) (table 2.3.2). The three most positive beliefs were already analysed as knowledge (section 2.4.1.). In addition, 55% (n=278) believed the maned wolf is harmless and 45.7% (n=231) believed the maned wolf plays a role in improving the country's tourism and culture: this may indicate divided opinions. Negative beliefs corresponded to 9.8% of responses (n=191), the most popular being that maned wolves are a threat to livestock (28.1% of respondents, n=142), confirming the suggestion by previous authors that this is the main issue to be addressed in maned wolf conservation (Dietz, 1984; Anic, 2002; Rodrigues, 2002).

<b>Negative beliefs:</b>	
<b>Do you agree with the following statements?</b>	<b>Responses (% of respondents, N=505)</b>
The maned wolf must be hunted	5 (1%)
The maned wolf is useless	21 (4.2%)
The maned wolf scares and attacks people	23 (4.6%)
The maned wolf attacks chicken pens and livestock	142 (28.1%)
<b>Total (responses= 1956)</b>	<b>191 (9.8% of responses)</b>
<b>Positive beliefs:</b>	
<b>Do you agree with the following statements?</b>	<b>Responses (% of respondents, N=505)</b>
The maned wolf does not harm anyone	278 (55%)
The maned wolf needs to be protected	411 (81.4%)
The best place for the maned wolf is nature	441 (87.3%)
Preserving the maned wolf helps to preserve the ecosystem	404 (80%)
The maned wolf helps my country's tourism and culture	231 (45.7%)
<b>Total (responses= 1956)</b>	<b>1765 (90.2% of responses)</b>

Table 2.3.2. Q1+Q4 respondents' positive and negative beliefs about the maned wolf's ecology and behaviour

Percentages of respondents who believed in a need for hunting the maned wolf were very low across all target groups (table 2.3.2.). Respondents' belief that maned wolves are harmless varied between 72% (n=18), in International Paper staff, and 45.3% (n=67) in sixth-form students, demonstrating divided opinions. There was relatively strong statistical evidence of an

association between some beliefs and characteristics of the respondents. Although only a minority of respondents believed *wolves are dangerous beasts* disproportionately many year 8 students ( $n=43$ ), few zoo visitors ( $n=3$ ) and no International Paper staff ( $N=502$ ,  $\chi^2=45.7$ ;  $df=5$ ;  $p<0.001$ ) held this belief. Only a small minority of respondents believed people were threatened by the maned wolf across all target groups, however many rural respondents ( $n=7$ ,  $N=502$ ,  $\chi^2=11.6$ ;  $df=5$ ;  $p=0.041$ ) tended to hold this belief. Opinions were also divided in relation to the belief that *the maned wolf helps the country's tourism and culture*. In this case disproportionately few sixth-form students ( $n=51$ ) and disproportionately many rural respondents ( $n=36$ ) believed this ( $N=502$ ,  $\chi^2=23.6$ ;  $df=5$ ;  $p<0.001$ ).

Answers to the statement *the maned wolf attacks chicken pens and livestock* varied across target groups. Few sixth-form students ( $n=25$ ) and CU visitors ( $n=2$ ) tended to have such belief, in comparison with many rural respondents ( $n=45$ ) ( $N=502$ ,  $\chi^2=101.2$ ;  $df=5$ ;  $p<0.001$ ). Similarly few urban residents ( $n=86$ ) held this belief, in comparison to many rural residents ( $n=52$ ) ( $N=470$ ,  $\chi^2=41.9$ ;  $df=1$ ;  $p<0.001$ ), thus indicating a potential area of conflict between rural people and the maned wolf (table 2.3.2.).

### 2.3.2.1. By food preferences

The statistical analysis shows strong associations between beliefs about the maned wolf's food preferences and feeding habits. Many respondents who believed that maned wolves' favourite food item in the wild is *chicken* also tended to believe that *maned wolves attack chicken pens and livestock* ( $n=42$ ,  $N=475$ ,  $\chi^2=59.4$ ;  $df=3$ ;  $p<0.001$ ). Also few respondents who have chosen the *wolf's fruit* as favourite food item believed that maned wolves do raid chicken pens ( $n=41$ ). Respondents of Q1 who believed *maned wolves eat mainly meat* ( $n=46$ ,  $N=440$ ,  $\chi^2=13.3$ ;  $df=1$ ;  $p<0.001$ ) and *hunt livestock in the absence of prey* ( $n=56$ ,  $N=440$ ,  $\chi^2=22.2$ ;  $df=1$ ;  $p<0.001$ ) also tended to believe *maned wolf attacks chicken pens and livestock*.

### 2.3.3. Beliefs about the future of the maned wolf

What should be done with the maned wolf?	Count	Percent of respondents who agree with statement (total-450)
Brazil should get rid of these animals	2	0.4
Hunting to harvest body parts should be allowed	3	0.7
Brazil should leave them alone	336	74.5
Brazil should protect and preserve them	423	93.8
<b>Total respondents= 450</b>	<b>764</b>	

Table 2.3.3. Q1 respondents' beliefs about what should be done with the maned wolf in Brazil.

Beliefs about what should be done with maned wolves in Brazil were overall very positive. The great majority of respondents of Q1 believed the maned wolf should be protected by the country (93.8%, n=423), and 74.5% (n=336) believed the species should not be disturbed (table 2.3.3.). Only a small minority of urban residents, and no rural residents believed the country should get rid of the maned wolf (0.5%) or believed in making the harvesting of its body parts legal (0.5%) (table 2.3.3a., p 324).

### 2.3.4. Positive Beliefs Score

For each questionnaire, questions concerning beliefs of respondents about the maned wolf were grouped and converted into points (or a score) representing the number of questions indicating a positive or a negative belief.

The respondents of Q1 and Q4 Positive Beliefs score had 14 points (bar chart 2.3.4., p 324) divided into (0-3) low, (4-8) moderate, and (9-13) high positive beliefs score. High scores on positive beliefs were achieved by 88.1% of respondents (table 2.3.4, p 325). No respondents scored low in positive beliefs.



There was no evidence of a strong association between urban/rural residence and positive beliefs. However, the statistical analysis shows reasonably strong evidence of an association between the level of positive beliefs and other characteristics of the respondents. Few respondents from São Carlos scored moderate in positive beliefs in comparison to other research locations ( $n=11$ ,  $N=504$ ,  $\chi^2= 12.9$ ,  $df=3$ ,  $p=0.005$ ). Many respondents in or up to year 10 education ( $n=36$ ,  $N=482$ ,  $\chi^2= 9.9$ ;  $df=2$ ;  $p=0.007$ ) demonstrated a moderate level of positive beliefs when compared to other education levels. All International Paper respondents scored high in positive beliefs. There were no strong associations between sources of information about the maned wolf and belief scores.

#### **2.3.4.1. Positive Beliefs by Knowledge score**

There is strong statistical evidence of an association between positive beliefs of respondents and knowledge about the maned wolf. Amongst the respondents of Q1 and Q4 low levels of knowledge were associated with moderate levels of positive beliefs ( $N=504$ ,  $\chi^2=64.3$ ;  $df=1$ ;  $p<0.001$ , table 2.3.4.1a., p 325). Amongst rural respondents there was a 100% match between high levels of knowledge and high levels of positive beliefs (table 2.3.4.1b., p 325).

#### **2.3.4.2. By Attitudes**

There is strong statistical evidence of a positive association between the display of a low level of positive attitudes and the display of a moderate level of positive beliefs ( $N=450$ ,  $\chi^2=15.2$ ;  $df=1$ ;  $p<0.001$ , table 2.3.4.2., p 325) amongst the respondents of Q1.

#### **2.3.5. Summary of findings**

Aspect	Result	Chi squared Statistics Bonferroni correction= 0.003 *not significant when Bonferroni correction is applied
<b>Uses of body parts of mw</b>		
as accessories	Year 8 students > rural respondents	49.7; df=5; $p<0.001$
as lucky charms	Heard about mw from zoo/museum/CU < other information sources	12.2; df=1; $p<0.001$
<b>Maned wolf's ecology and behaviour</b>		
wolves are dangerous beasts	Year 8 students > zoo visitors No International Paper staff	45.7; df=5; $p<0.001$
Mw is useless	Year 8 students > other groups No International Paper staff	17.8; df=5; $p=0.003$
Mw scares and attacks people	Rural respondents > other target groups No International Paper staff	11.6; df=5; $p=0.041^*$
Mw helps country's tourism and culture	Rural respondents > sixth-form students	23.6; df=5; $p<0.001$
Mw attacks chicken pens and livestock	Rural respondents > sixth-form students, CU visitors	101.2; df=5; $p<0.001$
	Rural residents > urban residents	41.9; df=1; $p<0.001$
	Chicken is favourite food > other food preferences	59.4; df=3; $p<0.001$
	Mw eat mainly meat	13.3; df=1; $p<0.001$
	Mw hunt livestock in the absence of prey	22.2; df=1; $p<0.001$
<b>Positive beliefs score</b>	No association with urban and rural residence	
	No association with sources of information about the mw	
Moderate levels	São Carlos respondents < other locations	12.9; df=3; $p=0.005^*$
	Low levels of knowledge	64.3; df=1; $p<0.001$
	(Q1) Low levels of positive attitudes	15.2; df=1; $p<0.001$
	Educated up to year 10 > other education groups	9.9; df=2; $p=0.007^*$
High levels	All respondents from International Paper	
	(rural respondents) 100% match with high levels of knowledge	

Table 2.3.5. Summary of results for the Question Category Beliefs

## Discussion

### 1. The maned wolf within the changing universe of local people.

Beliefs about maned wolves as predators of livestock could result from a manifestation of evolved innate responses to predators (Kruuk, 2000) in combination with the more recent immigration of such values to the New World with the European settlers (Kellert *et al.*, 1996). This could be true for the blaming of the maned wolf for attacks on poultry, which in Europe

were perpetrated by foxes and wolves, and to the association of magical value to some of its body parts, as with the European wolf (Freefy, 1983; Bush, 1995; Kruuk, 2002).

Another potential problem area for conflict resulting from the immigration of European settlers, is that a considerable number of local people (33.3%) value the maned wolf for its body parts, and especially for the use of its pelt for fashion and decorative purposes (28.2%). Around the world many predators have been hunted for their hides, meat, organs, body parts and substances (Knight, 2000), making this demand a reason for species' decline and endangerment. Beliefs about magical powers similar to the ones attached to the maned wolf (see Chapter Two, 4.3. and 4.3.1.) can also be found in other cultures. The beliefs of many year 8 students and possibly rural respondents (although numbers were too small to establish a strong association between rural respondents and some of these beliefs) make these groups a potential concern in the conflict between use-of-body-parts and maned wolf survival. Year 8 students also believed maned wolves to be useless: this group falls within the category of lower educational level respondents who displayed overall moderate positive beliefs towards the species. Further investigation into the reasons behind the beliefs of this group, and how to influence them (children are in full time education) is advised.

Magical power is usually associated with the animal's desirable attributes and their acquisition through possession of the animal's corresponding body parts (Kruuk, 2002). Insufficient data exists to establish categorically that beliefs about the maned wolf's magical attributes originated from the European settlers and not from the native indigenous culture. However similar beliefs about magical powers attributed to parts of a wolf's body are found in European countries, while the few records of indigenous people's accounts about the maned wolf make no mention of such beliefs. Quite the opposite: indigenous people talk about the maned wolf as a "fruit eater" (Miller, 1930; Carvalho, 1976) as keeping chickens is a *caipira* and not an indigenous tradition. Investments in clear and accurate information about the maned wolf may help eradicate misconceptions and improve the efficacy potential of conservation strategies.

## **2. *The maned wolf in respect to local people's livelihood***

Overall a majority of respondents were aware of the maned wolf's importance in ecological terms, indicating positive values about the maned wolf (another predictor of positive attitudes according to Kellert *et al.*, 1996). According to Kellert (1985) negative perceptions relate to beliefs that the species is dangerous and responsible for causing damage to human property due to a predatory nature, amongst other associations. However, beliefs that the maned wolf poses a threat to people and livestock were not associated with lack of knowledge about the species in this sample.

The large majority of rural respondents, most rural residents and many in the local people sample saw the maned wolf as a threat to livestock. This belief associated with other beliefs about predatory behaviour towards domestic chickens indicate a problem area that could generate negative perceptions (Kellert, 1985) and result in conflict between local people and the maned wolf, as suggested by field research findings from Dietz (1984), Rodrigues (2002), and Anic (2002). Negative beliefs about the maned wolf's feeding ecology and behaviour may need to be addressed and demystified by conservation strategies. A significant number of rural respondents also believed maned wolves are a threat to people; this may be related to isolated and rare incidents of females protecting pups (Magalhães, 1939; Ihering, 1968; Carvalho, 1976; Dietz, 1984, 1986). There was a direct link between knowledge and positive beliefs amongst rural respondents, which also suggest that conservation programmes would benefit from incorporating the knowledge held by this rural population to address negative beliefs and attitudes in other groups (in Greater São Paulo and amongst CU visitors particularly).

Year 8 students who displayed positive attitudes towards the maned wolf, relating them to positive attributes (such as harmless, defensive, etc) indicated a different opinion of "wolves", seen as "dangerous beasts". Such results reinforce the importance of dissociating the image of the maned wolf from that of the European wolf. Results also suggest that sixth-form students' awareness of how maned wolves may benefit the country can be limited and could be addressed by conservation programmes. Some authors suggest that local people do not know

enough about the potential benefits that maned wolves may bring to their lives (Motta-Junior, 2000; Anic, 2002) and recommend disseminating such facts as a conservation tool.

### **3. Environmental awareness and people in the vicinity of conservation areas**

Results indicated that zoo goers (unlike CU visitors) had fewer negative beliefs about wolves in general, and about any magical uses of maned wolves' body parts, suggesting that zoos may facilitate the dissemination of positive beliefs in relation to maned wolf conservation. Zoos as sources of information will be discussed further in the Experience section (2.6.). Once again, International Paper staff and rural respondents reinforced the association between positive beliefs and knowledge, having achieved high scores in both areas. Results suggest that these interest groups should be considered during the planning of conservation strategies as they may help to influence local people by disseminating positive beliefs about the species.

## **2.4. Conservation**

### **Introduction**

Attitudes towards the conservation of wild animals may offer an indication of people's potential attitudes towards species such as the maned wolf (Kellert *et al.*, 1986). This section aims to address research questions 1, 2 and 3 by examining people's beliefs and attitudes towards the conservation of the maned wolf and wild animals to ascertain the levels of the conservation component of their attitudes towards maned wolves, and by testing differences between interest groups.

### **Results**

### 2.4.1. Responsibility for protecting the maned wolf and endangered wild animals

#### 2.4.1.1. Responsibility for protecting the maned wolf

Who is responsible for protecting the maned wolf?	Responses	Percentage of respondents who agree with statement
Everybody	337	66.7
NGOs	112	22.2
Rural people	89	17.6
The government	114	22.6
CUs	245	48.5
The zoos	211	41.8
<b>Total (respondents=505)</b>	<b>1108</b>	

Table 2.4.1.1. Q1+Q4 respondents' beliefs concerning the responsibility for protecting the maned wolf

Most respondents (66.7%, n=337) of Q1 and Q4 believed it was everybody's responsibility to protect the maned wolf. Decreasing percentages of respondents believed in the responsibility of CUs, zoos, the government and NGOs, followed by a minority (17.6%, n=89) who believed rural people were responsible for protecting the maned wolf (table 2.4.1.1.): these results were curiously similar to the percentage found amongst rural respondents (16.7%, n=9) (table 2.4.1.1.Q4, p 326).

Target groups by beliefs regarding the responsibility for protecting the maned wolf by		Everybody is responsible for protecting the maned wolf	NGOs are responsible for protecting the maned wolf $\chi^2=18.8$ ; $p=0.002$	Rural people are responsible for protecting the maned wolf	The government is responsible for protecting the maned wolf $\chi^2=21.3$ ; $p=0.001$	The CUs are responsible for protecting the maned wolf $\chi^2=34.1$ ; $p<0.001$	The zoos are responsible for protecting the maned wolf $\chi^2=52.3$ ; $p<0.001$	Total respondents
target groups	students year 8	100	45	37	54	87	95	156
	students sixth-form	89	36	19	23	84	62	148
	zoo visitors	60	19	10	16	39	32	86
	CU visitors	24	3	5	5	12	9	33
	rural population	39	2	9	8	8	8	54
	International Paper	24	7	9	7	12	3	25
<b>Total responses</b>		<b>336</b>	<b>112</b>	<b>89</b>	<b>113</b>	<b>242</b>	<b>209</b>	<b>502</b>

Table 2.4.1.1a. Q1+Q4 respondents' beliefs concerning the responsibility for protecting the maned wolf in relation to target groups.

There was reasonably strong statistical evidence of an association between beliefs about responsibility for the protection of the maned wolf and certain characteristics of the respondents (table 2.4.1.1a.). Amongst year 8 students many believed in the responsibility of the government (N=502,  $\chi^2=21.3$ ; df=5;  $p=0.001$ ), zoos (N=502,  $\chi^2=52.3$ ; df=5;  $p<0.001$ ) and a majority of year 8 (55.8%, n=87) and sixth-form students (56.8%, n=84) believed it was the responsibility of CUs. Although sample numbers were small, few International Paper respondents (N=502,  $\chi^2=52.3$ , df=5,  $p<0.001$ ) believed zoos were responsible. A disproportionately small percentage of rural respondents and rural residents respectively believed NGOs (N=502,  $\chi^2=18.8$ ; df=5;  $p=0.002$ ; N=470,  $\chi^2= 7.6$ ; df=1;  $p<0.001$ ), CUs (N=502,  $\chi^2=34.1$ ; df=5;  $p<0.001$ ; N=470,  $\chi^2=25.3$ ; df=1;  $p<0.001$ ) or zoos (N=502,  $\chi^2=52.3$ ; df=5;  $p<0.001$ ; N=470,  $\chi^2=18.8$ ; df=1;  $p<0.001$ ) were responsible for protecting the maned wolf (table 2.4.1.1a and b.).

Place of residence by beliefs regarding the responsibility for protecting the maned wolf		Everybody is responsible for protecting the maned wolf	NGOs are responsible for protecting the maned wolf $\chi^2= 7.6$ ; $p<0.001$	Rural people are responsible for protecting the maned wolf	The government is responsible for protecting the maned wolf	The CUs are responsible for protecting the maned wolf $\chi^2=25.3$ ; $p<0.001$	The zoos are responsible for protecting the maned wolf $\chi^2=18.8$ ; $p<0.001$	Total respondents (N=470)
Urban/ rural residence	Urban	249	97	69	94	207	178	379
	Rural	65	11	15	13	23	20	91
<b>Total responses</b>		314	108	84	107	230	198	470

**Table 2.4.1.1b. Q1+Q4 respondents' beliefs concerning the responsibility for protecting the maned wolf in relation to residence.**

### 2.4.1.2. Responsibility by knowledge of local CU and zoo

Familiarity with local CU and zoo by beliefs regarding the responsibility for protecting the maned wolf	The CUs are responsible for protecting the maned wolf	The zoos are responsible for protecting the maned wolf	Total responses
Do you know of the local CU?	85	62 $\chi^2= 10.5$ ; $p=0.001$	190
Do you know of the local zoo?	180	172 $\chi^2=26.1$ ; $p<0.001$	349
<b>Total respondents=505</b>	245	211	

**Table 2.4.1.2. Q1+Q4 respondents' beliefs concerning the responsibility for zoos and CUs protecting the maned wolf in relation to knowledge of zoos and CUs.**

There was strong statistical evidence of a positive association between respondents being familiar with the local zoo and believing in the responsibility of zoos for protecting the maned wolf ( $N=505$ ,  $\chi^2=26.1$ ;  $df=1$ ;  $p<0.001$ ), and negative association between being familiar with the local CU and believing zoos to be responsible ( $N=505$ ,  $\chi^2= 10.5$ ;  $df=1$ ;  $p=0.001$ ) (table 2.4.1.2.).

### 2.4.1.3. Responsibility for protecting endangered wild animals

Who is responsible for protecting endangered animals?	Responses	Percentage of respondents who agree with statement
Everybody	53	68.8
NGOs	11	14.3
Rural people	7	9.1
The government	23	29.9
CUs	29	37.7
The zoos	29	37.7
<b>Total (respondents=77)</b>	<b>1108</b>	

Table 2.4.1.3. Q2 respondents' beliefs concerning the responsibility for protecting endangered animals.

Similar to the sample who recognized the maned wolf, most respondents of Q2 (who did not recognize the maned wolf) believed everybody had responsibility for protecting endangered wild animals (table 2.4.1.3.). CUs and Zoos were the most popular options amongst 37.7% of respondents ( $n=29$ ). A smaller minority (9%,  $n=9$ ) believed the protection of endangered wild animals was the responsibility of rural people.

## 2.4.2. Values related to the conservation of the maned wolf and wild animals

Respondents of Q1 were asked to mark an X in the space that best represented the values they associated with the conservation of the maned wolf (see Q1q13 in Appendix I), while respondents of Q2 were asked to associate such values with the conservation of wild animals (see Q2q9 in Appendix I).

### 2.4.2.1. Values related to the conservation of the maned wolf



Values related to the conservation of the maned wolf	Responses	Percent
backwardness	87	19.3
neither	60	13.3
progress	227	50.3
no answer	77	17.1
total	451	100
uselessness	25	5.5
neither	41	9.1
necessity	312	69.2
no answer	73	16.2
total	451	100
tradition	120	26.6
neither	108	23.9
modernity	119	26.4
no answer	104	23.1
total	451	100
city	20	4.4
neutral	50	11.1
country	287	63.6
no answer	94	20.9
total	451	100
threat	40	8.9
neither	48	10.6
protection	299	66.3
no answer	64	14.2
total	451	100
ignorance	26	5.8
neither	44	9.8
knowledge	296	65.6
no answer	85	18.8
total	451	100
politicians	23	5.1
neither	32	7.1
nature	339	75.2
no answer	57	12.6
total	451	100
<b>Total (respondents= 451)</b>	<b>3157</b>	

Table 2.4.2.1.Q1 Respondents of Q1' values in relation to the conservation of the maned wolf.

Most respondents of Q1 associated the conservation of the maned wolf with *nature* as opposed to *politicians*; with *necessity* as opposed to *uselessness*; with *protection* as opposed to *threat*;

with *knowledge* as opposed to *ignorance*; with *country* as opposed to *city*; and with *progress* as opposed to *backwardness*. They were divided about an association between conservation of the maned wolf and *tradition* as opposed to *modernity* and *neither* (table 2.4.2.1.Q1).

Most urban and rural residents associated maned wolf conservation with the same values (table 2.4.2.1a., p 326) *nature, necessity, protection, knowledge* and *country*, were divided in relation to *modernity* and *tradition*, and differed in relation to associating it with *progress*. While 54.8% (n=206) of urban respondents associated maned wolf conservation with *progress*, only 27.7% (n=11) of rural respondents made the same association, and the same percentage associated it with backwardness.

There was strong statistical evidence of an association between such beliefs and some socio-demographic characteristics of the respondents. While amongst year 8 students (n=75, N=345,  $\chi^2=33.6$ ; df=8;  $p<0.001$ ), and respondents educated up to year 10 (n=78, N=342,  $\chi^2=22.6$ ; df=6;  $p=0.001$ ; table 2.4.2.1a., p 326) many associated maned wolf conservation with *modernity*, few amongst sixth-form students (n=23, N=345,  $\chi^2=33.6$ ; df=8;  $p<0.001$ ), and respondents in/sixth-form education (n=29, N=342,  $\chi^2=22.6$ ; df=6;  $p=0.001$ ) associated it with *modernity* and disproportionately many amongst CU visitors (considering the small sample numbers) associated it with *tradition* (n=12, N=345,  $\chi^2= 33.6$ ; df=8;  $p<0.001$ ). Amongst CU visitors many also associated it with *backwardness* (n=8, N=372,  $\chi^2= 23.3$ ; df=8;  $p=0.003$ ).

Amongst respondents from São Carlos many associate maned wolf conservation with *modernity* (43.9%, n=61) while a disproportionately large percentage of respondents from Greater São Paulo associated it with *tradition* (n=29, N=341,  $\chi^2= 20.3$ ; df=4;  $p<0.001$ ) and many associated it with *threat* (n=12, N=377,  $\chi^2= 12.4$ ; df=4;  $p=0.015$ ).

#### 2.4.2.2. Values related to the conservation of wild animals

Values related to the conservation of wild animals	Frequency	Percent
backwardness	16	20.8
neutral	7	9.1
progress	39	50.6
no answer	15	19.5
total	77	100
uselessness	6	7.8
neither	12	15.6
necessity	45	58.4
no answer	14	18.2
total	77	100
tradition	29	37.7
neither	14	18.2
modernity	15	19.5
no answer	19	24.7
total	77	100
city	4	5.2
neutral	9	11.7
country	45	58.4
no answer	19	24.7
total	77	100
threat	10	13.0
neither	14	18.2
protection	36	46.8
no answer	17	22.1
total	77	100
ignorance	11	14.3
neither	6	7.8
knowledge	45	58.4
no answer	15	19.5
total	77	100
politicians	4	5.2
neither	3	3.9
nature	55	71.4
no answer	15	19.5
<b>Total</b>	<b>77</b>	<b>100.0</b>

**Table 2.4.2.2. Q1+Q4 respondents' values in relation to the conservation of wild animals**

The answers of respondents who knew of the maned wolf, were similar to most respondents of Q2 who did not know of the maned wolf and associated conservation of wild animals with (table

2.4.2.2.) *nature* (71.4%, n=55); *necessity, country and knowledge* (58.4%, n=45); *progress* (50.6%, n= 39); and *protection* (46.8%, n=36). A majority, however, associated conservation of wild animals with *tradition* (37.7%, n=29) as opposed to *modernity*.

### 2.4.3. Attitudes to hunting

Most respondents of Q2 (people who did not know of the maned wolf) believed in the fairness of the hunting prohibition and believed that *all hunting should be banned*, followed by *It should be prohibited to hunt animals that are disappearing* (table 2.4.3.). Beliefs concerning making allowances for hunting were not popular beliefs. Although the number of rural residents in this sample was too small to establish evidence of associations (n=5) none were in favour of lifting the ban, of hunting animals for food or because they are dangerous.

It is prohibited to hunt wild animals in Brazil. In your opinion:	Responses	Percentage of respondents who agree with statement
Hunting prohibition is fair, all hunting should be banned	57	74.0
It should be prohibited to hunt animals that are disappearing	17	22.1
Hunting dangerous animals should be allowed	1	1.3
Hunting animals for food should be allowed	2	2.6
Hunting animals for pelt, medicines and talismans should be allowed	1	1.3
The prohibition is unfair: all hunting should be allowed	1	1.3
<b>Total (respondents= 77)</b>	<b>79</b>	

Table 2.4.3. Q2 respondents' attitudes to hunting regulations.

### 2.4.4. Beliefs about wild predators

Of replies from respondents of Q2, 90.9% (n=211) corresponded to positive beliefs towards wild predators. Respondents believed wild predators have the right to live, and acknowledged the importance of their ecological role (table 2.4.4.). The most popular negative beliefs were that *predators are valuable as game* (10.4%, n=8), and that *wild predators are a threat to livestock*, but there was no evidence of associations between these beliefs and attitudes towards hunting

(2.4.3.). Although the number of rural residents in this sample was too small to establish associations (n=5) none believed wild predators are a threat to safety, are inconvenient, cause damage or transmit disease to domestic animals, or are valuable as game. In addition, none also believed they are beautiful, fascinating, strong and powerful, or are a source of cultural inspiration.

In your opinion wild predators:	Responses	Percentage of respondents who agree with statement
<b>Positive beliefs</b>		
Wild predators are part of the ecological web	33	42.9
Wild predators are essential to maintain nature's balance	42	54.5
Wild predators have the right to live	50	64.9
Wild predators need to be protected from people	20	26.0
Wild predators inspire curiosity	25	32.5
Wild predators are beautiful, fascinating, strong and powerful	25	32.5
Wild predators are source of stories, tales, legend, songs	16	20.8
<b>Total positive beliefs</b>	211	
<b>Negative beliefs</b>		
Wild predators are a threat to safety	3	3.9
Wild predators are a threat to livestock	7	9.1
Wild predators are inconvenient, a bother, only cause damage	0	0
Wild predators transmit disease to domestic animals	3	3.9
Wild predators are valuable as game	8	10.4
<b>Total negative beliefs</b>	21	
<b>Total (respondents= 77)</b>	232	

Table 2.4.4. Q2 respondents' positive and negative beliefs about wild predators

#### **2.4.5. Bio/education professionals' beliefs about maned wolf conservation**

Most respondents employed by the zoos, CUs and schools where questionnaires were distributed believed education plays an essential role in the conservation of the maned wolf and other wild animals (82.5%, n=118) (table 2.4.5.) and in addition believed that schools, as well as reserves and zoos play a role in forming opinions about wild animals' conservation (76.9%, n=110).

Beliefs related to maned wolf conservation	Frequency	Percentage of respondents who agree with statement
The maned wolf is not relevant enough for conservation/env.education	0	0
Maned wolf conservation includes several habitats and wild species	57	39.9
The protection of the maned wolf and wild fauna relies on research, training, legal support and enforcement, management	106	74.1
Environmental education is necessary for conservation of maned wolf and wild animals	118	82.5
Cultural values are important in the conservation of the maned wolf and wild animals	90	62.9
Long-term support from local people is important for conservation of maned wolf and wild animals	76	53.1
Interdisciplinary approach is important in the conservation of wild animals	84	58.7
Long-term solutions for conservation of maned wolf involve changes in culture/attitudes	70	49.
Long-term solutions for conservation of maned wolf involve changes in conservation professionals/educators culture/attitudes	49	34.3
Reserves, zoos and schools help to form opinions about wild animals conservation	110	76.9
General public/students must be involved in conservation initiatives	112	78.3
<b>Total (respondents= 143)</b>		

**Table 2.4.5. Q3 Bio/education professionals' beliefs about maned wolf conservation**

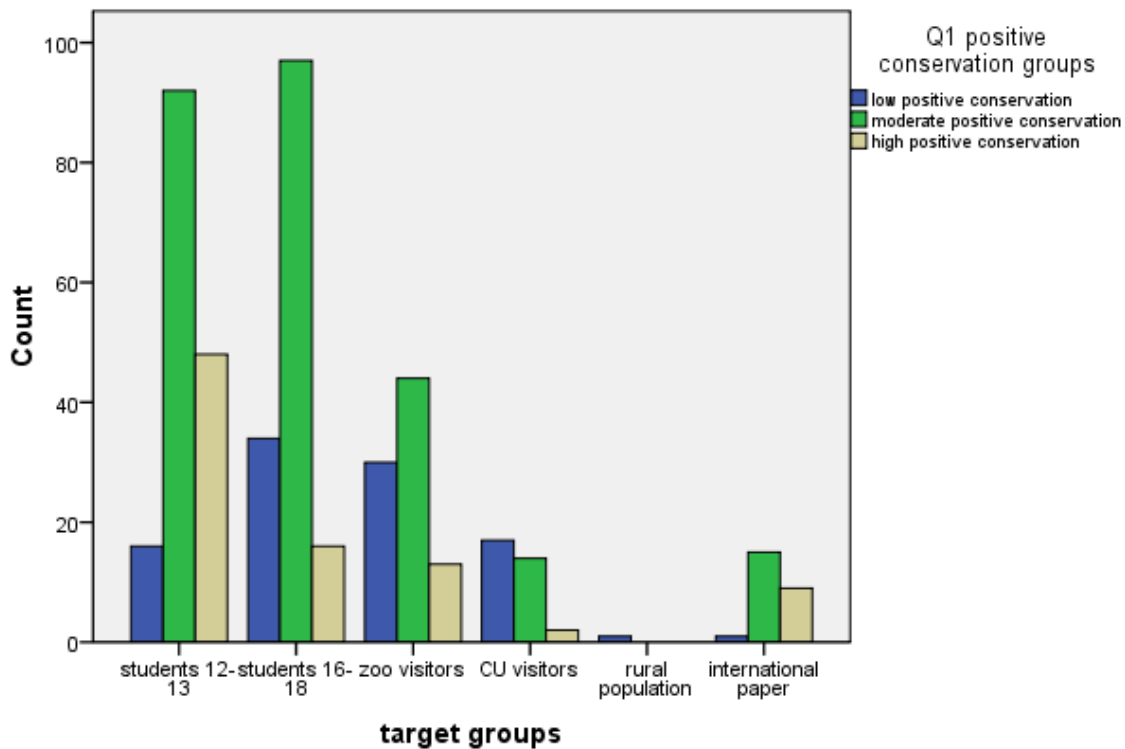
Bio/education respondents did not believe the maned wolf was irrelevant in terms of conservation/environmental education programmes, although only a smaller percentage believed in the maned wolf's role as *umbrella species* for the conservation of several habitats and wild species (39.9%; n=57). A large number of respondents believed that long-term solutions for the conservation of the maned wolf would involve changes in attitudes and culture in general (49%, n=70) and specifically those of conservation professionals and educators (34.3%, n=49).

Compared to other target groups, a majority of CU professionals believed *maned wolf conservation includes several habitats and wild species* (58%, n=18, table 2.4.5a., p 327); a majority of school (61.1%, n=22) and CU professionals (58%, n=18) believed *long-term support from local people is important for conservation of maned wolf and wild animals*, when compared to a minority of zoo and International Paper professionals and professionals with bio/education occupations. Some associations between responses and the characteristics of the professional respondents were statistically significant. A majority of respondents from São Carlos believed *long-term solutions for conservation of maned wolf involve changes in the culture and attitudes of conservation professionals/educators* (58.3%, n=14, N=143,  $\chi^2= 8.8$ ; df=3;  $p=0.032$ )

compared to a minority in all other research locations. Male respondents tended to believe *maned wolf conservation includes several habitats and wild species* (n=35; N=140,  $\chi^2= 11.7$ ; df=1; p=0.001).

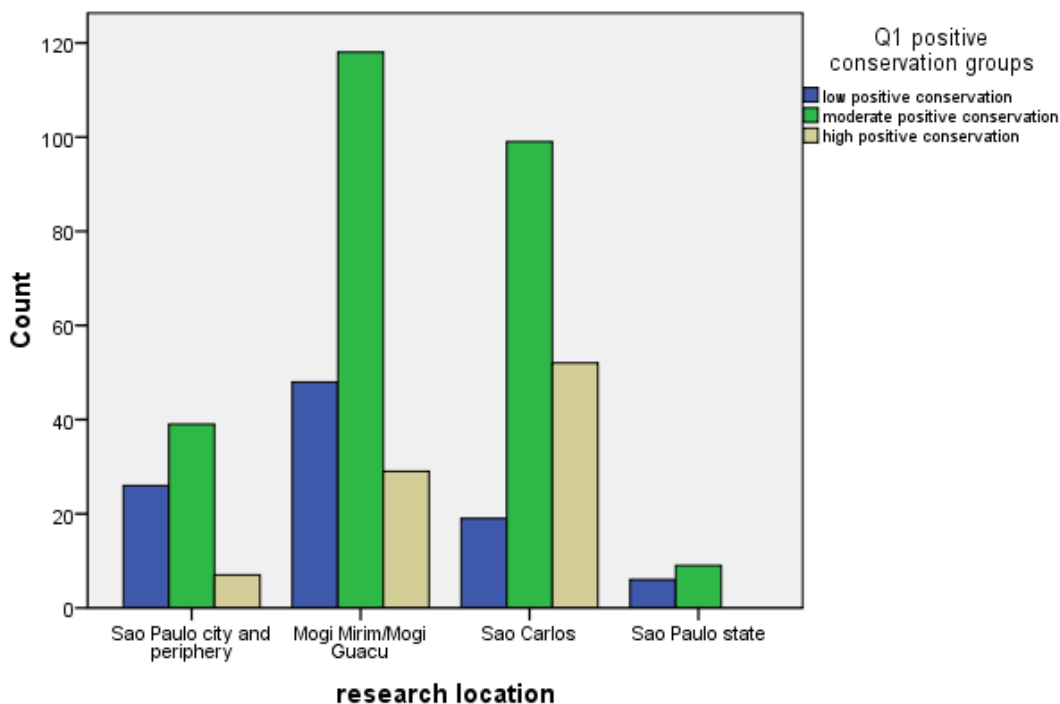
**2.4.6. Positive Conservation Score**

The positive conservation score for the respondents of Q1 had 12 points divided into (0-3) low positive conservation score, (4-7) moderate, and (8-11) high. 58.8% (n=265) of respondents scored moderate in positive conservation. The score was then regrouped into low (0-5, 48.6%, n=219) and high (6-11, 51.4%, n=232) for further statistical analysis (bar chart 2.4.6.Q1 and table 2.4.6.Q1, p 327).



Bar chart 2.4.6a.Q1 Respondents' positive conservation scores according to Target Groups

There was no evidence of strong association between urban/rural residence and positive conservation views, however there was reasonably strong statistical evidence of an association between positive conservation scores and target groups ( $N=447$ ,  $\chi^2=59$ ;  $df=8$ ;  $p<0.001$ , bar chart 2.4.6a.Q1), research locations ( $N=435$ ,  $\chi^2=16.6$ ;  $df=1$ ;  $p<0.001$ , bar chart 2.4.6b.Q1) and education groups ( $N=428$ ,  $\chi^2=16.3$ ;  $df=6$ ;  $p=0.012$ ). Amongst the respondents with the most positive views many were year 8 students (54.5%,  $n=48$ ) and respondents from São Carlos (59%,  $n=52$ ), and few were sixth-form students (18.1%,  $n=16$ ). Zoo visitors ( $n=29$ ) and CU visitors ( $n=17$ ) had the least positive views towards conservation. Respondents educated up to sixth-form were less positive about conservation ( $n=25$ ) when compared to other education levels. Tukey and Bonferroni tests (followed by *post-hoc* comparisons) indicate that conservation awareness was significantly higher ( $p\leq 0.001$ ) in São Carlos ( $M=6.53$ , 95%) than in any other research location.



Bar chart 2.4.6b.Q1 Respondents' Positive Conservation scores according to Research Location

Tukey and Bonferroni tests also indicate that International Paper staff ( $M=6.60$ , 95%) and year 8 students ( $M=6.59$ , 95%) displayed significantly higher conservation awareness than CU visitors



( $M=3.73$ , 95%,  $p<0.001$ ), zoo visitors ( $M=4.83$ , 95%,  $p<0.005$ ) and sixth-form students ( $M=5.14$ , 95%,  $p<0.05$ ).

The positive conservation score for the respondents of Q2 had 28 points divided into (0-8) low positive conservation score, (9-18) moderate, and (19-28) high. Results showed 54.5 % of respondents scored moderate in positive conservation (bar chart 2.4.6.Q2 and table 2.4.6.Q2, p 328). Most respondents scored at the higher end of the moderate positive conservation score. There were no low positive conservation scores. There was no evidence of strong association between positive conservation scores and target groups.

The positive conservation score for the respondents of Q3 had 12 points divided into (0-3) low positive conservation score, (4-7) moderate, and (8-11) high (table 2.4.6.Q3, p 329). Bio professionals scored mostly high in positive conservation (49%,  $n=70$ ). There was no evidence of reasonably strong associations between variables and positive conservation scores in this group.

#### **2.4.6.2. Knowledge by conservation scores**

There is strong statistical evidence of a positive association between knowledge and positive conservation scores ( $N= 450$ ,  $\chi^2=57$ ;  $df=1$ ;  $p<0.001$ , table 2.4.6.2.Q1, p 329) amongst the respondents of Q1. Respondents who displayed the most positive views about maned wolf conservation also tended to display high levels of knowledge about the species. This association was also true for low positive conservation and low knowledge scores.

#### **2.4.7. Negative Conservation Score**

The negative conservation score of respondents of Q1 had 12 points divided into (0-3) low negative conservation score, (4-7) moderate, and (8-11) high. 69% of respondents scored moderate in negative conservation (bar chart 2.4.7.Q1 and table 2.4.7.Q1, p 330).

Tests of Between-Subjects Effects indicate that the difference between negative conservation scores of target groups depends significantly ( $p < 0.001$ ) on their location. Conservation awareness varied significantly ( $p < 0.001$ ) amongst research locations. Tukey and Bonferroni tests (followed by *post-hoc* comparisons) indicate negative conservation scores were significantly lower amongst São Carlos respondents ( $M = 3.54$ , 95%) than amongst respondents from Greater São Paulo ( $M = 4.88$ , 95%,  $p < 0.001$ ) and from São Paulo state ( $M = 4.93$ , 95%,  $p = 0.013$ ). There was no evidence of association between negative conservation views and urban/rural residence.

#### **2.4.7.1. Knowledge by Negative Conservation**

There was strong statistical evidence of a negative association between respondents of Q1's low levels of negative views about maned wolf conservation and low levels of knowledge about the species ( $N = 450$ ,  $\chi^2 = 14.5$ ;  $df = 2$ ;  $p = 0.001$ , table 2.4.7.1.Q1, p 330).

