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Including People in Primate Conservation: A Case Study of Shepherds and Barbary Macaques in Bouhachem forest, Northern Morocco

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Thesis submitted for the degree of Doctor of Philosophy

Department of Anthropology
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Siân S. Waters

Abstract

Strategies for conserving species threatened with extinction are often guided by the collection and analysis of ecological data. However, in anthropogenic landscapes the inclusion of local people's knowledge and perceptions may be effective in encouraging them to change their behaviour in favour of conservation. I use a conservation project for the Endangered Barbary macaque in Bouhachem forest, northern Morocco, to examine the effectiveness of applying ethnographic data to the development of a conservation strategy. I first present the historical, political and social context of the study site and describe how local people's interactions with outside agencies result in their marginalisation and how this might influence future conservation activities. I describe how, to avoid further exclusion, I engaged local people in project research activities by integrating our different knowledge systems to co-produce information about Barbary macaque locations in Bouhachem. I examine shepherds' ontology of Barbary macaques along with a wild canid, the golden jackal and two domestic species - goats and dogs interpreting these data within the framework of boundary theory. I describe and discuss the reactions of shepherds and their dogs when they are in physical proximity to Barbary macaques and I interpret the social and cultural factors which underlie these often negative cross-species encounters. I demonstrate how inclusion of shepherds in research activities and gaining an understanding of the reasons for their negative behaviour toward the macaques enabled me to foster a change in their attitudes towards a culture of Barbary macaque conservation. To improve the successful outcome of conservation projects and avoid alienating local people, I suggest there is a need for a sensitive method of communication when imparting scientific data which are not concordant with local people's knowledge. I use the example of vaccinating village dogs against rabies both to deliver the message that problem dogs are owned and not feral and to provide a health benefit to villagers. Finally, I appraise the effectiveness of collecting and analysing ethnographic data in relation to conservation and the difficulties I encountered whilst doing so. I discuss the ethical issues surrounding the authorship of publications when co-production of information is the aim of a study. I conclude that the collection and analysis of ethnographic data provide an important dimension to successful conservation practice.

Contents Page

Contents Page		i
List of Figures		v
List of Tables		vi
Glossary		vii
List of abbreviations		vii
Statement of copyright		viii
Acknowledgements		ix
Dedication		xi
1	**Introduction**	**1**
1.1.	Conservation frameworks	1
1.2.	Conservation social science	2
1.3.	People and primate conservation	3
1.4.	Thesis structure	4
2	**Background, study site and methods**	**8**
2.1.	Background	8
2.2.	The study site	9
2.2.1.	Morocco	9
2.2.2.	Geographic and natural characteristics of the study site	10
2.2.3.	Villages and people of the study site	12
2.2.4.	Agricultural practices at the study site	14
2.3.	The Barbary macaque	16
2.4.	My research assistant, Ahmed El Harrad	17
2.5.	The conservation project: Barbary Macaque Conservation in the Rif	18
2.6.	Methods	19
2.6.1.	Study participants	20
2.6.2.	Interviewing	20
2.6.3.	Participant observation	22
2.6.4.	Data analysis	23
2.7.	Ethics	23
2.7.1.	Legal authorisation	24

3	**The context of conservation: historical, political and social influences on the villagers around Bouhachem forest**	**25**
3.1.	Introduction	25
3.2.	The European occupation of Morocco, 1912-1956	26
3.2.1.	Bouhachem during the Spanish Occupation	27
3.3.	Villagers and the state	28
3.4.	Villagers and urban society	31
3.5.	Villagers and development agencies	32
3.6.	Conclusions	37
4	**Integrating knowledge and co-producing information: a population survey of the Barbary macaque in Bouhachem forest, northern Morocco**	**38**
4.1.	Introduction	38
4.2.	Challenges and benefits for knowledge integration	41
4.3.	Building trust	43
4.4.	Co-producing information in practice: challenges and solutions	44
4.4.1.	Clarifications and orientations regarding Barbary macaque presence In Bouhachem	44
4.4.2.	Integrating Barbary macaque location LEK and CSK	49
4.4.3.	The characteristics of shepherds' Barbary macaque location LEK	55
4.4.4.	My reflections on shepherds' Barbary macaque location LEK	57
4.5.	Shepherds' LEK of Barbary macaque numbers	57
4.5.1.	Shepherds' LEK regarding changes in the Bouhachem Barbary macaque population	58
4.6.	Conclusions	60
5	**Managing metaphorical boundaries and borderlands: shepherd-animal relations in Bouhachem forest**	**62**
5.1.	Introduction	62
5.1.1.	Metaphorical boundaries, animals and Islam	63
5.1.2.	The borderlands: people's problems with boundary maintenance	64
5.2.	Shepherd-animal relations in Bouhachem	65
5.2.1.	The Barbary macaque	66