#### **2.4.8. Summary of findings**

Aspect	Result	Chi squared Statistics Bonferroni correction= 0.0021 *not significant when Bonferroni correction is applied
<b>Responsibility for protecting the maned wolf</b>		
government	Year 8 students > other target groups	21.3; df=5; $p=0.001$
zoos	Year 8 students > rural respondents Rural residents < urban residents Higher in respondents who know of local zoo Lower in respondents who know of the local CU	52.3; df=5; $p<0.001$ 18.8; df=1; $p<0.001$ 26.1; df=1; $p<0.001$ 10.5; df=1; $p=0.001$
NGOs	Rural respondents < other target groups Rural residents < urban residents	18.8;df=5; $p=0.002$ 7.6; df=1; $p<0.001$
Conservation Units	Rural respondents < other target groups Rural residents < urban residents	34.1; df=5; $p<0.001$ 25.3; df=1; $p<0.001$
<b>Values related to the conservation of the mw</b>		
modernity	Year 8 students > sixth-form students Educated up to year 10 > sixth-form education	33.6; df=8; $p<0.001$ 22.6; df=6; $p=0.001$
tradition	CU visitors> other target groups Greater São Paulo > other research locations	33.6; df=8; $p<0.001$ 20.3; df=4; $p<0.001$
backwardness	CU visitors> other target groups	23.3;df=8; $p=0.003^*$
threat	Greater São Paulo > other research locations	12.4;df=4; $p=0.015^*$
<b>Bio/education professionals' beliefs about maned wolf conservation</b>		
<i>long-term solutions for conservation of maned wolf involve changes in conservation professionals/educators culture/attitudes</i>	São Carlos respondents > other research locations	8.8;df=3; $p=0.032^*$
<i>maned wolf conservation includes several habitats and wild species</i>	Males > females	11.7; df=1; $p=0.001$
<b>Positive Conservation score</b>	Q1 No differences between urban and rural residence Q2 and Q3 no differences between socio-demographic variables	
high	Q1 Year 8 students > sixth-form students Q1 São Carlos respondents > other locations Q1 mean São Carlos > mean other locations Q1 educated up to sixth-form < other education groups Q1 mean International Paper and year 8 students> mean CU visitors, zoo visitors, sixth-form students Q1 High levels of knowledge	59; df=8; $p<0.001$ 16.6; df=1; $p<0.001$ $p<0.001$ 16.3;df=6; $p=0.012^*$ $p<0.001$ , $p<0.005$ , $p<0.05$ 57; df=1; $p<0.001$
low	Q1 Zoo visitors and CU visitors > other target groups Q1 Low levels of knowledge	59; df=8; $p<0.001$ 57; df=1; $p<0.001$
<b>Negative conservation score</b>		
low	Q1 mean São Carlos respondents < mean Greater São Paulo and São Paulo state Q1 few low levels of knowledge	$p<0.001$ , $p=0.013$ 14.5; df=2; $p=0.001$

Table 2.4.8. Summary of results for the Question Category Conservation

## **Discussion**

Estes *et al.* (2001), in Miller *et al.* (2001) suggest that the exclusion of predators from a system should result in dramatic consequences at many levels. The carnivore biologists' defence of these wild predators is supported by many arguments, as illustrated by Clark *et al.* (2001), Miller *et al.* (2001), Kruuk (2002), and Fascione, Delach and Smith (2004). People's beliefs about wild predators need to be uncovered so that they may be incorporated into conservation strategies.

### **1. Environmental awareness and people in the vicinity of conservation areas**

#### **1.1. The role of Zoos**

While many year 8 students tended to believe in the responsibility of zoos for the protection of the maned wolf few rural residents had such a belief. This indicated a division of opinion amongst local people possibly linked to the values they confer to zoos (often seen as places that help the conservation of species), which could be investigated further. People who were familiar with the local zoo were more likely to believe in its responsibility for the protection of the maned wolf. The fact that local people support maned wolf conservation and believe zoos are responsible for it may suggest an opportunity for the local zoos to enlist public support for maned wolf conservation campaigns, although not financial support as only 7.8% of respondents were prepared to help the maned wolf by contributing with money. However zoo visitors, together with CU visitors and sixth-form students demonstrated a lower level of conservation awareness compared with other interest groups, reinforcing the need for zoos and CUs to target and engage such groups in conservation awareness initiatives. Results also suggest that conservation awareness is strongly associated with knowledge, suggesting that educational campaigns may be the best way to address lack of support for wildlife/maned wolf conservation.

### **2. Conflicts between rural and urban interests**

Some suggest the implementation of conservation measures may be impaired by differences between the socio-economic and cultural values of people in poorer areas when contrasted with the values and policies of policy-makers from urban and academic backgrounds (Knight, 2000; Mattson, 2004; de Paula and Boulhosa, 2004). This research investigated people's perceptions of the role of urban and rural elements within the context of maned wolf conservation.

When asked to associate values with the conservation of the maned wolf the majority of urban and rural residents both came to similar results. The two groups only differed in the way they associated it with either progress or backwardness: while urban people slightly favoured progress rural people were equally divided between the two values. Interestingly, no rural residents associated maned wolf conservation with politicians, ignorance or threat, and very small percentages associated it with city and uselessness. Results suggest that opinions about the conservation of the maned wolf in this sample were not polarized between rural and urban residents, and there was no evidence of feelings that the species' conservation is centralized by city politicians. These results reflect that fact that there are no policies in place to specifically protect the maned wolf (see Chapter Two, 2.2.2.), nor governmental campaigns particularly targeting the species in the research areas.

When asked who was responsible for protecting the maned wolf, most urban and rural residents in the sample agreed it was everybody's responsibility, though rural residents were less inclined to consider NGOs, CUs and zoos responsible. Neither group tended to consider rural people responsible. Once again, results suggest that urban and rural residents in the research sites share the same values about responsibility for the conservation of the maned wolf, showing no evidence of antagonism.

Respondents of the rural questionnaire have voiced feelings that the CU staff "have to" favour wildlife over local people, because their aim is to protect it. Such responses may reflect feelings of personal neglect over policy makers' concerns for wildlife, as suggested by Campbell, 2000, Knight, 2000 and Hill, 2004, which could result in poaching. Their responses to the questionnaire, however, are consistent with a low level of antagonism in relation to the maned wolf and to conservation management. The confidential nature of the data gathered was

stressed lest views showed signs of conflict. Nonetheless it is not possible to discard or verify whether responses tried to conceal and protect traditional practices that could be detrimental to wildlife conservation, and such concerns may be investigated further in the future.

Although Brazil has banned the hunting of wild animals for over 30 years (see Chapter Two, section 2.2.3.), poaching is a reality to this day and is used as a way to complement people's diet, provide sport, and to source materials for medicinal and magical uses (Cândido, 2001; personal communication, 2007). Knowledge of people's attitudes towards hunting is important to identify whether they pose a threat to the maned wolf. Results from this research however suggest that the hunting ban is supported by the majority of the sample and justifications for lifting the ban are not popular amongst urban and rural people alike (though the rural sample was too small to certify this association).

In the sample, many rural people at home and in land related occupations were *sitiantes* (or part of their family units), inhabiting small holdings and selling their produce to large agricultural companies. Such lifestyles might provide small rural producers with enough economic support to free them from reliance on supplementing their income with resources from the wild areas, giving them some leeway to withstand eventual losses to wildlife, thus reducing potential conflict with CU management. Further investigation in associations between income, reliance on natural resources and vulnerability to wildlife related damage, and attitudes toward conservation would be useful in order to clarify some of the human dimensions of the issue. Results, however, do not suggest there is strong antagonism between local rural and urban interests in areas concerning the conservation of the maned wolf.

The association between maned wolf and other wild animals' conservation and tradition or backwardness found amongst CU visitors and respondents from Greater São Paulo may reflect beliefs connected to a development agenda for natural areas of Brazil. In this case, respondents within these interest groups may see maned wolf conservation negatively, as a practice opposing modernity and progress. Further investigation into such associations is advised.

### **3. Local people and support for the conservation of the maned wolf**

Conservation awareness towards the maned wolf was strongly related to knowledge about the species. It was mostly found amongst year 8 students, São Carlos respondents and significantly less amongst zoo and CU visitors. Such findings indicate that zoos and CUs have not yet fulfilled their potential in spreading awareness about the conservation needs of the species, although most bio/education professionals in the sample believed education, carried out by schools, reserves and zoos, plays a role in forming opinions about maned wolf and wild animals' conservation.

The attitudes towards wild predators were not as positive amongst people who did not know of the maned wolf: here only 26% believed wild predators should be protected, though a majority believed they had the right to live. These results might indicate that familiarity with the maned wolf improves people's willingness to protect the species. It is possible to suggest that knowledge of the maned wolf dissociates it from the preconceptions, fears and dislikes often associated with the "wild predators" group (cognitive dissonance as suggested by Bath and Majic, 2001). Positive values towards wild predators should influence people's attitudes favourably towards maned wolf conservation. It would be useful to investigate whether or not people who knew of the maned wolf also had a more positive attitude towards wild predators in general.

## **2.5. Value towards wild animals, carnivores, and nature**

### **Introduction**

Values are underlying guides to people's beliefs and attitudes, as so they influence behaviour indirectly (Daigles, Hrubes and Ajzen, 2002). "Peoples' basic values about animals and nature, which affect their perception of individual animal species" are considered by Kellert *et al.* (1986:

978) as one of the four interacting variables predicting people's attitudes towards wild carnivore species. This section aims to address research questions 1, 2 and 3 by examining the local levels of positive and negative values towards wild animals, carnivores and nature in order to identify the value component of attitudes towards the maned wolf, and by testing for differences amongst interest groups.

## Results

### 2.5.1. Value towards nature

Respondents of Q2 were asked how important nature was to them, on a scale from 1 (*not important*) to 7 (*very important*). 90.9% (n= 70) of respondents found nature important to them, and 3.9% were indifferent (neutral, n=4) (table 2.5.1., p 331). Such a picture was consistent across research locations and target groups.

### 2.5.2. Value towards wild animals

To you wild animals are as important as:	Count (percentage)
People	43 (55.8%)
Pets	30 (39%)
Livestock	36 (46.8%)
Total	77

Table 2.5.2. Q2 respondents' value towards wild animals

Opinions about wild animals being as important as people may have been divided amongst the respondents of Q2 (55.8%, n=43) (table 2.5.2.). Interestingly no rural residents, as opposed to many urban residents (51.5%, n=34) considered them *as important as livestock* (table 2.5.2a, p 331). A smaller percentage considered them *as important as pets* (39%, n=30). Of the sample, 28.6% (n=22) considered wild animals simultaneously *as important as people, pets and livestock* and 16.9% (n=13) did not answer yes to any of the above.



Most sixth-form students and zoo visitors considered wild animals *as important as people* (table 2.5.2a.) and most zoo visitors (66.6%, n=16) considered them *as important as livestock*, making zoo visitors the group with most positive values regarding the importance of wild animals.

### 2.5.3. Value of wildlife related activities

During the last year did you:	Responses	Percent of respondents who engaged on each activity
observe wildlife in nature?	19	24.7
feed wildlife in nature?	0	0
photograph wildlife in nature?	12	15.6
<b>Total (77 respondents)</b>	31	

Table 2.5.3. Wildlife activities undertaken by Q2 respondents during the past year

For respondents of Q2 the above activities were not frequent (table 2.5.3.) and 61% of respondents did not engage in any of the activities during the previous year. Observing wildlife in nature was the most frequent activity followed by wildlife photography. There were no reports of feeding wildlife in nature.

#### 2.5.3.1. Missing wildlife related activities if no longer available

Respondents of Q2 were asked how much they would miss the above wildlife related activities if they were no longer available, on a scale from 1 (*not at all*) to 7 (*very much*) (see Q2q4, in Appendix I). There was no evidence of differences between urban and rural residents' responses. Most respondents (90.4%, n= 66) stated they would miss wildlife-related activities if no longer available, even though many did not actively engage in them (table 2.5.3.1., p 332).

All respondents who had experienced a wildlife-related activity in the previous year, either observing or photographing wildlife in nature, stated they would miss it if no longer available (table 2.5.3.1a., p 332).

#### **2.5.4. Value of CU and wildlife within it**

Most rural respondents indicated positive attitudes (92%) towards their neighbouring conservation unit and the wildlife within it (table 2.7.6.). Amongst the 8% negative attitudes, 14.8% stated they *would not miss the reserve if it didn't exist* (n=8). These responses are analysed further in section 2.7.6.

#### **2.5.5. Value score**

Q2 respondents' 9 points score was divided into (0-2) low, (3-5) moderate, and (6-8) high positive values score, and into (0-3) low and (4-8) high positive values score for statistical analysis (bar chart 2.5.5.Q2, p332 and table 2.5.5.Q2, p 332). Most respondents scored moderate (76.6%, n=59) in the first scale, and low (53.2%, n=41) in the second in relation to positive values towards nature.

Tests of Between-Subjects Effects indicate significant ( $p=0.032$ ) differences in positive values between research locations. Tukey and Bonferroni tests (followed by *post-hoc* comparisons) indicate value scores are significantly higher amongst respondents from Greater São Paulo (M=4.05, 95%) than Low Mogiana region (M=3.00, 95%,  $p=0.010$ ).

The rural respondents' 13 points score was divided into (0-4) low, (5-8) moderate, and (9-12) high positive value score. Most respondents scored high in positive values towards nature (77.8%) and there were no low scores (bar chart 2.5.5.Q4 and table 2.5.5.Q4, p 333). Cross-referencing Value score with other variables did not show evidence of strong associations.

### **Discussion**

In this research, the sample who did not know of the maned wolf was divided on the subject of beliefs that wild animals were as important as people and livestock, and only a minority considered them as important as pets, possibly reflecting the fact that most respondents resided in urban areas, where pets are highly valued. However the great majority considered nature important to them, and even though they had not engaged recently in wildlife related activities such as observing, feeding or photographing wildlife, the majority stated they would miss such activities if they were no longer available. Their feelings about wildlife-related activities may be an indication of their interest in wildlife conservation, as people need not participate actively to have strong feelings about wildlife conservation (Mankin, Warner and Anderson, 1999) and may reflect an association between the existence of wildlife-related activities and desirable standards of living.

### **1. Environmental awareness and people in the vicinity of conservation areas**

#### **1.1. The role of Zoos**

Zoo visitors in this research's sample also demonstrated the most positive values concerning the relative importance of wild animals (as important as people and livestock), and the highest percentage of value towards nature, indicating a potential for positive attitudes towards species such as the maned wolf.

## **2.6. Experience**

### **Introduction**

According to Kellert *et al.* (1986:978) "past and present experiences of interaction with a species, including conflict, recreation, material use, etc." compose the final of the four elements in forming people's attitudes towards carnivores. The stronger and more direct the experience the stronger will be the associative link (Fazio, 1990, in Manstead, 1996).

Some of the questions addressed people's experience in relation to contact with the maned wolf. Such questions were cross-referenced with questions on attitudes and beliefs about the maned wolf in order to compare attitudes of people with direct and indirect experience, as predictors of future behaviour towards the species. Some questions addressed respondents' sources of information about the maned wolf. Knowing target groups' favoured sources of information may help conservation strategies to develop target specific campaigns for different media. In this section the experience component of attitudes towards the maned wolf and the differences between interest groups in relation to it were examined in order to address research questions 1, 2 and 3.

## **Results**

### **2.6.1. Experience of the local Conservation Unit and local Zoo**

37.6% of the respondents of Q1 and Q4 (n=190) were familiar with the local CU, and 69.1% (n=349) were familiar with the local zoo (table 2.6.1., p 333).

Not all CU visitors indicated they knew/knew of the local CU (87.9%, n= 29), and not all the zoo visitors indicated they knew/knew of the local zoo (75.6%, n= 65), which indicates a difference between what respondents perceive as "knowing" and "being/having been there". Nevertheless disproportionately few (N=505,  $\chi^2=32.9$ ;  $df=1$ ;  $p<0.001$ ) respondents who allegedly knew/knew of the local zoo had never visited it.

There was strong statistical evidence of an association between familiarity with the local zoo and CU and certain characteristics of the respondents. A disproportionately large percentage of rural residents (n=48, N=470,  $\chi^2=11.6$ ;  $df=1$ ;  $p=0.001$ ) were familiar with the local CU, compared to urban residents (table 2.6.1 a).

Socio-demographic characteristics of respondents by their familiarity with local zoo or local CU		Do you know of the local zoo?	Do you know of the local CU?	Total respondents per variable
<b>target groups</b>	students year 8	135	48	156
	students sixth-form	104	49	148
	zoo visitors	65	10	86
	CU visitors	8	29	33
	rural population	23	38	54
	International Paper	11	16	25
		$\chi^2=80;df=5;p<0.001$	$\chi^2=96.5;df=5;p<0.001$	
<b>Total responses</b>		346	156	502
<b>research location</b>	Greater São Paulo	41	43	72
	Low Mogiana region	115 (51.8%)	107	222
	São Carlos	178 (90.8%)	40	196
	São Paulo state	15	0	15
		$\chi^2=86.1;df=3;p<0.001$	$\chi^2=59.4;df=3;p<0.001$	
<b>Total responses</b>		349	190	505
<b>gender</b>	Male	180	95	263
	female	164	87	227
<b>Total responses</b>		344	182	490
<b>Age groups</b>	Up to 13	126	58	157
	14-18	125	50	174
	19-40	38	29	71
	41 and up	36	40	60
			$\chi^2=27.5;df=3;p<0.001$	
<b>Total responses</b>		325	177	462
<b>Residence</b>	Urban	282	127	379
	Rural	46	48	91
		$\chi^2=19.8;df=1;p<0.001$	$\chi^2=11.6;df=1;p=0.001$	
<b>Total responses</b>		328	175	470
<b>Occupation groups</b>	Students	264	119	352
	At home	14	16	24
	Urban occupations	38	25	58
	Bio/education occupations	8	11	16
	Land related occupations	5	10	15
			$\chi^2=22.9;df=4;p<0.001$	
<b>Total responses</b>		329	181	465
<b>Education groups</b>	No formal education	0	3	4
	Educated up to year 10	168	90	227
	Educated up to sixth-form	145	66	207
	Tertiary education	25	21	45
<b>Total responses</b>		338	180	483

Table 2.6.1a. Target groups, research locations and socio-demographic variables of respondents of Q1+Q4 according to their familiarity with the local zoo and CU.

Also disproportionately many CU visitors ( $n=29$ ), rural respondents ( $n=38$ ) and International Paper respondents ( $n=16$ ) ( $N=502$ ,  $\chi^2=96.5$ ;  $df=5$ ;  $p<0.001$ ), those aged 41+ ( $n=40$ ;  $N=462$ ,  $\chi^2=27.5$ ;  $df=3$ ;  $p<0.001$ ), those at home ( $n=16$ ) or in bio/education occupations ( $n=11$ ) ( $N=465$ ,  $\chi^2=22.9$ ;  $df=4$ ;  $p<0.001$ ), from Greater São Paulo ( $n=43$ ) and the Low Mogiana region ( $n=107$ ,  $N=505$ ,  $\chi^2=59.4$ ;  $df=3$ ;  $p<0.001$ ), and disproportionately few zoo visitors ( $n=10$ ), aged 14-18 ( $n=50$ ), from São Carlos ( $n=40$ ) and no respondents from São Paulo state were familiar with the local CU. These results relate to the sampling and to the fact that people who are working in contact with the local CU and people living in its neighbouring area are more familiar with its existence. Amongst respondents who were familiar with the local zoo there were disproportionately many year 8 students ( $n=135$ ;  $N=502$ ,  $\chi^2=80$ ;  $df=5$ ;  $p<0.001$ ), from São Carlos ( $n=178$ ;  $N=505$ ,  $\chi^2=86.1$ ;  $df=3$ ;  $p<0.001$ ) and disproportionately few CU visitors ( $n=8$ ), rural respondents ( $n=23$ ) ( $N=502$ ,  $\chi^2=80$ ;  $df=5$ ;  $p<0.001$ ) and rural residents ( $n=46$ ;  $N=470$ ,  $\chi^2=19.8$ ;  $df=1$ ;  $p<0.001$ ), from the Low Mogiana region ( $n=115$ ;  $N=505$ ,  $\chi^2=86.1$ ;  $df=3$ ;  $p<0.001$ ).

### 2.6.1.1. Experience of local CU and Zoo by purpose of visit

Purpose of visit to local zoo or CU by familiarity with local CU and zoo	Do you know of the local CU?		Do you know of the local zoo?	
	Count	Percent	Count	Percent
The purpose of your visit was to see the animals?	86 $\chi^2=14.9$ ; $df=1$ ; $p<0.001$	45.2	237 $\chi^2=62$ ; $df=1$ ; $p<0.001$	67.9
The purpose of your visit was a family/friends day out?	85	44.7	148	42.4
The purpose was a school visit?	68	35.8	130	37.2
The purpose was an environmental education course?	12	6.3	15	4.3
I have never visited	6	3.1	1 $\chi^2=32.9$ ; $df=1$ ; $p<0.001$	.2
<b>Total (respondents=505)</b>	190		349	

Table 2.6.1.1. Respondents of Q1 and Q4 experience of local CU and zoo according to purpose of visit.

There is strong statistical evidence that few respondents who were familiar with the local CU tended to visit it to see animals ( $N=505$ ,  $\chi^2=14.9$ ;  $df=1$ ;  $p<0.001$ ) and the largest percentage would visit it as part of a day out with friends and family (44.7%,  $n=85$ ), followed by a school visit (35.8%,  $n=68$ ), and only 6.3% ( $n=12$ ) visited as part of an environmental education course (table 2.6.1.1.). Many frequent CU goers are keen on walking and jogging, as was apparent during the distribution of the questionnaires.

On the other hand, many respondents who were familiar with the local zoo tended to visit it to see the animals ( $n=237$ ;  $N=505$ ,  $\chi^2=62.5$ ;  $df=1$ ;  $p<0.001$ ), followed by a day out (42.4%,  $n=148$ ) and only 4.3% ( $n=15$ ) visited as part of an environmental education course.

Disproportionately few ( $N=470$ ,  $\chi^2=10.7$ ;  $df=1$ ;  $p=0.001$ ) rural residents ( $n=37$ ) (table 2.6.1.1a.) visited zoos or CUs to see animals or indicated they did so as part of a school visit ( $n=13$ ,  $N=470$ ,  $\chi^2=23$ ;  $df=1$ ;  $p<0.001$ ), and none had visited for environmental education purposes.

Respondents' place of residence by their purpose of visit to zoo or CU	Purpose of visit to zoo or CU					
	The purpose of your visit was to see the animals? $\chi^2=10.7$ ; $df=1$ ; $p=0.001$	The purpose of your visit was a family/friends day out?	The purpose was a school visit? $\chi^2=23$ ; $df=1$ ; $p<0.001$	The purpose was an environmental education course?	Total	
urban/rural residence	urban	226	147	156	21	379
	rural	37	43	13	0	91
	Total	263	190	169	21	470

Table 2.6.1.1a. Q1+Q4 respondent's place of residence in relation to purpose of visits to local zoo and CU.

## 2.6.2. Sources of information about the maned wolf

I saw/heard about the maned wolf on:	Responses	Percentage of respondents per source of information
TV or radio	319	63.2%
Papers/books/magazines	191	37.8%
school, env.edu course	100	19.8%
Internet	82	16.2%
parents or family or friends	28	5.5%
Secondary sources	382	75.6%
Zoo, museum, CU	326	64.6%
live in nature	181	35.8%
in my own property (55 respondents, Q4)	16	29%
Primary sources	181	35.8%
<b>Total (respondents= 505)</b>		

Table 2.6.2. Q1 + Q4 respondents' source of information about the maned wolf

The great majority of respondents of Q1 and Q4 heard about the maned wolf from *secondary sources* (75.6%), followed by *zoos, museums and CUs* (64.6%, n= 326) while 35.8% (n=181) had seen it *live in nature* (table 2.6.2.). *TV and radio* (63.2%, n=319) were the most popular of the media used.

There was reasonably strong statistical evidence of an association between sources of information about the maned wolf and certain characteristics of the respondents. As it could be expected, amongst rural residents disproportionately many saw the maned wolf *live in nature* (53.8%, n=49, N=470,  $\chi^2=14.5$ ; df=1;  $p<0.001$ ), however a surprisingly large number of urban residents had also seen them in nature (32.4%, n=123, N=470); 80.7% (n=306, N=470) of urban residents heard about the maned wolf from *secondary sources* compared to 58.2% of rural residents (n=53, N=470  $\chi^2=14.5$ ; df=1;  $p<0.001$ ) who had also heard considerably less about the maned wolf from *TV and radio* (47.3%, compared to 67.3% of urban residents, N=470,  $\chi^2=12.7$ ; df=1;  $p<0.001$ ), *papers, books and magazines* (22%, compared to 42.2% of urban residents, N=470,  $\chi^2=12.7$ ; df=1;  $p<0.001$ ), and the *internet* (3.3%, compared to 18.7% of urban residents, N=470,  $\chi^2=13.2$ ; df=1;  $p<0.001$ ). Amongst rural residents few heard of the maned wolf from *zoos, museums and CU* (44%, compared to 71.2% of urban residents, N=470,  $\chi^2=24.3$ ; df=1;  $p<0.001$ ). A large percentage of rural residents (29%) had seen the maned wolf in their own properties (16 in 51 rural respondents).

Amongst rural respondents (70.4%, n=38) and International Paper staff (88%, n=22) (N=502,  $\chi^2=74.6$ , df=1,  $p<0.001$ ); respondents aged over 19 (63.1%, n=82, N=462,  $\chi^2=55$ ; df=1;  $p<0.001$ ); people at home (66.7%, n=16,) in urban (55.2%, n=32) and land (93.3%, n=14) related occupations or in bio/education occupations (68.8%, n=11) (N=465,  $\chi^2=64.1$ ; df=1;  $p<0.001$ ); in/with tertiary education (62.2%, n=28, N=483,  $\chi^2=15$ ; df=1;  $p=0.001$ ), from the Low Mogiana region (46.4%, n=103, N=505,  $\chi^2=20$ ; df=1;  $p<0.001$ ) a disproportionately large percentage had *seen the maned wolf live in nature*. On the other hand disproportionately few amongst sixth-form students (23.6%, n=35, N=502,  $\chi^2=74.6$ ; df=1,  $p<0.001$ ), aged under 18 (26.5%, n=88, N=462,  $\chi^2=55$ ; df=1;  $p<0.001$ ), students (25.9%, n=91, N=465,  $\chi^2=64.1$ ; df=1;  $p<0.001$ ), and those from São Carlos (27%, n=53, N=505,  $\chi^2=20$ ; df=1;  $p<0.001$ ) had *seen the maned wolf live in nature*. Disproportionately few amongst the rural respondents (37%, n=20) and CU visitors (18.2%, n=6) (N=502,  $\chi^2=59$ ; df=1;  $p<0.001$ ); respondents aged 41+ (40%,



n=24, N=462,  $\chi^2=26$ ; df=1;  $p<0.001$ ); those in land related occupations (13.3%, n=2, N=465,  $\chi^2=24.2$ ; df=1;  $p<0.001$ ), and from Greater São Paulo (27.8%, n=20, N=505,  $\chi^2=54.5$ ; df=1;  $p<0.001$ ) had heard about the maned wolf from the *zoo/museum/CU*. A disproportionately large percentage of respondents from Greater São Paulo (98.6%, n=71, N=505,  $\chi^2=31.2$ ; df=1;  $p<0.001$ ) and disproportionately few amongst the rural respondents (42.6%, n=23, N=502,  $\chi^2=38.3$ ; df=1;  $p<0.001$ ), respondents aged over 41 (50%, n=30, N=462,  $\chi^2=32.9$ ; df=1;  $p<0.001$ ) had heard about the maned wolf from *secondary sources*.

### 2.6.2.1. By beliefs and attitudes towards the maned wolf

Amongst the respondents of Q1 and Q4 there was strong statistical evidence of a positive association between the experience of seeing the maned wolf *live in nature* and the beliefs that they *attack chicken pens and livestock* (N=505,  $\chi^2=15.5$ ; df=1;  $p<0.001$ ) or that they *attack and scare people* (N=505,  $\chi^2=11.9$ ; df=1;  $p=0.001$ ). There were also strong associations between believing that the *maned wolf needs protection* and seeing it *in nature* (N=505,  $\chi^2=17.8$ ; df=1;  $p<0.001$ ) or in a *zoo/museum/CU* (N=505,  $\chi^2=19.9$ ; df=1;  $p<0.001$ ).

Amongst respondents of Q1 there was strong statistical evidence of an association between feelings about the maned wolf and the experience of seeing it in nature. Few respondents who considered the maned wolf *ugly* had seen it in nature (n=4, N=451,  $\chi^2=9.5$ ; df=3;  $p=0.023$ ), and many (40%, n=34, N=451,  $\chi^2=8.5$ ; df=3;  $p=0.036$ ) who found it *neither powerful nor powerless* had seen it in the wild.

### 2.6.3. Bio/education professionals' experience working with the maned wolf

As expected, out of 143 respondents working in zoos, schools and CUs, most respondents worked with the maned wolf (69.3%) either directly (25.9%, n=37) or indirectly (43.4%, n=62). 28% (n=40) did not work with the maned wolf (table 2.6.3.). No school professionals worked directly with the maned wolf (table 2.6.3a., p 334) while a large percentage of zoo professionals

(46.8%, n=29) did. There was strong statistical evidence that many respondents from São Paulo state (41.9%, n=18, N=139,  $\chi^2=16$ ; df=6;  $p=0.014$ ) worked directly with the maned wolf, as opposed to respondents from São Carlos. More males (37.1%, n=23) than females (17.6%, n=13) worked directly with the maned wolf. Half the number of bio/education professionals in urban occupations worked directly with the maned wolf (n=10). There was no evidence of strong associations between experience of working with the maned wolf and attitudes towards its conservation (table 2.6.3a. p334).

Does your work involve the maned wolf?	Frequency	Percent of respondents per degree of involvement
No	40	28.0
Yes, indirectly	62	43.4
Yes, directly	37	25.9
Total	139	97.2
no answer	4	2.8
Total	143	100.0

Table 2.6.3. Q3 Bio professionals experience working with the maned wolf.

#### 2.6.4. Experience of damage caused by the maned wolf or other animals

Has the maned wolf ever caused damage to you/your family?	Frequency	Percent of respondents per experience of damage
No	464	91.9
Yes	14	2.8
Don't know if was wolf or other animal?	6	1.2
Don't know	21	4.2
Total	505	100.0

Table 2.6.4. Q1+Q4 respondents' experience of damage caused by maned wolf or other animal.

The great majority of the respondents of Q1 and Q4 and their families, had not suffered damage caused by the maned wolf (91.9%, n=464) (table 2.6.4.) These variables have been grouped into two categories for statistical analysis: *no experience of damage* (96%, n=485) and *damage was caused by maned wolf or other animal* (4%, n=20) (table 2.6.4a., p 334)

The great majority of rural respondents, and their families, had not suffered damage caused by the maned wolf either (77.8%, n=42) (table 2.6.4b., p 334). However, 18.5% (n=10) of respondents did indicate that the maned wolf caused damage to themselves or to their family, and 3.7% (n=2) indicated that the damage might have been caused by the maned wolf or another animal. Out of the people who suffered damage (n=12), most considered the damage *material* in nature (91.6%, n=11) (table 2.6.4c., p 335).

Due to small samples it was not possible to ascertain the strength of associations between the perception of damage caused by the maned wolf and socio-demographic characteristics of the respondents.

#### **2.6.4.1. By beliefs and attitudes towards the maned wolf**

None of the 20 respondents who had suffered damage believed the maned wolf should be hunted, and most respondents who had experienced damage held positive beliefs about the maned wolf (table 2.6.4.1., p 335).

There was strong statistical evidence of a positive association between the belief that *maned wolves attack chicken pens and livestock* and previous experiences of damage caused by the maned wolf or another animal to the respondent or their family (N=505,  $\chi^2=46$ ; df=1;  $p<0.001$ ), as might be expected (table 2.6.4.1., p 335).

None of the respondents of Q1 who had experienced damage allegedly caused by the maned wolf or by another animal to themselves or to their family considered the maned wolf *good* (table 2.6.4.1a, p 335). None however indicated the belief that maned wolves should be eliminated or that people should be allowed to hunt them for their body parts.

### 2.6.4.2. By attitudes towards maned wolves found attacking livestock

Rural respondents' attitudes towards maned wolves found attacking livestock by damages If a maned wolf is found attacking livestock, it must be:	damage groups		Total responses
	No damage	Damage caused by maned wolf or other animal	
it must be trapped	2	1	3
it must be killed	3	1	4
it must be handed over to the authorities	18	4	22
Body parts must be harvested	0	0	0
one must set the dogs after it	2	3	5
one must scare it away	9	4	13
missing	33	8	41
reinforce chicken pen	2	0	2
missing	40	12	52
Total respondents	42	12	54

**Table 2.6.4.2.Q4. Rural respondents' attitudes towards maned wolves found attacking livestock by damages**

Only 8.3% (n=1) of respondents who had suffered damages, or whose family had suffered damage, allegedly caused by the maned wolf, agreed *a maned wolf found attacking livestock must be killed or trapped*, and none agreed that *parts should be harvested* (0/12) (table 2.6.4.2.Q4.). This suggests that retaliation killing was not popular amongst people who had lost livestock to the maned wolf. The most frequent responses amongst this group was handing the culprit over to the authorities or scaring it away (33.3%, n=4). However numbers were too small for further analysis of significance.

### 2.6.5. Summary of findings

Aspect	Result	Chi squared Statistics Bonferroni correction= 0.0013 *not significant when Bonferroni correction is applied
Experience of local CU and Zoo		
Know of local CU	Rural > urban residents CU visitors, rural respondents, International Paper staff > zoo visitors Aged 41 and over > aged 14-18 Bio/education occupations > other occupations Greater São Paulo, Low Mogiana region > São Carlos respondents No respondents from São Paulo state	11.6; df=1; p<0.001 96.5; df=5; p<0.001 27.5; df=3; p<0.001 22.9; df=4; p<0.001 59.4; df=3; p<0.001
Know of local zoo	Few never visited Year 8 students > CU visitors, rural respondents São Carlos > Low Mogiana region Urban residents > Rural residents	32.9; df=1; p<0.001 80; df=5; p<0.001 86.1; df=3; p<0.001 19.8; df=1; p<0.001

Aspect	Result	Chi squared Statistics Bonferroni correction= 0.0013 *not significant when Bonferroni correction is applied
Purpose of visit		
To see animals	Few people visited CU with that purpose Rural residents < urban residents Many visited zoo with that purpose	14.9; df=1; $p<0.001$ 10.7; df=1; $p=0.001$ 62.5; df=1; $p<0.001$
School visit	Rural residents < urban residents	23; df=1; $p<0.001$
Environmental education	No rural residents	
Sources of information about mw		
Live in nature	Rural residents > urban residents Rural respondents, International Paper staff > sixth-form students Aged 19 and over > aged up to 18 People at home, urban and land related occupations, bio/education > students Tertiary education > lower levels of education Low Mogiana region > São Carlos respondents Belief that mw attacks chicken pens and livestock Belief that mw must be protected Belief that mw attacks and scares people Few found mw "ugly" Many found it neither "powerful nor powerless"	14.5; df=1; $p<0.001$ 74.6; df=1, $p<0.001$ 55; df=1; $p<0.001$ 64.1; df=1; $p<0.001$ 15; df=1; $p<0.001$ 20; df=1; $p<0.001$ 15.5; df=1; $p<0.001$ 17.8; df=1; $p<0.001$ 11.9; df=1; $p=0.001$ 9.5; df=3; $p=0.023^*$ 8.5; df=3; $p=0.036^*$
Secondary sources	Urban residents > rural residents Greater São Paulo > other research locations Rural respondents < other target groups Aged 41 and over < other age groups	14.5; df=1; $p<0.001$ 31.2; df=1; $p<0.001$ 38.3; df=1; $p<0.001$ 32.9; df=1; $p<0.001$
TV and radio	Urban residents > rural residents	12.7; df=1; $p<0.001$
Papers, books, magazines	Urban residents > rural residents	12.7; df=1; $p<0.001$
internet	Urban residents > rural residents	13.2; df=1; $p<0.001$
zoos, museums and CU	Rural residents < urban residents Rural respondents and CU visitors < other target groups Aged 41 and over < other age groups Land related < other occupations Greater São Paulo < other research locations Belief that mw must be protected	24.3; df=1; $p<0.001$ 59; df=1; $p<0.001$ 26; df=1; $p<0.001$ 24.2; df=1; $p<0.001$ 54.5; df=1; $p<0.001$ 19.9; df=1; $p<0.001$
Bio/education professionals' experience working with the maned wolf	No association with attitudes towards mw conservation	
Did not work with maned wolf	São Carlos respondents > other research locations	16; df=6; $p=0.014^*$
Experience of damage caused by the maned wolf or other animals		
Alleged experience of damage caused by mw or another animal	Belief that maned wolf attacks chicken pens and livestock None believed mw should be hunted None considered mw "good" None believed mw should be eliminated None believed mw should be harvested for body parts	46; df=1; $p<0.001$

Table 2.6.5. Summary of results for the Question Category Experience

## **Discussion**

### **1. The maned wolf within the changing universe of local people.**

Local people's negative experiences of maned wolves having caused damage to their property could be a predictor of attitudes towards the maned wolf, as suggested by Kellert *et al.* (1996). In contrast to widespread beliefs about the maned wolf's attacks on chicken pens, and confirming research on the maned wolf's feeding ecology, only a small minority of the local people sample alleged the maned wolf caused damage to themselves or to a member of their families. Although numbers were significantly higher in the rural sample they were still not as high as the percentage of rural people who believed in the threat of or in the food preference for chicken, again indicating such beliefs are possibly greater than their alleged experience of damage inflicted by the maned wolf. In support of this argument only 3.7% of rural respondents indicated the animals from the local CU caused damage to their property, though 3 times more bio/education professionals in the sample believed local people were victims of damage caused by animals from the local reserve. Bio/education professional responses here may have been influenced by beliefs of rural people that wolves cause damage.

Although there are records of maned wolves' predation of livestock these seem to be concentrated around winter months and in connection with the existence of pups (see Chapter Two, 4.4.). Maned wolves seem to be otherwise timid and reluctant to approach people (Magalhães, 1939; Ihering, 1968; Carvalho, 1976; Dietz, 1984). Therefore it is possible to suggest that the seemingly widespread belief amongst rural people that maned wolves are a threat to chicken pens may be heightened by cultural traditions connected with the European wolf, combined with the spreading of information based on the experience of rare (yet memorable) attacks on domestic stock suffered by some members of the community, and do not necessarily correspond to reality. In this case, information to clarify differences between the two species and particularly regarding the maned wolf's feeding ecology may be essential for conservation.

A positive association between people sighting the maned wolf live in nature and believing that it attacks chicken pens and livestock and that it scares and attacks people, was also observed in the sample, supporting suggestions of a link between perception of threat and frequency of encounters, even though attacks may be a rare event (Michelle *et al.*, 2005). This association deserves further investigation.

## **2. The maned wolf in respect to local people's livelihood**

People who had had chickens taken by the maned wolf would not always consider this to be a cause of damage. Questions related to this subject could be rephrased as: Has the maned wolf ever taken anything that belongs to you/your property (and what was it)? Has the maned wolf ever caused: a) material damage; b) emotional damage, c) etc....

The large majority of rural respondents who had experienced damage to livestock allegedly caused by the maned wolf categorized it as “material in nature”, if so, with no further implications to their emotional wellbeing as has been suggested by research on other predators' attacks (Knight, 2000; Breck, 2004). Information volunteered by respondents of rural questionnaires indicated overall tolerance towards maned wolves' attacks on their chickens, confirming suggestions that livestock keepers do not see it as a threat (Dietz, 1984, Carvalho, 1976, Sillero-Zubiri, Hoffman and Macdonald., 2004). In fact, no-one in the sample who had suffered damage believed the maned wolf should be hunted and most indicated positive attitudes towards the species and its conservation. This contrasts with Kellert's (1985) association between negative perceptions and responsibility for causing damage to human property. However no-one in the general public/students who allegedly had suffered damage, considered the maned wolf to be good. Although numbers were too small to establish the strength of such associations, negative experiences can be predictors of negative attitudes (Kellert *et al.*, 1996) and results suggest scope for more investigation about links between the experience of damage and negative attitudes such as: fear of the maned wolf, lack of care and dislike for it, reluctance to tell family and friends about its need for protection, and beliefs about medicinal properties associated with it.

The effects of experiences related to surplus killings carried out by the maned wolf on livestock, as suggested by Anic (2002), and with the publicity of rare depredation events, were not examined by this research. It would be useful to investigate these effects further as they have the potential to be long-lasting influences on attitudes towards the maned wolf (Mishra, 1997, in Knight, 2000; Hill, 2004) (see Chapter One, 2.4, and Chapter Two, 4.4.).

### **3. Relationship between human occupied landscapes and the maned wolf.**

A surprisingly large percentage (35.8%) of this research's sample (a majority of rural residents, and particularly respondents from the Low Mogiana region, as opposed to São Carlos) had seen the maned wolf live in nature. Results indicate that knowledge, positive attitudes and beliefs about the maned wolf and its conservation tended to be found amongst many urban residents who had seen the maned wolf live in nature, and amongst rural respondents, suggesting that the experience of seeing the maned wolf in its natural environment influences attitudes in a positive way, as suggested by Kellert (1994) and Kvaalen (1998). Although the sample is too small to take assumptions further, results suggest the experience of seeing the maned wolf live on personal property is quite different and is associated with negative attitudes, as suggested by Bangs *et al.* (2005). Secondary sources of information may be conducive to positive attitudes towards the maned wolf amongst rural people, and this association must be further investigated and explored by conservation strategies.

Indeed for most people in this present research's sample, an individual's experience of familiarity with the maned wolf was mediated by another person or media (respondents from Greater São Paulo in particular), and for many it took place in zoos, museums and CUs but significantly less so for the rural population. In respect to media, TV and radio were the most popular sources of information about the maned wolf for both urban and rural people (although significantly less so for this second group). These deserve a great deal of attention from conservation programmes, followed by newspapers, books and magazines. Results suggest schools and environmental education courses did not contribute as much to local people's knowledge of the maned wolf, and were similar to Anic's (2002) findings in relation to local school children in the southeast, indicating there is scope for more development.



Although firsthand experience of a species is the most predictive factor in future behaviour towards that species (Kellert *et al.*, 1986; Fazio, 1990, in Manstead, 1996) this research's data show there were strong associations between the use of a variety of media as information sources about the maned wolf and some variables. The correct choice of the maned wolf's favourite food in nature was made by respondents who heard of the maned wolf from zoos, museums and CU; this was particularly true of people who heard of it from school and environmental education courses. Results suggest these sources of information provided the most accurate and positive facts about the maned wolf and its feeding ecology. A case may be made for further investigation into how to extend these results to a larger audience including how transferable the learning experience provided by zoos, museums, CUs, schools and environmental education courses may be to other media.

On the other hand, most respondents who erroneously had chosen chicken as the maned wolf's favourite food item had heard of the maned wolf from TV and radio, as indeed has most of the minority of respondents who believed in medicinal uses associated with the maned wolf. Results suggest that the circulation of accurate information by these powerful, popular and wide reaching media could benefit conservation programmes and help target problems areas in the relationship between local people and the maned wolf. Cooperation between zoo, CU, education professionals and TV and radio media professionals could produce beneficial outcomes towards maned wolf conservation. As a point of interest, TV and radio provide a one-directional experience, where the audience may be easily distracted by the environment, while the environment and interactive nature of the experience in zoos/museums/CUs and environmental education may be more conducive to learning facts about wildlife.

### **3.1. *The maned wolf's tolerance to impact***

Although there are recent accounts of maned wolves' incursions into cities on local news, no published data has been found on people's tolerance of their presence within urbanized areas. However, the belief that the maned wolf should be protected and not disturbed was indicated by the majority of both urban and rural residents in this research's sample. It is possible that the

presence of maned wolves in urban properties might trigger similar reactions of insecurity and fear as those experienced by rural landowners.

On the other hand, people may impact maned wolf populations within and outside conservation areas by using natural resources within their range, or even by walking their dogs. Use of resources may impact the availability, distribution and variety of food items in the maned wolf's diet. The presence of people and dogs may impact the use of territory, choice of dens, resting and feeding places of maned wolves. The awareness of the way local people may impact indirectly maned wolf populations may need further investigation.

#### **4. Environmental awareness and people in the vicinity of conservation areas**

When respondents were asked about their familiarity with the local zoos and CUs, some confusion in questionnaire replies may have been created by the word “*conhecer*”: in Portuguese “*conhecer*”: could mean both “to know” and “to know of”. Results indicated a difference between what respondents perceive as “knowing” and “being/having been there”. This question could be replaced by two others: have you heard of the existence of the local CU/zoo? Have you ever visited the local CU/zoo?- thus clearing possible misunderstandings.

Policies of exclusion, combined with a lack of awareness about the existence of the local CU, have been known to impair environmental education initiatives that aim to engage people with the local environment and promote conservation as a strategy to improve people's life standards (Padua and Tabanez, 1997; Sorrentino, 1997; Fiori, 2006). Notably, just over 1/3 of the local people in this research knew of the local CU, and amongst those who were aware of it just over 1/3 had been on a school visit. This put CUs ahead of zoos in their engagement with education institutions. Importantly, a majority of bio/education professionals and rural residents were familiar with the local reserve, which should help develop environmental education initiatives aimed at promoting engagement between local people and nature within these CUs. Results indicate this is only a possibility not yet fulfilled for the rural population, as no rural residents had

visited the CU for environmental education purposes, and only a minority had been there as part of a school activity.

#### **4.1. Role of zoos**

Most professionals in this research who worked directly with the maned wolf were employed by zoos. The potential of the zoo as opinion maker is confirmed by the fact that the majority of the local people in this research's sample were familiar with the local zoo, most of whom had visited it, particularly year 8 students. Going to the zoo was less popular amongst rural residents and CU visitors. Contrary to the extent of people's lack of familiarity with the local CU, the zoo in São Carlos (PESC) was known of by over 90% of the local people and about half the people in the Low Mogiana region knew of their local zoo. The animals were the main reason for a visit to the zoo and only a minority of visits were promoted by schools and even less involved environmental education. This suggests a lack of interaction between local schools and zoos, and indicates that their education role could be enhanced.

A majority of the local people in this research, particularly urban residents, had heard about the maned wolf from zoos, museums and CUs, and results suggest they are sources of accurate information. Respondents who heard about the maned wolf from these sources displayed the most positive beliefs (particularly that of the need for protection, rather than the belief in the use of body parts as lucky charms) towards it and towards values related to the importance of wild animals and nature. Paradoxically, they also displayed the highest percentage of neutral attitudes and a lack of conservation awareness. This indicates an opportunity for positive changes in attitudes towards the conservation of the species, which could be explored by the zoo.

Although results were positive overall for people who had experienced contact with the maned wolf through zoos, a considerable percentage of zoo visitors (mainly from São Paulo city) could not identify the maned wolf. This lack of awareness amongst the most urban sample might be linked to the shy and nocturnal nature of the species and its not always being visible, even

within zoo settings. Alternatively, there might be an overall lack of interest in native species (Bizerril and Andrade, 1999; Bestelmeyer, 2000; Anic, 2002).

## ***2.7. Relationships between interest groups: beliefs and feelings of interest groups towards each other***

### ***Introduction***

Attitudes towards the conservation of animal species are also influenced by “people/people” relationships (Knight, 2000). Educators and bio/conservation professionals are often mediators and guardians of people’s relationships with the maned wolf and the quality of their contact with local people may influence, and help to predict behaviours towards the conservation of the species. Denise Taylor (2004) believes education has a key role in the mitigation of conflict between people and wild carnivores; she recognizes a lack of multidisciplinary cooperation between interest groups. She suggests that the key issue is “who needs education, and why?” and she points out that “the general public may need it to develop attitude and behaviour changes in society” as well as “conservationists may need it to foster co-existence” (Taylor, 2004:298). Knowing some key beliefs target groups have about themselves and other target groups, and being aware of the relationships between people and the maned wolf, may be a tool for conservation strategies to address problem areas through educational initiatives.

In order to address research questions 1, 3, 4 and 5 it was necessary to examine the attitudes of bio/education professionals towards local people and vice-versa, as well as the accuracy of professional’s perceptions of local people’s (rural residents in particular) beliefs and attitudes towards the neighbouring conservation area and its wildlife. The aim of this section is to investigate such beliefs, the levels of positive and negative relationships between bio/educational professionals and the rural sample, and how they vary amongst interest groups’ variables by testing for differences amongst them.

## Results

### 2.7.1. Bio/education professionals' beliefs about the general public/students in relation to the maned wolf

General public/students...	Responses	Percentage of respondents who agreed with statement
are against the conservation of the maned wolf	0	0
are not interested in the conservation of the maned wolf	32	22.4
know nothing/close to nothing about the maned wolf	97	67.8
have a good knowledge about the maned wolf	15	10.5
want to protect the maned wolf	53	37.1
felt sympathy for the maned wolf	53	37.1
<b>Total (respondents=143)</b>	250	

Table 2.7.1. Q3 Bio/education professionals' beliefs about general public/students in relation to maned wolf.

A majority (67.8%, n=97) of bio/education professionals believed local people knew little or nothing about the maned wolf and 37.1% believed people felt sympathy for and wanted to protect the maned wolf (table 2.7.1.). None of the respondents believed they were against the maned wolf's conservation, however 22.4% (n=32) believed in people's general disinterest in the conservation of the maned wolf. Only 10.5% (n=15) believed people actually have a good knowledge about the species.

A majority of respondents from São Carlos (54.1%, n=13) believed local people wanted to protect the maned wolf, as opposed to a minority of respondents in other research locations. (table 2.7.1a., p 336). There was strong statistical evidence of a positive association between the belief that local people *want to protect the maned wolf* and rural residence (n=10, N=137  $\chi^2=6.2$ ; df=1; p=0.012). A majority of respondents in urban occupations believed in local people's will to protect the maned wolf (61.9%, n=13) and had sympathy (57.1%, n=12) for it when (table 2.7.1a., p 336), compared with a minority of skilled professionals in bio/education occupations and students.

### 2.7.2. Bio/education Professionals' beliefs

Beliefs about bio/education professionals, maned wolf conflict and local people	Responses	Percentage of respondents who agreed with statement
Biologist/educator is an authority who practices an objective and impartial science	16	11.2
Biologist/educator is a professional with personal points of view	42	29.4
Need to concentrate efforts on co-existence between people and maned wolf to guarantee future of species	107	74.8
Conflicts with people causes mortality amongst maned wolves	59	41.3
Conflicts with maned wolves cause material damage to rural people	15	10.5
Maned wolves need to be protected from people	47	32.95
Programmes to decrease conflict must consider all parts involved	78	54.5
Captive breeding maned wolves could meet demands for body parts	3	2.1
Maned wolves are dangerous and may attack people in the wild/countryside	2	1.4
Conservationists/educators can alienate the public/students	17	11.9
Conservation/e education programmes are not well accepted by the local people	9	6.3
<b>Total (respondents=143)</b>	<b>395</b>	

**Table 2.7.2. Q3 Bio/education professional's beliefs about themselves and the conflict between maned wolf and local people**

Most bio-education respondents (74.8%, n=107) believed in the need to foster co-existence between local people and the maned wolf as part of species conservation efforts and (54.5%, n=78) believed that all parts involved in the conflict must be considered (table 2.7.2.).

Many respondents believed conflict between maned wolf and people results in death to the maned wolf (41.3%, n=59) and a smaller percentage believed it results in damage to rural people (10.5%, n=15). In addition, 32.9% (n=47) of respondents believed maned wolves need protection from people.

Although 11.2% (n=16) of respondents believed the *biologist/educator is an authority who practices an objective and impartial science*, 29.4% (n=42) believed the *biologist/educator is a professional with personal points of view*.

The least popular statements were mostly related to subjects that might be of concern to local people: *maned wolves are dangerous and may attack people in the wild/countryside* (1.4%, n=2); *captive breeding maned wolves could meet demands for body parts* (2.1%, n=3); *conservationists/educators can alienate the public/students* (11.9%, n=17). However only 6.3% (n=9) believed *conservation/environmental education programmes are not well accepted by the local people*.

There was no evidence of an association between urban/rural residence and the above beliefs, however there was reasonably strong statistical evidence of an association between these and other characteristics of the respondents. A majority of respondents in urban occupations (61.9%, n=13) (labourers?) believed *maned wolves need to be protected from people*, as well as disproportionately many respondents educated up to sixth-form (75%, n=12, N=139,  $\chi^2=23$ ; df=2;  $p<0.001$ ).

### **2.7.3. Bio/education professionals' beliefs about education initiatives**

The great majority of respondents (97.2%, n=139) believed *educational initiatives must target the community*; most believed (81.1%, n=116) they *must target biologists/educators*, and *politicians* (72.7%, n= 104). Only 2.8% (n=4) did not believe in the success of education initiatives as conservation tools (table 2.7.3., p 337).

There was no evidence of a strong association with urban/rural residence and target groups, research areas or socio-demographic variables.

### **2.7.4. Beliefs about the relationship between conservation programmes and local people**

Most bio/education professional respondents believed that positive relationships between conservation programmes and local people were the result of educational activities bringing

together programmes and the local school/community (74.8%, n=107); improvements in local people's education (65%, n=93); appropriate training of biologists/educators (63.6%, n=91); and social/cultural activities programmed to bring together professionals and locals (63.6%, n=91). Respondents may have been divided in their viewpoints about including local people in the management programme for the maned wolf (58%, n=83) and about professionals taking part in conflict resolution between local people and the maned wolf. There was doubt that these initiatives would contribute to positive relationships between conservation programmes and local people (50.3%, n=72) (Table 2.7.4.).

Which of the following initiatives contribute to positive relationships between conservation programmes and local people?	Responses	Percentage of respondents who agreed with statement
Appropriate training of biologists/educators contribute to positive relationship with local people	91	63.6
More effort from educators/biologists	55	38.5
Improvements in local people's education	93	65
Improvements in local people's standards of living	38	26.6
Professionals taking part in conflict resolution between local people and maned wolf	72	50.3
Including local people in the management programme for the maned wolf	83	58
More respect and receptivity from local people	37	25.9
Social/cultural activities organised by programme to bring together professionals and locals	91	63.6
Programme professionals taking part in social/cultural activities organised by locals	56	39.2
Educational activities bringing together programme and local school/community	107	74.8
<b>Total (143 respondents)</b>	<b>723</b>	

**Table 2.7.4. Q3 Bio/education professional's beliefs about the relationship between conservation programmes and local people**

Smaller percentages of respondents believed that *programme professionals taking part in social/cultural activities organised by locals* (39.2%, n=56); *more effort from educators/biologists* (38.5%, n=55); *improvements in local people's standards of living* (26.6%, n=38); and *more respect and receptivity from local people* (25.9%, n=37) contributed to positive relationships between conservation programmes and the local community.

There was no evidence of an association between the variables and urban/rural residence. A majority of the Low Mogiana region professionals (57.8%, n=26) believed *programme*



*professionals taking part in social/cultural activities organised by locals* contribute to positive relationships between conservation programmes and local people, compared to a minority of professionals from other research locations.

### **2.7.5. Bio/education professionals' beliefs about the involvement of local people in maned wolf conservation.**

Most (60.8%, n=87) bio/education professional respondents believed that involving local people in the conservation of the maned wolf *helps raise support and money for conservation* (table 2.7.5.). However, most responses suggest an array of obstacles to such an involvement (75%, n=285).

<b>In your opinion, involving local people in the conservation of the maned wolf:</b>	<b>Responses</b>	<b>Percentage of respondents who agreed with statement</b>
helps raise support and money for conservation	87	60.8
has no obstacles	8	5.6
is not necessary	0	0
faces lack of receptivity, interest and respect from local people	56	39.2
is difficult due to bureaucracy	66	46.2
is difficult due to lack of time and money	24	16.8
is difficult due to lack of education and standards of living in local people	44	30.8
is difficult due to lack of preparation and interest of teachers	34	23.8
is difficult due to lack of flexibility in the school year planning/schedule and lack of autonomy/support for teachers	28	19.6
is difficult due to lack of cooperation between biologists, educators and other professionals	33	23.1
<b>Total (respondents=143)</b>	<b>380</b>	

**Table 2.7.5. Q3 Bio/education professionals' beliefs about the involvement of local people in maned wolf conservation**

In decreasing percentages, many respondents believed that involving local people in the conservation of the maned wolf faced difficulties such as (46.2%, n=66) *bureaucracy*; (39.2%, n=56) *lack of receptivity, interest and respect from local people*; (30.8%, n=44) *lack of education and low standards of living of local people*; (23.8%, n=34) *lack of preparation and interest of teachers*; (23.1%, n=33) and *lack of cooperation between biologists, educators and other professionals*. Smaller percentages believed in obstacles such as (19.6%, n=28) *lack of*

*flexibility in the school year planning/schedule and lack of autonomy/support for teachers; and (16.8%, n=24) lack of time and money.* Only 5.6% (n=8) could see no obstacle in involving local people in the conservation of the maned wolf, but none of the respondents believed there was no need to involve local people.

A majority of zoo professionals (54%, n=34) believed *lack of receptivity, interest and respect from local people* were the main obstacles to local people becoming involved in maned wolf conservation in contrast to all other groups. There was no evidence of associations between variables and urban/rural residence, however there was reasonably strong statistical evidence of an association between such beliefs and research locations. Few respondents from the Low Mogiana region (n=4, N=140,  $\chi^2=8.9$ ; df=3;  $p=0.030$ ) believed that *lack of preparation and interest of teachers* was an obstacle. Many respondents from São Carlos (n=11, N=140,  $\chi^2=10.2$ ; df=3;  $p=0.017$ ) however, believed the obstacle was a *lack of cooperation between biologists, educators and other professionals*.

#### **2.7.5.1. By experience working with the maned wolf**

Disproportionately few (n=7, N=136,  $\chi^2= 12$ ;  $p=0.002$ ) respondents who did not work with the maned wolf believed *involving local people in the conservation of the maned wolf faces lack of receptivity, interest and respect from local people*.

#### **2.7.6. Bio/education professionals' and rural respondents' beliefs about each other and the local CU**

There was no evidence of differences between the responses of urban and rural residents within the bio/education professionals' sample. Bio/education professionals were divided about the belief that the local community considers the reserve an important place to protect nature (52.4%), as compared to the large majority of the rural respondents (98.1%, n=53) whose stated

belief was that *the reserve is important to protect nature*. Also 79.6% of local people believed the CU provides good living standards for the wild animals and plants (table 2.7.6.).

Bio/education professionals/local people positive beliefs	Bio/education professionals who agreed with statement (N= 143)	Rural respondents who agreed with statement (N=54)
Community says the reserve is important to protect nature/ The reserve is important to protect nature	75 (52.4%)	53 (98.1%)
the wild animals and plants have good living conditions in the reserve		43 (79.6%)
Local people show respect for reserve and its professionals	48 (33.5%)	
the reserve and its workers help the local people		27 (50%)
people who work in the reserve know much about wildlife		18 (33.3%)
Local community uses reserve for leisure/ The reserve is a good place to visit	79 (55.2%)	48 (88.9%)
the reserve is a beautiful place		47 (87%)
Some animals from reserve cause damage to neighbouring people/ The animals from the reserve cause damage to our property	15 (10.5%)	2 (3.7%)
Plants and animals of reserve are valuable to local people/ the animals and plants in the reserve are useful to us	37 (25.9%)	40 (74%)
Neighbouring people demonstrate an interest in taking part in reserve management/ local people should take part in the management of the reserve	24 (16.8%)	38 (70.4%)
Reserve creates jobs for local people	53 (37%)	
Reserve brought improvements to local community	40 (28%)	
Local people call upon the reserve to resolve problems with wild animals	42 (29.3%)	23 (42.5%)
Reserve workers assist local people who have problems with wild animals	37 (25.9%)	29 (53.7%)
Reserve workers try to reduce/resolve conflicts between local people and wild animals	43 (30%)	21 (38.9%)
<b>Total positive beliefs</b>	<b>493</b>	<b>389</b>
<b>Professionals/local people negative beliefs</b>		
Local people promote illegal use of reserve resources	26 (18.2%)	
the animals and plants in the reserve are useful to us		40 (74%)
Local community doesn't take part in anything promoted by reserve/ nothing done by the reserve interests me	9 (6.2%)	4 (7.4%)
Local people show dislike for the people from reserve	3 (2.1%)	
we would not miss the reserve if it didn't exist		8 (14.8%)
it would be better to replace the reserve with plantations and livestock		7 (12.9%)
the reserve is controlled by city politicians		5 (9.2%)
Local people say reserve has not brought benefits to community/ the reserve does not benefit local people	9 (6.2%)	3 (5.5%)
<b>Total negative beliefs</b>	<b>47</b>	<b>27</b>
<b>Total</b>	<b>540</b>	<b>416</b>

Table 2.7.6. Bio/education professionals' and rural respondents' positive and negative beliefs about each other and the local CU

Bio/education professionals were also divided about the belief *local community uses reserve for leisure* (55.2%), while 88.9% of the rural respondents stated *the reserve is a good place to visit*, and 87% believed *the reserve is a beautiful place*.

While 10.5% of professionals believed *some animals from reserve cause damage to the neighbouring people*, only 3.7% of the rural respondents indicated damage caused by reserve animals to their property.

Only 25.9% of professionals believed *plants and animals of reserve are valuable to local people*, while 74% of the rural respondents found the animals and plants in the reserve useful to them.

Professionals also highly underestimated local people's interest in *taking part in reserve management* (16.8%), which was stated by 70.4% of the rural respondents.

Research showed that 33.5% of professionals thought local people are respectful of the reserve and its professionals, compared to 50% of the rural respondents who found the reserve and its workers helpful to the local people; 33.3% of the rural respondents also believed *people who work in the reserve know much about wildlife*, whilst 29.3% of professionals believed *local people called upon the reserve to resolve problems with wild animals*, compared to 42.5% of rural respondents. In addition, 25.9% of professionals believed *reserve workers assist local people who have problems with wild animals*, compared to 53.7% of rural respondents; and 30% of professionals believed *reserve workers try to reduce/resolve conflicts between local people and wild animals*, compared to 38.9% of rural respondents.

Overall, both bio/education professionals and local people displayed predominantly positive beliefs about each other and the CU, however professionals seemed to be conservative in relation to the scope of positive attitudes they expected from the local people, when their answers were compared to rural respondents' attitudes.

A minority (18.2%) of professionals believed *local people promote illegal use of reserve resources*, whereas a majority (74%) of local people stated the usefulness of animals and plants from the reserve: due to the sensitive nature of asking people about their use of the natural resources within the reserve, the question was phrased very generally.

A minority of both groups (6.2% of professionals; 7.4% of rural respondents) stated a lack of participation of the local community in activities promoted by the reserve. Again only 6.2% of professionals and 5.5% of rural respondents indicated that local people do not believe the reserve had brought them benefits. Rural respondents' attitudes about both issues seem to mirror professionals' expectations, which were mostly positive.

Whilst 37% of professionals believed the *reserve creates jobs for local people*; 28% believed the *reserve brought improvements to local community* whereas only 2.1% of professionals stated *local people show dislike for the people from the reserve*. A slightly higher percentage of rural respondents stated negative attitudes regarding the existence of the reserve: 14.8% stated they would not miss the reserve if it didn't exist; and 12.9% stated it would be better to replace the reserve with plantations and livestock. The discrepancy in the results may indicate that rural respondents have a different view about the role of the reserve and the sort of benefits it brings to the community when compared with the views expressed by bio/education professionals.

A small number (9.2%) of rural respondents believed *the reserve is controlled by city politicians* and such belief relates to the fact that the reserves are managed by the state (São Carlos University is a federal institution, and the reserve in Mogi is managed by the São Paulo state government).

There was strong statistical evidence of associations between beliefs and some characteristics of the respondents. Amongst bio/education professionals, disproportionately many CU professionals ( $n=13$ ,  $N=125$ ,  $\chi^2= 13.4$ ;  $df=3$ ;  $p=0.004$ ) believed *local people promote illegal use of reserve resources* (table 2.7.6a., p 337). Only a small minority of bio/education professionals from Greater São Paulo agree that local people consider the reserve important to protect nature

( $n=3$ ,  $N=125$ ,  $\chi^2=9.7$ ;  $df=3$ ;  $p=0.021$ ) when compared to a majority of respondents of all other research locations. No bio/education professionals from Greater São Paulo believed that *local people show respect for the reserve and for its professionals* ( $N=125$ ,  $\chi^2=17$ ;  $df=3$ ;  $p=0.001$ ), and considering the low numbers, none believed *local people call upon the reserve to resolve problems with wild animals* ( $N=125$ ,  $\chi^2=9$ ;  $df=3$ ;  $p=0.029$ ). A majority of respondents aged 51 and over (54.5%,  $n=6$ ) believe *local people are interested in participating in reserve management*, compared to a minority of other age groups. A majority of respondents with urban occupations (52.4%,  $n=11$ ) believed the *plants and animals of reserve are valuable to local people*.

A majority of rural respondents from the Low Mogiana region (72.4%,  $n=21$ ) as opposed to a minority of respondents from São Carlos (24%,  $n=6$ ) believed *the reserve and its workers help the local people* (table 2.7.6a, p 337), that local people call upon the reserve to resolve problems with wild animals (51.7% and 32% respectively), and are assisted by reserve workers (75.9%, and 28% respectively). Many rural respondents from the Low Mogiana region (65.5%,  $n=19$ ) and few from São Carlos (8%,  $n=2$ ,  $N=54$ ,  $\chi^2=18.7$ ;  $df=1$ ;  $p<0.001$ ) believed *reserve workers try to reduce/resolve conflicts between local people and wild animals* (table 2.7.6a, p 337)

### **2.7.7. Rural respondents' beliefs about CU workers in relation to local issues**

Rural respondents were asked to tick the space that best represented their opinion about the importance reserve workers placed on three different issues concerning local people and the local reserve, on a 7 points scale (1-3=*indifferent*, 4- *neither*, 5-7=*much importance*). 37% ( $n=20$ ) of respondents believed *reserve workers place much importance on damages to local residents that might be caused by wildlife and on problems faced by the local community*, 9.3% ( $n=5$ ) believed they were *indifferent*, 9.3% believed they were *neither*, and 44.4% ( $n=24$ ) did not answer the question because of lack of information and lack of contact with the reserve workers (table 2.7.7., p 338). However, 37% of respondents believed *reserve workers place much importance on cultural traditions and what goes on in the local community*, 9.3 % ( $n=5$ ) believed they are *indifferent*, 5.6% ( $n=3$ ) believed they are *neither*, and 48.1% ( $n=26$ ) did not answer.

A majority of rural respondents from the Low Mogiana region (62.1%, n=18) and a small minority respondents from São Carlos (8%, n=2) believed *reserve workers place much importance on damages to local residents that might be caused by wildlife* (table 2.7.7a., p 338); *on problems faced by the local community* (62.1%, n=18 and 8%, n=2, respectively) and *on cultural traditions and what goes on in the local community* (65.5%, n=19 and 4%, n=1, respectively). A few respondents from the Low Mogiana region and many from São Carlos did not answer any of these three questions.

The fact that fewer respondents knew the local CU in São Carlos, compared to the Low Mogiana region, had an impact on the lack of answers to the above questions. In São Carlos, to people who did not know it, the reserve was described as part of the UFSCar. To answer the above questions São Carlos' respondents reflected about the existence of a local reserve of Cerrado, and also about the existence of PESC and relationships between PESC staff and local people.

#### **2.7.8. Positive people relationship (*pr*) score**

For bio/education professionals, different scores were devised to consider respondents who were not in contact with a nearby CU: in the first score all research locations were included, and the question addressing beliefs about local people's relationship with their local CU was excluded from the count (-Q3q9, see Appendix I); in the second score respondents from São Paulo Zoo were excluded, since they had no contact with the CU.

Scores (-Q3q9) had 32 points and were divided into three categories: (0-9) low; (10-20) moderate; and (21-31) high positive *pr* score. Most respondents scored a moderate *pr* score and no respondents scored low (bar chart 2.7.8a, p 339, table 2.7.8a., p 338).

Scores (+Q3q9→ excluding SP zoo respondents) had 40 points and were divided into three categories: (0-13) low; (14-26) moderate; and (27-40) high positive *pr* score. Most respondents scored a moderate *pr* score and no respondents scored low (table 2.7.8b., p 339).

Tests of Between-Subjects Effects indicate a significantly strong ( $p=0.003$ ) association between positive *pr* in these groups and research locations. Tukey and Bonferroni tests (followed by Tukey *post-hoc*) indicate positive *pr* is significantly higher in the Low Mogiana region ( $M=25.18$ , 95%) when compared with Greater São Paulo ( $M=20.23$ , 95%,  $p=0.002$ ).

No evidence of strong associations between socio-demographic variables and positive relationships with local people was found in this sample.

Rural respondents' scores had 11 points and were divided into (0-3) low positive *pr* score, (4-7) moderate, and (8-11) high. 40.7% ( $n=22$ ) of respondents scored moderate in positive *pr* score, 31.5% ( $n=17$ ) scored low, and 27.8% scored high ( $n=22$ ), mean is at the top end of low, median and mode are moderate (bar chart 2.7.8c, p 340 and table 2.7.8c., p 339).

However there was statistically strong evidence that results for rural respondents varied with research location. Most respondents from the Low Mogiana region (51.7%,  $n=15$ ) displayed a very positive relationship with bio/education professionals and CU staff while most respondents from São Carlos (60%,  $n=15$ ,  $N=54$ ,  $\chi^2= 24.5$ ;  $df=2$ ;  $p<0.001$ ) displayed a low level of positive *pr* (table 2.7.8d, p 340).

### 2.7.8.1. By Conservation score

There was strong statistical evidence ( $N=140$ ,  $\chi^2=22.5$ ;  $df=2$ ;  $p<0.001$ ) of a positive association between high positive *pr* and high positive conservation scores amongst bio/education professionals.



### 2.7.9. Negative people relationship score

Rural respondents' negative *pr* Scores had 11 points and were divided into (0-3) low negative *pr* score, (4-7) moderate, and (8-11) high. Most respondents (51.9%) scored moderate, 46.3% (n=25) scored low, 1.9% (n=1) scored high, and were regrouped into low (0-5) and high (6-11) for statistical analysis (table 2.7.9.Q4, p 341).

The majority of respondents from São Carlos (80%, n=20) scored a moderate negative *pr* while 68.9% of respondents from Low Mogiana region scored low (table 2.7.9a.Q4., p 341).

### 2.7.10. Summary of findings

Aspect	Result	Chi squared Statistics Bonferroni correction = 0.005  *not significant when Bonferroni correction is applied
<b>Bio/education professionals' beliefs about the general public/students in relation to the mw</b>		
Local people are against the maned wolf's conservation	No bio/education respondents had such belief	
<b>Bio/education Professionals' beliefs</b>		
mw needs to be protected from people	Up to sixth-form education > other education groups	23; df=2; p<0.001
<b>Bio/education professionals' beliefs about education initiatives</b>	No difference between socio-demographic variables	
<b>Beliefs about the relationship between conservation programmes and local people</b>	No difference between urban/rural residents	
<i>Bio/education professionals' beliefs about the involvement of local people in maned wolf conservation.</i>	No differences between urban/rural residents	
<i>lack of preparation and interest of teachers</i>	Low Mogiana region respondents < other research locations	8.9; df=3; p=0.030*
<i>lack of cooperation between biologists, educators and other professionals</i>	São Carlos respondents > other research locations	10.2; df=3; p=0.017*
<i>involving local people in the conservation of the maned wolf faces lack of receptivity, interest and respect from local people</i>	Respondents who did not work with maned wolf < respondents who did (direct or indirectly)	12; df=2; p=0.002

Aspect	Result	Chi squared Statistics Bonferroni correction = 0.005  *not significant when Bonferroni correction is applied
<b>Bio/education professionals' and rural respondents' beliefs about each other and the local CU</b>	No differences between urban and rural residents	
<i>local people promote illegal use of reserve resources</i>	CU professionals > other target groups	13.4; df=3; $p=0.004$
<i>the community says the reserve is important for nature conservation</i>	Bio/education professionals from Greater São Paulo < other research locations	.7; df=3; $p=0.021^*$
<i>local people show respect for reserve and its professionals</i>	No bio/education respondents from Greater São Paulo	17, df=3, $p=0.001$
<i>local people call upon the reserve to resolve problems with wild animals</i>	No bio/education respondents from Greater São Paulo	9, df=3, $p=0.029^*$
<i>reserve workers try to reduce/resolve conflicts between local people and wild animals</i>	Rural residents from Low Mogiana region > São Carlos	18.7; df=1; $p<0.001$
<b>Positive people relationship score</b>	Q3 No difference between socio-demographic variables	
High	Q3 mean Low Mogiana > mean Greater São Paulo Q4 Rural respondents from Low Mogiana region > São Carlos respondents	$p=0.002$ 24.5; df=2; $p<0.001$
	Q3 High positive conservation score	<0.001
Low	Rural respondents from São Carlos > Low Mogiana region respondents	24.5; df=2; $p<0.001$

Table 2.7.10. Summary of results for the Question Category Relationships between target groups

### Discussion

Clark *et al.* (2001) suggest the problem-solver's perspective in relation to that problem needs to be recognized in order to avoid unconscious bias. They also suggest that understanding the social context of the conservation problem is central to being able to address it and to the finding of a permanent solution. It is essential to know the professionals' beliefs about the importance of the social context and about their own role in respect to the relationship between local people and the maned wolf so that problems in this area may be addressed by conservation strategies.

### **1. *The involvement of local people in conservation units***

It is widely believed that the long term survival of large canids, such as the maned wolf, depends on the inclusion of local people in conservation policies, advocated in Chapter Two (4.1.). It is to be noted that the Brazilian government environmental office had recently at the time of this study established the inclusion of local people in the conservation of natural resources (biomes, species) as a priority (IBAMA, MMA 2004); this directive has been integrated into the action plans for local conservation areas. The extent of the government commitment to the implementation of this directive is yet to be seen, as public consultations about local people's prospective involvement with the CUs were taking place at the time of the field research (personal communications, 2007). Possibly as a result of not yet having had the chance to access local people's opinions at this time, CU and bio/education professionals in general greatly underestimated the interest of local people in taking part in reserve management.

Bio/education professionals were divided in their opinions about the inclusion of local people contributing to positive relationships with conservation programmes in maned wolf conservation, and about the benefit to their long term conservation initiatives of their long term support. The pivotal role of public support in the long-term effectiveness of conservation initiatives has been advocated by many authors (Well and Brandon, 1992, in Rocha, 1997; Weber and Rabinowitz, 1996; Fascione, Delach and Smith, 2004). Overall, most professionals in the sample believed that the general public/students must be involved in conservation initiatives for the maned wolf and other wild animals, and most believed such inclusion would help raise support and money for conservation. This may indicate readiness to engage in the development and application of such initiatives. Nevertheless many professionals believed local involvement would be riddled with obstacles related to organization, receptivity of local people, the education system, and cooperation between professionals. Bio/education professionals in this research suggested that low educational levels, and lack of preparation, interest and cooperation on the part of the bio/education professionals themselves are obstacles to local people becoming involved in maned wolf conservation. Further investigation should explore how to make improvement to these areas, and how to include maned wolf conservation in the school calendar, bearing in mind curricular constraints. As suggested by Miranda (2003, see Chapter Two, 4.1.)

bio/education professionals agreed that such obstacles to the dissemination of conservation minded initiatives are a result of lack of funding for scientific development combined with urgent basic needs of the local population. Such realization may suggest that conservation programmes for the maned wolf will only be able to recruit the support and participation of bio/education professionals if the above mentioned obstacles of funds and bureaucracy can be addressed first.

Some authors suggest that attempts to import models of conservation strategies, which are inadequate to the local socio-cultural reality (Diegues, 2000, Miranda, 2003), may also create obstacles that would result in the alienation of local people from conservation initiatives. Indeed many bio/education professionals in this research sample were aware of the negative aspects of their relationship with local people, suggesting a lack of their respect and receptivity (particularly professionals working with the maned wolf), and, on a smaller scale a lack of interest in maned wolf conservation: some believed conservationists and educators can alienate local people. However most did not believe conservation and education programmes were not well accepted by locals. Some conservation and education professionals did not see themselves as authority figures practising an objective and impartial science, a position that can often put up barriers and result in alienation. Additionally, a majority believed in the need for professional improvements through better training, thereby indicating an openness to change that might facilitate the implementation of initiatives aimed at fostering co-existence and increasing support for maned wolf conservation.

Although bio/education professionals in this research may have overly negative expectations of local people's attitudes towards CUs and protected wildlife there is a consensus amongst them about the value of long term public support to conservation, as suggested by Rocha (1997). In the literature, environmental education is often cited as the main tool in overcoming the alleged barriers between conservation units and local people (see Chapter Two, 4.8.; Rocha, 1997). Indeed, most bio/education professionals in this research sample believed the key to a positive relationship between conservation programmes and local people is, above all, to be found in education but they were divided as to the importance of socio-cultural integration. Cultural values were considered important in the conservation of the maned wolf and wild animals by over half this research's sample, while bio/education professional groups were divided about the

importance of changes in culture in general for the long-term success of the conservation of the maned wolf (most from International Paper agreed, as opposed to a minority of school and CU professionals and students). It has been suggested that an understanding of local people's perceptions of the environment and conservation is necessary to address the relationship between such groups and natural resources (Rocha, 1997; Fiori, 2006). The apparent discrepancy between the importance attributed by bio/education professionals to education and to cultural values deserves attention, since the understanding of local people's cultural values and attitudes is essential for the effectiveness of any attempts to change behaviours through education (see Chapter One, 2.11.).

Bio/education professionals also indicated concerns about mitigation of conflict between local people and the maned wolf, as suggested by Fascione, Delach and Smith (2004). The majority of the sample believed the co-existence between local people and the maned wolf is essential to guarantee the future of the species (as in Weber and Rabinowitz, 1996) but they were divided over the importance of giving consideration to all parts involved and any benefits mitigation may bring to the relationship between local people and conservation programmes. Mitigation issues will be discussed later in Chapter Five, section 5.1.2..

The belief of Costa *et al.* (2005) that reserves are vulnerable to poaching, human settlement and logging was reinforced by personal communications from CU professionals, in varied orders of priority. Although a minority of bio/education professionals agreed with this statement, the view of a significant number of CU professionals in this research's sample was that local people promote illegal use of reserve resources: this may also derive from familiarity with lifelong traditions associated with the *caipira* culture and with small landholders (*sitiantes*). Additionally a large number of urban occupation professionals (working force) believed local people found the plants and animals of the reserve valuable. Indeed a majority of the rural respondents found animals and plants of the reserve useful to them. The use of wild animals and plants as supplements to subsistence plantations and livestock acquired by hunting, fishing and gathering is part of the *caipira* culture that was prevalent in inland São Paulo state until mid 20<sup>th</sup> century (see Chapter Two, section 3, Arruda, 2000; Candido, 2001). Any use of natural resources within protected areas, which may be attributed to local people, promotes conflict between them and CU professionals. However such practices, together with their sustainable potential, should

be investigated since they might help to improve biodiversity in the long-term (Gomez-Pompa and Kaus, 1992; Colchester, 2000; Diegues, 2000; Guha, 2000). In the past, the indigenous heritage of rural people of the southeast was reflected in the “low impact” and sustainable way they related to the environment (Arruda, 2000; Candido, 2001) and in their knowledge of plants and animals. There are some records of the detailed knowledge that indigenous groups had about the maned wolf, which was also handed down in their traditional tales (see Chapter Two, 4.2.). Investigation of traditional knowledge of indigenous plants and animals may help programmes for the natural reforestation of degraded areas in the research locations, or might unlock the economic potential of some species, and may be one tool to bring together reserve professionals and local people.

Most rural respondents also displayed positive attitudes towards the local CU and the wildlife within it thus acknowledging the importance of the CU to protect nature, and considering it a beautiful place, pleasant to visit, where animals and plants live in good conditions. This suggests values about nature protection that might affect their perception of the maned wolf positively, as suggested by Kellert *et al.* (1996). However, the sample of bio/education professionals was cautious in its expectations of local people’s knowledge and positive attitudes towards the reserve and natural resources. Here they showed misconceptions about local people’s attitudes towards nature. The bio/education professionals of Greater São Paulo in particular tended to have lower opinions of the way local people see the protected areas and their professionals. Literature also indicates the beliefs of education professionals that local people in the vicinity of protected areas lack awareness about their importance, do not support it and do not take part in its management (Rocha, 1997). Such beliefs from bio/education professionals may need to be improved to better their contact with local people for conservation purposes.

## **2. The maned wolf in respect to local people’s livelihood**

It has been suggested that the establishment of protected areas and the prohibition of hunting and fishing may contribute to an increase in wildlife population (Messmer, 2000) and to a decrease in local people’s access to supplementary food sources and control over resources.

Where farmers are not allowed to take action against problems with wildlife, expectations may arise about governmental control and prevention of damage and conflict caused by wildlife (Hill, 2004). Such feelings are often at the root cause of people-wildlife conflict (Knight, 2000), therefore CU professionals' initiatives to establish a healthy relationship with local people and to attend and support neighbouring people's needs play an important role in conflict mitigation. Data from this research's rural sample indicated the best level of relationship between local people and bio/education professionals and CU staff was found in the Low Mogiana region. Here rural people considered reserve workers as knowledgeable, helpful, responsive and involved in resolving problems associated with wildlife and, additionally, interested in the local community while most believed the reserve brought benefits. High scores were also found amongst the most conservation minded of the bio/education professionals, suggesting a link between conservation mindedness and the establishment of positive relationships with local people in the present sample.

### ***3. Environmental awareness and people in the vicinity of conservation areas***

The great majority of CU professionals displayed only moderately positive attitudes towards local people. This, combined with lifelong policies of the exclusion of local people from conservation areas, may contribute to their lack of commitment to engage the rural population in environmental education activities within reserves. This needs to be addressed. Perhaps too, environmental education activities offered by reserves are not directed towards the rural public effectively; such an issue also deserves attention.

In this research, bio/education professionals' emphasis on education as a tool to improve knowledge alone is reflected on the fact that only a minority of school and CU professionals believed changes in culture and attitudes are necessary for the long term conservation of the maned wolf (bearing in mind the low expectations bio/education professionals displayed in relation to local people's knowledge and attitudes towards maned wolf conservation). Although the two groups represent the opposite extremes of bio/education professionals in terms of the quality of their relationships with local people, still only up to 1/3 of school professionals displayed the highest degree of positive relationships. The present sample indicated that,

school professionals believe that biologists and educators are authorities who practise an objective and impartial science: this may need to be targeted for change to avoid the dangers of alienating local people, as suggested by Taylor (2004). This indicates that changes in the attitudes of both CU and school professionals' groups could benefit conservation. The way to address the necessary changes is also indicated by the sample: most bio/professionals believed in education as a primary tool to bring local people and conservation professionals together and that these education initiatives must target the community as well as biologists and educators (as suggested by Taylor, 2004).