5.2.2.	The domestic goat	69
5.2.3.	The golden jackal	72
5.2.4.	The domestic dog	75
5.2.4.1.	The dog as protector	75
5.2.4.2.	The dog as predator	76
5.2.4.3.	The dog as a liminal animal	78
5.3.	Conclusions	79
6	**Breaching the boundaries: physical interactions between Barbary macaques, shepherds and their dogs in Bouhachem Forest**	**82**
6.1.	Introduction	82
6.2.	Physical interactions between Barbary macaques, shepherds and their dogs in Bouhachem	84
6.2.1.	The physical consequences of Barbary macaque crop-raiding	84
6.2.2.	Hunting of Barbary macaques by shepherds in Bouhachem forest	87
6.2.3.	Dog harassment and predation of Barbary macaques	92
6.3.	Conclusions	95
7	**Choosing to conserve: social factors influencing pro-conservation behaviour change among Bouhachem shepherds**	**97**
7.1.	Introduction	97
7.2.	Factors influencing positive conservation behaviour change	98
7.3.	Changing behaviour	100
7.3.1.	Continued engagement	101
7.3.2.	Knowledge sharing	103
7.3.3.	Influence of key individuals	105
7.4.	Negative consequences of the conservation team's presence	109
7.5.	Conclusions	111
8	**Communication for conservation: successes and limitations**	**113**
8.1.	Introduction	113
8.1.1.	Communicating controversial information	114
8.1.2.	Communicating conservation goals by benefitting people	115
8.2.	My rationale for developing the Dog Health Programme	117

8.3.	Conducting the Dog Health Programme	118
8.3.1.	Successes of the Dog Health Programme	122
8.3.2.	Limitations of the Dog Health Programme	124
8.4.	Conclusions	125
9	**Discussion and conclusions**	**126**
9.1.	Thesis summary	126
9.2.	Implications of this study for practising conservationists	127
9.3.	Reflections on the use of ethnography in conservation management	130
9.3.1.	Publishing co-produced information: authorship issues	132
9.4.	Future directions	133
9.5.	Conclusions	135
	Appendices	
1	Interview questions for the local ecological knowledge survey of Barbary macaque locations	137
2	Participant information sheet	138
3	Participant consent form	139
4	An example of a research permit	140
5	Photographs used in my survey of shepherds' local ecological Knowledge of carnivores	142
	References	**144**

List of Figures

Figure 2.1. The location of Jebel Bouhachem Nature Reserve (SIBE) in northern Morocco and the Mediterranean 10

Figure 2.2. The location of Moulay Abd Es Salam and the ten study villages within their respective communes 14

Figure 2.3. A young male Barbary macaque 16

Figure 2.4. The logo for Barbary Macaque Conservation in the Rif 19

Figure 3.1. The now derelict Spanish Civil Guard and Forestry Headquarters in Bouhachem 27

Figure 3.2. Village women returning home with their loads of firewood 33

Figure 3.3. Fuel-efficient ovens in the village of Ouled Ben Blal 34

Figure 4.1. A Barbary macaque searching for invertebrates underneath a rock 46

Figure 4.2. A large quantity of macaque faeces of various ages under a habitual Barbary macaque sleeping site in a zeen oak (*Quercus canariensis*) 46

Figure 4.3. Results of my visits to the sites named by shepherds in Table 4.2. as locations of Barbary macaque presence 54

Figure 4.4. A map drawn by Ahmed under instruction from Talajamine shepherd, Ahmed Chitwan. Each Barbary macaque location is denoted by a circle. Note Mr Chitwan's separation of two circles representing Barbary macaque presence on the left to denote the area of forest close to his village and away from the main forest area 56

Figure 5.1. A *dib* killed by dogs – July 2010 74

Figure 5.2. A dog pack attacking a Barbary macaque in Bouhachem forest in February 2014 77

Figure 5.3. The Barbary macaque after the attack pictured in Figure 5.2 77

Figure 5.4. My summary of shepherds' perceptions of the relationships among Barbary macaques and three other species that use Bouhachem forest 80

Figure 6.1. A male macaque next to a potato field outside Ouled Ben Blal village 85