The findings of this research support previous indications of lack of awareness of the local human dimension in environmental education programmes, suggesting they could also benefit from the involvement of diverse local groups from the neighbourhood of conservation areas when developing plan directives and identifying local needs (Almeida, 1997; Castilhos, Alves and Silva, 1997; Dietz and Nagagata, 1997; Indrusiak and Padua, 1997; Padua and Padua, 1997; Macdonald and Sillero-Zubiri, 2002; Boitani, Asa and Moehrensclager, 2004), in the same way that reserve management would. Inclusion of local people's beliefs, values and general culture should favour communication between them and the education professionals, rather than indoctrination on the part of educators (Taylor, 2004). In this way changes in behaviour and awareness of issues about maned wolf conservation may arise from a process of information, reflection and critical thinking, combined with a feeling of ownership and empowerment over such issues (Hungerford and Volk, 1990; Taylor, 2004). As has been mentioned previously, educators and conservation biologists must use the contact with traditional people as an opportunity to learn about the natural environment and about the way the people have traditionally (and sustainably) related to it, thereby emphasizing reciprocity and cooperation in the nature of their relationship<sup>7</sup> (Diegues, 2000; Pimbert and Pretty, 2000). Such practices of understanding local people's behaviour and inclusion are recommended for the improvement of relationships between interest groups for the benefit of the maned wolf's conservation in the research sites.

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<sup>7</sup> As stated by Pimbert and Pretty (2000:201): "People within and around protected areas shouldn't be seen as simple informants, but rather as teachers, activists, (...) evaluators. The local specialists encompass forest guards, vets, herbalists, extractivists, pastoralists, fisherman, etc..."



This research showed that an interdisciplinary approach to conservation was supported by a slight majority of urban residents and by the best educated but was not supported by most of the bio/education professionals; only a minority were concerned with a lack of cooperation between biologists, educators and other professionals. Bio/education professionals in this research's sample valued improvements in the local education and training of professionals, as well as social cultural activities as effective ways to bring together conservation programmes and the local community. Improvements in local people's life standards, however, were not considered by most as an important factor mediating local people's relationship with conservation programmes. Investing in an association between local people's support and participation in conservation and a quest for the improvement of their standards of living, as suggested by Padua and Tabanez (1997), may benefit the effectiveness of local conservation programmes when involving local people in the conservation of the maned wolf.

### **3.1. *The role of Zoos***

Most zoo professionals displayed the same overall moderate levels of positive relationships with local people, independent of location, suggesting there is space for improvement in their attitudes towards the general public. The closeness between zoo professionals and maned wolves should be a great asset for environmental education strategies, providing accurate, conservation minded information and personal experiences to mediate the public's experience of the maned wolf. However, in this sample, the human dimension of such contact may need to be addressed to improve professionals' relationship with local people.

### **4. *Local people and support for the conservation of the maned wolf***

It has been suggested that conservation strategies for the maned wolf ought to incorporate a network of protected areas, multiple-use lands or areas sometimes populated by a large number of people (see Chapter One, 2.7.; Boitani *et al.*, 2004; Michelle *et al.*, 2005). Research indicates that the impact of human action pose a threat to the maned wolf not only directly by

causing mortality, but also indirectly by reducing genetic variability of maned wolf populations (Rodrigues, 2002) and by reducing natural resources following loss and fragmentation of habitat. However only 1/3 of bio/education professionals in this research's sample (particularly respondents educated up to sixth-form) believed maned wolves need to be protected from people: this is not consistent with their overall expectations and attitudes towards local people in relation to maned wolf conservation. Such a percentage suggests that a majority of bio/educators in this sample are not committed to maned wolf conservation, or may lack information on factors affecting it.

Remarkably only a minority of bio/education professionals believed local people wanted to protect the species, again indicating professionals may not be in tune with local people's attitudes towards maned wolf conservation. Moreover, their relationship with local people, where maned wolf conservation issues are concerned, may be affected by their negative beliefs, once again suggesting that to benefit conservation, improvement in bio/education professionals' attitudes towards local people is needed.

### ***3. Other questions and further discussion***

#### ***Introduction***

The mortality of maned wolves is influenced by many anthropogenic actions, as seen in Chapter Two, 4.5.1.. Identifying the elements involved in such actions is important for the conservation of the species, since these factors can only be addressed if understood. In order to address research questions 1, 2 and 3 this section investigates the attitudes of people living in the vicinity of conservation areas towards maned wolf mortality and the beliefs of bio/education professionals regarding the reasons why maned wolves are killed. Responses were tested for differences amongst interest groups' variables. Further discussion also explores the interface and correlations between the previous sections.

**Results****3.1. Beliefs about why people kill the maned wolf**

Beliefs of bio/education professionals/rural respondents	Bio/education professionals who agreed with statement (N=143)	Rural respondents who agree with statement (N=54)
	Count (percentage of respondents)	
People kill maned wolves for pleasure/ People kill the maned wolf for sport	58 (40.6%)	22 (40.7%)
People kill maned wolves for retaliation/ Caught raiding chicken pen	98 (68.5%)	11 (20.4%)
Killed before it raids chicken pen		7 (13%)
People kill maned wolves for self-defence	34 (23.8%)	2 (3.7%)
People kill the maned wolf for material gain/ Selling parts of the body	53 (37.1%)	2 (3.7%)
Parts of the body bring luck		3 (5.5%)
Parts of the body have medicinal properties		2 (3.7%)
People kill maned wolves by accident	101 (70.6%)	11 (20.4%)
People kill maned wolves because of animosity, intolerance/ People dislike the maned wolf	19 (13.3%)	20 (37%)
Competition for game species		0
People kill maned wolves because of ignorance towards the species	6 (4.2%)	10 (18.5%)
People kill maned wolves for fear (pilot)	0	
<b>Total</b>	369	90

**Table 3.1. Comparison between beliefs of local people and beliefs of bio/education professionals about why people kill the maned wolf.**

Both bio/education professionals and rural respondents were asked to choose one or more reasons why people kill the maned wolf, from a list. This question allowed there to be a survey of the most popular beliefs, as well as comparisons between the beliefs of the two groups.

Most bio/education professional respondents believed accidents are the main cause of maned wolves' deaths (70.6%), compared with 20.4% of rural respondents.

Whereas 68.5% of bio/education professionals believed maned wolves are killed as a form of retaliation for attacks on livestock, rural respondents' believed that maned wolves are *killed*

*because they are caught raiding chicken pen* (20.4%), and *killed before they raid chicken pen* (13%); thus their belief that maned wolves are killed for retaliation equals 33.4%.

The most popular belief amongst rural respondents (40.7%, n=22) was that maned wolves are *killed for sport*, compared to a similar score of 40.6% of bio/education professionals.

Whilst 37% of rural respondents believed maned wolves are *killed because people dislike them*, only 13.3% of professionals expressed this opinion (*animosity, intolerance*). None amongst the local people believed *competition with game species* to be a reason for maned wolves' mortality.

A larger percentage (37.1%) of bio/education professionals believed maned wolves are *killed for material gain*, compared to 3.7% of rural respondents (selling parts of the body). Rural respondents' score could however be combined with *parts of the body bring luck* (5.5%), and *parts of the body have medicinal properties* (3.7%), reaching a combined total of 13% for *use of parts of the body*, which is still lower than the bio/education professional's percentage.

*Self-defence* as a reason for the maned wolf's mortality also seems to have been overstated by professionals (23.8%), compared to 3.7% of rural respondents.

Many (18.5%) rural respondents volunteered the suggestion that maned wolves are *killed because of ignorance towards the species*, compared to 4.2% of professionals.

Most rural respondents' beliefs regarding reasons why people kill the maned wolf were dissonant with bio education professional's beliefs.

The large majority of zoo professionals (83.3%, n=55) chose *retaliation* as a cause of mortality. A majority of bio/education professionals from Greater São Paulo (53.6%, n=15), as opposed to a minority of respondents in all other locations, believed maned wolves are killed for pleasure. A majority of rural respondents in São Carlos (56%, n=14) believed *people kill the maned wolf for sport* compared to a minority in the Low Mogiana region (27.6%, n=8).

There was no evidence of association between urban/rural residents within the bio/education professionals' sample, however there was reasonably strong statistical evidence of an association between beliefs about causes of maned wolf mortality and other gender: a disproportionately large percentage of female (n=27, N=140,  $\chi^2=11.4$ ; df=1;  $p=0.001$ ) respondents believed that *people kill the maned wolf in self-defence*.

### 3.1.1. By experiences with the maned wolf

The majority of bio/education professional respondents who believed *people kill the maned wolf for pleasure* worked with maned wolf indirectly (53.2%, n=33), this compared to a minority of all other groups.

### 3.1.2. Summary of findings

Aspect	Result	Chi squared Statistics
Beliefs about why people kill the maned wolf	Q3 No differences between urban/rural residents	
Self-defence	Females > males	11.4; df=1; $p=0.001$

Table 3.1.2. Summary of results for causes of maned wolf mortality.

## Discussion

In the present study low levels of knowledge were related to low levels of positive attitudes towards the maned wolf and its conservation; high levels of knowledge amongst rural

respondents were positively associated with high levels of positive beliefs about the maned wolf. Such associations of knowledge, attitudes and beliefs suggest a potential for the development of positive behaviours towards the conservation of the maned wolf. Research suggests a correlation between positive attitudes towards large carnivores, low fear level, and higher support for their protection (Bath and Farmer, 2000). The finding of a positive association between high levels of knowledge and high levels of positive conservation values amongst respondents in the present study is also a predictor of positive attitudes towards the species (Kellert *et al.*, 1996), suggesting positive implications towards maned wolf conservation.

Knowledge was, however more important than level of education, as a predictor of positive attitudes towards the maned wolf in the present samples. Indeed, although other target groups had higher levels of education and included more bio-education professionals, International Paper staff (interestingly none were education professionals) and rural respondents consistently scored higher than other groups. Therefore both groups deserve special attention and further investigation relating their positive attitude predictors and socio-demographic characteristics to future conservation strategies that are aimed at other target groups. Their potential as opinion makers amongst local people should also be considered.

Concomitantly a minority of respondents with the lowest level of knowledge about the maned wolf also tended to display few positive attitudes or beliefs towards the species. Although it would be difficult to measure the direct effects of lack of knowledge of maned wolf conservation, both rural respondents and bio/education professionals cited “ignorance” as a reason why people kill the maned wolf. Promoting the spread of knowledge amongst this group should help to improve attitudes towards maned wolf conservation.

### **1. *The involvement of local people in conservation units***

As suggested by Candido's (2001) views on changes in rural people's relationship with and knowledge of the natural environment, most bio/education professionals in this research believed the local people did not know much about the maned wolf. Within this group, only rural

residents, people least educated and professionals in urban occupations (working force) displayed a higher proportion of positive views about local people's knowledge of the maned wolf, showed sympathy for it and/or willingness to protect it; this is in contrast to skilled professionals in bio/education occupations and students. As data analysis shows, however, rural respondents knew more about the maned wolf's habits and ecology than most other target groups, suggesting that this trait might have persisted in the rural population.

## **2. Human caused mortalities amongst maned wolves**

Research suggests that road mortality and reduction of environmental carrying capacity, both of which result from imposed development impacting the Cerrado in recent years, are the main threats to maned wolf populations (Rodrigues, 2002; Paula, Medici and Morato, 2008). Indeed most bio/education professionals in this research's sample also believed road kills are the main cause of human related deaths amongst maned wolves, an opinion not shared by most rural respondents.

Despite many suggestions of ways to cut down on road casualties (Pontes-Filho *et al.*, 1997; Anic, 2002; Rodrigues, 2002) some authors indicate the main problem lays in an alarming degree of intentionality surrounding road killings of maned wolves and other wild animals (Carvalho, 1976; Rodrigues, 2002). This is justified by various claims such as that *they are a threat to livestock or have magical uses*. When asked "why do people kill the maned wolf?" rural respondents in this research also suggested maned wolves are killed intentionally, out of people's *badness*, and because people *feel pleasure in killing*. Many indicated people kill the maned wolf because they *dislike it*, and some suggested it was killed due to *ignorance*. Smaller percentages of bio/education professionals agreed. Such reasons may need to be re-considered by conservation programmes in the face of rural responses. Ignorance about the species may result in dislike of it. This may be due to fear, cultural and historical antipathies, association with more carnivorous species- such as *Canis lupus* - or negative values associated with wilderness, and responsibility for attacks on poultry, which in the long term may result in negative perceptions and attitudes towards the maned wolf (Kellert, 1985), even as far as

harming or killing. However killing for pleasure does not derive from the same causation, and will be explored later in this section.

It is suggested that the dissemination of a rural development agenda (Knight, 2000; Miranda, 2003) may be a reflection of people's feelings of dislike towards wilderness and wild predators. Such feelings have been linked to endemic species of the Cerrado in Brazil (Carvalho, 1976; Klink and Machado, 2005) and may be connected with reasons for human related deaths of maned wolves based on *dislike for it* in the present sample. In this case, attitudes towards the Cerrado and endemic species in general may need to be targeted to have a positive influence on maned wolf conservation.

Although an overall attitude of tolerance seems to exist among rural respondents about the poaching of livestock by the maned wolf, there are records in the literature of retribution killings carried out by farmers (Dietz, 1984; Anic, 2002; Rodrigues, 2002; Sillero-Zubiri, Hoffman and Macdonald., 2004). Dietz (1984) in fact identifies it as the highest cause of human related death amongst maned wolves in Serra da Canastra (Minas Gerais state, in the southeast of Brazil), where the occurrence of hunting for sport was not recorded. Most bio/education professionals in this research's sample also saw retaliation (related to attacks on poultry) and conflicts with people as some of the main causes of the maned wolf's mortality, again compared to a minority of rural respondents (20.4%; lower than the 31% in Anic, 2000), consistent with their claims of tolerance towards poaching. Indeed, killing was one of the least popular suggested forms of retaliation to attacks on livestock within the sample. Retribution deaths may be low at this research sites as a result of low predation, as suggested by Ogada *et al.* (2003) and in agreement with the data collected on damage caused by maned wolves.

Just over 1/3 of bio/education professionals in the present sample believed maned wolves were killed for material gain, including the harvesting of body parts. In comparison only a small percentage (13%, lower than 24.1% in Anic, 2002) of rural respondents (all in land related occupations) believed they were killed for the use of body parts: this may indicate that this problem is confined to a limited segment of the public. As observed in section two, many respondents did value the use of the maned wolf's body parts, and it is possible to suggest



younger students and possibly some of the most rural segments of the sample (rural people in land-related occupations, however the small number of rural people in land-related occupations does not allow for an assessment of the strength of the association. Of respondents to the present research only a very small minority indicated a wish that harvesting of maned wolf body parts should be allowed, suggesting a lack of demand. The research indicates no need for considerations about trying to meet cultural needs by harvesting captive bred animals while protecting wild populations (Anic, 2002; Kruuk, 2002; Treves and Karanth, 2003). A more effective way to pursue conservation may be to displace such beliefs with the development of a conservation ethic based on ecological and other benefits attached to wildlife, as suggested by Sillero-Zubiri, Hoffman and Macdonald (2004) and Macdonald and Sillero-Zubiri (2004).

## **2.1. Hunting**

The most popular belief amongst rural people in this research was that maned wolves are killed for sport (40.7%) (a similar percentage was found amongst bio/education professionals). Despite a lack of evidence from data collection in the research areas to establish the true number of maned wolves killed by sport hunters, it is possible to make some inferences about the nature of the hunting issue.

Hunting, fishing, and gathering have been described as indigenous practices adopted by the *caipira* culture as a mean of subsistence and of reinforcing bonds with the natural environment (Candido, 2001; Miranda, 2003; see Chapter One, section 2.4.). Hunting has also been described in a similar way by modern Native Americans, who also associate hunting with stress-relief, excitement, and the strengthening of social bonds (Daigle, Hrubes and Ajzen, 2002). If local rural people in this research's sample have sustained some of the traditional traits from their indigenous heritage, through their overall knowledge about the maned wolf, could hunting as a sport and tradition have also remained?

There are also suggestions that hunting bans and urbanization have contributed to limiting hunting to defence of human property, leaving hunting enthusiasts restricted to pursuing only carnivores for such purposes (Candido, 2001). As an added dimension, claims of damage caused by certain species have been used as justification for hunting them down, even when

landowners admit having no bad feelings towards the species and even admiring their presence (Marvin, 2000). The practice of hunting has been described as an emotionally charged experience, full of meaning for the hunter (Marvin, 2000; Daigle, Hrubes and Ajzen, 2002; Earl, 2009, personal communication) suggesting such enthusiasts would go a long way to justify their action even where hunting is outlawed.

Many hunters may support carnivore conservation and have positive attitudes towards it (Kellert *et al.*, 1996; Bath, 2009), suggesting there may be hunters amongst the respondents who are sympathetic to the maned wolf in this research. However, some hunters may display negative attitudes towards predators and heavily impact populations. Kellert *et al.* (1996) suggest that conservation strategies must target each of these groups differently, as the first group might help influence the second, by peer pressure.

Overall, in this research rural people's perceptions of why people kill the maned wolf were dissonant with the perceptions of bio/education professionals. Fear, self-defence (except for many female respondents) and competition for quarry were also not considered relevant as reasons for the maned wolf's mortality by rural people. The belief of 20.4% of rural respondents that maned wolves are killed in retaliation is consistent with the alleged experiences of 18.5% that maned wolves caused damages to themselves or family members. Results for rural respondents beliefs about retaliation killings are however much lower than bio/education professionals', possibly indicating that local people do not consider the maned wolf as a cause of substantial damage. Considering the endangered status of the species, those numbers are still worthy of consideration and suggest the need to address conflict between the maned wolf and local farmers. However rather than being a primary reason for maned wolf mortality, it may be suggested that retaliation and prevention of attacks on livestock may have been used as a form of justification by people who actually kill the maned wolf for sport.

Although hunters have been considered as potential supporters of carnivore species' conservation (Kellert *et al.*, 1996; Knight, 2000; Naughton-Treves *et al.*, 2003) because of their affinities with the natural environment and because of invested interests, support for hunting has been criticized for reinforcing an utilitarian logic that selects *desirable* species for conservation

and is symptomatic of a biased attitude towards wildlife (Knight, 2000; Seddon and Khoja, 2003). Hunting practices as a form of pest control are not favoured by all farmers (Marvin, 2000) and may be considered immoral and criminal by other sectors of society (Knight, 2000). Indeed, this research suggests that local people who had no personal knowledge of the maned wolf were opposed to hunting and most were in favour of a complete hunting ban, strengthening the above claims. Feelings about hunting and hunting ban should be investigated amongst other interest groups.

### **3. Relationship between human occupied landscapes and the maned wolf**

Woodroffe's (2000) suggestion that a positive association between human density and decline of carnivore populations exists when mortality rates are caused by direct persecution and accidental killings may be valid in the case of the maned wolf. Although it may be impossible to shift density determinants, influencing and changing people's attitudes by conservation efforts and favourable legislation may help to address mortality rates caused by humans, people's tolerance, government policies, and trade in body parts (Woodroffe, 2000; Linnel, Swenson and Andersen, 2001).

### **4. Environmental awareness and people in the vicinity of conservation areas**

Environmental educators working in the southeast, advocate that, through the integration of cultural and natural resources, the promotion of self-esteem associated with local values, may be achieved when local people become involved with conservation (see Chapter Two, 4.8.; Dietz and Nagagata, 1997; Padua and Padua, 1997; Tabanez *et al.*, 1997). Within such a context, building on local people's generally positive attitudes towards the species seen in the present research, the maned wolf could become a flagship species to attract attention and elicit support for the conservation of the local habitats as the golden-lion tamarind became in Rio de Janeiro (Dietz and Nagagata, 1997). Moreover research results suggest that most bio/education respondents believe in the maned wolf's relevance to environmental education and some believe there to be a role for it as an umbrella species for the conservation of the

Cerrado habitat and wildlife. Strengthening the associations which already are established in the minds of local people between the maned wolf and the local environment, should contribute to feelings of ownership, an important component of behavioural change (Hungerford and Volk, 1990).

#### **4.1. The role of Zoos**

Zoos occupy a privileged position in shaping public opinion, as this is where people and wild animals come into close proximity without conflict (arguably at least for people). Many zoos, including some covered by this research (see Chapter Two, 3.2.), have pursued an active role in the conservation of animal species, supporting *in situ* conservation projects, research, promoting breeding programmes for endangered species and their reintroduction (Consorte-McCrea, 1994a; Bowkett, 2009).

The group of zoo professionals included the largest percentage of respondents who believed that local people's involvement in the conservation of the species was hindered by lack of receptivity, interest and respect, and that maned wolves were killed in retaliation for its threats to livestock. Holding such negative beliefs of local people and the general public, could influence the relationship between them and distance them from each other and so could hinder the potential role of zoos in fostering conservation education, therefore needs to be addressed.

#### **5. Local people and support for the conservation of the maned wolf**

Long term coexistence, wide extensions of wild habitat, low population density and lack of impact on local economy and human occupied areas are predictors of positive attitudes and tolerance towards wild carnivores (Kellert *et al.*, 1996; Andersone, 2005; Randveer and Mãe, 2005; Bath, 2009). Such characteristics reflect the reality of the rural research sites where this research was conducted (see Chapter Two, 3.2.2. and 3.2.3.) and most of the relationships between local people and the maned wolf. However, although local people in this sample

display tolerance towards the maned wolf in the present economic situation, the question arises of their ability to sustain their attitudes towards the maned wolf in the face of choices between its conservation and changes in land use for the expansion of intensive farming or industry and the creation of jobs and increased income.

A research scenario may indicate that most local people can identify the species being targeted by a conservation programme and that they hold no negative opinions about that species or the natural environment. Even then problems such as a widespread lack of awareness of the existence of the local natural reserve, where the programme is based, and a lack of awareness of links between habitat destruction and the decrease of local fauna may still need to be targeted (Dietz and Nagagata, 1997) to benefit conservation. In this context, conservation strategies targeting the maned wolf could benefit from the implementation of long term education programmes that consolidate a conservation ethic (Dietz and Nagagata, 1997) to encompass values related to wildlife conservation, and to discuss detrimental impacts to maned wolf populations that may be indirectly caused by human action. Results from this research suggest such programmes should target diverse interest groups, including local residents and bio/education professionals.

Present results reinforce an association between sympathy towards maned wolves, tolerance, support for their conservation, and belief in their high ecological, recreational and existence value, as suggested by Kellert *et al.* (1996). Conservation awareness campaigns could highlight the attractive characteristics of the maned wolf also associated with other charismatic carnivores (their large size and dog-like features), combined with rare negative encounters with people, as suggested by Bangs *et al.* (2005) and Knight (2000). Popular interest in the species might become a channel for people's natural interest towards and knowledge about wildlife; this may be used as a gateway to involve people with wildlife and ecosystem conservation (Dietz and Nagagata, 1997).

## **4. Profiles of respondents**

### **Introduction**

Socio-demographic conditions also influence people's attitudes, as groups are not homogenous in the way conflict may be experienced by its members (Kellert *et al.*, 1996; Kaltenborn and Bjerke, 2002; Hill, 2004; Bath, 2009). As a consequence of age, gender, place of residence, and other variables, individuals may experience varied degrees of vulnerability to wildlife conflict and therefore perceive conflict situations with wildlife in different ways (Kellert *et al.*, 1996). In order to address research questions 1 and 3 results concerning positive and negative attitudes' predictors (the most positive and negative profiles of respondents concerning their knowledge, beliefs and attitudes towards the maned wolf, conservation) and attitudes towards other groups are presented and discussed next in relation to their target groups, research locations and socio-demographic variables.

### **Results**

#### **4.1. Misconceptions profile**

Misconceptions about the maned wolf's feeding habits, number trends, and beliefs about the use of body parts tended to be found amongst many:

- Rural respondents and residents
- Year 8 students
- Respondents aged up to 13
- Respondents educated up to year 10

And amongst a majority of:

- Respondents aged 41 and over (70%)
- Respondents at home (87.5%)

Respondents in the Low Mogiana region and in Greater São Paulo consistently displayed misconceptions regarding the maned wolf, in contrast to São Carlos respondents, who were better informed about their social behaviour, food preferences and feeding habits. The experience of seeing the maned wolf in nature (particularly on their own property), and of damage allegedly caused by the maned wolf or other animals was associated with a high level of misconceptions amongst rural people. In contrast, respondents who heard about the maned wolf from zoo, museum or CU, or from school or environmental education course displayed the lowest levels of misinformation.

The lowest levels of misconceptions were found amongst:

- International Paper staff
- Sixth-form students
- Those educated to a higher level

## ***4.2. Positive and negative profiles***

### ***4.2.1. Positive:***

Knowledge, positive attitudes and beliefs about the maned wolf and its conservation tended to be found amongst many:

- Rural respondents
- Year 8 students
- International Paper staff

Once again respondents from São Carlos displayed a high degree of positive attitudes, associated with high levels of knowledge about the maned wolf; this contrasted with respondents from Greater São Paulo, who tended to display negative attitudes. Sources of information also may have influenced attitudes positively for respondents whose information about the maned wolf came from school/env.education, or the internet, and urban respondents who saw the maned wolf live in nature.

#### ***4.2.1.Negative:***

Lack of knowledge, negative attitudes and beliefs tended to be found amongst many:

- CU visitors
- Sixth-form students
- The least educated

### ***4.3. Relationships between target groups***

Positive relationships between professionals working in schools, reserves and zoos and the local people were found amongst a majority of:

- Bio/education professionals of Low Mogiana region
- Rural respondents in the Low Mogiana region

Less positive (moderate) relationships between the groups were found amongst a majority of:

- Bio/education professionals of Greater São Paulo
- Rural respondents in São Carlos



**Discussion**

Research suggests that socio-economic variables, people's cultural upbringing and environment, and personal experiences are largely responsible for their attitudes towards wildlife, and carnivores (Kellert, 1985; Bath and Buchanan, 1989; Kellert *et al*, 1996; Kaltenborn, Bjerke and Vitterso, 1999; Mankin, Warner and Anderson., 1999; Bath, 2000; Messmer, 2000; Mattson, 2004; Kleiven, Bjerke and Kaltenborn, 2004; Kaczensky, Blazic and Gossow., 2004; Bath, 2009). Such attitudes may vary over time, and may be influenced by socio-economic changes (see Ingold, 1992), and by the introduction of new cultural values (see Candido, 2001). Pronounced differences in attitudes influencing wildlife-related knowledge and approach may be found among and between groups within a society, according to age, gender, place of residence, employment sector and education (Kellert, 1985; Mattson, 2004). There are suggestions that people's attitudes towards wildlife change over time in response to increased knowledge of wildlife and conservation issues (Mankin, Warner and Anderson, 1999). In such contexts, misconceptions, misinformation and superficial knowledge, and lack of positive involvement with wildlife are problems that need to be addressed by conservation programmes.

The socio-demographic profile of people who tend to be more negative towards carnivores identified by Kaczensky, Blazic and Gossow, (2004); Kaltenborn, Bjerke and Vitterso (1999) and Kleiven, Bjerke and Kaltenborn (2004) (see Chapter One, section 2.10.) was very similar to the socio-demographic profile of local people with the highest levels of misconceptions about the maned wolf (with the exception of gender) in this research's sample. This research's results however indicate that the misconception profile do not match the profile of respondents with negative attitudes towards the maned wolf. For instance, older respondents in the present sample were associated with misconceptions but not with negative attitudes.

Respondents from the Low Mogiana region and Greater São Paulo displayed the highest degrees of misconceptions about the maned wolf, while respondents from São Carlos displayed the lowest. Low Mogiana region carried a major percentage of rural samples, which may help to explain the results about misconceptions as they relate to experiences of close contact with the maned wolf within property and of damages caused by wild carnivores. Campaigns targeting

rural residents' misconceptions should specifically address this research location. On the other hand, residents of Greater São Paulo live in areas that are no longer inhabited by the maned wolf and they were not able to identify the species. Here, misconceptions may be more associated with confusion between the maned wolf and *Canis lupus* and these also need to be investigated further to target each location differently.

São Carlos respondents were amongst the most positive in relation to the maned wolf and its conservation. The fact that São Carlos' respondents exhibited a higher level of knowledge about the maned wolf emphasizes a link between knowledge and positive attitudes towards the species, at least within the local scenario.

On the other hand, a majority of rural respondents in the Low Mogiana region displayed the most positive attitudes towards bio/education professionals, as opposed to a majority of rural respondents in São Carlos, who displayed the least positive (moderate) attitudes. Such results suggest that the variables that differentiate these two locations must be considered (in relation to beliefs about the involvement of reserve workers in conflict resolution between local people and wild animals, and to the importance placed onto damage caused by wildlife to local residents) so that the most positive of these features may be extended and applied to other locations, and may address the most negative features found in São Carlos. In the bio/education professionals' group, all respondents from Greater São Paulo displayed the least positive (moderate) attitudes towards local people. Considering that the Greater São Paulo respondents exhibited the most negative opinions relative to conservation, local bio/education professionals in this location might be correct in believing that local people lack support for maned wolf conservation, and are negative towards the reserve and its professionals. However this group's relationship with local people must be addressed for the benefit of wildlife conservation.

Negative attitudes in relation to the conservation of the species in Greater São Paulo may also relate to lack of experience in actually seeing the maned wolf live in nature. Different from many findings related to *Canis lupus* and other large carnivores in Europe and North America, the present results suggest knowledge and familiarity with the maned wolf favour attitudes towards

its conservation. Such results do, however, concur with Bath's review (2009), which has also found rural people's attitudes towards wolves to be more positive than "less rural or even urban residents" (Bath, 2009:191). The positive nature of rural people's attitudes towards large canids may be left unchallenged if there is a lack of negative experiences caused by proximity with the predator (Bath, 2009). This may be the case regarding the maned wolf in the research areas. Although the percentage of respondents who experienced damage caused by the maned wolf was too small to establish strong associations, most of them displayed positive beliefs about the species and did not wish its demise, possibly because such damage was apparently not considered to have an economic impact (unlike damages caused by other large carnivores).

Though the attitude of CU professionals to their relationship with local people was moderate it was the lowest amongst target groups. This may be related to their belief that local people promote illegal use of reserve resources. Half of the rural respondents' sample also displayed moderate attitudes towards bio/education professionals suggesting that attitudes on both sides have scope for improvement. Further investigation regarding this relationship is advised to identify specific areas for improvement.

Although misconceptions were the least frequent amongst sixth-form students, this target group was the most negative in relation to the maned wolf and its conservation; this led to its identification as the group to be targeted by campaigns based on values about wildlife and conservation. Interestingly, a close match to the groups of respondents displaying highest levels of misconceptions in the present research was identified by Daigle, Hrubes and Ajzen (2002) in their profile of the hunters group in the Green Mountain National Forest in Vermont; this included male respondents, respondents with lower incomes and lower education levels. Hunting affiliations of the respondents in São Paulo are difficult to establish since that activity is outlawed in Brazil, therefore an association between hunting activities and misconceptions could not be verified, but it deserves further investigation.

The most positive profile results in relation to the maned wolf are similar to Kellert *et al.* (1996) in relation to sympathy towards wolves. In addition, rural respondents' scores were consistently high in knowledge, attitudes, beliefs and values towards the maned wolf, wildlife and

conservation. This indicated that misconceptions about the maned wolf's feeding ecology, status and beliefs about parts of their bodies, do not correlate with negative attitudes towards the species. Results however do suggest that positive attitudes which were higher amongst rural and International Paper respondents correlate with general knowledge about species ecology and behaviour and with positive values towards nature.

In terms of maned wolf conservation, farmers do not have a negative profile. This may be because maned wolves are not considered responsible for serious economic damage and farmers' appreciation of the species and their values towards nature and wildlife may be a result of their experience of living close to nature, as suggested by Messmer (Chapter One, section 2.9.). Indications that closeness to nature may benefit people's attitudes towards maned wolf conservation are also supported by the fact that residents of urban areas in all research sites are closer to nature than residents in Greater São Paulo; here few respondents knew the maned wolf, many had heard of it from secondary sources and here were found the most negative attitudes towards conservation of the species.

Professionals working in the fields of education and biology, as well as International Paper staff, were generally highly educated and apparently supported maned wolf conservation no matter where they reside. Their overall support is similar to that encountered by Bath and Buchanan (1989), Kaltenborn and Bjerck (2002) and Bath (2009) in members of professional and highly educated groups living in both urban and rural areas, and suggest possible ecocentric values.

Although samples were not big enough to infer associations between older age and negative attitudes, results suggest there may be an association with low levels of education. Older age and lower education in this sample may differentiate people who value personal and family security, respect for traditions and other old fashioned values, as suggested by Kaltenborn and Bjerke (2002) and Bath (2009), values which have consistently associated them with negative attitudes towards large carnivores in other cultures.

## CHAPTER FIVE: Discussion and Conclusions

### ***5.1. Towards co-existence and mitigation of conflict***

#### ***Introduction***

Past discussions preceding this present research, have suggested the existence of conflict between people and the maned wolf. Although my findings suggest a lack of wide spread conflict in the research sites, it may still exist in other parts of the maned wolf's range, and however small the foci of conflict may be, they have the potential to contribute to the maned wolf's decline and should not be overlooked. In order to address the research aim of contributing to conservation strategies, findings related to the research questions 3, 4 and 5 are examined in this section in conjunction with a review of practices to prevent and mitigate conflict that may be applicable to the maned wolf scenario.

Some people may see large predators like the maned wolf as a nuisance, but they are important elements in the maintenance of a healthy ecosystem by their direct role in controlling other species and indirectly through cascading effects of predation. As generally charismatic species they also help raise public awareness of the importance of the conservation of wild species and habitat (see Chapter One, 2.2, and Chapter Two, 4.2). They cannot survive only in protected zones as they occupy wide areas, so their survival depends on linked areas of healthy habitat and on the support of neighbouring landowners and residents of rural areas (Clark *et al.*, 2001; Macdonald and Sillero-Zubiri, 2004; Michelle *et al.*, 2005; Woodroffe, Thirgood and Rabinowitz, 2005) (see Chapter Two, 2.). The success of maned wolf conservation, therefore, depends on tolerance, conflict mitigation and on the reduction of risks to them and to people to further a successful coexistence. Some of the questions have investigated issues related to conflict prevention, resolution and mitigation of conflict. The present section will provide a review of approaches used to address conflict in the light of present discussion about local people's attitudes towards the maned wolf.

As discussed earlier, results from this research suggest a high degree of tolerance from the local people in the sample towards the maned wolf. The fostering of co-existence between local people and the maned wolf was also valued by a majority of bio/education professionals in the sample. A large percentage (41.3%, particularly respondents over 51) believed conflicts cause maned wolf mortality rather than causing material damage to rural people, found to be low. There are no numbers to quantify the mortality of maned wolves caused by conflict and results suggest that retaliation killings numbers are low; however road fatalities (considered as an important factor in the decline of maned wolf populations) may be linked to negative feelings towards wild animals in general and may encompass an element of conflict as suggested by bio/education professionals. Although only half believed that involving local people would help improve their relationship with conservation programmes, the majority of bio/education professionals believed all parts must be involved in conflict-resolution (as opposed to a minority of school professionals) - a practice recommended by human dimensions research and advocated by authors such as Bath, Kellert, Fascione, Delach and Smith. Results suggest bio/education professionals support such practices, therefore the next step would involve recommending those that could be better suited to the situation on research sites.

Most rural respondents in the Low Mogiana region sample (and few in São Carlos) indicated positive beliefs towards the involvement of reserve workers in conflict resolution between the local people and wild animals and also giving support to local people in face of conflict. However only under a third of bio/education professionals indicated that reserve workers (and sometimes zoo workers) might help or try to resolve or reduce conflict between local people and wild animals. The level of engagement of professionals was not associated with research location (except for an even lower level of participation in Greater São Paulo) or target group. These results point to a discrepancy in relation to rural people's perception of their involvement. Results suggest that although mitigation/conflict resolution may be valued by bio/education professionals it has not been fully established as a practice within CUs, perhaps because direct conflicts are a rare occurrence. The fact that local people saw reserve workers as helpful and active in conflict resolution is however very important as an indicator of good relationship between local people and CUs.

### **5.1.1. Clarifying misconceptions and promoting behavioural change**

In the present research, amongst a minority, feelings that the maned wolf is ferocious and dangerous were amongst the most negative attitudes towards the species. These may be associated with fear, although only a small minority of respondents conveyed beliefs that the maned wolf scares and attacks people. Further investigation into the elements of *fear* in relation to the maned wolf is advised, since fear is a strong predictor of negative attitudes towards carnivores and must be targeted by information as well as by values about wildlife conservation, as suggested by Bath (2009). Targeting specific misconceptions by increasing public awareness of the endangered status of the maned wolf (declining densities) and clarifying misapprehensions about their feeding habits may contribute to the elimination of these fears about the species (Dietz, 1986; Motta-Junior, 2000; Anic, 2002, Bath, 2009).

As measures to increase support for the conservation of the maned wolf and reduce risks to them some authors also recommend the spread of specific information about the potential benefits that this species may bring to the lives of local people, for example the dissemination of seeds of Cerrado fruits (*lobeira*, *gabioba* *Campomanesia pubescens*) and pest control (Motta-Junior, 2000; Anic, 2002). Once again, to target behavioural change information has to be associated with feelings of connection with the maned wolf, suggested by Hungerford and Volk (1990). This might be achieved by enlisting nationalistic feelings and developing a local pride in order to help preserve a species that belongs to the national heritage, as was suggested by Dietz (1986) and Sillero-Zubiri, Hoffman and Macdonald (2004). As a majority of rural people in this research were already aware of the maned wolf's ecological importance and predation on rats it is possible to investigate further how such beliefs relate to attitude variables to establish their role in conservation support.

### **5.1.2. Review of measures to address and mitigate conflict**

Although results from this research suggest overall positive attitudes towards the maned wolf and tolerance towards damage caused by it, there are still small sources of conflict that must be addressed. Public perceptions of damaging impacts caused by a species cannot be shifted by

research and knowledge alone and it is necessary to identify measures that can be perceived as effective by the local people who are involved in conflict, as suggested by Woodroffe, Thirgood and Rabinowitz (2005) and Bath (2009).

Methods to resolve people-carnivore conflict around the world have been addressed by many authors (Musiani *et al.*, 2002; Treves and Karanth, 2003; Breck, 2004; Macdonald and Sillero-Zubiri, 2004; Mattson; 2004, Sillero-Zubiri, Hoffman and Macdonald. 2004) and can be grouped as follows (Boitani, Asa and Moehrenschrager, 2004:148):

- 1 prevention: means of avoiding conflict, by preventing carnivore attacks on livestock, including changes in husbandry; by avoiding harmful contact between people and carnivore species
- 2 mitigation: compensation for losses, making them more acceptable to people; improving tolerance of species
- 3 control: means of reducing carnivore populations, including extermination, translocations and removal of individuals.

Next these will be reviewed and discussed within the context of the present research.

### **1. Prevention:**

1a.protection and restoration of native habitat (vegetation, water sources); conserving species richness and population density;

Population density and birth rates of carnivores are affected by prey abundance and size; these may decline with habitat loss and competition with poachers. Maned wolves' omnivorous diet also depends on a variety of plant food that can be affected by habitat degradation. Remediation frequently involves complex, large-scale socio-economic measures. However,



pollution control, deforestation arrest and restoration initiatives have improved the conditions of many wild populations worldwide (Mattson, 2004). These should be considered as strategies to help prevent maned wolf from approaching human occupied areas in search of food and eventual attacks on livestock, thus preventing conflict with people.

In poorer areas there may be intense pressure to occupy natural habitat land to house and feed local people. Capturing maned wolves to sell parts of the body may be seen as a way to supplement income. It has been suggested that parks and reserves should address the socio-economic issues of the local people to discover options that both favour wildlife and improve people's life standards (Castilhos, Alves and Silva, 1997; Dietz and Nagagata, 1997). Local conservation areas could consult local people and investigate initiatives carried out by other conservation programmes thus identifying those which would be the most efficient in addressing local issues.

1b. restrictions on the harvest of native food sources; increasing natural food sources particularly when maned wolves are looking after pups;

Field studies on European wolves suggest relatively few wild prey were needed to produce a reduction in livestock attacks; they also indicate that local abundance and its accessibility were important in the selection of wild or domestic prey (Meriggi and Lovari, 1996). Supplemental wild prey could benefit maned wolves during times of extra energetic demands (winter months), and help reduce incursions into human occupied areas with the potential to end in conflict. However, according to Macdonald and Sillero-Zubiri (2004) there are opposite short and long-term consequences to wild-prey availability on carnivore predation of livestock: in the short-term the abundance of wild prey reduces predatory behaviour towards livestock (prey switching); in the long-term canid abundance increases as a result of abundant prey, leading to an increase in livestock attacks. This association is yet to be studied in relation to maned wolf populations.

1c. preventing contact between maned wolf and hunters/poachers;

Evidence from field studies shows that human-carnivore conflicts are not random (Wydeven *et al.*, 2004) and common patterns can be found around the world, as regards timing, location, and profiles of both humans and carnivores involved in the conflict. Such research suggests that it may be possible to predict a large number of human-carnivore encounters. Conservation programmes could work with local land owners to identify the areas and times of the year when most encounters with maned wolves take place. A network of information on maned wolf sightings could speed up local authorities' response to potential attacks and prevent conflict, as well as fostering cooperation between interest groups in maned wolf conservation.

1d. preventing contact between the maned wolf and livestock:

1. use of guard-dogs to protect livestock and scare the maned wolf and other predators away;
2. effective fencing and penning animals at night and setting barriers to exclude predators.
3. improved livestock husbandry and surveillance
4. changes in the choice of livestock (breed, numbers, size, group cohesiveness, mothering ability)
5. aversive and disruptive stimuli (gustatory, olfactory, visual, tactile)

The understanding of the biological and ecological factors influencing maned wolves' decision to take livestock, rare as it is, should aid the development of techniques and strategies that livestock and wildlife managers can use to mitigate problems (Breck, 2004). Although wild predators can be efficient killers and livestock have mostly lost their anti-predator instincts (Breck, 2004) practical experience has shown that appropriate livestock husbandry practices may reduce loss of livestock to predators (Ogada *et al.*, 2003). The same network of information mentioned above could be of help here.

Field studies (Anic, 2002; Lacerda., 2002) and information from interviews indicate that the presence of domestic dogs is a deterrent to maned wolf attacks on livestock effectively in

keeping them away. Some rural people seem to pen their chickens at night, and using guard dogs against possible maned wolf incursions (Dietz, 1994; Figueira, 1995), though some argue that chickens farmed in a confined space “do not thrive” (personal communication). Although they make efficient guards against maned wolf approach, the keeping of dogs near protected areas may have unwanted consequences that must be monitored by conservation initiatives: locals may use dogs to hunt wildlife; dogs can act as reservoir hosts for diseases that attack wild carnivores; if guard dogs are not properly cared for they may attack and kill livestock themselves; stray dogs may become feral; inbreeding can also be a concern for some wild canid species (Ogada *et al.*, 2003; Meriggi and Lovari, 1996).

It has been suggested that changes in livestock husbandry may be difficult to achieve where farmers are resistant to change, when management options are too expensive or too hard to apply, when a lack of incentives and low losses mean the extra work is not worth doing. This may be the case with maned wolf attacks on poultry. Community involvement is recommended to change the traditional views if not of the older, then of the younger generations (Sillero-Zubiri, Hoffman and Macdonald, 2004).

Non-lethal forms of control of predators based on aversive stimuli may involve highly technical interventions that are not economically viable in rural communities within developing countries (Rabinowitz, 2005) and are only worth the costs where losses are substantial, making this technique inadequate to resolve conflict with the maned wolf.

The use of different species of guard animals (donkeys, llamas) has been attempted with success in deterring the approach of different species of predators and could be investigated further, as well as other choices of livestock that may be more resilient to maned wolf eventual attacks. Overall, investment in the prevention of predatory attacks on livestock is valuable as it decreases damage and stops maned wolves creating the habit of killing livestock. This has been recommended in relation to other carnivores (Ogada *et al.*, 2003).

- 1e. ameliorating human impact; halting and decreasing human expansion into wild habitat

1. education campaigns to reduce risks of attacks on humans as a result of approaching pups or dens
2. establishment of protected areas and zoning schemes
3. fostering co-existence and tolerance between people and wildlife

Some economic activities may be compatible with the conservation of the maned wolf if properly regulated and when enough natural habitat is sustained (industries; fishing, logging; sustainable plantations and extractivism; honey production; agriculture; cattle farming; recreation and tourism) (Linnell, Swenson and Andersen, 2005). Some of these economic activities are already practiced in the research areas (see Chapter Two, section 3.2.). As long as their sustainable potential is confirmed, conservation strategies could pursue an agenda of cooperation for mutual benefit.

Since there must be compromises to allow coexistence between carnivores and people, the practise of zoning aims to differentiate the management of areas of different use, to reduce the overlap between the carnivore's range and any conflicting activity, as suggested by Linnell, Swenson and Andersen (2005). A compromise would be achieved as human activities are given preference in some areas, and maned wolf conservation in others.

- 1f. road fencing and speed limit control;

Wildlife reserves and other wild areas, are often surrounded or crossed by highways, and may attract carnivores to road kills and other edibles (rubbish, spills). Roads often cross through territories, separate water sources or fragment populations. Such problems can be targeted by thoughtful planning, by the creation of under and overpasses and by the erection of effective barriers (Mattson, 2004), as well as enforcement of speed limits around conservation areas and fines (Rodrigues, 2002) that may direct revenue to wildlife protection.

It has been suggested that damage caused by canids may be reduced to a minimum, without being completely eliminated. At this point, mitigation approaches to the problem of local people having to bear the residual cost of maned wolf conservation may come into place, as suggested by Treves and Karanth (2003). Such tools can only achieve long-term solutions when applied within the context of a management strategy that defines when each is to be used.

## **2. Mitigation:**

Conflict between the maned wolf and people is not restricted to issues regarding alleged predation on domestic stock. General intolerance, sport hunting and killing for the harvesting of body parts are potentially important issues that also need to be addressed by conservation programmes. The improvement of habitat conditions and safe access to natural sources of food and water and even a decrease in livestock damage caused by maned wolves cannot by themselves ensure a successful future for the maned wolf. In the words of Bath (2009:174) this can only be achieved “by a greater tolerance and willingness of all aspects of society to coexist and share a cultural landscape with a large carnivore”. Measures to help to increase people’s tolerance towards wild carnivores and willingness to tolerate any potential risk and damage they may cause include:

### 2a. acknowledgement, recognising the problem;

It has been suggested that a willingness to listen to and a recognition of local people’s legitimate concerns may reduce underlying tension towards conservationists and wildlife management, which might be directed towards wildlife. These may be the first steps towards reducing conflict and improving tolerance towards the maned wolf (Macdonald and Sillero-Zubiri, 2004; Sillero-Zubiri, Hoffman and Macdonald, 2004).

### 2b. community participation and sharing revenue;

There is a consistent trend towards the co-management of habitat and wildlife with local communities, especially outside protected areas. Conservation programmes for diverse species in Brazil, such as the TAMAR (for marine turtles), the Golden Lion Tamarin, and the Ipê (for the black-faced tamarin) (Castilhos, Alves e Silva, 1997; Dietz and Nagagata, 1997; Padua and Padua, 1997) have taken the approach of the fostering of the development of economic benefits for the local communities with successful results. These include job creation (research, conservation, monitoring, service, management activities), training professionals, and investing revenue from the conservation programmes directly into the community (supporting schools, health care, workshops, social-cultural initiatives and venues). Such an approach could be considered by maned wolf conservation initiatives.

Community participation may also involve the design and management of protected areas or transfer of land and resource rights to local communities (Ethiopian wolf in Menz; Inuvialuit Land Claim, Canada's Western Arctic) (Sillero-Zubiri and Laurenson, 2001; Sillero-Zubiri, Hoffman and Macdonald, 2004; Manseau, Parlee and Ayles, 2005). Such approaches should also be investigated and considered.

2c. financial compensation and other cost-sharing schemes;

Conservation programmes have also managed to transfer economic benefits to local communities through (Woodroffe, Thirgood and Rabinowitz, 2005; Sillero-Zubiri, Hoffman and Macdonald, 2004):

1. compensation for livestock losses
2. performance payments

Landowners' tolerance towards damage caused by wildlife may be enhanced through economic incentives, which would appeal to a utilitarian view of wildlife (Sodova, 1980, in Messmer, 2000). The cost of living with carnivores tends to be unevenly spread between rural and urban societies (see Chapter One, 2.9.). Compensation schemes have been created worldwide to

share the burden that may fall on farmers and rural populations, through public funding. Such schemes require good planning and effective application and monitoring (Ogada *et al.*, 2003). Some however suggest such schemes do not alleviate the problem, do not cover full costs, and are frequently burdened by corruption and bureaucracy (Sillero-Zubiri, Hoffman and Macdonald, 2004; Michelle *et al.*, 2005). In São Paulo State there are compensation schemes in place to reimburse livestock proprietors for losses caused by wild predators, however proprietors appear to consider losses caused by the maned wolf too few and too small to require compensation casting doubt on compensation schemes as the answer to conflict mitigation livestock losses.

Richer countries can help to share the burden of conserving wild carnivores directly or via tourism, research grants and other initiatives that offer financial support to sustainable enterprises. NGO driven schemes that cost-share actions to prevent livestock predation with landowners (raising money from diverse segments of society for paying for guard dogs and improvements in husbandry, hiring people to monitor the movement of individual maned wolves) are a possible option (Stone *et al.*,2004) that could be effective within the maned wolf scenario. Since local people in this research had little intention of contributing to maned wolf conservation with money, financial support may have to be sought elsewhere.

#### 2d. tax incentives to landowners

To aid the conservation of the species Dietz (1984) recommends the establishment of 2km buffer zone around the perimeter of protected areas, and suggests the creation of tax incentives for landowners within these buffer zones, in exchange for habitat management practices (controlled burning, grazing, hunting, clearing of brush). He believes such measures could triple the carrying capacity of parks and surrounding areas for maned wolves.

Rural producers who support maned wolf conservation on their property could market their products as “maned wolf-friendly”; an “ecolabel” that differentiates their product in the eyes of the public and may achieve premium prices, especially in urban areas, where support for predator conservation is present (as the Cheetah Country Beef, Cheetah Conservation Fund,

2010; Thirteen Mile Lamb and Wool Company, 2010). Where the use of mitigation measures (such as improvements in husbandry) is required from farmers, tax benefits for payment of compensation have also been successful with other carnivores (Swenson and Andrén, 2005) and could be considered in the research sites.

2e. recreational use;

2f. consumptive use of maned wolves to generate revenue (sport-hunting)

Bearing in mind hunting is prohibited in Brazil, and the great majority of local people in this research supported the hunting ban, regulating the sustainable hunting of large carnivores, in practical terms, can be difficult but also carries ethical issues and values. It has been suggested that consumptive and non-consumptive uses of wildlife within a conservation framework must result in a shift to positive land-use decisions and reduction of illegal use in order to have any conservation value. However benefits from consumptive use tend not to target the people who suffer the most from the costs of conflict with wildlife; they therefore cannot meet conservation objectives (Leader-Williams and Hutton, in Woodroffe, Thirgood and Rabinowitz, 2005). There are no suggestions that incentives for consumptive use of maned wolves would be feasible when the species biology is considered (low densities, solitary in habits, few offspring/year) or that these incentives would bring back benefits to its conservation.

2g. non-consumptive use of maned wolf to generate revenue

Ecotourism can be a potent tool for the conservation of high profile and visible canid species. Maned wolves seem to fall into such a category, attracting tourists to protected areas of grasslands in Brazil and Argentina (Macdonald and Sillero-Zubiri, 2004). Being able to see the animals does not appear to be the most important aspect, as many visitors are attracted by the knowledge of their presence, as suggested by Bath (2009). Ecotourism could be a feasible tool to improve wildlife tolerance amongst local people (Walpole and Thouless, 2005) and to raise conservation awareness for the maned wolf amongst the paying visitors. Some suggest a



drawback might be that economic rewards of ecotourism may be low if not coupled with other initiatives to increase and produce revenue for the local community (Sillero-Zubiri, Hoffman and Macdonald, 2004; Walpole and Thouless, 2005). Many regions do not lend themselves to ecotourism, and rural communities may find the presence of paying visitors intrusive (Sillero-Zubiri, Hoffman and Macdonald, 2004), therefore the inclusion of local people in the planning of ecotourism schemes is advisable to avoid the development of further conflict.

Although economic benefits to the local community seem to be a powerful tool in the reduction of negative attitudes towards wildlife this perspective has been criticized for reducing rural people's relationship with nature to a view based on material gain. More emphasis on other potential benefits resulting from the conservation of wildlife may be needed while trying to enhance conservation awareness within their own cultural traditions (Knight, 2000).

#### 2h. celebration of local culture

Field studies indicate that in communities where living with wildlife is an everyday event that has not been discontinued through time, local people may demonstrate a higher tolerance towards the presence of predators, and acknowledge their 'right to exist' (Bath, 2009). Conservation minded economic enterprises can live alongside with landowners who encourage wildlife and tolerance towards predators such as the maned wolf out of a genuine conservation ethic, as suggested by Frank, Woodroffe and Ogada (2005). Local people's values and tolerance to the maned wolf must be taken into consideration before conservation strategies are devised.

Cultural elements (festivals, songs, dances, crafts) relating to moments of harmony between rural people/natural environment/maned wolf may have been lost but they can be revived, with support from the conservation programme. Such initiatives help improve local people's self-esteem and pride in their local environment and culture, as suggested by Padua and Tabanez, (1997) and Sorrentino (1997). Reinforcing links between the local people's ways and life standards and the natural environment and its balance foster conservation awareness and support for conservation programmes. As suggested by Sodova (1980, in Messmer, 2000)

such an approach may also contribute to enhancing landowners' tolerance through personal (sense of pride and well-being linked to the wildlife in their farm) and social incentives (peer-group acceptance, community recognition, leadership status).

## 2i. conservation education

Bearing in mind that conflict between the maned wolf and local people seems restricted to a small minority, where conflict seems irreducible it will be necessary to research new paths to ameliorate it and to change people's perceptions. This might be done by enhancing both the values attributed to the species and people's appreciation for wildlife and its non-tangible benefits (Sodova, 1980, in Messmer, 2000; Macdonald and Sillero-Zubiri, 2004). Education can be a tool in the alleviation of conflict by fighting misconceptions, negative beliefs and negative attitudes with accurate information, thus improving the way people feel about wildlife (Conover, 2002, in Macdonald and Sillero-Zubiri, 2004).

As previously suggested, such strategies could improve support for maned wolf conservation by targeting misconceptions about their feeding habits and alleged damages caused to livestock. The strategies could also demystify the attribution of mystical powers to parts of bodies and devalue potential economic benefits from harvesting of body parts, by comparing them with the real benefits that maned wolves bring to plantations, habitat and other potential forms of revenue for the local community. Campaigns to increase appreciation for the maned wolf could target intolerance driven killings and sport hunting.

The involvement of local people in maned wolf conservation can be achieved by the development of tailor-made education campaigns for different key groups, which must be based on an understanding of their beliefs, attitudes, socio-political and cultural dimensions so that each aspect may be targeted for change when necessary (Bath, 2009; Taylor, 2009). Integrating local people and their ecological concerns, by working with local spokespeople within each group and using the maned wolf as a flagship species, can be an effective way to

develop trust within the community and build support for conservation (Sillero-Zubiri, Hoffman and Macdonald, 2004:265).

In rural areas of this research, lower levels of formal education were found compared with urban areas. Illiteracy and basic levels of schooling in rural areas are issues to be considered when planning education strategies, so that they may appeal to the needs of each group (Jhala and Giles, 1991).

- 2j. sanctions on hunting and trading body parts at national and international levels; and
- 2k. measures and resources allocation for effective protection of carnivores

Mattson (2004) suggests that threats concerning the consumptive use of body parts can be addressed by regulatory measures either to maintain targeted species at sustainable harvest levels, or to halt the practice altogether. In reality the cultural variables as regards the value attributed to the body parts of carnivores have proven hard to comprehend and control while the illegal exploitation of such products has provided a considerable source of income to people in different countries. There are no studies to suggest maned wolf populations (notoriously low in densities) could withstand regulated harvesting of body parts, and as it stands the maned wolf is included in CITES, Appendix II, therefore trade in its body parts is prohibited abroad as well as in Brazil.

In some parts of the world ranchers have indicated an interest in offsetting losses to predators through sport hunting (Frank, Woodroffe and Ogada, 2005). In Brazil even with hunting banned, conservation areas are often vast, difficult and costly to man and patrol, suggesting that sport hunting schemes would be hard to implement and to oversee.

Mattson (2004) points out that the identification of players, problems, and mitigation strategies is only part of a process to conserve carnivores, which must be followed by the “promotion, adoption, implementation, and appraisal of governing policies”.

### **3. Control**

#### 3a. predation control and reduction:

As part of the Brazilian wild fauna, the maned wolf is fully protected and the IBAMA is very reluctant to sacrifice individuals even under exceptional circumstances (where the public might be at danger). Therefore, in the present scenario lethal control of maned wolves is not a legal option. Moreover, research indicates that traditional attempts to remove the threat of carnivores through extermination are seldom effective in long-term predation reduction. New approaches have been favoured focussing on changing the behaviour of individual animals involved in damage and the behaviour and perceptions of the people involved, in an attempt to reduce conflict and facilitate co-existence (Treves and Karanth, 2003).

#### 3b. non-lethal alternatives:

1. changing the behaviour of animals involved (prey and predator)- see Prevention, 1d.
2. control of maned wolf population densities
3. capturing and translocating problem animals

The success of translocation of maned wolves may depend on the suitability of the new habitat, the existence of territorial vacancies, the new location being far enough from home to stop individuals returning, and on public acceptance of translocation (Treves and Karanth, 2003). Field research shows that the translocation of maned wolves can be problematic and unsuccessful, as animals tend to return to their original territory, or to move to a third area out of

receptor reach, and survivorship appears to be low (Rodrigues, 2002). Maned wolves are highly territorial and cannot tolerate the presence of other adults in the area, using scent marking to inhibit the establishment of incoming animals (Consorte-McCrea, 1994a; Rodrigues, 2002). Attempts to translocate single maned wolves must be closely monitored and based on background research into maned wolf populations' distribution, as well as resource availability and human occupation in the area.

4. supplemental feed

5. discouraging wildlife feeding

Conservation programmes discourage the intentional feeding of carnivores in an attempt to avoid problems caused by habituation (Silva and Talamoni, 2003; 2004). Such problems created between the maned wolf and local people have been targeted by research programmes in the Serra da Canastra Park (CENAP-IBAMA, 2008). Social carnivores display extended relationships with pups after weaning, providing them with opportunities to pass on behaviour patterns to their young (Gehrt, 2004). Carnivores associating humans with a threat will avoid elements associated with human activity. Carnivores with consistent access to food provided by people (intentional feeding, refuse) will most likely lose that fear, possibly resulting in attacks and conflict.

It has also been suggested that supplemental feeding of meat and processed foods may lead to detrimental effects on the maned wolf's health and provoke changes in its ecology, thus making the increase of natural food sources more desirable and effective for conservation purposes (Silva and Talamoni, 2003).

## **5.2. Conclusions**

The present study has investigated and compared the attitudes of interest groups towards the conservation of the maned wolf in urban and rural areas of São Paulo state. The main conclusions regarding such attitudes, and how they may relate to threats to and conservation of the maned wolf, are summarised in this section, by addressing the research questions proposed in Chapter One, page 22. Recommendations are made in this section to enhance the success of conservation strategies for the species. A summary of these recommendations can be found in Appendix IV.

### **5.2.1. Research Questions**

#### **5.2.1.1. What are the attitudes of the various interest groups towards the maned wolf, conservation and towards other interest groups?**

#### **Attitudes of interest groups towards the maned wolf**

The rural population and International Paper staff displayed the highest levels of positive attitudes towards maned wolf conservation, thus making them important groups to consider when planning conservation strategies as being potential disseminators of positive attitudes amongst the local population.

Most local people knew about the maned wolf and were aware of its importance in ecological terms. There was an association between knowledge, positive beliefs and attitudes towards the maned wolf amongst most respondents, predicting a potential for positive behaviour supporting the conservation of the species.

Most urban and rural people displayed high degrees of positive attitudes towards the maned wolf, indicating the potential for positive behaviours towards its conservation. Values related to the conservation of the maned wolf and opinions about who is responsible for it were not polarized between urban and rural residents. This suggests no strong differences and antagonisms between the two groups that could influence negatively attitudes towards conservation.

The large majority of rural people saw the maned wolf as a threat to livestock, which could generate negative attitudes towards the species. However, even the minority who had suffered damage allegedly caused by maned wolves, showed tolerance and displayed positive attitudes towards them.

Sixth-form students displayed the most negative attitudes in relation to the maned wolf and its conservation and must be targeted by campaigns based on values about wildlife and conservation. In a minority of people, low levels of knowledge were associated with few positive attitudes and beliefs about the maned wolf. Associations between a lack of knowledge and feelings that the maned wolf is bad and ferocious deserve further investigation, as fear can be a strong predictor of negative attitudes towards conservation and must be addressed by education focussed on information and values. Few respondents did not care about the maned wolf or did not like it. In a minority, results showed that low levels of positive attitudes, positive beliefs and knowledge about the maned wolf were associated with a lack of intention to find out more about it, thus indicating possible resistance to conservation awareness campaigns centred on the species.

For urban residents, the experience of seeing the maned wolf live in the wild, was associated with positive attitudes, indicating that there is the potential for conservation programmes to gain support by organizing monitored field trips, nature trails and other activities related to ecotourism.

In regard to Kellert *et al.* (1996)'s predictors of attitudes towards large carnivores:

- ❖ respondents had mostly positive attitudes in relation to the maned wolf's physical and behavioural characteristics, reflected in their overall positive attitudes towards the species;
- ❖ most people displayed a high level of knowledge about the maned wolf's ecology and behaviour (particularly rural people), however some misconceptions regarding the maned wolf's feeding habits and the belief in special properties associated with parts of its body were evident; misconceptions were not associated with low general knowledge and negative attitudes.
- ❖ In relation to past and present experiences of interaction with the species, most respondents had heard about the maned wolf from secondary sources (75.6%), and from zoos, museums and conservation units (64.5%). However a surprising 35.8% had seen the maned wolf live in nature; the great majority of respondents (91.9%), including rural people (77.8%), had never experienced damage caused by the maned wolf to themselves or to their families, indicating a lack of negative experiences that could predict negative attitudes.

### **Attitudes of interest groups towards nature and wildlife conservation**

Rural residents valued nature and had positive attitudes towards the local conservation area and wildlife within it. Most people who did not know of the maned wolf indicated positive values towards wild predators, which might also predispose them to support maned wolf conservation.

In regard to Kellert *et al.* (1996)'s predictors of attitudes towards large carnivores:

- ❖ most people who did not know of the maned wolf displayed moderate values towards wildlife and nature; however, most rural respondents who were familiar with the maned wolf valued wild animals and nature, a predictor of positive attitudes towards the species.



**Attitudes of interest groups towards other interest groups**

Professionals from schools, zoos and conservation units displayed only moderate positive attitudes towards the local population, across all research sites and socio-demographic variables. These unsupported negative expectations of bio/education professionals regarding the attitudes of people living in the neighbourhood of reserves must be addressed to prevent the creation of negative bias in their contact with local people.

Rural respondents in the Low Mogiana region demonstrated the most positive attitudes towards professionals in the neighbouring conservation unit, in contrast to rural respondents in São Carlos. Positive attitudes in the Low Mogiana region were related to beliefs that CU professionals care about the local people and mitigate conflicts with wildlife. The same model that resulted in such positive attitudes may help to improve relationships between bio/education professionals and local people in other locations.

**5.2.1.2. Are these attitudes compatible with conservation biologists' views of maned wolf conservation?**

Results indicate that local people were mostly tolerant of eventual raids conducted by maned wolves, which complied with conditions supporting co-existence and maned wolf conservation. Results suggest rural people's experiences of long term coexistence with the maned wolf which are associated with positive attitudes towards the species, are found where the impact on the local economy is low, where natural habitat is extensive and population densities are low. A number of indicators associated with tolerance towards maned wolf raids may relate to the research scenario: firstly, the conservation of the species may be compatible with values towards nature and with the local economy; secondly, local people may trust the local authorities to address damage and contain problem animals; finally, maned wolves may not be considered a real threat. Nevertheless, further research on the perception of damage in relation to size of property is advised, as the perceptions of large land owners and subsistence producers may be different.

Although many people valued the maned wolf for attributes related to its body parts, a possible source of conflict with conservation goals, there was no indication of a demand for harvesting them. Therefore maned wolf conservation strategies could be working towards the displacement of such beliefs by values related to ecocentric ethics and benefits attached to the conservation of the species.

Mortality of maned wolves caused by humans and retribution killings associated with attacks on livestock may be low resulting from the low frequency of predation events. Results suggest that retaliation and prevention of livestock predation may be being used as justification for killing the maned wolf for sport. Hunting is an outlawed activity in Brazil that in this case has no evidence of being sustainable due to the maned wolf's biology and status. Therefore it demands further investigation as it is not compatible with conservation directives.

Most attitudes towards the maned wolf suggest compatibility with conservation goals in the present and potentially in the future. The overall positive attitudes and the demonstrated intention of helping conservation, suggest that people may support actions to help the maned wolf, to tolerate damage caused by them and to maintain their position if faced with conflict. These attitudes predict people would maintain positive behaviours in face of future changes that could affect maned wolf conservation, if these changes were coupled with the awareness of how everyday decisions may impact species' populations. Therefore an investment in people's perceptions of links between anthropogenic and economic pressures, their own behaviour and decision making powers and the decline of maned wolf populations is highly advised.

Peer groups expectations in relation to people's attitudes towards maned wolf conservation should also be examined further, as they help to predict behaviour towards the species.

**5.2.1.3. What attitudes must be addressed by conservation programmes to improve compatibility between people's attitudes and the conservation of the maned wolf, and to decrease any conflict between local people and the maned wolf?**

Although most respondents displayed positive attitudes towards the maned wolf the impact of the negative attitudes of minority groups cannot be ignored, considering the status of the species. Sightings of maned wolves within respondents' own properties may be associated with a perception of threat to people or livestock, and to misconceptions about increases in maned wolf numbers, which may result in a lack of support for maned wolf conservation. Such associations demand further investigation so that they may be addressed by conservation strategies.

Lack of knowledge and misconceptions about the maned wolf also need to be addressed by conservation strategies. In a minority, negative attitudes may be linked with misconceptions about the maned wolf's feeding ecology, magical powers and number trends, and some perceptions of their physical and behavioural attributes, rather than with experiences of actual damage caused by maned wolves. Beliefs about the maned wolf's feeding ecology and magical attributes may have been influenced by perceptions of the European wolf (*Canis lupus*) therefore strategies to dissociate the two species in people's minds, could benefit conservation.

Further research into the extent of local people's associations between the maned wolf and the European wolf, and into the demand for and use of maned wolf body parts by some groups, is advised to help conservation programmes make informed decisions to address misconceptions.

Conservation programmes must target change in negative attitudes that have a cognitive nature (such as misconceptions), by disseminating clear and accurate information about specific beliefs regarding the species (size, weight, feeding ecology, population numbers and distribution patterns, threatened status) amongst some groups. The effectiveness of such educational

strategies will also depend on the credibility of the information source amongst local people and on how appropriate is the medium chosen.

Although numbers were small, results recommend further investigation into any possible associations of experience of damage caused by the maned wolf with: fear, indifference and dislike for the maned wolf; beliefs about medicinal properties related to its body parts; and lack of support for its conservation. The effects of the experience of witnessing rare predation events could be long-lasting and could influence people's attitudes negatively and should be further investigated.

Maned wolf mortality was associated with lack of appreciation and ignorance towards the species. Lack of appreciation for local wildlife may be linked to an agenda for rural development for the Cerrado. Based on most people's positive attitudes towards the species, its attractive characteristics and on its potential as umbrella, the maned wolf may be an effective flagship for the conservation of the Cerrado habitat. Local people's self-esteem could be promoted by fostering integration between natural resources and cultural values; existing bonds between species and environment which contribute to feelings of ownership, themselves important components in behavioural change, could be strengthened.

Hunting may also be ingrained in indigenous roots and cultural traditions of local people. Further research into local people's attitudes towards hunting is also recommended to identify which groups are the potential foci of conflict with maned wolf conservation. Although most rural respondents may not depend on the harvesting of natural resources to supplement their livelihood, the use of natural resources is a potential source of conflict with CUs. Therefore, associations between income, reliance on harvesting, vulnerability to wildlife related damage, and support towards maned wolf conservation could be investigated further.

Although TV and radio were the most popular media amongst all respondents they were associated with misconceptions about the maned wolf. On the other hand, zoos, museums, CUs and environmental education courses were associated with the most positive and accurate

information. Therefore, results suggest conservation programmes should foster cooperation between accurate information sources and the most far reaching media, to help to improve the quality of information and to help increase support for maned wolf conservation.

Neutral attitudes (more common than negative attitudes in my research) provide a good opportunity for advances in coexistence and must also be targeted by maned wolf conservation programmes, as they are the most likely to be influenced positively. Bio/education professionals must, however, consider that the understanding of local people's cultural values and attitudes is essential for the effectiveness of any attempts to change behaviours through education.

#### **5.2.1.4. Do conservation professionals address local people's concerns about living with the maned wolf?**

Co-existence between local people and the maned wolf was considered essential by bio/education professionals to guarantee the future of the species; they also valued long term support for conservation by the public. However local people's concerns were not fully addressed across all research locations.

Concerns about living with the maned wolf and other wildlife were mostly addressed in the Low Mogiana region (as opposed to São Carlos); here rural people indicated positive beliefs towards the involvement of reserve workers in conflict resolution between local people and wild animals and the support they gave to local people in face of conflict. Rural people's perception of the involvement of reserve workers was however higher than bio/education professionals believed it to be. Such findings suggest that conflicts between local people and wildlife may be rare and although mitigation/conflict resolution may be valued by bio/education professionals it has not been fully established as a practice within CUs. Notwithstanding, in one of the research sites, the perception of local people that reserve and zoo workers were responsive to their concerns about wildlife indicates a positive relationship between those groups.

Results also suggest that, in the present sample, a link was forged between the conservation mindfulness of bio/education professionals and the establishment of positive relationships with local people. Variables, which differentiated the relationship between bio/education professionals and local people in the Low Mogiana region and in São Carlos, must be considered so that the lessons learned in successful co-existence may be applied to other locations.

Openness to change was seen in most bio/education professionals as they believed in the need for professional improvements through better training. This pre-disposition suggests that the implementation of initiatives to foster co-existence and to increase support for maned wolf conservation may be well accepted.

**5.2.1.5. What conservation views must be addressed/adapted to improve compatibility between those initiatives intended to protect the maned wolf and the attitudes of local people, and to decrease conflict between local people and the maned wolf?**

Results indicate that CUs have not been able to engage people who live in their neighbouring rural areas in environmental education activities; this suggests that better ways of targeting this interest group need further investigation. Education initiatives can be effective tools in altering misconceptions about the maned wolf's feeding ecology and status and must be aimed at some of the groups to help improve their attitudes towards maned wolf conservation. However any information must be delivered in conjunction with other variables.

The involvement of local people in the conservation of the maned wolf also depends on conservation programmes being able to foster feelings of ownership over the species and empowerment in relation to the possibility of changing the present scenario of decline. These aims may be achieved by the inclusion of diverse local groups in the development of plan directives for the proposed conservation of the maned wolf and in the identification of local needs, which may also be addressed by conservation programmes. Help from representatives

of the rural population and International Paper staff who display the highest levels of positive attitudes towards maned wolf conservation, should be enlisted to help foster positive changes in attitudes amongst their peer groups, be they rural people or bio/education professionals.

As noted earlier, results indicate that school professionals are in danger of alienating local people. Educational initiatives would gain in effectiveness and reach by bringing together bio/education professionals and local people to discuss conservation issues. Information, reflection and critical thinking are favoured as a way forward together with emphasis on reciprocity and cooperation on the exchange of expertise about the local environment. Thus educational initiatives will need to target bio/education professionals as well as local communities.

Results suggest that zoo professionals need to target their own negative perceptions about local people in order to improve relationships, and help to spread even more widely their effective, conservation minded information and experience in the promotion of positive attitudes towards the maned wolf. The educational role of zoos could also be expanded by fostering interaction with local schools and community through conservation programmes.

Although results indicate overall attitudes towards the maned wolf were positive, small areas of conflict must still be addressed. Tolerance, conflict mitigation and reduction of risks to both maned wolves and people are important in fostering coexistence. Although this research showed that conflict mitigation was valued by bio/professionals, it has not been fully established as a conservation practice amongst CUs, possibly because of the occasional nature of conflicts. Therefore experiences from other conservation programmes about conflict prevention, mitigation and control must be considered in the context of the characteristics of each research site.

Recommendations on methods that address conflict and are suited to the characteristics of the relationships between local people and the maned wolf encountered in this research were listed in Chapter Five, section 5.1.2, under the headings: prevention, mitigation and control. Together

with the recommendations summarized in Appendix IV these should provide a helpful tool to enable conservation programmes to foster positive attitudes towards maned wolf conservation.

### ***5.2.2. Profiles of respondents according to maned wolf conservation issues***

The groups to be targeted in relation to misconceptions about the maned wolf are:

- Rural residents
- Younger population (aged up to 13); possibly people over 41
- People with a low level of education
- Rural people who have seen the maned wolf live in nature, particularly on their own property; or those who themselves or whose family suffered damage caused, allegedly, by the maned wolf or by other animals.

The media, primarily TV and radio, must be targeted so that the information they circulate about the maned wolf and its conservation needs is of better quality and greater accuracy.

The groups that must be targeted to increase positive attitudes towards the maned wolf are:

- CU visitors
- Sixth-form students
- People with a low level of education
- People living in areas where the maned wolf is not present

The groups that must be targeted to increase positive attitudes towards other interest groups are:

- Bio/education professionals across all variables (particularly residents of Greater São Paulo)



- Rural residents of São Carlos

### **5.2.3. Final remarks**

For my final remarks I return to the work of Kellert *et al.* (1996), which has launched many of the questions that string together this research, and reflect on some of his final recommendations for conservation programmes.

As suggested by Kellert *et al.* (1996), causal associations between knowledge, attitudes, values and behaviours are not clear. According to Bath (2009), for some species the conflict with people may have a cognitive nature (based on a lack of knowledge or misconceptions), while for others it may be rooted in a hierarchy of values (pitching conservation against livelihood); relate to costs and benefits; or spring from a lack of trust and conflicts between interest groups themselves. In the case of the maned wolf, results suggest that negative attitudes are associated with misconceptions concerning feeding habits and to learned associations with *Canis lupus*; to a perception of threat related to the proximity of the maned wolf within people's properties; and possibly to values undermining the importance of local wildlife. Therefore conservation education programmes for the maned wolf must target knowledge as well as values.

The long term success of conservation programmes relies on the needs of local communities being taken into consideration, as well as those of maned wolf populations (Kellert *et al.*, 1996; Bath, 2009).

Finally, the conservation of the maned wolf cannot be reduced to its ecological or economic value. It must encompass the subtleties of the way we relate to the species, combining a rich array of cultural, aesthetic, emotional and spiritual dimensions, and pervading our relationship with nature (Knight, 2000; Cândido, 2001). The maned wolf enriches our personal and social lives, awakens our curiosity and brings us closer to the living world. Citing Kellert *et al.*

(1996:988), in protecting species such as the maned wolf we protect humanity's greatest values by "recognizing that people depend on a broad array of relations to the living world in their efforts to achieve lives of meaning and purpose." Conservation programmes that incorporate such dimensions foster the protection of the maned wolf in connection with biodiversity and quality of life, and may produce far reaching and long lasting benefits.

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# **APPENDICES**

## APPENDIX I

### QUESTIONÁRIO 1

1) Você conhece o bicho na foto ao lado?

Sim  Não

**SE VOCE RESPONDEU NÃO, PREENCHA SOMENTE O QUESTIONÁRIO 2 (próxima página)- Obrigada!**

2) Onde você já viu ou ouviu falar do lobo guará?

(PODE MARCAR MAIS DE UMA RESPOSTA)

- Televisão, rádio  Jornais, livros, revistas  
 Internet  Zoológico, museu, reserva  
 Já vi ao vivo, na natureza  Pelos meus parentes, amigos  
 Escola, curso de educação ambiental

3) O que o lobo guará mais come na natureza?

(MARQUE **SÓ UMA** RESPOSTA)

- ratos  gente  
 galinha  passarinhos  
 carne de vaca  frutas  
 fruta do lobo  tatú  
 insetos  não sei

4) Você acha que o número de lobos guarás no Brasil está:

diminuindo  aumentando  continuando igual

5) Você acredita que (PODE MARCAR MAIS DE UMA FRASE):

- partes do corpo do lobo guará são boas para fazer remédios  
 dá sorte carregar um pedaço do couro de lobo guará  
 o couro do lobo guará serve para fazer enfeites  
 nenhuma das respostas acima

6) Você concorda com as seguintes frases? (PODE MARCAR MAIS DE UMA FRASE)

- O lobo guará tem que ser caçado  
 O lobo guará vive nos campos e cerrados do Brasil  
 O lobo guará caça ratos que atacam as plantações  
 O lobo guará não faz mal a ninguém  
 O lobo guará precisa ser protegido  
 Lobos são feras perigosas  
 O melhor lugar para o lobo guará é a natureza  
 O lobo guará não serve para nada  
 O lobo guará assusta e ataca gente  
 O lobo guará ataca galinheiros e criações  
 Proteger o lobo guará ajuda a proteger a natureza/ecologia  
 O lobo guará ajuda o turismo e a cultura do meu país  
 eu não me importo com o lobo guará  
 eu não gosto do lobo guará

8) O lobo guará dá/já deu algum prejuízo a você/sua família?

sim  não  não sei se foi o lobo ou outro animal  não sei

Que tipo de prejuízo? \_\_\_\_\_

9) Você conhece: a Unidade de Conservação (reserva) local?  o Zoológico local?

Sua visita foi para: ver os animais  passear com a família  visita de escola   
 fazer curso de educação ambiental  nunca visitei   
 outra razão( ): \_\_\_\_\_





**QUESTIONNAIRE 1**

1) Do you recognise the animal in the photo?  
 Yes  No → go to questionnaire 2

2) Where did you see or hear about the maned wolf?  
 (YOU MAY MARK MORE THAN ONE ANSWER)  
 Television, radio  Zoo, museum, reserve  
 Internet  News papers, books, magazines  
 School, environmental education course  
 I saw it live, in nature  Through my family, friends

3) In nature, what does the maned wolf eat the most?  
 (CHOOSE ONLY ONE ITEM)  
 rats  people  
 chicken  birds  
 steak  fruits  
 wolf's fruit  armadillo  
 insects  I don't know

4) Do you think the number of maned wolves in Brazil is:  
 decreasing  increasing  staying the same

5) Do you believe that (YOU MAY MARK MORE THAN ONE ANSWER)  
 parts of the maned wolf's body are good for making remedies  
 to carry a piece of the maned wolf's pelt brings luck  
 the maned wolf's skin is good for making accessories  
 none of the above options

6) Do you agree with the following statements? (YOU MAY MARK MORE THAN ONE STATEMENT)  
 The maned wolf must be hunted  
 The maned wolf lives in the grasslands and savannahs of Brazil  
 The maned wolf hunts rats that attack plantations  
 The maned wolf does not harm anyone  
 The maned wolf needs to be protected  
 Wolves are dangerous beasts  
 The best place for the maned wolf is nature  
 The maned wolf is useless  
 The maned wolf scares and attacks people  
 The maned wolf attacks chicken pens and livestock  
 Preserving the maned wolf helps to preserve the ecology  
 The maned wolf helps my country's tourism and culture  
 I don't care about the maned wolf  
 I don't like the maned wolf

7) Has the maned wolf ever caused any damage to you/your family?  
 yes  no  I don't know if it was the maned wolf or another animal  I don't know  
 What sort of damage? \_\_\_\_\_

8) Do you know: the local Conservation Unit (reserve)?  the local zoo?   
 The purpose of your visit was: to see the animals  family day out  school visit   
 Environmental education course  other  I have never visited







**QUESTIONÁRIO 2-**

1) A natureza é importante para você? (FAÇA UM X NO ESPAÇO QUE MELHOR REPRESENTA SUA OPINIÃO)

muito importante: \_\_: \_\_: \_\_: \_\_: \_\_: \_\_: \_\_: sem importância nenhuma

2) Para você animais selvagens são tão importantes quanto:

- ( ) gente
- ( ) animais de estimação
- ( ) animais domésticos e de criação
- ( ) todos os acima
- ( ) nenhum dos acima

3) Durante o último ano você:

- ( ) Observou animais selvagens na natureza
- ( ) Alimentou animais selvagens na natureza
- ( ) Fotografou animais selvagens na natureza
- ( ) Nenhum dos acima

4) Você sentiria falta deste contato com a natureza se este não estivesse mais disponível?  
sentiria muita falta: \_\_: \_\_: \_\_: \_\_: \_\_: \_\_: \_\_: não sentiria nenhuma falta

5) A caça de animais selvagens é proibida no Brasil. Na sua opinião:

- ( ) a proibição é justa, toda caça deve ser proibida
- ( ) a caça de animais que estão desaparecendo deve ser proibida
- ( ) a caça de animais perigosos deve ser permitida
- ( ) a caça de animais para comer deve ser permitida
- ( ) a caça de animais para couro, remédios e amuletos deve ser permitida
- ( ) a proibição é injusta, toda caça deve ser permitida

8) Na sua opinião predadores selvagens (PODE MARCAR MAIS DE UMA RESPOSTA):

- ( ) fazem parte da teia ecológica
- ( ) são necessários para manter o equilíbrio ecológico na natureza
- ( ) são uma ameaça à segurança
- ( ) são uma ameaça às criações de animais
- ( ) também tem direito à vida
- ( ) são inconvenientes, uma peste, só dão prejuízos
- ( ) transmitem doenças para animais domésticos
- ( ) precisam ser protegidos das pessoas
- ( ) são caça valiosa
- ( ) causam curiosidade
- ( ) são bonitos, fascinantes, fortes e poderosos
- ( ) são fontes de histórias, contos, causos, cantigas

9) Você associa a **conservação** (iniciativas para manter/aumentar os números de uma espécie na natureza) **de animais selvagens** com (EM CADA LINHA, MARQUE SUA RESPOSTA COM UM X NO ESPAÇO QUE MELHOR REPRESENTA SUA OPINIÃO):

ATRASSO: \_\_: \_\_: \_\_: \_\_: \_\_: \_\_: \_\_: PROGRESSO  
 NECESSIDADE: \_\_: \_\_: \_\_: \_\_: \_\_: \_\_: \_\_: INUTILIDADE  
 TRADIÇÃO: \_\_: \_\_: \_\_: \_\_: \_\_: \_\_: \_\_: MODERNIDADE  
 CIDADE: \_\_: \_\_: \_\_: \_\_: \_\_: \_\_: \_\_: CAMPO

AMEAÇA : \_\_: \_\_: \_\_: \_\_: \_\_: \_\_: \_\_: PROTEÇÃO  
 IGNORÂNCIA : \_\_: \_\_: \_\_: \_\_: \_\_: \_\_: \_\_: SABEDÓRIA  
 POLÍTICOS : \_\_: \_\_: \_\_: \_\_: \_\_: \_\_: \_\_: NATUREZA

10) Você conhece:

a Unidade de Conservação (reserva) local? ( ) o Zoológico local? ( )

Sua visita foi para:

ver os animais ( ) passear com a família ( ) curso de educação ambiental ( )  
 visita de escola ( ) nunca visitei( ) outra razão ( ):\_\_\_\_\_

11) Quem é responsável por proteger animais selvagens em perigo de extinção? (PODE MARCAR MAIS DE UMA RESPOSTA)

( ) todos ( ) ONGs (organizações não governamentais)  
 ( ) população rural ( ) o governo ( ) parques e reservas (UCs)  
 ( ) zoológicos

### Dados pessoais:

Sexo: ( ) masculino ( ) feminino

Bairro/cidade: \_\_\_\_\_  
 rural ( ) urbana ( )

Ocupação: \_\_\_\_\_

Completo o: primário ( ) secundário( ) técnico( ) superior( )

Estudante: série/classe: \_\_\_\_\_

Idade: 12-13 ( ) 14-15 ( ) 16-17 ( ) 18-25 ( ) 26-30 ( ) 31-35 ( ) 36-40 ( ) 40-45 ( ) 46-50 ( ) 51-60 ( ) 61-70 ( ) over 71 ( )

**MUITO OBRIGADA PELA SUA COLABORAÇÃO!**

## QUESTIONNAIRE 2

1) Is nature important for you? (MARK YOUR ANSWER WITH AN X IN THE SPACE THAT BETTER REPRESENTS YOUR OPINION)

Very important: \_\_: \_\_: \_\_: \_\_: \_\_: \_\_: \_\_: not important

2) To you, wild animals are as important as:

( ) people ( ) pets  
 ( ) livestock ( ) none of the above

3) During the last years did you:

( ) Observe wildlife  
 ( ) Feed wildlife  
 ( ) Photograph wildlife  
 ( ) None of the above

4) How much such wildlife-activities would be missed if no longer available?