Figure 6.2. A Barbary macaque aged 8 - 10 months killed by dogs in Bouhachem forest 93

Figure 8.1. A girl from Lahcene village placing a yellow collar on her family dog 120

List of Tables

Table 2.1. The ten study villages in Bouhachem and their administrative categories with the number of households and dogs (where data are available) 13

Table 4.1. The name and physical description of each Barbary macaque location named by shepherds. The locations are ordered by the number of times they were named by shepherds 50

Table 4.2. Evidence of Barbary macaque presence from my three site visits to each of the 52 locations named by shepherds March-November 2010 52

Table 8.1. Numbers and percentage of domestic dogs vaccinated in three villages in Bouhachem in October 2010 121

Glossary

Ahadīth – Traditions based on reports of the sayings and activities of the Prophet Mohamed and his followers accompanied by the tradition of its chain of transmission

Halāl: Permissible to use or engage in

Harām: Forbidden to use or engage in

Ilmurran: Young men of the Maasai tribe of Kenya

Imam: Leader of prayer

Jebel: Mountain

Jebela: Region of northern Morocco

Matorral: Spanish term for dry heathland vegetation

Marja: Open, sometimes marshy, green space

Moussem: Festival

Oued: Watercourse - dry for most or part of the year

Qabila: Administrative district

Xalifa: Military chief

List of Abbreviations

CBRNM: Community Based Natural Resource Management

CSK: Conventional Scientific knowledge

EU: European Union

HCEFLCD: *Haut Commissariat aux Eaux et Forêts et à la Lutte Contre la Desertification* (High Commission of Water and Forests and the fight against desertification)

ICDP: Integrated Conservation and Development Project

GPS: Global Positioning System

LEK: Local Ecological Knowledge

NGO: Non-Governmental Organisation

NTFP: Non-Timber Forest Product

SIBE: Site d'Intérêt Biologique et Ecologique (Site of Biological and Ecological Interest)

TEK: Traditional Ecological Knowledge

Statement of copyright

The copyright of this thesis rests with the author. No quotation from it should be published without the author's prior written consent and information derived from it should be acknowledged.

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For my Dad,

John Edward Waters

1927-2012

Chapter 1 – Introduction

1.1. Conservation frameworks

From the 19th to mid-20th centuries, nation states and colonialism were the main protagonists behind the rise of modern conservation (Western 2001) with conservationists believing that there is an inverse relationship between people's actions and the health of the environment. This perceived negative activity thus necessitated the protection of some areas from people and justified the use of an approach based on scientific management and policing (Pimbert & Pretty 1997). Some scholars believe that 'Fortress conservation', as it is now often referred to, tacitly allowed conservationists and others to view people as a threat to, rather than part of, nature in order to justify exclusion of communities (Milton 1996). This exclusion may have led to expensive policy failures when conservation measures have been undertaken against the needs and wishes of local people[1] (Western 2001). The disempowerment and marginalisation experienced by local people due to their exclusion from conservation activities has also been blamed for incidents of wildlife killing (Saunders 2011; Mariki *et al* 2015). Fortress conservation is now largely discredited as an effective conservation approach due to its strong links with increased levels of human poverty caused by excluding local people from pursuing their livelihoods in protected areas of high biodiversity (Adams 2004).

Due to social scientists' concerns about increased poverty around protected areas, a more anthrocentric conservation ethic, known as 'social conservation', has been developed (Ghimire & Pimbert 1997). This type of conservation is represented by Integrated Conservation and Development Projects (ICDPs), and Community Based Natural Resource Management (CBNRM) (also known as community conservation projects) (Horwich & Lyon 2007; Miller *et al* 2011). Both ICDPS and CBNRMs incorporate a more participatory form of conservation planning involving local communities and the development of poverty alleviation programmes (Blaikie & Jeanrenaud 1997; Berkes 2004; McShane & Wells 2004). ICDPs are generally large in both scale and finances and their mission is to lessen the potential negative effects on local people's livelihoods caused by the advent of legislation to protect areas or species in or near their communities (McShane & Wells 2004; Horwich & Lyon 2007). Previous proponents of ICDPs have now acknowledged that large conservation non-governmental organisations (NGOs) have

[1] Throughout this thesis I use the term "local people" to refer to people who live close to and interact with wildlife in both protected and non-protected areas.

encountered difficulties in translating broad organisational goals into specific and appropriate conservation activities illustrating tensions in programme implementation over a large scale (Wahlen 2014). An employee of one such NGO expressed the hope that smaller grassroots NGOs will contribute to increasingly complex conservation concerns because large NGOs are not meeting with the success they anticipated (Wahlen 2014).