Very much: \_\_: \_\_: \_\_: \_\_: \_\_: \_\_: \_\_: not at all

5) It is prohibited to hunt wild animals in Brazil. In your opinion:

( ) the prohibition is fair, all hunting should be banned

- it should be prohibited to hunt animals that are disappearing  
 hunting dangerous animals should be allowed  
 hunting animals for food should be allowed  
 hunting animals for pelt, medicines and talismans should be allowed  
 the prohibition is unfair, all hunting should be allowed

8) In your opinion wild predators (YOU MAY MARK MORE THAN ONE ANSWER):

- are part of the ecological web  
 are essential to maintain nature's balance  
 are a threat to safety  
 are a threat to livestock  
 have the right to live  
 are inconvenient, a pest, only cause damage  
 transmit disease to domestic animals  
 need to be protected from people  
 are valuable as game  
 inspire curiosity  
 are beautiful, fascinating, strong and powerful  
 are the source of stories, tales, legend, songs

9) Do you associate **conservation** (initiatives to maintain/increase the numbers of a species in nature) of wild animals (ON EACH LINE, MARK AN **X** IN THE SPACE THAT BEST REPRESENTS YOUR OPINION):

BACKWARDNESS: \_\_: \_\_: \_\_: \_\_: \_\_: \_\_: \_\_: \_\_: PROGRESS  
 NECESSITY : \_\_: \_\_: \_\_: \_\_: \_\_: \_\_: \_\_: \_\_: USELESSNESS  
 TRADITION : \_\_: \_\_: \_\_: \_\_: \_\_: \_\_: \_\_: \_\_: MODERNITY  
 CITY : \_\_: \_\_: \_\_: \_\_: \_\_: \_\_: \_\_: \_\_: COUNTRY  
 THREAT : \_\_: \_\_: \_\_: \_\_: \_\_: \_\_: \_\_: \_\_: PROTECTION  
 IGNORANCE : \_\_: \_\_: \_\_: \_\_: \_\_: \_\_: \_\_: \_\_: KNOWLEDGE  
 POLITICIANS : \_\_: \_\_: \_\_: \_\_: \_\_: \_\_: \_\_: \_\_: NATURE

10) Do you know:      the local Conservation Unit (reserve)?( )  
                                  the local zoo? ( )

The purpose of your visit was:

- to see the animals( )      family day out( )  
 school visit( )      Environmental education course( )      other( )  
 I have never visited( )

**Personal Data:**

Sex: ( ) male ( ) female

Residence: \_\_\_\_\_  
 rural ( )      urban ( )

Occupation: \_\_\_\_\_

Completed: primary school ( ) secondary( ) diploma( ) degree( ) post-graduate( )

Student: form: \_\_\_\_\_

Age: 12-13 ( ) 14-15 ( ) 16-17 ( ) 18-25 ( ) 26-30 ( ) 31-35 ( ) 36-40 ( ) 40-45 ( ) 46-50 ( )  
 51-60 ( ) 61-70 ( ) over 71 ( )

**MANY THANKS FOR YOUR HELP!**

**QUESTIONÁRIO 3-****1. Na sua opinião o público em geral/estudantes (PODE MARCAR MAIS DE UMA RESPOSTA):**

- são contra a conservação do lobo guará
- não se interessam pela conservação do lobo guará
- não sabem nada/quase nada sobre o lobo guará
- tem um bom conhecimento sobre o lobo guará
- querem proteger o lobo guará
- tem simpatia pelo lobo guará

**2. Com relação a conservação marque as frases com as quais concorda :**

- lobo guará não é bastante relevante no contexto de conservação/educação ambiental
- a conservação do lobo guará abrange diversos habitats e diversas espécies da fauna e flora silvestres
- a proteção do lobo guará e fauna silvestre depende de pesquisa, treinamento de pessoal, apoio legal, cumprimento da lei, e manejo ambiental.
- educação ambiental é necessária na conservação do lobo guará e fauna silvestre
- valores culturais da população são importantes na conservação do lobo guará e fauna silvestre
- apoio a longo prazo da população é importante para conservação do lobo guará e fauna silvestre
- uma abordagem interdisciplinar é importante na conservação de fauna silvestre
- soluções a longo prazo para a conservação do lobo guará envolvem mudanças na cultura e nas atitudes da população
- soluções a longo prazo para a conservação do lobo guará envolvem mudanças na cultura e nas atitudes dos profissionais de conservação/educação
- reservas, zoológicos e escolas ajudam a formar opiniões sobre conservação de fauna silvestre
- a população deve ser envolvida em iniciativas de conservação

**3. Na sua opinião (PODE MARCAR MAIS DE UMA RESPOSTA):**

- o biólogo/educador é uma autoridade, um expert, que pratica uma ciência objetiva e imparcial
- o biólogo/educador é um profissional com pontos de vista próprios e pessoais
- é necessário concentrar esforços na coexistência entre seres humanos e lobos guarás para garantir o futuro da espécie
- conflitos com população rural causam mortalidade de lobos guarás
- conflitos com lobos guará causam prejuízos materiais à população rural
- os lobos guarás precisam ser protegidos das pessoas
- programas para diminuir conflito entre pessoas e lobos guarás devem levar em consideração todas as partes envolvidas
- criar lobos guarás em cativeiro para fins econômicos seria uma boa maneira de atender a demanda de partes do lobo para remédios, amuletos e enfeites
- lobos guarás são perigosos e atacam pessoas no campo/mata
- biólogos/educadores podem alienar o público/estudantes
- programas de conservação/educação ambiental não são bem aceitos pela população local

**4. Seu trabalho envolve o lobo guará?      Sim, diretamente( )      Sim, indiretamente( )      Não ( )****5. Pessoas matam o lobo guará por: (PODE MARCAR MAIS DE UMA RESPOSTA)**

- prazer (caça esportiva, etc)
- retaliação (para prevenir ou punir ataques a propriedade)
- auto-defesa (para prevenir ou punir ataques a pessoa)
- ganho material (para uso ou venda de partes do lobo)
- acidente (nas estradas, etc)
- animosidade, intolerância (não gostam do animal)
- outro: \_\_\_\_\_

**6. Na sua opinião, no contexto da conservação do lobo guará, iniciativas educativas devem ser dirigidas a: (PODE MARCAR MAIS DE UMA RESPOSTA)**

- comunidade (informação sobre o lobo guará e sobre a importância da sua conservação; conscientização do papel de cada um no ecossistema)
- políticos (apoiarem medidas legais para a proteção do lobo guará)

- ( ) biólogos/educadores (desenvolverem uma relação produtiva com outros segmentos da sociedade)  
 ( ) ninguém: iniciativas educativas não promovem sucesso em termos de conservação

**7. Com relação a programas de conservação do lobo guará, quais das iniciativas a seguir contribuem para relações positivas entre programa e população?**

- ( ) treinamento apropriado de biólogos/educadores do programa  
 ( ) maior empenho dos biólogos/educadores do programa  
 ( ) melhoria na educação da população  
 ( ) melhoria na qualidade de vida da população  
 ( ) participação de profissionais do programa na resolução de conflitos entre a população e o lobo guará  
 ( ) inclusão da população local no manejo do programa de conservação do lobo guará  
 ( ) maior respeito e receptividade da população  
 ( ) atividades socio/culturais, organizadas pelo programa, que reúnam os biólogos/ educadores do programa e a população local  
 ( ) participação de profissionais do programa em atividades socio/culturais organizadas pela comunidade local  
 ( ) atividades educativas ligando o programa e as escolas/comunidade locais

**8. Na sua opinião, o envolvimento da população na conservação do lobo guará:**

- ( ) facilita o levantamento de apoio e verbas para conservação  
 ( ) não encontra obstáculos  
 ( ) não é necessário  
 ( ) encontra falta de receptividade, interesse e respeito da população  
 ( ) é dificultado devido a burocracia, falta de apoio do governo e setor privado  
 ( ) é dificultado por falta de tempo e dinheiro  
 ( ) é dificultado por falta de escolaridade e qualidade de vida da população  
 ( ) é dificultado por falta de preparação e interesse dos professores  
 ( ) é dificultado por falta de flexibilidade no planejamento/calendário escolar e de autonomia e apoio aos professores  
 ( ) é dificultado por falta de cooperação entre biólogos, educadores e outros profissionais envolvidos

**9. Na sua opinião, quais afirmações refletem a relação entre a população e a reserva (UC) local?:**

- ( ) comunidade diz que a reserva é importante para a proteção da natureza  
 ( ) população local demonstra respeito à reserva e seus profissionais  
 ( ) comunidade utiliza a reserva como forma de lazer  
 ( ) alguns bichos da reserva trazem prejuízo para quem mora na vizinhança  
 ( ) os bichos e as plantas da reserva são valiosos para quem mora na vizinhança  
 ( ) a população local promove o uso ilegal de recursos da reserva (caça, desmatamento)  
 ( ) a comunidade local não participa de nada que é promovido pela reserva  
 ( ) população local demonstra não gostar do pessoal da reserva  
 ( ) população local diz que a reserva não trás benefícios à comunidade  
 ( ) pessoas da vizinhança mostraram interesse em participar no manejo da reserva  
 ( ) a reserva gera empregos para a comunidade local  
 ( ) a reserva trouxe melhorias para comunidade local  
 ( ) moradores locais procuram a reserva para resolver problemas com animais selvagens  
 ( ) funcionários da reserva atendem a moradores que tem problemas com animais selvagens  
 ( ) funcionários da reserva procuram diminuir/resolver conflitos entre população local e animais selvagens

**Dados pessoais:**

Sexo: ( ) masculino ( ) feminino

Origem/moradia: \_\_\_\_\_ rural ( ) urbana ( )

Local de trabalho: \_\_\_\_\_

Ocupação: \_\_\_\_\_ idade: \_\_\_\_\_

Completo o primário ( ) secundário( ) técnico( ) superior( ) pos-grad( )

(Estudante) Instituição de ensino: \_\_\_\_\_

**MUITO OBRIGADA PELA SUA COLABORAÇÃO!**

## QUESTIONNAIRE 3

### 1. In your opinion the general public/students (YOU MAY MARK MORE THAN ONE ANSWER):

- are against the conservation of the maned wolf
- are not interested in the conservation of the maned wolf
- know nothing/close to nothing about the maned wolf
- have a good knowledge about the maned wolf
- want to protect the maned wolf
- feel sympathy for the maned wolf

### 2. In relation to conservation, please mark the statements you most agree with:

- the maned wolf is not relevant enough within a conservation/environmental education context
- maned wolf conservation includes several habitats and many wild species of animals and plants
- the conservation of the maned wolf relies on research, training personnel, legal support, law enforcement, and environmental management.
- environmental education is necessary for the conservation of the maned wolf and wild animals
- cultural values are important in the conservation of the maned wolf and wild animals
- long-term support from local people is important for the conservation of the maned wolf and wild animals
- an interdisciplinary approach is important in the conservation of wild animals
- long-term solutions for the conservation of the maned wolf involve changes in people's culture and attitudes
- long-term solutions for the conservation of the maned wolf involve changes in conservation professionals/educators culture and attitudes
- reserves, zoos and schools help to form opinions about wildlife conservation
- local people must be involved in conservation initiatives

### 3. In your opinion (YOU MAY MARK MORE THAN ONE ANSWER)

- the biologist/educator is an authority, an expert, who practices an objective and impartial science
- the biologist/educator is a professional with personal points of view
- it is necessary to concentrate efforts in the co-existence between people and maned wolves to guarantee the future of the species
- conflicts with people causes mortality amongst maned wolves
- conflicts with maned wolves cause material damage to rural people
- maned wolves need to be protected from people
- programmes to decrease conflict between people and maned wolves must take into consideration all parts involved
- captive breeding maned wolves for economic ends could be a good way to meet the demands for maned wolf body parts for medicines, accessories and good luck charms
- maned wolves are dangerous e may attack people in the wild
- conservationists/educators can alienate the public/students
- conservation/environmental education programmes are not well accepted by local population

### 4. Does your work involve the maned wolf? Yes, directly( ) Yes, indirectly( ) No ( )

### 5. People kill the maned wolf for: (YOU MAY MARK MORE THAN ONE ANSWER )

- pleasure (sport, etc)
- retaliation (to prevent or to punish raids to property)
- self-defence (to prevent or to punish attacks to people)
- material gain (for use or sale of body parts)
- accident (on the road, etc)
- animosity, intolerance (people dislike the animal)
- other: \_\_\_\_\_

### 6. In your opinion, in the context of the maned wolf conservation, educational initiatives must target: (YOU MAY MARK MORE THAN ONE ANSWER)

- the community (to spread information about the maned wolf and the importance of conservation; awareness about peoples role in the ecosystem)
- politicians (to engage their support to legal measures to conserve the maned wolf)

- ( ) biologists/educators (to help develop a productive relationship with other stake holders)  
 ( ) no one: educational initiatives are not successful tools for conservation

**7. Which of the following initiatives contribute to positive relationships between conservation programmes and local people?**

- ( ) appropriate training of biologists/educators within the programme  
 ( ) more effort from biologists/educators within programme  
 ( ) improvements in local people's education  
 ( ) improvements in local people's standards of living  
 ( ) programme's professionals taking part in conflict resolution between local people and the maned wolf  
 ( ) including local people in the conservation programme for the maned wolf  
 ( ) more respect and receptivity from the local people  
 ( ) social/cultural activities, organized by the programme, which gather together biologists/educators from programme and local people  
 ( ) programme professionals taking part in socio/cultural activities organized by the local community  
 ( ) educational activities bringing together the programme and local schools/community

**8. In your opinion, involving local people in the conservation of the maned wolf:**

- ( ) makes it easier to raise support and money for conservation  
 ( ) has no obstacles  
 ( ) is not necessary  
 ( ) faces lack of receptivity, interest and respect from local people  
 ( ) is difficult due to bureaucracy, lack of support from government and private sectors  
 ( ) is difficult due to lack of time and money  
 ( ) is difficult due to lack of education and standards of living in local people  
 ( ) is difficult due to lack of preparation and interest of teachers  
 ( ) is difficult due to lack of flexibility in the school year planning/schedule and lack of autonomy and support for teachers  
 ( ) is difficult due to lack of cooperation between biologists, educators and other professionals involved

**9. In your opinion, which of the following statements reflect local people's relationship with the local reserve?:**

- ( ) the community shows that the reserve is important to protect nature  
 ( ) local people show respect for the reserve and its professionals  
 ( ) local community uses the reserve for leisure  
 ( ) the animals from the reserve cause damage to the neighbouring people  
 ( ) the animals and plants of the reserve are valuable to the local people  
 ( ) local people promote the illegal use of reserve resources (hunting, logging, etc)  
 ( ) the local community shows no interest in whatever is promoted by the reserve  
 ( ) local people show dislike for the people from the reserve  
 ( ) local people say the reserve has not brought benefits to the community  
 ( ) neighbouring people demonstrated interest to take part in managing the reserve  
 ( ) the reserve creates jobs for the local community  
 ( ) the reserve brought improvements to the local community  
 ( ) local people call upon the reserve to resolve problems with wild animals  
 ( ) reserve workers assist local people who have problems with wild animals  
 ( ) reserve workers try to reduce/resolve conflicts between local people and wild animals

**Personal data:**

Sex: ( ) male ( ) female

Residence: \_\_\_\_\_ rural ( ) urban ( )

Occupation: \_\_\_\_\_ age: \_\_\_\_\_

Completed: primary school ( ) secondary ( ) diploma ( ) degree ( ) post-graduate ( )

Student: course: \_\_\_\_\_

**MANY THANKS FOR YOUR HELP!**

**QUESTIONÁRIO rural**

1. Você conhece o bicho na foto ao lado?  
 Sim       Não → **responda questionário 2**
2. Onde você já viu ou ouviu falar do lobo guará?  
 (PODE MARCAR MAIS DE UMA RESPOSTA)  
 Televisão, rádio       Internet  
 Jornais, livros, revistas       Escola, curso educação ambiental  
 Pelos meus parentes, amigos       Zoológico, museu, reserva  
 Já vi ao vivo, na natureza       Na minha propriedade
3. O que o lobo guará mais come na natureza?  
 (ESCOLHA **SÓ UMA** RESPOSTA)  
 ratos       gente  
 galinha       passarinhos  
 carne de vaca       frutas  
 fruta do lobo       tatú  
 insetos       não sei
4. Você acha que o número de lobos guarás no Brasil está:  
 diminuindo       aumentando       continuando igual
5. Você acredita que (PODE MARCAR MAIS DE UMA FRASE):  
 partes do corpo do lobo guará são boas para fazer remédios  
 dá sorte carregar um pedaço do couro de lobo guará  
 o couro do lobo guará serve para fazer enfeites  
 nenhuma das opções acima
6. Você concorda com as seguintes frases? (PODE MARCAR MAIS DE UMA FRASE)  
 O lobo guará tem que ser caçado  
 O lobo guará vive nos campos e cerrados do Brasil  
 O lobo guará caça ratos que atacam as plantações  
 O lobo guará não faz mal a ninguém  
 O lobo guará precisa ser protegido  
 Lobos são feras perigosas  
 O melhor lugar para o lobo guará é a natureza  
 O lobo guará não serve para nada  
 O lobo guará assusta e ataca gente  
 O lobo guará ataca galinheiros e criações  
 Preservar o lobo guará ajuda a preservar a ecologia  
 O lobo guará ajuda o turismo e a cultura do meu país  
 eu não me importo com o lobo guará  
 eu não gosto do lobo guará
7. O lobo guará dá/já deu algum prejuízo a você/sua família?  
 sim       não       não sei se foi o lobo ou outro animal       não sei
8. SIM- o prejuízo foi de ordem:  
 econômica - custou dinheiro ou bens  
 afetiva, emocional  
 física – lobo atacou ou tentou atacar  
 espiritual - tirou a paz de espírito
9. Se um lobo guará é encontrado atacando a criação este deve ser:  
 preso em armadilha  
 morto  
 entregue para as autoridades  
 aproveitado para tirar partes do corpo  
 colocar os cachorros atrás dele





## 10. Pessoas matam o lobo guará por: (PODE MARCAR MAIS DE UMA RESPOSTA)

- por esporte
- pego atacando galinheiro
- matam antes que ataque galinheiro
- porque competem por caça (pássaros, tatú,...)
- para se proteger/ auto-defesa
- para vender partes do corpo
- porque partes do corpo trazem sorte
- porque se faz remédios com partes do corpo
- acidente, atropelamento
- porque as pessoas não gostam dele

11. Você conhece: a Unidade de Conservação (reserva) local? ( ) o Zoológico local? ( )  
 Sua visita foi para: ver os animais ( ) passear com a família ( ) visita de escola ( )  
 fazer curso de educação ambiental ( ) outro ( ) nunca visitei ( )

## 12. Você acha que:

- a reserva é importante para proteger a natureza
- a reserva é um bom lugar para visitar
- os bichos da reserva trazem prejuízo para a gente
- os bichos e as plantas da reserva são úteis para a gente
- a reserva não ia fazer falta se não existisse
- era melhor ter plantações e criações no lugar da reserva
- a reserva é um lugar bonito
- a reserva e quem trabalha nela ajuda o povo da vizinhança
- nada que a reserva faz é do meu interesse
- quem controla a reserva são os políticos da cidade
- os bichos e as plantas selvagens tem boas condições de viver na reserva
- a reserva não trás benefícios para quem mora na vizinhança
- as pessoas que trabalham na reserva sabem muito sobre os animais
- as pessoas da vizinhança deveriam participar no manejo da reserva
- moradores locais procuram a reserva para resolver problemas com animais selvagens
- funcionários da reserva atendem a moradores que tem problemas com animais selvagens
- funcionários da reserva procuram diminuir/resolver conflitos entre população local e animais selvagens

## 13. Que importância o pessoal da reserva local demonstra dar a prejuízos que os animais selvagens possam causar para os moradores da redondeza? (FAÇA UM X NO ESPAÇO QUE MELHOR REPRESENTA A SUA OPINIÃO)

MUITA IMPORTÂNCIA: \_\_: \_\_: \_\_: \_\_: \_\_: \_\_: \_\_: INDIFERENTES

## 14. Que importância o pessoal da reserva local demonstra dar para os problemas da comunidade local?

MUITA IMPORTÂNCIA: \_\_: \_\_: \_\_: \_\_: \_\_: \_\_: \_\_: INDIFERENTES

## 15. Que importância o pessoal da reserva local demonstra dar para as tradições culturais e acontecimentos da comunidade local?

MUITA IMPORTÂNCIA: \_\_: \_\_: \_\_: \_\_: \_\_: \_\_: \_\_: INDIFERENTES

## 16. Quem é responsável por proteger o lobo guará? (PODE MARCAR MAIS DE UMA RESPOSTA)

- todos
- ONGs (organizações não governamentais)
- população rural
- o governo
- parques e reservas (UCs)
- zoológicos

**Dados pessoais:**

Sexo: ( ) masculino ( ) feminino

idade: \_\_\_\_\_

Bairro/cidade: \_\_\_\_\_ rural ( ) urbana ( )

Ocupação: \_\_\_\_\_

Completou o: primário ( ) secundário ( ) técnico ( ) superior ( )

Estudante: série/classe: \_\_\_\_\_

**MUITO OBRIGADA PELA SUA COLABORAÇÃO!**

**QUESTIONNAIRE 4- Rural**

- 1) Do you recognise the animal in the photo?  
 Yes       No → go to questionnaire 2
- 2) Where did you see or hear about the maned wolf?  
 (YOU MAY MARK MORE THAN ONE ANSWER)  
 Television, radio       News papers, books, magazines  
 Internet       School, environmental education course  
 Zoo, museum       I saw it live, in nature  
 Through my family, friends       in my property
- 3) In nature, what does the maned wolf eat the most?  
 (CHOOSE ONLY ONE ITEM)  
 rats       people  
 chicken       birds  
 steak       fruits  
 wolf's fruit       armadillo  
 insects       I don't know
- 4) Do you think the number of maned wolves in Brazil is:  
 decreasing       increasing       staying the same
- 5) Do you believe that (YOU MAY MARK MORE THAN ONE ANSWER)  
 parts of the maned wolf's body are good for making remedies  
 to carry a piece of the maned wolf's pelt bring luck  
 the maned wolf's skin is good for making accessories  
 none of the above options
- 6) Do you agree with the following statements? (YOU MAY MARK MORE THAN ONE STATEMENT)  
 The maned wolf must be hunted  
 The maned wolf lives in the grasslands and savannahs of Brazil  
 The maned wolf hunts rats that attack plantations  
 The maned wolf does not harm anyone  
 The maned wolf needs to be protected  
 Maned wolves are dangerous beasts  
 The best place for the maned wolf is nature  
 The maned wolf is useless  
 The maned wolf scares and attacks people  
 The maned wolf attacks chicken pens and livestock  
 Preserving the maned wolf helps to preserve the ecology  
 The maned wolf helps my country's tourism and culture  
 I don't care about the maned wolf  
 I don't like the maned wolf
- 7) Has the maned wolf ever caused any damage to you/your family?  
 yes       no       I don't know if it was the maned wolf or another animal       I don't know
- 8) YES- the damage was:  
 material – it resulted in costs or losses  
 emotional – caused distress  
 physical – the wolf attacked or tried to  
 spiritual – it took away the peace of mind
- 9) If a maned wolf is found attacking livestock, it must be:  
 caught in a trap  
 killed  
 handed to the authorities  
 used for harvesting body parts  
 set the dogs after it



10. People kill the maned wolf for: (YOU MAY MARK MORE THAN ONE ANSWER)

- sport
- caught raiding chicken pen
- killed before it may raid the chicken pen
- competition for game (birds, armadillo,...)
- self-defence
- selling parts of the body
- parts of the body bring luck
- parts of the body have medicinal properties
- accident, run over
- people dislike the maned wolf

11. Do you know: the local Conservation Unit (reserve)?(  ) the local zoo? (  )  
 The purpose of your visit was: to see the animals(  ) family day out(  ) school visit(  )  
 Environmental education course(  ) other(  ) I have never visited(  )

12. Do you consider:

- the reserve is important to protect nature
- the reserve is a good place to visit
- the animals in the reserve cause damage to our property
- the animals and plants in the reserve are useful to us
- we would not miss the reserve if it didn't exist
- it would be better to replace the reserve with plantations and livestock
- the reserve is a beautiful place
- the reserve and its workers help the local people
- nothing done by the reserve interests me
- the reserve is controlled by city politicians
- to some the reserve and wild animals are more important than the local people
- the reserve does not benefit local people
- people who work in the reserve know much about wildlife
- the reserve brought benefits and employment to the region
- local people should take part in the management of the reserve
- local people call upon the reserve to resolve problems with wild animals
- reserve workers assist local people who have problems with wild animals
- reserve workers try to reduce/resolve conflicts between local people and wild animals

13. In your opinion, what importance reserve workers place on damages to local residents that might be caused by wildlife? (MARK YOUR ANSWER WITH AN X IN THE SPACE THAT BEST REPRESENTS YOUR OPINION)

MUCH IMPORTANCE: \_\_: \_\_: \_\_: \_\_: \_\_: \_\_: \_\_: INDIFERENT

14. In your opinion, what importance reserve workers place on problems faced by the local community?

MUCH IMPORTANCE: \_\_: \_\_: \_\_: \_\_: \_\_: \_\_: \_\_: INDIFERENT

15. In your opinion, what importance reserve workers place on cultural traditions and what goes on in the local community?

MUCH IMPORTANCE: \_\_: \_\_: \_\_: \_\_: \_\_: \_\_: \_\_: INDIFERENT

**Personal Data:**

Sex: (  ) male (  ) female age: \_\_\_\_\_

Residence: \_\_\_\_\_

rural (  ) urban (  )

Occupation: \_\_\_\_\_

Completed: primary school(  ) secondary(  ) diploma(  ) degree(  ) post-graduate(  )

Student: form: \_\_\_\_\_

**MANY THANKS FOR YOUR HELP!**

## APPENDIX II Question categories and scores

Scores were counted according to the answers chosen by each respondent. In multiple choice questions each item chosen counted as one point: one item in support of maned wolf conservation counted as one point (+) in positive scores; one item in opposition to maned wolf conservation counted as one point (-) in a negative score; neutral answers counted as one point (n) in neutral scores. Negative statements that were left blank were counted as one point in a positive score, and positive statements that were left blank were counted as one point in a negative score. The questions that compose each score have been marked below to illustrate how scores were computed. Answers marked with an (X) were considered correct, not attached to a positive or negative value.

### 1. Knowledge/beliefs about the maned wolf and habitat - knowledge score (questions about knowledge, beliefs)

(Q1q3; Q4q3) In nature, what does the maned wolf eat the most?

(CHOOSE **ONLY ONE** ITEM)- *the choice of any of the correct items counted as one point.*

- |  |  |
|--|--|
| <input checked="" type="checkbox"/> rats         | <input type="checkbox"/> people            |
| <input type="checkbox"/> chicken                 | <input type="checkbox"/> birds             |
| <input type="checkbox"/> steak                   | <input checked="" type="checkbox"/> fruits |
| <input checked="" type="checkbox"/> wolf's fruit | <input type="checkbox"/> armadillo         |
| <input type="checkbox"/> insects                 | <input type="checkbox"/> I don't know      |

7) (Q1q4; Q4q4) Do you think the number of maned wolves in Brazil is:

- decreasing       increasing       staying the same

(Q1q6; Q4q6) Do you agree with the following statements?

- The maned wolf lives in the grasslands and savannahs of Brazil  
 The maned wolf hunts rats that attack plantations  
 The maned wolf needs to be protected  
 The best place for the maned wolf is nature  
 Preserving the maned wolf helps to preserve the ecosystem  
 The maned wolf helps my country's tourism and culture

(Q1q12) The grey wolf lives in Europe and the USA. Choose which phrases refer to the maned wolf or to the grey wolf

- |   | Maned wolf                          | grey wolf                           |
|---|-------------------------------------|-------------------------------------|
| 6. Live in groups of 10 or more animals                                 | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
| 7. Eats mainly meat   | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
| 8. In the absence of wild prey it may hunt livestock (sheep, goat, pig) | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
| 9. Hunts in group   | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
| 10. Eats more rats and insects than chickens                            | <input checked="" type="checkbox"/> | <input type="checkbox"/>            |
| 11. Attacks the aged and children to eat                                | <input type="checkbox"/>            | <input type="checkbox"/>            |

### 2. Attitudes: Positive/negative/neutral attitudes/feelings towards the maned wolf- attitude score (questions about attitudes, feelings)

(Q1q6; Q4q6) Do you agree with the following statements?

- ( - ) I don't care about the maned wolf
- ( - ) I don't like the maned wolf

(Q1q11) What do you think about the maned wolf?:

GOOD \_+\_:+\_:+\_:+\_:\_:~::~-\_- BAD  
 BEAUTIFUL \_+\_:+\_:+\_:+\_:\_:~::~-\_- UGLY  
 BRAVE \_+\_:+\_:+\_:+\_:\_:~::~-\_- COWARD  
 DANGEROUS \_-\_-::~-\_-:\_:~::~+\_:+\_:+\_ HARMLESS  
 AGRESSIVE \_-\_-::~-\_-:\_:~::~+\_:+\_:+\_ DEFENSIVE  
 VALUABLE \_+\_:+\_:+\_:+\_:\_:~::~-\_- WORTHLESS  
 FEROCIOUS \_-\_-::~-\_-:\_:~::~+\_:+\_:+\_ TAME

(Q1q13) What would you do to help the maned wolf?

- ( + ) I would tell my family and friends that the maned wolf needs protection
- ( + ) I would join a group to help protect wild animals such as the maned wolf
- ( + ) I would contribute with money
- ( n ) Nothing
- ( + ) I would try to find out more about the maned wolf and where it lives

(Q4q9) If a maned wolf is found attacking livestock, it must be:

- ( - ) trapped
- ( - ) killed
- ( + ) handed to the authorities
- ( - ) used for harvesting body parts
- ( - ) set the dogs after it

### 3. Beliefs: Positive/negative beliefs score

8) (Q1q5; Q4q5) Do you believe that:

- ( - ) parts of the maned wolf's body are good for making remedies
- ( - ) to carry a piece of the maned wolf's pelt bring luck
- ( - ) the maned wolf's skin is good for making accessories
- (3+) none of the above options

9) (Q1q6; Q4q6) Do you agree with the following statements?

- ( - ) The maned wolf must be hunted
- ( + ) The maned wolf does not harm anyone
- ( + ) the maned wolf needs to be protected
- ( + ) The best place for the maned wolf is nature
- ( - ) The maned wolf is useless
- ( - ) The maned wolf scares and attacks people
- ( - ) The maned wolf attacks chicken pens and livestock

(Q1q14) What do you think should be done with the maned wolves in Brazil?

- ( - ) Get rid of these animals
- ( - ) Harvest for the use of body parts should be allowed
- ( + ) Leave them alone
- ( + ) Protect and preserve them

#### 4. Beliefs and attitudes towards conservation- conservation score

(Q1q10; Q2q11; Q4q16) Who is responsible for protecting the maned wolf?

(Q2q11) Who is responsible for protecting wild animals?

- (+) everybody                      (+) NGOs                      (+) rural people  
 (+) the government              (+) parks and reserves              (+) zoos

(Q1q13) Do you associate conservation (initiatives to maintain/increase the numbers of a species in nature) **of the maned wolf** with:

(Q2q9) Do you associate conservation (initiatives to maintain/increase the numbers of a species in nature) **of wild animals** with:

BACKWARDNESS: \_-\_-\_-: -\_-\_-: **n**\_: \_+\_: +\_: +\_ PROGRESS  
 ECCESSITY : \_+\_: +\_: +\_: **n**\_: -\_-\_-: -\_-\_- USELESSNESS  
 TRADITION : -\_-\_-: -\_-\_-: **n**\_: \_+\_: +\_: +\_ MODERNITY  
 THREAT : -\_-\_-: -\_-\_-: **n**\_: \_+\_: +\_: +\_ PROTECTION  
 IGNORANCE : -\_-\_-: -\_-\_-: **n**\_: \_+\_: +\_: +\_ KNOWLEDGE  
 POLITITANS : -\_-\_-: -\_-\_-: **n**\_: \_+\_: +\_: +\_ NATURE

(Q2q5) It is prohibited to hunt wild animals in Brazil. In your opinion:

- (+) the prohibition is fair, all hunting should be banned  
  
 (-) hunting dangerous animals should be allowed  
 (-) hunting animals for food should be allowed  
 (-) hunting animals for pelt, medicines and talismans should be allowed  
 (-) the prohibition is unfair, all hunting should be allowed

(Q2q8) In your opinion wild predators:

- (+) are part of the ecological web  
 (+) are necessary to maintain nature's balance  
 (-) are a threat to safety  
 (-) are a threat to livestock  
 (+) have the right to live  
 (-) are inconvenient, a pest, only cause damage  
 (+) need to be protected from people  
 (-) are valuable as game  
 (+) inspire curiosity  
 (+) are beautiful, fascinating, strong and powerful  
 (+) are the source of stories, tales, legend, songs

**(Q3q2). In relation to conservation, please mark the statements you most agree with:**

- (-) the maned wolf is not relevant enough within a conservation/environmental education context  
 (+) maned wolf conservation includes several habitats and many wild species of animals and plants  
 (+) the conservation of the maned wolf and wildlife relies on research, training personnel, legal support, law enforcement, and environmental management.  
 (+) environmental education is necessary for the conservation of the maned wolf and wild animals  
 (+) people's cultural values are important in the conservation of the maned wolf and wild animals  
 (+) long-term support from local people is important for the conservation of the maned wolf and wild animals  
 (+) an interdisciplinary approach is important in the conservation of wild animals  
 (+) long-term solutions for the conservation of the maned wolf involve changes in people's culture and attitudes

- (+ ) long-term solutions for the conservation of the maned wolf involve changes in conservation professionals/educators culture and attitudes
- (+ ) reserves, zoos and schools help to form opinions about wildlife conservation
- (+ ) local people must be involved in conservation initiatives

### 5. Value towards wild animals, carnivores, and nature: value score

(Q2q1) Is nature important to you?

Very important: + + + n - - - - not important

(Q2q2) To you, wild animals are as important as:

- (+ ) people
- (+ ) livestock
- (+ ) pets

(Q2q3) During the last years did you:

- (+ ) Observe wildlife
- (+ ) Feed wildlife
- (+ ) Photographed wildlife

(Q2q4) How much such wildlife-activities would be missed if no longer available?

Very much: + + + n - - - - not at all

(Q4q12). Do you consider:

- (+ ) the reserve is important to protect nature
- (+ ) the reserve is a good place to visit
- (- ) the animals in the reserve cause damage to our property
- (- ) the animals and plants in the reserve are useful to us
- (- ) we would not miss the reserve if it didn't exist
- (- ) it would be better to replace the reserve with plantations and livestock
- (+ ) the reserve is a beautiful place
- (- ) nothing done by the reserve interests me
- (- ) the reserve is controlled by city politicians
- (+ ) the wild animals and plants have good living conditions in the reserve
- (- ) the reserve does not benefit local people
- (+ ) the reserve brought benefits and employment to the region
- (+ ) local people should take part in the management of the reserve
- (+ ) local people call upon the reserve to resolve problems with wild animals

### 6. Beliefs and feelings towards other interest groups- people relationship score

(Q3q1) In your opinion the general public/students:

- (- ) are against the conservation of the maned wolf
- (- ) are not interested in the conservation of the maned wolf
- (- ) know nothing/close to nothing about the maned wolf
- (+ ) have a good knowledge about the maned wolf
- (+ ) want to protect the maned wolf
- (+ ) feel sympathy for the maned wolf

(Q3q3). In your opinion

- ( - ) the biologist/educator is an authority, an expert, who practices an objective and impartial science
- ( + ) the biologist/educator is a professional with personal points of view
- ( + ) it is necessary to concentrate efforts in the co-existence between people and maned wolves to guarantee the future of the species
- ( + ) programmes to decrease conflict between people and maned wolves must take into consideration all parts involved
- ( + ) conservationists/educators can alienate the public/students
- ( - ) conservation/environmental education programmes are not well accepted by the local people

(Q3q6, pilot) In your opinion, in the context of the maned wolf conservation, educational initiatives must target:

- ( + ) the community (to spread information about the maned wolf and the importance of conservation; awareness about people's role in the ecosystem)
- ( + ) politicians (to engage their support to legal measures to conserve the maned wolf)
- ( + ) biologists/educators (to help develop a productive relationship between other stake holders)
- ( - ) no one: educational initiatives are not successful tools for conservation

(Q3q7) Which of the following initiatives contribute to positive relationships between conservation programmes and local people?

- ( + ) appropriate training of biologists/educators within the programme
- ( + ) more effort from biologists/educators within programme
- ( + ) improvements in local people's education
- ( + ) improvements in local people's standards of living
- ( + ) programme's professionals taking part in conflict resolution between local people and the maned wolf
- ( + ) including local people in the management of the conservation programme for the maned wolf

(Q3q8) In your opinion, involving local people in the conservation of the maned wolf:

- ( + ) makes it easier to raise support and money for conservation
- ( + ) has no obstacles
- ( - ) is not necessary
- ( - ) faces lack of receptivity, interest and respect from local people
- ( - ) is difficult due to bureaucracy, lack of support from government and private sectors
- ( - ) is difficult due to lack of time and money
- ( - ) is difficult due to lack of education and standards of living in local people
- ( - ) is difficult due to lack of preparation and interest of teachers
- ( - ) is difficult due to lack of flexibility in the school year planning/schedule and lack of autonomy and support for teachers
- ( - ) is difficult due to lack of cooperation between biologists, educators and other professionals involved

(Q3q9) In your opinion, which of the following statements reflect local people's relationship with the local reserve (CU)?:

- ( + ) the community says that the reserve is important to protect nature
- ( + ) local people shows respect for the reserve and its professionals
- ( - ) local people promote the illegal use of reserve resources (hunting, logging, etc)
- ( - ) the local community don't take part in anything promoted by the reserve
- ( - ) local people shows dislike for the people from the reserve
- ( - ) local people say the reserve has not brought benefits to the community
- ( + ) neighbouring people demonstrated interest to take part in managing the reserve
- ( + ) reserve workers assist local people who have problems with wild animals



( + ) reserve workers try to reduce/resolve conflicts between local people and wild animals

(Q4q12). Do you consider:

- ( + ) the reserve is important to protect nature
- ( - ) it would be better to replace the reserve with plantations and livestock
- ( + ) the reserve and its workers help the local people
- ( - ) nothing done by the reserve interests me
- ( - ) the reserve is controlled by city politicians
- ( - ) to some the reserve and wild animals are more important than the local people
- ( - ) the reserve does not benefit local people
- ( + ) people who work in the reserve know much about wildlife
- ( + ) reserve workers assist local people who have problems with wild animals
- ( + ) reserve workers try to reduce/resolve conflicts between local people and wild animals

(Q4q13). What importance reserve workers place on damages to local residents that might be caused by wildlife?

MUCH IMPORTANCE: + + + n - - - : INDIFERENT

(Q4q14). What importance reserve workers place on problems faced by the local community?

MUCH IMPORTANCE: + + + n - - - : INDIFERENT

(Q4q15). What importance reserve workers place on cultural traditions and what goes on in the local community?

MUCH IMPORTANCE: + + + n - - - : INDIFERENT

## APPENDIX III – Tables and graphs

### 1. CHARACTERISTICS OF THE SAMPLE

Demographic characteristics by place of residence			urban/rural residence		Total
			urban	rural	
target groups	students year 8		159	9	168
	students sixth-form		148	18	166
	zoo visitors		88	9	97
	CU visitors		20	8	28
	school prof		35	1	36
	zoo prof		57	5	62
	CU prof		21	9	30
	rural population		3	51	54
	International Paper		32	1	33
Total			563	111	674
research location	Greater São Paulo	Count	120	6	126
		Expected Count	105.4	20.6	126.0
		Std. Residual	1.4	-3.2	
	Low Mogiana region	Count	200	64	264
		Expected Count	220.8	43.2	264.0
		Std. Residual	-1.4	3.2	
	São Carlos	Count	200	32	232
		Expected Count	194.0	38.0	232.0
		Std. Residual	.4	-1.0	
	São Paulo state	Count	47	9	56
		Expected Count	46.8	9.2	56.0
		Std. Residual	.0	.0	
Total		Count	567	111	678
		Expected Count	567.0	111.0	678.0
male or female	male	Count	274	57	331
		% within gender	82.8%	17.2%	100.0%
	female	Count	291	50	341
		% within gender	85.3%	14.7%	100.0%
Total		Count	565	107	672
		% within gender	84.1%	15.9%	100.0%

Demographic characteristics by place of residence			Urban	Rural	Total	
age group 1	up to 13	Count	163	9	172	
		Expected Count	144.9	27.1	172.0	
		Std. Residual	1.5	-3.5		
	14-18	Count	175	22	197	
		Expected Count	166.0	31.0	197.0	
		Std. Residual	.7	-1.6		
	19-40	Count	125	23	148	
		Expected Count	124.7	23.3	148.0	
		Std. Residual	.0	-.1		
	41 and up	Count	51	42	93	
		Expected Count	78.4	14.6	93.0	
		Std. Residual	-3.1	7.2		
Total		Count	514	96	610	
$\chi^2=18.1, df=3, p<0.001$		Expected Count	514.0	96.0	610.0	
occupation groups	students		355	34	389	
	at home urban occupations		7	20	27	
			59	27	86	
	bio/edu occupations		117	6	123	
			0	15	15	
Total		538	102	640		
education groups	educated up to year 10	Count	199	60	259	
		Expected Count	216.6	42.4	259.0	
		Std. Residual	-1.2	2.7		
	educated up to sixth-form	Count	206	39	245	
		Expected Count	204.9	40.1	245.0	
		Std. Residual	.1	-.2		
	tertiary education	Count	152	10	162	
		Expected Count	135.5	26.5	162.0	
		Std. Residual	1.4	-3.2		
	Total		Count	557	109	666
	$\chi^2= 21.1; df=2; p<0.001$		Expected Count	557.0	109.0	666.0

Table 1.2.1. Urban and Rural residents' demographic characteristics

Research location and socio-demographic variables by target groups		target groups									Total
		students year 8	students sixth-form	zoo visitors	CU visitors	school prof	zoo prof	CU prof	rural population	International Paper	
research location	Greater São Paulo	31	28	31	19	2	15	11	0	0	137
	Low Mogiana region	78	55	30	20	20	7	8	29	35	282
	São Carlos	67	91	34	0	14	5	5	25	0	241
	São Paulo state	0	0	15	0	0	39	7	0	0	61
	Total	176	174	110	39	36	66	31	54	35	721
male or female	male	84	86	51	11	8	25	23	31	30	349
	female	91	84	54	17	28	38	8	23	5	348
	Total	175	170	105	28	36	63	31	54	35	697
age groups	up to 13	161	0	2	15	0	0	0	1	0	179
	14-18	11	159	26	1	0	1	0	3	0	201
	19-40	0	2	48	8	15	41	8	12	23	157
	41 and up	0	2	12	3	12	6	13	38	8	94
	Total	172	163	88	27	27	48	21	54	31	631
occupation groups	students	176	174	24	17	0	5	1	6	0	403
	at home	0	0	6	1	0	0	0	20	0	27
	urban occupations	0	0	39	6	0	11	9	12	12	89
	bio/edu occupations	0	0	4	1	36	45	19	0	20	125
	land related occupations	0	0	0	0	0	0	0	15	0	15
	Total	176	174	73	25	36	61	29	53	32	659
education groups	no formal education	0	0	0	1	0	1	0	3	0	5
	educated up to year 10	176	0	23	19	0	3	3	39	2	265
	educated up to sixth-form	0	174	41	6	0	6	10	11	6	254
	tertiary education	0	0	28	4	36	53	17	1	27	166
	Total	176	174	92	30	36	63	30	54	35	690

Table 1.3. target groups by socio-demographic variables and research location

## 2. QUESTION CATEGORIES

### 2.1.KNOWLEDGE

Socio-demographic variables, target groups and research locations by respondent's ability to identify the maned wolf			Do you know the animal in the photo?		Total
			No	Yes	
target groups	students year 8	Count	20	156	176
		Expected Count	23.2	152.8	176.0
		Std. Residual	-.7	.3	
	students sixth-form	Count	26	148	174
		Expected Count	22.9	151.1	174.0
		Std. Residual	.6	-.3	
	zoo visitors	Count	24	85	109
		Expected Count	14.4	94.6	109.0
		Std. Residual	2.5	-1.0	
	CU visitors	Count	6	33	39
		Expected Count	5.1	33.9	39.0
		Std. Residual	.4	-.1	
	rural population	Count	0	54	54
		Expected Count	7.1	46.9	54.0
		Std. Residual	-2.7	1.0	
	International Paper	Count	0	25	25
		Expected Count	3.3	21.7	25.0
		Std. Residual	-1.8	.7	
Total	$\chi^2=20.6$ ; $df=5$ ; $p=0.001$	Count	76	501	577
		Expected Count	76.0	501.0	577.0
research location	Greater São Paulo	Count	37	71	108
		Expected Count	14.3	93.7	108.0
		Std. Residual	6.0	-2.3	
	Low Mogiana region	Count	16	222	238
		Expected Count	31.5	206.5	238.0
		Std. Residual	-2.8	1.1	
	São Carlos	Count	24	196	220
		Expected Count	29.2	190.8	220.0
		Std. Residual	-1.0	.4	
	São Paulo state	Count	0	15	15
		Expected Count	2.0	13.0	15.0
		Std. Residual	-1.4	.6	
Total	$\chi^2=53.5$ ; $df=3$ ; $p<0.001$	Count	77	504	581
		Expected Count	77.0	504.0	581.0
male or female	male		23	262	285
		female	48	227	275
Total	$\chi^2=11.1$ ; $df=1$ ; $p=0.001$		71	489	560
age group 1	up to 13		22	156	178
	14-18		27	174	201
	19-40		16	71	87
	41 and up		5	60	65
Total			70	461	531

Socio-demographic variables, target groups and research locations by respondent's ability to identify the maned wolf			Do you recognize the animal in the photo?		total
			No	Yes	
urban/rural residence	urban	Count	66	379	445
		Expected Count	58.5	386.5	445.0
		Std. Residual	1.0	-.4	
	rural	Count	5	90	95
		Expected Count	12.5	82.5	95.0
		Std. Residual	-2.1	.8	
Total	Count	71	469	540	
	Expected Count	71.0	469.0	540.0	
occupation groups	students	49	351	400	
	at home	3	24	27	
	urban occupations	10	58	68	
	bio/edu occupations	1	16	17	
	land related occupations	0	15	15	
Total		63	464	527	
education groups	no formal education	0	4	4	
	educated up to year 10	31	226	257	
	educated up to sixth-form	35	207	242	
	tertiary education	6	45	51	
Total		72	482	554	

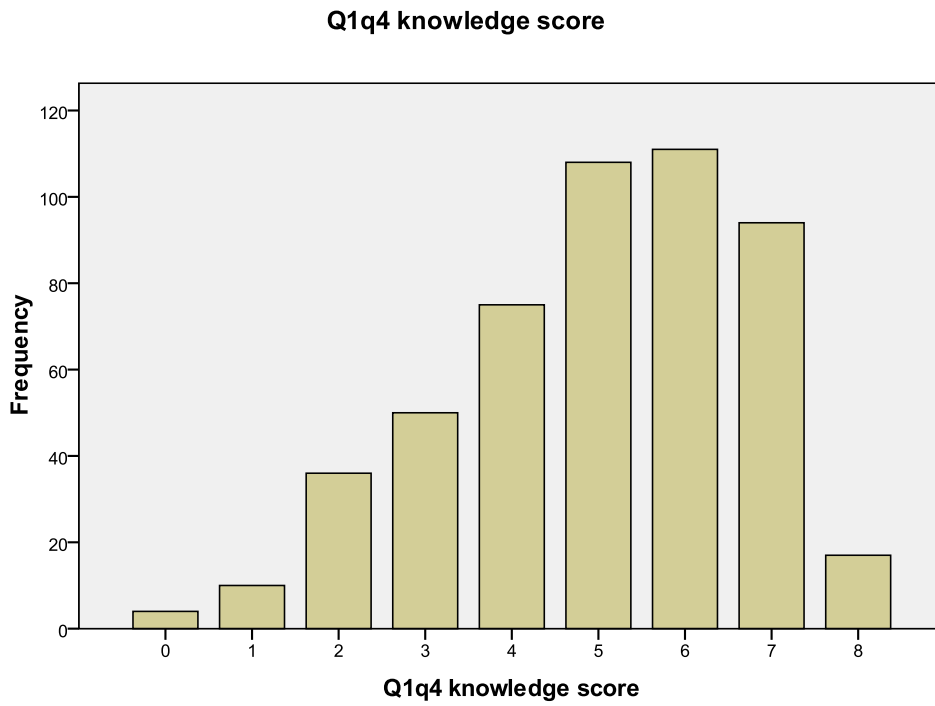
**Table 2.1.1. Q1+Q4 respondent's ability to recognize the maned wolf by socio-demographic variables, target groups and research locations.**

Trends in maned wolf's numbers by variables		Do you think the number of wolves is:			Total
		decreasing	staying the same	increasing	
Information source					
Live in nature		27	1	10	38
Total		41	2	11	54
Saw/heard about the maned wolf from secondary sources of information		19	1	3	23
Total		41	2	11	54
in my own property		7	1	8	16
Total		41	2	11	54
The maned wolf attacks chicken pens and livestock		33	2	10	45
Total		41	2	11	54
damage groups	No damage	34	2	6	42
	Damage caused by maned wolf or other animal	7	0	5	12
	Total	41	2	11	54
food groups	rats/wolf's fruit/fruit	21	0	3	24
	chicken	10	0	3	13
	don't know	2	1	0	3
	other answer	8	1	5	14
	Total	41	2	11	54

**Table 2.1.3.1.Q4 Rural respondents; trends in maned wolf's numbers according to source of information, food preferences, and experience of maned wolf caused damages.**

Do you think the number of maned wolves is:				The maned wolf attacks chicken pens and livestock		Total
				No answer	Yes	
decreasing	in my own property	No	Count % within in my own property	6 17.6%	28 82.4%	34 100.0%
		yes	Count % within in my own property	2 28.6%	5 71.4%	7 100.0%
	Total	Count % within in my own property	8 19.5%	33 80.5%	41 100.0%	
staying the same	in my own property	No	Count % within in my own property		1 100.0%	1 100.0%
		yes	Count % within in my own property		1 100.0%	1 100.0%
	Total	Count % within in my own property		2 100.0%	2 100.0%	
increasing	in my own property	No	Count % within in my own property	1 33.3%	2 66.7%	3 100.0%
		yes	Count % within in my own property	0 .0%	8 100.0%	8 100.0%
	Total	Count % within in my own property	1 9.1%	10 90.9%	11 100.0%	

**Table 2.1.3.1a.Q4 Rural respondents' trends in maned wolf's numbers according to source of information and to the belief that the maned wolf attacks chicken pens and livestock**



Bar chart 2.1.6. Q1+Q4 frequencies of knowledge scores

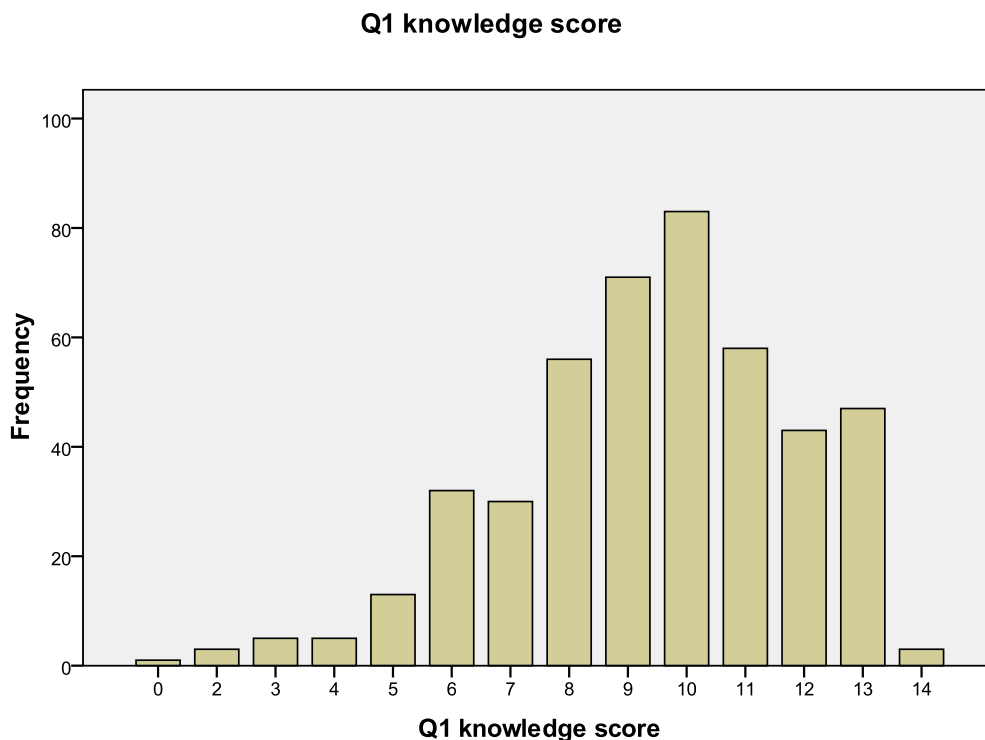
		Frequency	Percent
Valid	low knowledge	50	9.9
	moderate knowledge	238	47.1
	high knowledge	217	43.0
	Total	505	100.0

Table 2.1.6. Q1+Q4 knowledge scores

		Frequency	Percent
Valid	low knowledge	175	34.7
	high knowledge	330	65.3
	Total	505	100.0

Table 2.1.6a. Q1+Q4 knowledge scores regrouped





**Bar chart 2.1.6. Q1 frequencies of knowledge scores**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	low knowlegde	89	19.7	19.8	19.8
	high knowledge	361	80.0	80.2	100.0
	Total	450	99.8	100.0	
Missing	System	1	.2		
Total		451	100.0		

**Table 2.1.6. Q1 knowledge scores**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	low knowledge	15	3.3	3.3	3.3
	moderate knowledge	201	44.6	44.7	48.0
	high knowledge	234	51.9	52.0	100.0
	Total	450	99.8	100.0	
Missing	System	1	.2		
Total		451	100.0		

**Table 2.1.6a. Q1knowledge scores**

## 2.2. ATTITUDES

	Frequency	Percent
I don't care about the maned wolf	33	6.5
I don't like the maned wolf	8	1.6
Total= 505 respondents	41	8.1

**Table 2.2.1. Q1+Q4 respondents' attitudes towards the maned wolf.**

Socio-demographic characteristics by respondents' attitudes towards the maned wolf		I don't care about the maned wolf (N=33)	Total respondents per variable
target groups	students year 8	13	156
	students sixth-form	5	148
	zoo visitors	1	86
	CU visitors	2	33
	rural population	12	54
	International Paper	0	25
	Total respondents		502
age group 1	up to 13	9	157
	14-18	9	174
	19-40	2	71
	41 and up	12	60
	Total respondents		462
occupation groups	students	18	352
	at home	7	24
	urban occupations	5	58
	bio/edu occupations	0	16
	land related occupations	2	15
	Total respondents		465
		I don't like the maned wolf (N=8)	
urban/rural residence	urban	4	379
	rural	4	91
	Total respondents		470

**Table 2.2.1a. Q1+Q4 respondents' attitudes towards the maned wolf by socio-demographic characteristics.**

Value of the maned wolf in relation to use of body parts		q1 valuable neutral worthless				Total
		worthless	neither	valuable	no answer	
Do you believe that parts of the maned wolf are good for remedies?	Count	3	4	27	6	40
	% within q1 valuable neutral worthless	13.6%	8.0%	9.3%	6.8%	
Do you believe that to carry a piece of the maned wolf's pelt brings luck?	Count	0	4	7	12	23
	% within q1 valuable neutral worthless	.0%	8.0%	2.4%	13.6%	
Do you believe that the maned wolf's skin is good for accessories?	Count	4	10	82	19	115
	% within q1 valuable neutral worthless	18.2%	20.0%	28.2%	21.6%	
Total		22	50	291	88	451

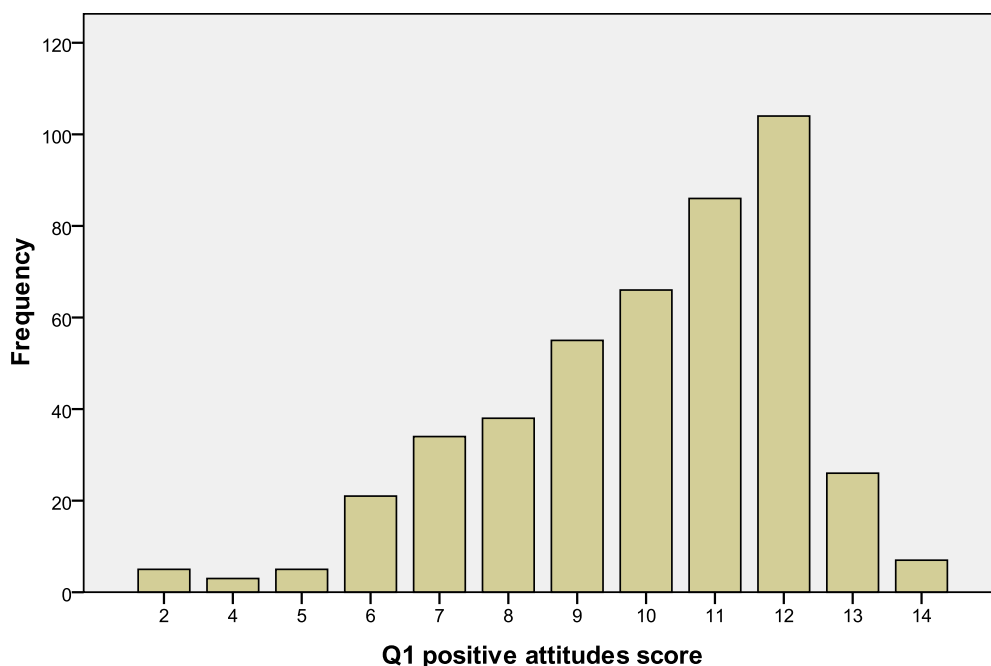
**Table 2.2.2.1. Q1 value of the maned wolf in relation to use of body parts**

Value of maned wolf in relation to hunting		q1 valuable neutral worthless				Total
		worthless	neither	valuable	no answer	
The maned wolf must be hunted	No answer	22	48	290	86	446
	Yes	0	2	1	2	5
	Total	22	50	291	88	451

**Table 2.2.2.2. Q1 value of maned wolf in relation to hunting**

**Attitude scores**

**Q1 positive attitudes score**



**Bar chart 2.2.5. Q1 frequency of positive attitudes scores**

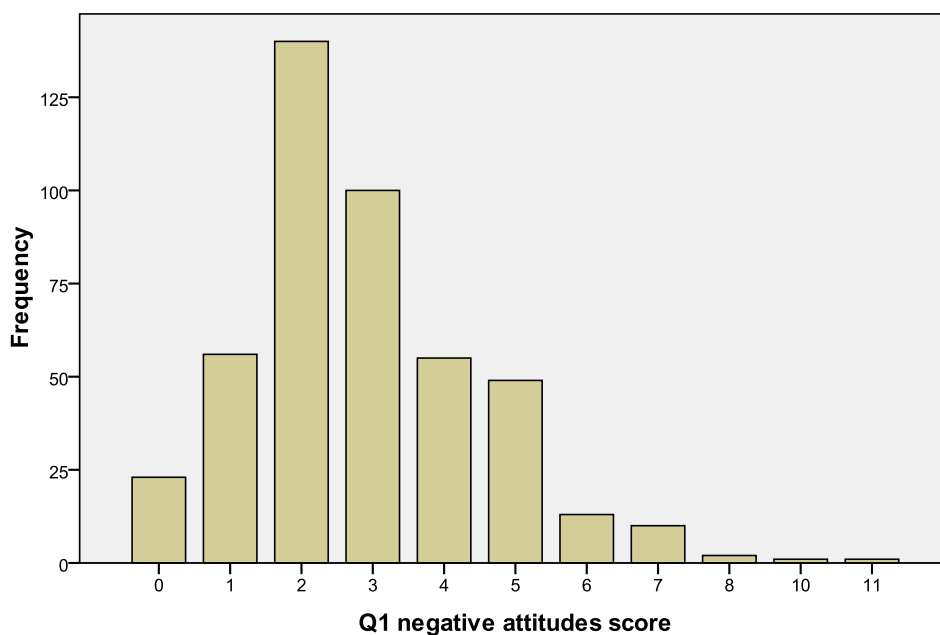
		Frequency	Percent
Valid	low positive attitude	8	1.1
	moderate positive attitude	153	21.1
	high positive attitude	289	39.9
	Total	450	62.1
Missing	System	275	37.9
Total		725	100.0
		Frequency	Percent
Valid	low positive attitude	68	15.1
	high positive attitude	382	84.7
	Total	450	99.8
Missing	System	1	.2
Total		451	100.0

**Table 2.2.5.Q1 respondents' positive attitudes score**

		Frequency	Percent
Valid	low positive attitude	3	5.6
	high positive attitude	51	94.4
Total		54	100.0

**Table 2.2.5.Q4 Rural respondents' positive attitudes score**

**Q1 negative attitudes score**



**Bar chart 2.2.6. Q1 frequency of negative attitudes score**

		Frequency	Percent
Valid	low negative attitude	435	96.5
	high negative attitude	14	3.1
	Total	449	99.6
Missing	System	2	.4
Total		451	100.0

		Frequency	Percent
Valid	low negative attitude	359	49.5
	moderate negative attitude	58	8.0
	high negative attitude	2	.3
	Total	419	57.8
Missing	System	306	42.2
Total		725	100.0

**Table 2.2.6. Q1 respondents' negative attitudes score**

		Frequency	Percent
Valid	low neutral attitudes	370	82.0
	high neutral attitudes	80	17.7
	Total	450	99.8
Missing	System	1	.2
Total		451	100.0

		Frequency	Percent
Valid	low neutral attitude	205	45.5
	moderate neutral attitude	237	52.5
	high neutral attitude	8	1.8
	Total	450	99.8
Missing	System	1	.2
Total		451	100.0

**Table 2.2.7. Q1 respondents' neutral attitudes score**

			Q1 neutral attitudes groups			
			low neutral attitude	moderate neutral attitude	high neutral attitude	Total
education groups	primary education	Count	95	92	0	187
	secondary education	Count	77	112	7	196
	tertiary education	Count	18	26	0	44
	Total	Count	190	230	7	427

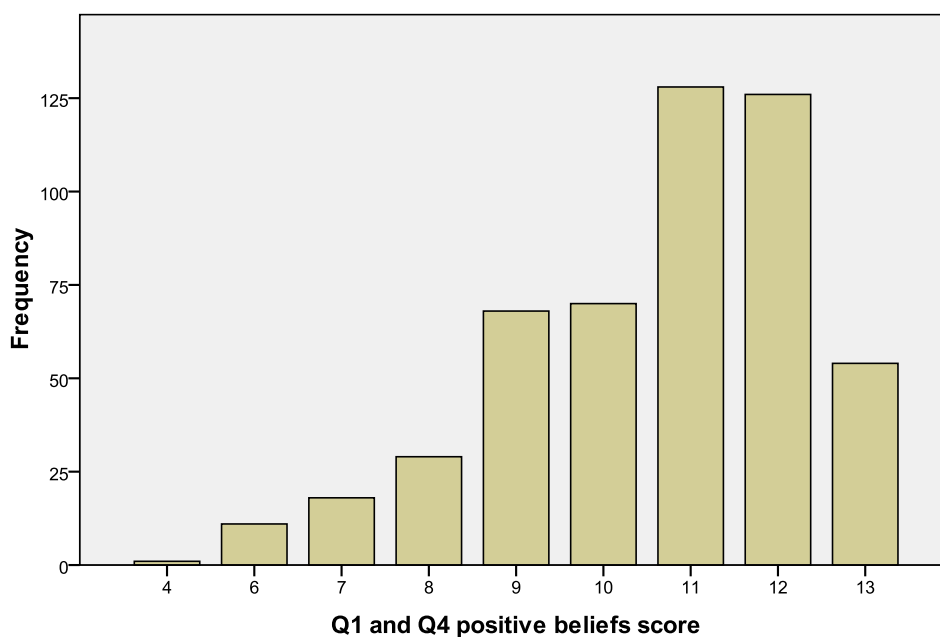
Table 2.2.7a. Q1 respondents’ neutral attitudes in relation to education level.

### 2.3. BELIEFS

		urban/rural residence		Total
		urban	rural	
Brazil should get rid of these animals	Count	2	0	2
	% within urban/rural residence	.5%	.0%	
Hunting to harvest bodyparts should be allowed	Count	2	0	2
	% within urban/rural residence	.5%	.0%	
Brazil should leave them alone	Count	287	30	317
	% within urban/rural residence	76.9%	75.0%	
Brazil should protect and preserve them	Count	364	37	401
	% within urban/rural residence	97.6%	92.5%	
Total	Count	373	40	413

Table 2.3.3a. Q1 respondents’ beliefs about what should be done with the maned wolf in Brazil according to residence.

Q1 and Q4 positive beliefs score



Bar chart 2.3.4. Q1+Q4 frequencies of positive beliefs scores.

Positive Beliefs Scores		Frequency	Percent
Valid	moderate positive beliefs	59	11.7
	high positive beliefs	445	88.1
	Total	504	99.8
Missing	System	1	.2
Total		505	100.0

Table 2.3.4. Q1+Q4 respondents' positive beliefs score

			Q1 and Q4 positive beliefs groups		Total
			moderate positive beliefs	high positive beliefs	
Q1 and Q4 knowledge groups	low knowledge	Count	23	27	50
		Expected Count	5.9	44.1	50.0
		Std. Residual	7.1	-2.6	
	moderate knowledge	Count	31	206	237
		Expected Count	27.7	209.3	237.0
		Std. Residual	.6	-.2	
	high knowledge	Count	5	212	217
		Expected Count	25.4	191.6	217.0
		Std. Residual	-4.0	1.5	
Total		Count	59	445	504
$\chi^2=64.3$ ; df=1; p<0.001		Expected Count	59.0	445.0	504.0

Table 2.3.4.1a. Q1+Q4 respondents' knowledge score by positive beliefs score.

			Q4 positive beliefs groups		
			moderate positive beliefs	high positive beliefs	Total
Q4 knowledge groups	low knowledge	Count	7	3	10
		% within Q4 knowledge groups 1	70.0%	30.0%	100.0%
	high knowledge	Count	0	44	44
		% within Q4 knowledge groups 1	.0%	100.0%	100.0%
	Total	Count	7	47	54
		% within Q4 knowledge groups 1	13.0%	87.0%	100.0%

Table 2.3.4.1b.Q4 Rural respondents' knowledge scores by positive beliefs score

			Q1 positive attitudes groups		Total
			low positive attitude	high positive attitude	
Q1 positive beliefs groups	moderate positive beliefs	Count	14	24	38
		Expected Count	5.7	32.3	38.0
		Std. Residual	3.4	-1.5	
	high positive beliefs	Count	54	358	412
		Expected Count	62.3	349.7	412.0
		Std. Residual	-1.0	.4	
Total		Count	68	382	450
$\chi^2=15.2$ ; df=1; p<0.001		Expected Count	68.0	382.0	450.0

Table 2.3.4.2. Q1 respondents' positive beliefs scores by positive attitudes.

## 2.4. CONSERVATION

Who is responsible for protecting the maned wolf?	Count	Percentage of respondents
Everybody	39	72.2
NGOs	2	3.7
Rural people	9	16.7
The government	8	14.8
CUs	8	14.8
The zoos	8	14.8
<b>Total (54 respondents)</b>	<b>74</b>	

Table 2.4.1.1.Q4 Rural respondents' beliefs concerning the responsibility for protecting the maned wolf

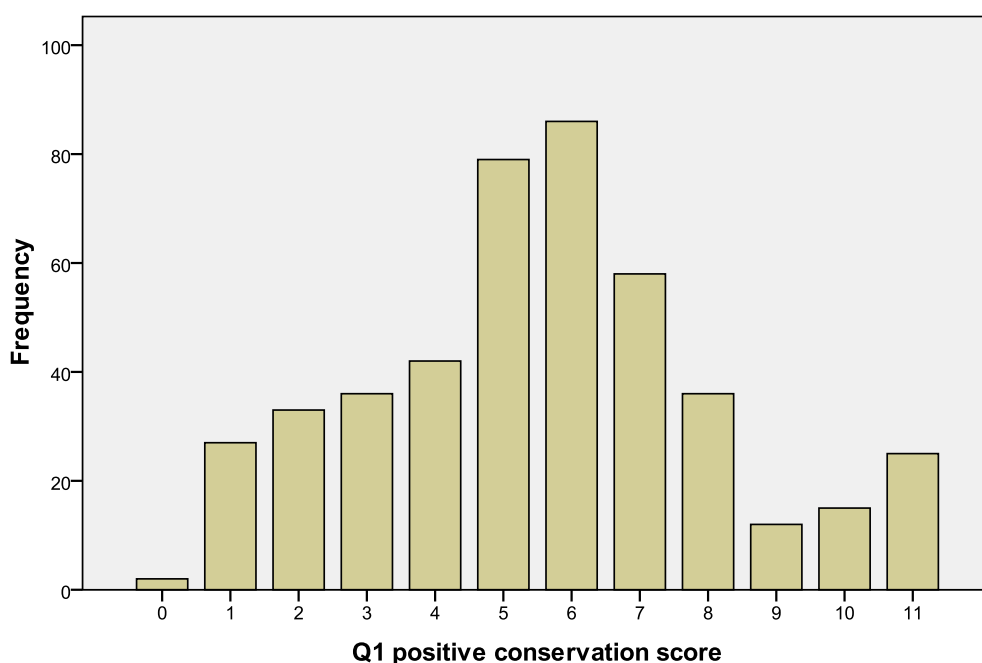
Values related to the conservation of the maned wolf by residence	urban/rural residence		
	urban	rural	Total
neither	50	8	58
progress	206	11	217
<b>Total</b>	<b>326</b>	<b>30</b>	<b>356</b>
neither	34	4	38
necessity	273	26	299
<b>Total</b>	<b>331</b>	<b>31</b>	<b>362</b>
neither	96	9	105
modernity	107	8	115
<b>Total</b>	<b>303</b>	<b>28</b>	<b>331</b>
neutral	42	6	48
country	251	23	274
<b>Total</b>	<b>310</b>	<b>31</b>	<b>341</b>
threat	35	0	35
neither	39	5	44
protection	261	25	286
<b>Total</b>	<b>335</b>	<b>30</b>	<b>365</b>
ignorance	23	0	23
neither	37	6	43
knowledge	261	22	283
<b>Total</b>	<b>321</b>	<b>28</b>	<b>349</b>
politicians	20	0	20
neither	27	4	31
nature	293	29	322
<b>Total</b>	<b>340</b>	<b>33</b>	<b>373</b>

Table 2.4.2.1a Q1 respondents' values in relation to the conservation of the maned wolf by urban and rural residence

Q3 beliefs by target groups		Maned wolf conservation includes several habitats and wild species	Long-term support from local people is important for conservation of maned wolf and wild animals	Long-term solutions for conservation of maned wolf involve changes in culture/attitudes	Total respondents
target groups	school prof	14	22	16	36
	zoo prof	20	32	33	66
	CU prof	18	18	15	31
	International Paper	5	4	6	10
Total		57	76	70	143

Table 2.4.5a. Bio/education professionals' beliefs about maned wolf conservation according to target groups.

**Q1 positive conservation score**



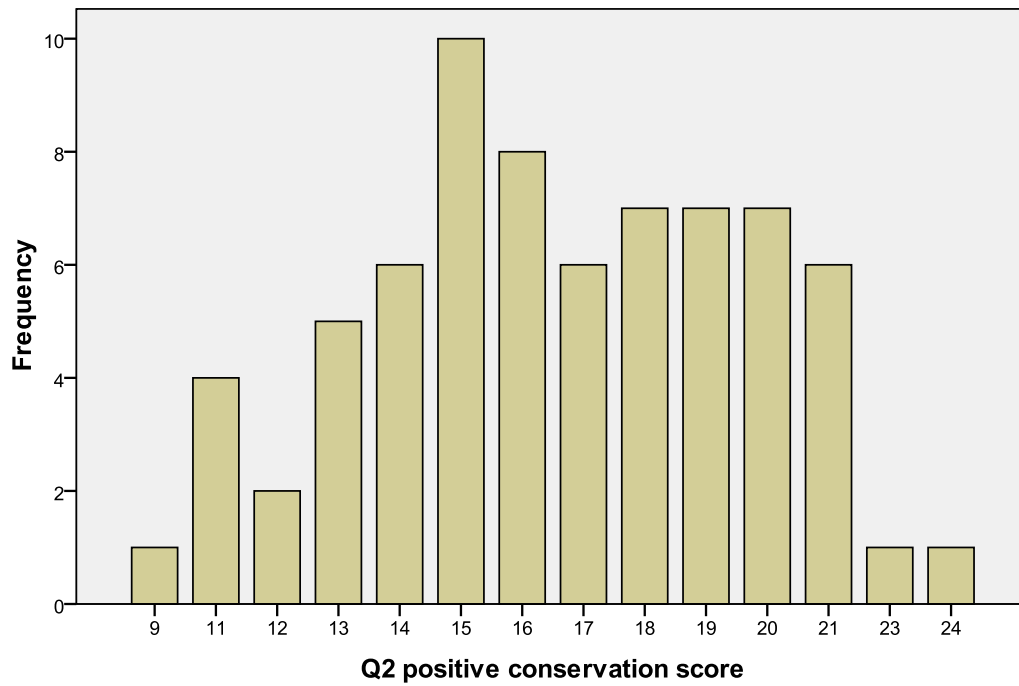
Bar chart 2.4.6.Q1. Positive conservation scores.

		Frequency	Percent
Valid	low positive conservation	97	21.5
	moderate positive conservation	265	58.8
	high positive conservation	88	19.5
	Total	450	99.8
Missing	System	1	.2
Total		451	100.0
Valid	low positive conservation	219	48.6
	high positive conservation	232	51.4
	Total	451	100.0

Table 2.4.6.Q1 General public/student respondents positive conservation score.



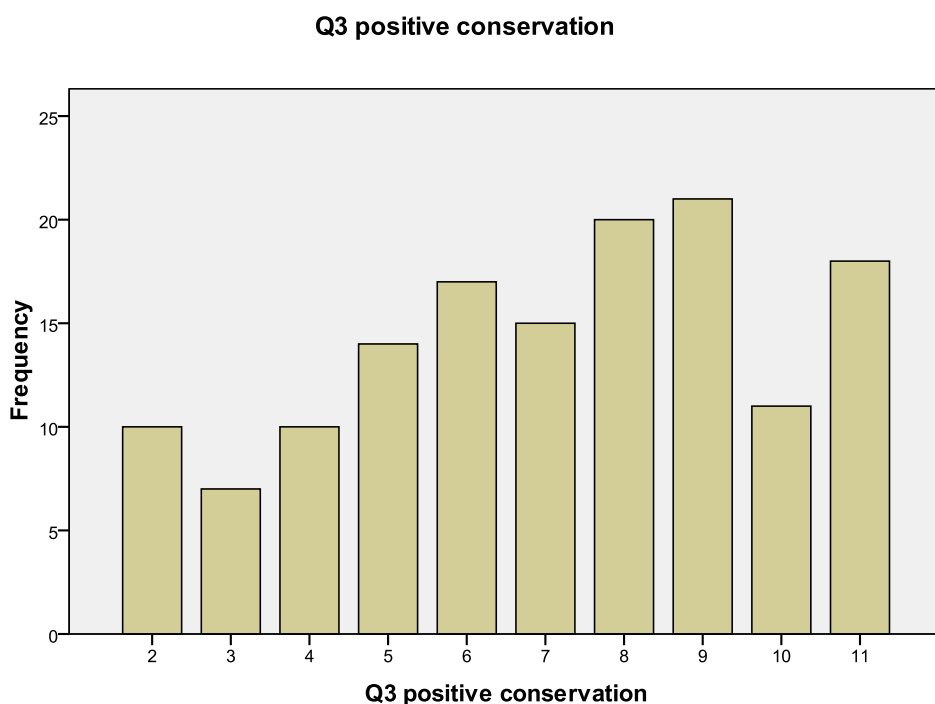
**Q2 positive conservation score**



**Bar chart 2.4.6. Q2 Positive conservation scores**

		Frequency	Percent
Valid	moderate positive conservation	42	54.5
	high positive conservation	29	37.7
	Total	71	92.2
Missing	System	6	7.8
Total		77	100.0

**Table 2.4.6.Q2 General public/student respondents who did not know the maned wolf positive conservation score.**



**Bar chart 2.4.6. Q3 Positive conservation scores**

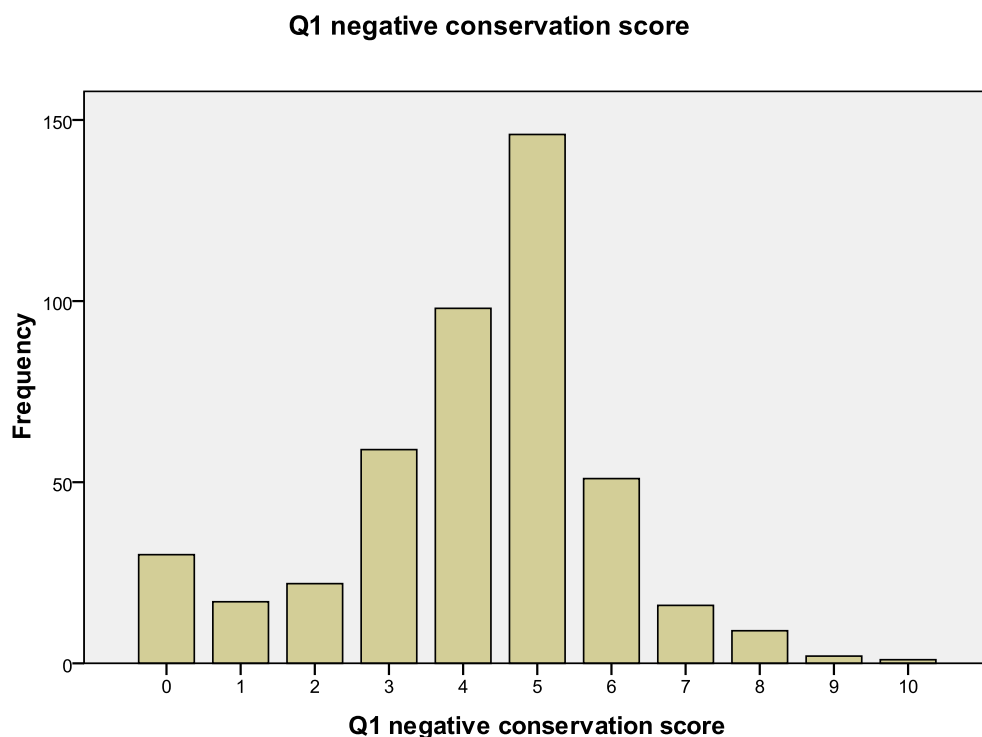
		Frequency	Percent
Valid	low positive conservation	17	11.9
	moderate positive conservation	56	39.2
	high positive conservation	70	49.0
	Total	143	100.0

**Table 2.4.6.Q3 Respondents' positive conservation score.**

			Q1 positive conservation groups 1		Total
			low positive conservation	high positive conservation	
Q1 knowledge groups1	low knowledge	Count	75	14	89
		Expected Count	43.1	45.9	89.0
		Std. Residual	4.9	-4.7	
	high knowledge	Count	143	218	361
		Expected Count	174.9	186.1	361.0
		Std. Residual	-2.4	2.3	
Total	Count	218	232	450	
	Expected Count	218.0	232.0	450.0	

$\chi^2=57$ ; df=1; p<0.001

**Table 2.4.6.2.Q1Knowledge by positive conservation scores.**



**Bar chart 2.4.7. Q1 Negative conservation scores**

		Frequency	Percent
Valid	low negative conservation	128	28.4
	moderate negative conservation	311	69.0
	high negative conservation	12	2.7
	Total	451	100.0

**Table 2.4.7. Q1 negative conservation groups**

			Q1 negative conservation groups			Total
			low negative conservation	moderate negative conservation	high negative conservation	
Q1 knowledge groups1	low knowledge	Count	11	76	2	89
		Expected Count	25.3	61.3	2.4	89.0
		Std. Residual	-2.8	1.9	-.2	
	high knowledge	Count	117	234	10	361
		Expected Count	102.7	248.7	9.6	361.0
		Std. Residual	1.4	-.9	.1	
Total	Count	128	310	12	450	
	Expected Count	128.0	310.0	12.0	450.0	
	$\chi^2=14.5; df=2; p=0.001$					

**Table 2.4.7.1.Q1 Knowledge scores by negative conservation.**

## 2.5. VALUE

Is nature important to you?			
		Frequency	Percent
Valid	neutral	3	3.9
	important	70	90.9
	Missing data	4	5.2
	Total	77	100.0

Table 2.5.1. Q2 respondents statements of importance of nature to them.