The success of CBNRMs appears to be independent of whether they are driven by internal or external agencies as long as the local people feel sufficiently involved and autonomous (Measham & Lumbasi 2013). CBNRMs with a participatory approach to species conservation have produced successful results for endangered species conservation such as the Baboon Sanctuary focusing on black howlers (*Alouatta pigra*) in Belize (Horwich & Lyon 2007) and the Endangered hirola antelope (*Beatragus hunteri*) in Kenya (Measham & Lumbasi 2013). Community conservation practitioners have noted the importance of social and cultural as well as economic incentives in CBNRMs (Horwich & Lyon 2007) which suggests that familiarity with social science techniques may be a necessity for conservation practitioners.

1.2. Conservation social science

Wildlife populations are rarely free from human influence so the social and cultural aspects of conservation are increasingly viewed as being as important as biological conservation (Pretty *et al* 2009; Wolverton *et al* 2014). However, boundaries of understanding and communication still exist between academic disciplines with regard to conservation (Heberlein 1988; Campbell 2005; Lowe *et al* 2009; Moon & Blackman 2014). Scholars have recommended that conservation practitioners become skilled at bridging such boundaries to achieve more effective conservation outcomes (Fox *et al* 2006; Chan *et al* 2007; Pretty 2011). However, conservation practitioners are usually biologists or ecologists by training, and may avoid studying people in relation to biodiversity or species conservation. This reluctance is related to a lack of understanding of human behaviour and lack of preparation for its study (Heberlein 2012; Verissimo 2013). Redford (2011) maintains that social science done badly by untrained scientists may be worse than no such research.

Those conservationists who do conduct social science research tend to choose quantitative instruments, such as questionnaires, to measure people's perceptions about wildlife (Newing 2011; Verissimo 2013). However, such perceptions do not necessarily indicate how people actually behave toward wildlife. For example, many livestock ranchers express

negative attitudes toward wild carnivores but do not kill them (Delibes 2013). Some environmental anthropologists have suggested that adopting quantitative methods would improve acceptance of their research findings by the wider conservation community (Charnley & Durham 2010). However, quantitative data may not provide the nuanced insight into people's sociocultural motivations that qualitative data can and may conceal rather than reveal issues pertinent to conservation practice (Goldman *et al* 2010; Satterfield *et al* 2013). Qualitative data obtained by engaging with local people can provide a profound representation of their reality and of their knowledge and understanding of a species to deliver positive conservation outcomes (Kuriyan 2002; Pratt *et al* 2004; Goldman *et al* 2013).

Conservation practitioners, interested in understanding how local people view their environment, collect qualitative research and analyse it using grounded theory (Pratt *et al* 2004). Grounded theory emerges from qualitative data to provide insight into the reasons underlying people's behaviour. Emergent theory provides insight and understanding into local people's reality enabling more meaningful solutions to local conservation issues (Pratt *et al* 2004). This method has been used to investigate conservation issues which may be complex, multi-faceted and contentious and may be a better way to investigate illegal activities such as poaching (Pratt *et al* 2004; MacMillan & Han 2011). There is, however, a lack of information about whether conservation strategies might be effectively developed and inclusive of local people if ethnographic rather than ecological data were used to drive conservation action.

1.3. People and primate conservation

Primates are frequently the subject of conservation endeavours (Lanjouw 2008; Bracebridge *et al* 2013). People's perceptions of primates can be particularly complex due to their similarity to humans (Costa *et al* 2013). Human-primate interactions are influenced by diverse cultural, social, ecological and other components which may be unique to geographical regions and are fundamental to the continued existence of remaining primate populations (Lee & Priston 2005; Loudon *et al* 2006; Hill & Webber 2010). How primates are treated in a culture depends very much on how they are interpreted by that culture in religion, science and art. In some cultures, humans have been enthusiastic in distancing themselves from other primates (Ohnuki-Tierney 1987; Corbey 2005). This process is characteristic of early Christianity, when primates were conceived of and portrayed as ugly, foolish and obscene (Corbey 2005). Common images from that period are of monkeys likened to an image of the devil, and as degenerate humans, thus associating the Christian belief in the innately sinful aspect of human nature with

primates (Corbey 2005). By the end of the Middle Ages the image of the monkey had become that of the fool, and the monkey's role as an unfavourable symbol of humans and their negative qualities has persisted into the modern day (Corbey 2005).