		To you wild animals are as important as people?	To you wild animals are as important as pets?	To you wild animals are as important as livestock?	Respondents per variable
<b>Target groups</b>	students year 8	10	8	7	20
	students sixth-form	17	8	11	26
	zoo visitors	14	12	16	24
	CU visitors	1	2	2	6
	Total responses	42	30	36	76
<b>Research locations</b>	Greater São Paulo	25	20	21	37
	Low Mogiana region	7	4	5	16
	São Carlos	11	6	10	24
	Total responses	43	30	36	77
<b>Gender</b>	Male	14	10	11	23
	Female	25	18	24	48
	Total responses	39	28	35	71
<b>Age groups</b>	up to 13	11	9	8	22
	14-18	17	10	12	27
	19-40	8	7	10	16
	41 and up	4	3	4	5
	Total responses	40	29	34	70
<b>Residence</b>	Urban	37	26	34	66
	Rural	2	1	0	5
	Total responses	39	27	34	71
<b>Occupation groups</b>	students	29	17	19	49
	at home	2	2	3	3
	urban occupations	6	6	6	10
	bio/edu occupations	1	1	1	1
	Total	38	26	29	63
<b>Education groups</b>	educated up to year 10	16	14	14	31
	educated up to sixth-form	22	11	16	35
	tertiary education	2	4	3	6
	Total	40	29	33	72

Table 2.5.2a. Q2 target groups, research location and socio-demographic variables in relation to importance of wild animals.

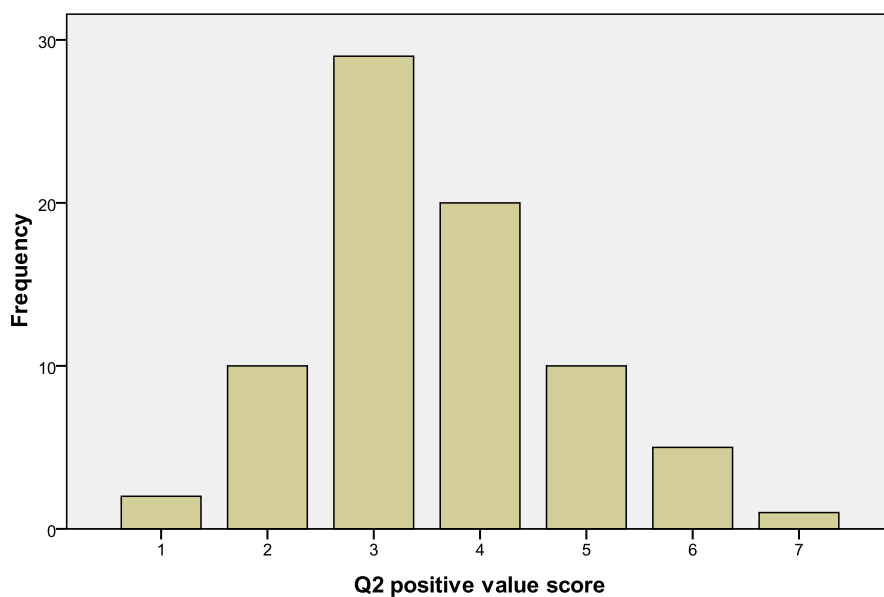
How much would you miss wildlife-related activities if no longer available?			
		Frequency	Percent
Valid	neutral	7	9.6
	miss	66	90.4
	Total	73	100.0

Table 2.5.3.1.. Q2 respondent’s statements about how much they would miss wildlife related activities if no longer available.

How much would you miss wildlife-related activities if no longer available?		
	neutral	miss
During the last year did you observe wildlife?	0	17
During the last year did you photograph wildlife?	0	12
Total respondents = 73	7	66

Table 2.5.3.1a. Q2 respondent’s statements about how much they would miss wildlife related activities if no longer available in relation to past experiences related to wildlife.

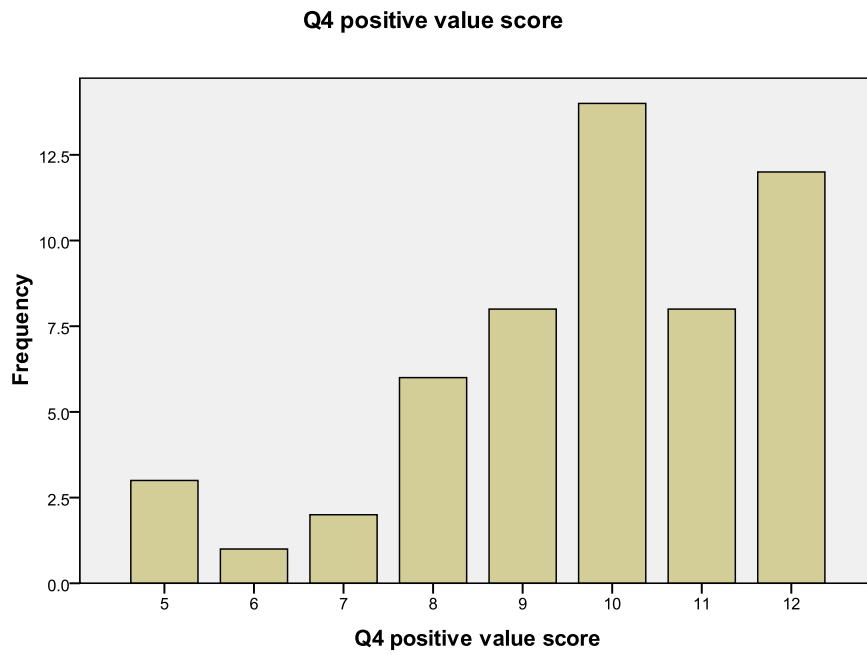
Q2 positive value score



Bar chart 2.5.5. Q2 Positive value scores

		Frequency	Percent
Valid	low positive value	12	15.6
	moderate positive value	59	76.6
	high positive value	6	7.8
	Total	77	100.0
Valid	low positive value	41	53.2
	high positive value	36	46.8
	Total	77	100.0

Table 2.5.5.Q2 positive value groups



**Bar chart 2.5.5.Q4 Positive value scores**

		Frequency	Percent
Valid	moderate positive value	12	22.2
	high positive value	42	77.8
	Total	54	100.0

**Table 2.5.5. Q4 positive value groups**

## 2.6. EXPERIENCE

Do you know the local:	Frequency	Percent
CU	190	37.6
Zoo	349	69.1
Total respondents	505	100.0

**Table 2.6.1. Q1+Q4 respondents' familiarity with local CU and zoo.**

Target groups, research locations and socio-demographic variables by Bio professionals experience working with the maned wolf		Does your work involve the maned wolf?			
		No	Yes, indirectly	Yes, directly	Total respondents per variable
target groups	school prof	21	15	0	36
	zoo prof	8	25	29	62
	CU prof	10	14	7	31
	International Paper	1	8	1	10
	Total responses	40	62	37	139
research location $\chi^2=16$ ; $df=6$ ; $p=0.014$	Greater São Paulo	5	14	9	28
	Low Mogiana region	12	24	8	44
	São Carlos	12	10	2	24
	São Paulo state	11	14	18	43
	Total	40	62	37	139
male or female	male	13	26	23	62
	female	27	34	13	74
	Total responses	40	60	36	136
age group 1	14-18	0	1	0	1
	19-40	14	36	18	68
	41 and up	12	13	6	31
Total responses		26	50	24	100
urban/rural residence	urban	37	51	30	118
	rural	3	7	5	15
Total responses		40	58	35	133
occupation groups	students	1	4	0	5
	urban occupations	3	7	10	20
	bio/edu occupations	36	46	24	106
Total responses		40	57	34	131
education groups	educated up to year 10	0	4	3	7
	educated up to sixth-form	3	6	7	16
	tertiary education	37	50	25	112
Total responses		40	60	35	135

Table 2.6.3a. Q3 Bio professionals experience working with the maned wolf by target groups, research locations and socio-demographic variables.

Has the maned wolf ever caused damage to you/your family?	Frequency	Percent
no	485	96.0
maned wolf or other animal	20	4.0
Total	505	100.0

Table 2.6.4a.Q1+Q4 respondents' experience of damage caused by maned wolf or other animal (re-grouped).

Has the maned wolf ever caused damage to you/your family?	Frequency	Percent
no	42	77.8
yes	10	18.5
don't know if was wolf or other animal	2	3.7
Total	54	100.0

Table 2.6.4b.Q4 rural respondents' experience of damage caused by maned wolf or other animal.

Has the maned wolf ever caused damage to you/your family?	Frequency
Yes, the damage was material	11
Yes, the damage was emotional	1
Yes, the damage was physical	0
Yes, the damage was spiritual	0
<b>total</b>	<b>12</b>

**Table 2.6.4c.Q4. Type of damage caused by maned wolf according to rural respondents.**

	damage groups		Total
	No damage	Damage caused by maned wolf or other animal	
The maned wolf must be hunted	5	0	5
The maned wolf does not harm anyone	270	8	278
The maned wolf needs to be protected	395	16	411
Wolves are dangerous beasts	61	4	65
The best place for the maned wolf is nature	422	19	441
The maned wolf is not worth anything	19	2	21
The maned wolf scares and attacks people	18	5	23
The maned wolf attacks chicken pens and livestock	123	19	142
$\chi^2=46$ ; $df=1$ ; $p<0.001$		Std. Res. 5.6	
Preserving the maned helps to preserve the ecology	387	17	404
The maned wolf helps my country's tourism and culture	220	11	231
I don't care about the maned wolf	27	6	33
I don't like the maned wolf	6	2	8
<b>Total</b>	<b>485</b>	<b>20</b>	<b>505</b>

**Table 2.6.4.1. Q1+Q4 respondents' experience of damage caused by maned wolf or other animal according to beliefs and attitudes towards the maned wolf.**

	damage groups		Total
	no	maned wolf or other animal	
q1 good bad	22	0	22
neutral			
bad			
neither	47	5	52
good	300	0	300
no answer	74	3	77
<b>Total N=</b>	<b>443</b>	<b>8</b>	<b>451</b>
Brazil should get rid of these animals	2	0	2
No answer	10	0	10
<b>Total N=</b>	<b>442</b>	<b>8</b>	<b>450</b>
Hunting to harvest bodyparts should be allowed	3	0	3
<b>Total N=</b>	<b>432</b>	<b>8</b>	<b>440</b>
Brazil should leave them alone	330	6	336
No answer	10	0	10
<b>Total N=</b>	<b>442</b>	<b>8</b>	<b>450</b>
Brazil should protect and preserve them	415	8	423
no answer	10	0	10
<b>Total N=</b>	<b>442</b>	<b>8</b>	<b>450</b>

**Table 2.6.4.1a. Q1 respondents' experience of damage caused by maned wolf or other animal according to feelings and beliefs about the maned wolf.**



## 2.7. PERSONAL RELATIONSHIPS

Target groups, research locations and socio-demographic variables by Bio/education professionals' beliefs about general public/students in relation to maned wolf		General public/students:						
		Are against the conservation of the maned wolf	Are not interested in the conservation of the maned wolf	know nothing/close to nothing about the maned wolf	have a good knowledge about the maned wolf	want to protect the maned wolf	Feel sympathy for the maned wolf	Total respondents per variable
Target groups	School prof	0	6	21	3	19	12	36
	Zoo prof	0	18	49	7	20	28	66
	CU prof	0	4	20	4	11	10	31
	International Paper	0	4	7	1	3	3	10
Total responses		0	32	97	15	53	53	143
research location	Greater São Paulo	0	7	24 (85.7%)	2	5	10	28
	Low Mogiana region	0	11	24 (53%)	8	22	20	45
	São Carlos	0	2	14 (58.3%)	0	13	8	24
	São Paulo state	0	12	35 (76%)	5	13	15	46
Total responses		0	32	97	15	53	53	143
gender	Male	0	11	41	6	26	26	64
	female	0	20	54	9	26	25	76
Total responses		0	31	95	15	52	51	140
Age groups	14-18	0	0	0	0	1	0	1
	19-40	0	20	48	8	24	30	70
	41 and up	0	4	21	4	16	12	32
Total responses		0	24	69	12	41	42	103
Residence	Urban	0	29	87	11	41	41	122
	Rural	0	1	6	3	10	8	15
Total responses		0	30	93	14	51	49	137
x <sup>2</sup>						6.2; p=0.012		
Occupation groups	Students	0	1	5	0	0	1	6
	Urban occupations	0	1	11	6	13	12	21
	Bio/edu occupations	0	27	76	8	38	36	108
Total responses		0	29	92	14	51	49	135
Education groups	Educated up to year 10	0	1	2	3	7	4	7
	Educated up to sixth-form	0	3	10	5	7	8	16
	Tertiary education	0	27	83	7	37	38	115
Total responses		0	31	95	15	51	50	139

Table 2.7.1a. Q3 Bio/education professionals' beliefs about general public/students in relation to maned wolf, according to target groups, research locations and socio-demographic variable.

	Frequency	Percent
<b>Educational initiatives must target the community</b>	139	97.2
<b>Education initiatives must target politicians</b>	104	72.7
<b>Education initiatives must target biologists/educators</b>	116	81.1
<b>Nobody: education initiatives are not successful tools for conservation</b>	4	2.8
<b>Total respondents= 143</b>		

Table 2.7.3. Q3 Bio/education professionals' beliefs about education initiatives

Rural respondents' beliefs about each other and the local CU by research locations			research location		Total	
			Low Mogiana region	São Carlos		
the reserve and its workers help the local people	no	Count	8	19	27	
		% within research location	27.6%	76.0%	50.0%	
		Std. Residual	-1.7	1.8		
	yes	Count	21	6	27	
		% within research location	72.4%	24.0%	50.0%	
		Std. Residual	1.7	-1.8		
Total		Count	29	25	54	
reserve workers assist local people who have problems with wild animals	no	Count	7	18	25	
		% within research location	24.1%	72.0%	46.3%	
	yes	Count	22	7	29	
		% within research location	75.9%	28.0%	53.7%	
	Total		Count	29	25	54
	reserve workers try to reduce/resolve conflicts between local people and wild animals $\chi^2=18.7$ ; $df=1$ ; $p<0.001$	no	Count	10	23	33
Expected Count			17.7	15.3	33.0	
% within reserve workers try to reduce/resolve conflicts between local people and wild animals			30.3%	69.7%	100.0%	
% within research location			34.5%	92.0%	61.1%	
Std. Residual			-1.8	2.0		
yes		Count	19	2	21	
		Expected Count	11.3	9.7	21.0	
		% within reserve workers try to reduce/resolve conflicts between local people and wild animals	90.5%	9.5%	100.0%	
		% within research location	65.5%	8.0%	38.9%	
		Std. Residual	2.3	-2.5		
Total		Count	29	25	54	
		Expected Count	29.0	25.0	54.0	

Table 2.7.6a.Q4. Rural respondents' beliefs about each other and the local CU by research locations

<b>what importance reserve workers place on damages to local residents that might be caused by wildlife</b>	Frequency	Percent
indifferent	5	9.3
neither	5	9.3
much importance	20	37.0
no answer	24	44.4
<b>What importance reserve workers place on problems faced by the local community?</b>		
indifferent	5	9.3
neither	5	9.3
much importance	20	37.0
no answer	24	44.4
<b>What importance reserve workers place on cultural traditions and what goes on in the local community?</b>		
indifferent	5	9.3
neither	3	5.6
much importance	20	37.0
no answer	26	48.1
Total	54	100.0

**Table 2.7.7. Q4 Rural respondents' beliefs about CU workers in relation to local issues**

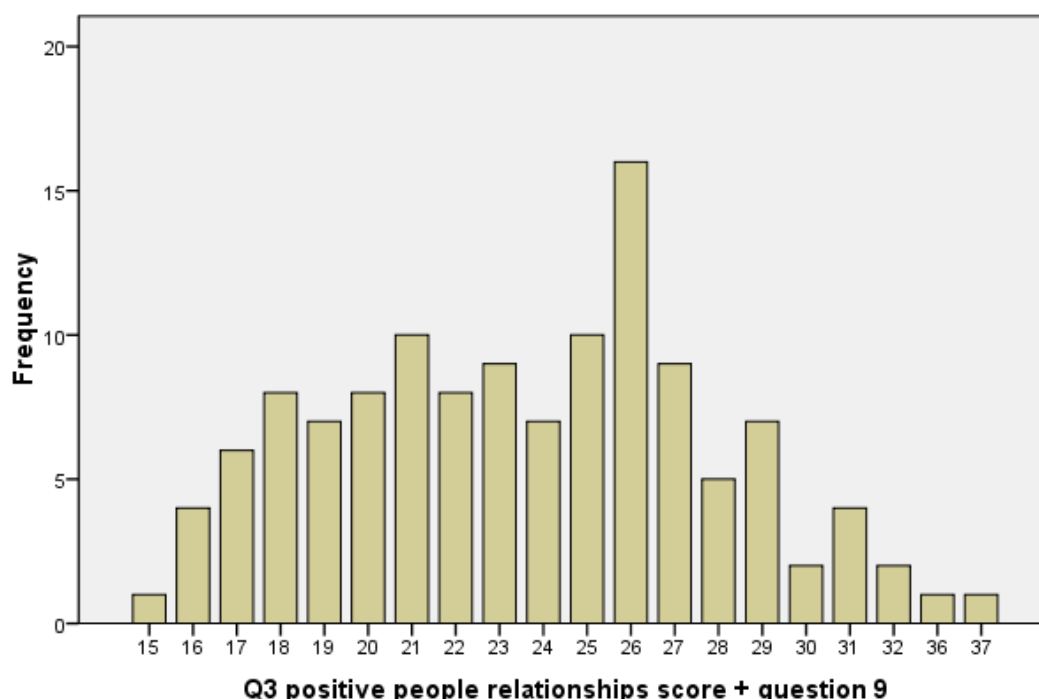
		What importance reserve workers place on damages to local residents that might be caused by wildlife?				Total
		indifferent	neither	much importance	no answer	
research location	Low Mogiana region	3	4	18 (62.1%)	4	29
	São Carlos	2	1	2 (8%)	20	25
Total		5	5	20	24	54
		What importance reserve workers place on problems faced by the local community?				Total
		indifferent	neither	much importance	no answer	
research location	Low Mogiana region	3	3	18 (62.1%)	5	29
	São Carlos	2	2	2 (8%)	19	25
Total		5	5	20	24	54
		What importance reserve workers place on cultural traditions and what goes on in the local community?				Total
		indifferent	neither	much importance	no answer	
research location	Low Mogiana region	4	3	19 (65.5%)	3	29
	São Carlos	1	0	1 (4%)	23	25
Total		5	3	20	26	54

**Table 2.7.7a. Q4 Rural respondents' beliefs about CU workers in relation to local issues by research locations.**

		Frequency	Percent
Valid	moderate positive people relation	107	74.8
	high positive people relation	33	23.1
	Total	140	97.9
Missing	System	3	2.1
Total		143	100.0

**Table 2.7.8a.Q3 positive relationship score groups**

**Q3 positive people relationships score + question 9**



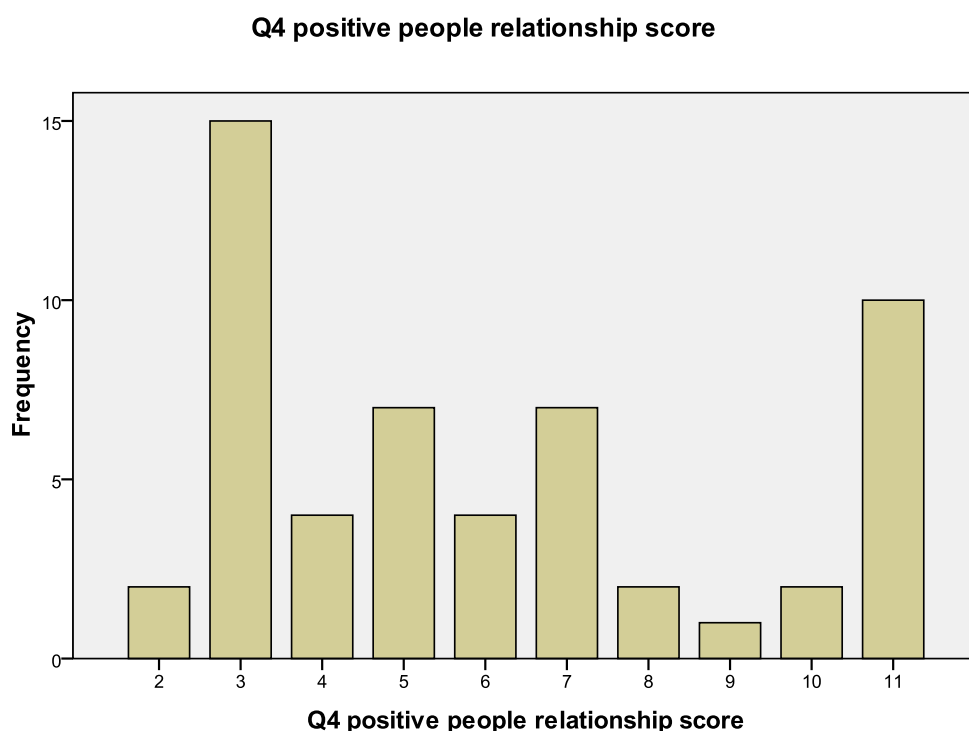
**Bar chart 2.7.8a.Q3 Bio/education professionals' positive people relationships scores.**

		Frequency	Percent
Valid	moderate positive people relation	94	65.7
	high positive people relation	31	21.7
	Total	125	87.4
Missing	System	18	12.6
Total		143	100.0

**Table 2.7.8b. Q3 positive people relationship groups + question 9**

		Frequency	Percent
Valid	low positive people relation	17	31.5
	moderate positive people relation	22	40.7
	high positive people relation	15	27.8
	Total	54	100.0

**Table 2.7.8c. Q4 positive people relationship groups**



Bar chart 2.7.8c. . Q4 positive people relationship scores

			Q4 positive people relationship groups			Total	
			low positive people relation	moderate positive people relation	high positive people relation		
research location $\chi^2= 24.5$ ; $df=2$ ; $p<0.001$	Low region	Mogiana	Count	2	12	15	29
			Expected Count	9.1	11.8	8.1	29.0
			% within research location	6.9%	41.4%	51.7%	100.0%
			Std. Residual	-2.4	.1	2.4	
	São Carlos		Count	15	10	0	25
			Expected Count	7.9	10.2	6.9	25.0
			% within research location	60.0%	40.0%	.0%	100.0%
			Std. Residual	2.5	.0	-2.6	
Total		Count	17	22	15	54	
		Expected Count	17.0	22.0	15.0	54.0	
		% within research location	31.5%	40.7%	27.8%	100.0%	

Table 2.7.8d.Q4. Rural respondents' PR scores according to research locations.

		Frequency	Percent
Valid	low negative people relation	25	46.3
	moderate negative people relation	28	51.9
	high negative people relation	1	1.9
	Total	54	100.0
		Frequency	Percent
Valid	low negative pr	25	46.3
	high negative pr	29	53.7
	Total	54	100.0

**Table 2.7.9.Q4 Rural respondents' negative people relationship groups**

		Q4 negative people relationship groups			Total
		low negative people relation	moderate negative people relation	high negative people relation	
research location	Low Mogiana region	20	8	1	29
	São Carlos	5	20 (80%)	0	25
	Total	25	28	1	54

**Table 2.7.9a.Q4 Rural respondents' negative people relationship groups by research location**

## APPENDIX IV – Recommendations and areas for further investigation

Summary of recommendations to maned wolf conservation programmes	
Knowledge	Sound knowledge on most aspects of maned wolves' ecology and behaviour by local people may be a generalized trend that needs to be considered in the planning of conservation programmes.
	Conservation programmes must target negative attitudes that have a cognitive nature (such as misconceptions) for change, by disseminating clear and accurate information about specific beliefs regarding the species (size, weight, feeding ecology, population numbers and distribution patterns, threatened status) amongst some interest groups.
	Educational initiatives to increase knowledge about the maned wolf and habitat could be used to tackle misconceptions within some interest groups and be a step towards improving their attitudes towards conservation
	Environmental educators in the research areas must also develop strategies to facilitate the involvement of local people with conservation issues and to reassure them that their involvement matters and can cause real change.
Attitudes	Conservation strategies must meet local people's interest in finding out more about the maned wolf and its habitat, to help the species, to foment maned wolf conservation.
	Lack of interest to find out more about the maned wolf amongst a minority displaying low levels of positive attitudes towards the species will need to be addressed by programmes.
	The circulation of accurate information about characteristics of the maned wolf, such as size, weight, and its ecology, feeding habits and population numbers should improve public attitudes towards it, as lack of positive attitudes seems to relate to lack of knowledge and to misconceptions and not to bad experiences.
	Positive attitudes already present in the society must be incorporated by environmental awareness strategies in zoos and elsewhere.
Beliefs	Negative beliefs about the maned wolf's feeding ecology and behaviour may need to be addressed and demystified by conservation strategies.
	Conservation programmes should benefit from incorporating the knowledge held by the rural population to address negative beliefs and attitudes in other groups (in Greater São Paulo and amongst CU visitors particularly).
	Sixth-form students' awareness of how maned wolves may benefit the country may be limited and could be addressed by conservation programmes.
	International Paper staff and rural respondents should be considered during the planning of conservation strategies and as they may help to influence local people (peer pressure) by disseminating positive beliefs about the species.
Experience	Information must be used to clarify differences between the maned wolf and the European wolf and particularly regarding feeding ecology.

	Secondary sources of information may be conducive to positive attitudes towards the maned wolf amongst rural people, and could be explored as such by conservation strategies.
	Schools and environmental education courses could make a greater contribution to local people's knowledge of the maned wolf.
	Conservation programmes could benefit from the circulation of accurate information by TV and radio (powerful, popular and wide reaching media) to target problem areas in the relationship between local people and the maned wolf.
	Cooperation between zoo, CU, education professionals and TV and radio media professionals could produce beneficial outcomes towards maned wolf conservation.
	The education role of zoos could be explored further to reach a higher percentage of zoo visitors.
	A high percentage of neutral attitudes and a lack of conservation awareness amongst respondents who heard about the maned wolf from zoos, museums or CUs indicate an opportunity for positive changes in attitudes towards the conservation of the species, which could be explored by the zoo.
Relationships between interest groups	The apparent discrepancy between the importance that bio/education professionals attributed to education and to cultural values deserves attention, since the understanding of local people's cultural values and attitudes is essential for the effectiveness of any attempts to change behaviours through education.
	Investigation of traditional knowledge of indigenous plants and animals may help programmes for the natural reforestation of degraded areas in the research locations, or unlock the economical potential of some species, and may be a tool to bring together reserve professionals and local people.
	Beliefs of bio/education professionals that local people in the vicinity of protected areas lack awareness about its importance, do not support it and do not take part in its management may need to be addressed to improve their contact with local people for conservation purposes.
	The fact that the great majority of CU professionals displayed only moderately positive attitudes towards local people may contribute to a lack of commitment to engage the rural population in environmental education activities within reserves, which needs to be addressed.
	Environmental education activities offered by reserves may be failing to target rural people effectively, and such issue also deserves attention.
	School professionals' belief that biologists and educators are an authority practising an objective and impartial science may need to be targeted for change to avoid the dangers of alienating local people.
	Changes in the attitudes of both CU and school professionals' groups towards local people could benefit conservation.
	The use of education as a conservation tool may bring together local people and conservation professionals, and education initiatives must target the community as



	well as biologists and educators to improve attitudes.
	Environmental education programmes and reserve management plans could benefit from the involvement of diverse local groups from the neighbourhood of conservation areas in the development of plan directives and in the identification of local needs.
	Educators and conservation biologists must use the contact with traditional people as an opportunity to learn about the natural environment and about the way they have traditionally (and sustainably) related to it, emphasizing reciprocity and cooperation in the nature of their relationship.
	Practices of inclusion and of understanding local people's behaviour are recommended for the improvement of relationships between interest groups for the benefit of the maned wolf's conservation in the research sites.
	Investing in an association between local people's support and participation in conservation and a quest for the improvement of their standards of living may benefit the effectiveness of local conservation programmes when involving local people in the conservation of the maned wolf.
	The human dimension of the contact between zoo professionals and the public may need to be addressed to improve professionals' relationship with local people and spread the reach of the high quality information provided by them.
	The relationship of bio/education professionals with local people, concerning maned wolf conservation issues, may be affected by their often unfunded negative beliefs, once again suggesting a need for improvement in their attitudes towards local people to benefit conservation.
Further questions and discussions	International Paper staff and rural respondents deserve special attention and further investigation that relate their positive attitude predictors and socio-demographic characteristics to future conservation strategies aimed at other target groups.
	Values related to the European wolf and a lack of knowledge about the endemic counterpart may need to be targeted by conservation campaigns to raise support for maned wolf conservation within some minority groups.
	In the face of rural responses, conservation programmes may need to consider that people may kill the maned wolf because they <i>dislike it</i> , due to <i>ignorance</i> , and because of <i>sport</i> .
	People's feelings of depreciation towards wilderness and wild predators, attitudes towards the Cerrado and endemic species in general may need to be targeted so that they may have a positive influence on maned wolf conservation.
	Conservation programmes could target lack of appreciation for local wildlife by helping local people to develop feelings of ownership over the maned wolf.
	Hunters who support maned wolf conservation must be targeted differently to hunters who display negative attitudes towards predators, as the first group might help influence the second, by peer pressure.

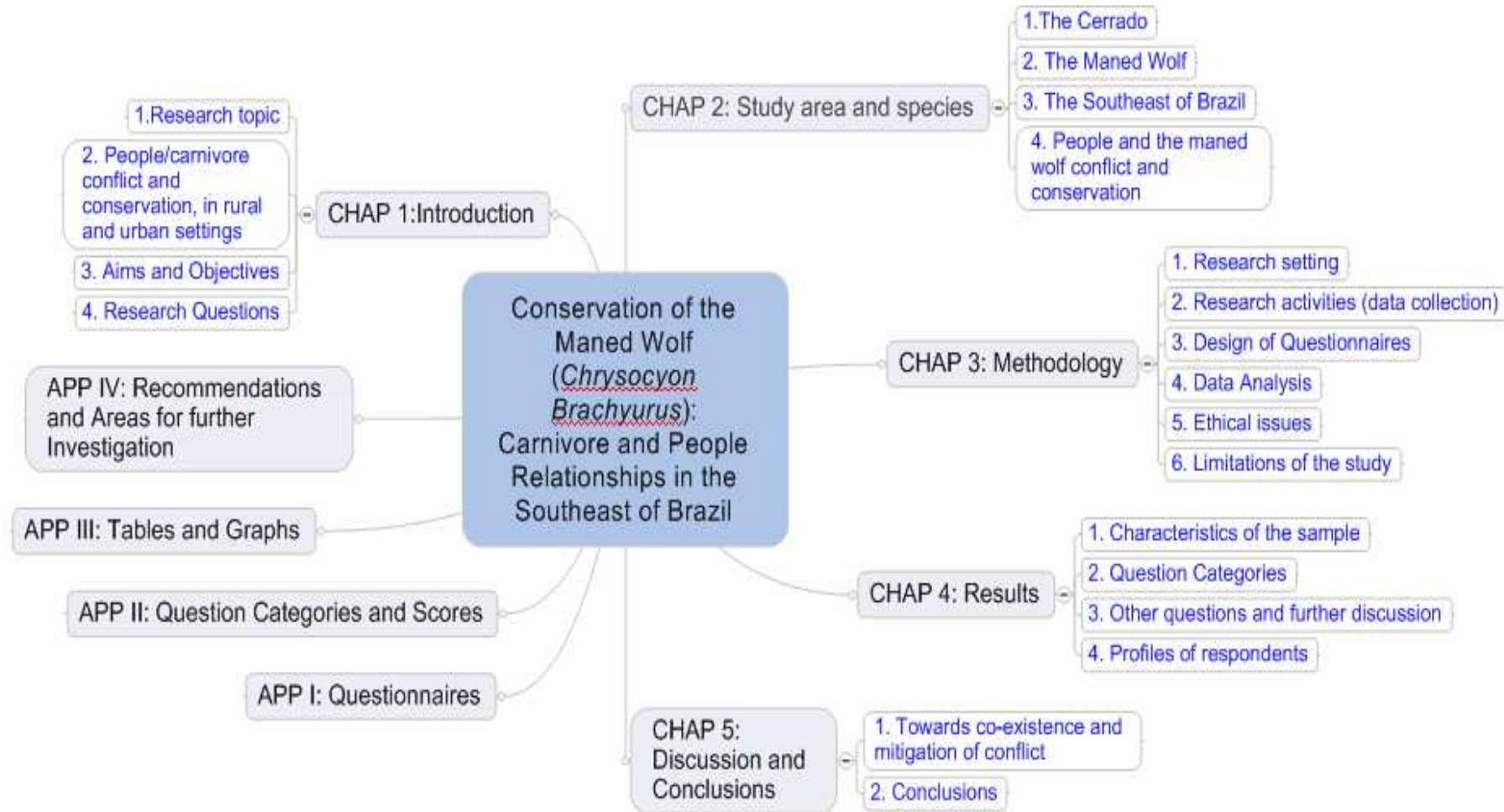
	The maned wolf could become a flagship species to attract attention and elicit support for the conservation of the local habitats.
	Awareness campaigns should benefit from integrating the diverse resources provided by schools, zoos and CUs to target misconceptions and attitudes about the maned wolf and conservation in the most effective way.
	Obstacles such as bureaucracy may need to be overcome to gain the support of bio/education professionals, prior to engaging them in maned wolf conservation.
	The human dimensions of the experience offered by zoos, including environmental education opportunities, and links with schools and community, could be explored further to increase the reach of their positive influence over knowledge, beliefs and sometimes attitudes of local people towards the maned wolf.
	Conservation strategies targeting the maned wolf could benefit from the implementation of long term education programmes geared towards the consolidation of a conservation ethic to encompass values related to wildlife conservation. Such programmes should target diverse interest groups, including local residents and bio/education professionals.
	Attractive characteristics of the maned wolf associated with charismatic carnivores, such as large size, dog-like features and rare negative encounters with people, could be explored by conservation awareness campaigns.
	Targeting specific misconceptions by increasing public awareness of the endangered status of the maned wolf (declining densities) and clarifying misapprehensions about their feeding habits may contribute to eliminate fears concerning the species.
	Spreading specific information about the potential benefits that this species may bring to local people's lives, such as disseminating seeds of Cerrado fruits (lobeira, gabioba <i>Campomanesia pubescens</i> ) and pest control, may help increase support for the conservation of the maned wolf.
Profiles	Campaigns targeting rural residents' misconceptions should specifically address the Low Mogiana region.
	The most positive features of the relationship between rural people and bio/education professionals in the Low Mogiana region (beliefs about reserve workers involvement in conflict resolution between local people and wild animals, and the importance placed onto damage caused by wildlife to local residents) must be considered when planning conservation strategies for other locations.
	The relationship between bio/education professionals and local people in Greater São Paulo must be addressed for the benefit of wildlife conservation.
	Large percentages of rural respondents and bio/education professionals displayed moderate attitudes towards each other suggesting there is scope for improvement on the attitudes of both parts towards each other.
	Sixth-form students and CU visitors were the most negative target groups in relation to the maned wolf and its conservation, identifying them as the groups to be targeted by campaigns based on values about wildlife and conservation.

<b>For further investigation</b>	
Knowledge	How much local people associate themselves with the maned wolf?
	What are the sources of the beliefs about maned wolf as poultry predators and how they may be associated with beliefs about <i>Canis lupus</i> , as they relate to fairy tales?
Attitudes	It would be interesting to research surviving cultural traditions, such as stories, as they are rich sources of information about the human dimensions of the world where conservation takes place, and can be useful for conservation programmes when devising awareness campaigns.
	Is there an association between perception of damage caused by the maned wolf and size of property and income?
	Further questions that target neutral attitudes and feelings about the maned wolf and conservation would be beneficial so that they may be particularly addressed by conservation programmes.
	What is the extent to which local people associate direct and indirect causes of maned wolf decline with anthropogenic and economical pressures, and the extent to which they associate their own behaviour and decision making power to conservation or decline of the maned wolf populations?
	Peer group expectations and perceived control over behaviours that relate to positive attitudes towards the maned wolf should be examined in the future, to ascertain the strength of the intentions to help the species (Theory of Planned Behaviour)
	The reasons behind highly positive attitudes of sixth-form students and CU visitors from Greater São Paulo, as opposed to highly negative attitudes of the same groups in the Low Mogiana region would be of interest for further investigation.
	The highly positive attitudes of zoo visitors in the Low Mogiana region, in contrast to the negative attitudes of the same group in Greater São Paulo also deserve further investigation.
Beliefs	What are the reasons behind the negative beliefs (maned wolf is useless, belief related to the use of its body parts) of year 8 students towards the maned wolf? What are the best ways to influence them, considering that children are in full time education?
Conservation awareness	What are the beliefs of different interest groups in relation to the role of zoos in the conservation of the maned wolf?
	Concerns that responses from rural residents may have tried to conceal and protect traditional practices that could be detrimental to wildlife conservation commend further investigation.
	Are there associations between income, reliance on natural resources and vulnerability to wildlife related damage? How they relate to attitudes toward the conservation of the maned wolf?

	Further investigation is advised into the association between maned wolf, wild animals' conservation and tradition or backwardness amongst CU visitors and respondents from Greater São Paulo and on how they may reflect beliefs connected to a development agenda for natural areas of Brazil.
	Do people who know the maned wolf also have a more positive attitude about wild predators in general?
Experience	Does the sighting the maned wolf live in nature relate to the beliefs that it attacks chicken pens and livestock, and scares and attacks people?
	Questions related to damages caused by the maned wolf could be rephrased as: Has the maned wolf ever taken anything that belongs to you/your property (and what was it)? Has the maned wolf ever caused: a) material damage; b) emotional damage, c) etc....
	Is experience of damage caused by maned wolf related to negative attitudes such as: fear of the maned wolf, lack of care and dislike for it, reluctance to tell family and friends about its need for protection, and beliefs about medicinal properties associated to it?
	What are the effects of experiences related with surplus killings carried out by the maned wolf on livestock, and of the publicity of rare depredation events, on attitudes towards the maned wolf conservation?
	Is the experience of seeing the maned wolf live in people's own property associated with negative attitudes towards the species?
	Secondary sources of information may be conducive to positive attitudes towards the maned wolf amongst rural people, and this association must be further investigated and explored by conservation strategies.
	Further investigation is needed on how transferable the high quality learning experience provided by zoos, museums, CUs, schools and environmental education courses may be to other media, and on ways to expand these results to a larger audience.
	The question about how familiar local people were with the local zoos and CUs could be replaced by two others: have you heard of the existence of the local CU/zoo? Have you ever visited the local CU/zoo?- to clear possible misunderstandings.
Relationships between interest groups	How can improvements be made to low educational levels, and lack of preparation, interest and cooperation on the part of the bio/education professionals, and how is it possible to include maned wolf conservation within the school calendar and curricular constraints?
	The use of natural resources by local people, together with their sustainable potential, should be investigated as they might help to improve biodiversity at long-term.
	Peer groups expectations in relation to people's attitudes towards maned wolf conservation should also be examined further, as they help to predict people's behaviour towards the species.

Further questions and discussions	How positive attitude predictors and socio-demographic characteristics of International Paper staff and rural respondents may be transferred to future conservation strategies aimed at other target groups? Their potential as opinion makers amongst local people should also be investigated.
	What are the feelings about hunting and hunting ban amongst all interest groups?
	Further investigation on elements of <i>fear</i> in relation to the maned wolf is advised, since fear is a strong predictor of negative attitudes towards carnivores and must be targeted by information as well as by values in respect to wildlife conservation.
	How beliefs about maned wolf's ecological importance and predation on rats relate to attitude variables and what is their role in conservation support?
	Further research into the extent of local people's associations between the maned wolf and the European wolf, and into the demand and use of maned wolf body parts by some groups, is advised to help conservation programmes make informed decisions when addressing misconceptions.
Profiles	Further investigation regarding the relationship between rural residents and bio/education professionals is advised to identify specific areas that could be improved.
	Although an association between hunting activities and misconceptions could not be verified due to the outlawed nature of that activity in Brazil, it deserves further investigation.

## Map of the Thesis



### Map of Chapter Four