The complex, often nuanced, relationship between humans and other primates means that interdisciplinary methods are increasingly used to study and conserve primates (Fuentes & Wolf 2002; Papworth *et al* 2013; Shutt 2014). Additionally, wild primates frequently come into contact with people. The study of these human-primate interactions is referred to as ethnoprimatology (Loudon *et al* 2006; Fuentes & Hockings 2010; Riley 2013). Ethno-primatologists study the diverse relationships between primates and people with the goal of furthering conservation aims and use a mixed methods approach of ecological and ethnographic data collection (Fuentes & Hockings 2010; Papworth *et al* 2013; Peterson & Riley 2013).

1.4. Thesis structure

This thesis examines the effectiveness of applying ethnographic data to conservation practice using a project to conserve Endangered Barbary macaques (*Macaca sylvanus*) in Bouhachem forest in northern Morocco as a case study. Local people's interactions with their environment involve diverse social, cultural and political perspectives which may not be immediately obvious to an incoming conservationist (Wolverton *et al* 2014). Many countries have a history of conservation being forcefully imposed by colonial powers (Redford 2011), or of conservation being monopolised by the state, marginalising local people (Benjaminsen *et al* 2013). Thus, conservationists need to gain insight into how historical, political and sociocultural factors have influenced local people's perceptions of and interactions with outside agencies (Brosius *et al* 1998; Fairet 2012). This understanding may help to avoid the deployment of conservation activities which alienate a disempowered population because of the political or social context in which they are conducted (Fairet 2012). After introducing my study site and research methods in Chapter 2, I present the historical, political and socio-cultural context of my study area and consider how this might influence future conservation activities (Chapter 3).

There is evidence to suggest that a conservation project concerned with a particular species will be more effective if it includes local people's knowledge and perceptions of the species concerned (Horwich & Lyon 2007; Measham & Lumbasi 2013). For example, taking an interdisciplinary, biosocial and participatory approach to species conservation with an emphasis on ethnographic data to identify local people's ontology and epistemology of a focal species

culminated in the successful inclusion of local people in African elephant (*Loxodonta africana*) conservation and research activities in the Samburu district of Kenya (Kuriyan 2002). However, to the best of my knowledge, there are no examples of local people being included in research activities at the start of a conservation initiative. In Chapter 4, I describe how I included and engaged local people in the conservation project from the start by integrating our different knowledge systems to co-produce information on the location of Barbary macaques in Bouhachem.

Ethnographic engagement with local people can provide insight into the ontology of their human-animal relations (Goldman *et al* 2010). Such relations differ considerably across societies and among cultural contexts within societies (Milton 2000; Watson & Huntington 2008). In many areas, local people do not share the intrinsic value placed on wildlife by conservationists and do not view its protection as a priority (Adams & Hulme 2001b). It is also important not to ignore the heterogeneity of ontologies surrounding some species (Richards 2000). Primates may have negative historical and even political resonance for some people and negative religious connotations for others (Richards 2000; Foltz 2006; Costa *et al* 2013). Some scholars suggest that a narrow focus on one species, however, may ignore the broader context in which any human-primate interface occurs in relation to other animals (Papworth *et al* 2013). In Chapter 5, I examine Bouhachem shepherds' ontology of Barbary macaques along with three other species important to local people within the framework of boundary theory. The species are domestic goats (*Capra hircus)*, domestic dogs (*Canis familiaris*) and the golden jackal (*C. aureus*).

Species may be valued, or vilified and killed, for complex social, cultural or political reasons (Simons & Meyers 2001; Foltz 2006; Marchini & Macdonald 2012; Goldman *et al* 2013) and how people view a species does not necessarily predict their behaviour towards it. (St John *et al* 2010; Delibes 2013). In Chapter 6, I describe the interactions which take place when Barbary macaques, shepherds and their dogs cross physical boundaries and come into contact, interpreting the shepherds' behaviour in its social and cultural context.

Misunderstanding the motivation for killing wildlife may lead to awareness campaigns aimed at eliminating non-existent, or falsely problematised, sets of ideas and behaviours among local people and, in some cases, such awareness activities may not be enough to persuade people to change their behaviour (Waylen *et al* 2009; Marchini & Macdonald 2012; St John *et al*

2012). Many conservation initiatives rely on economic incentives to increase tolerance or modify human behaviour towards wildlife (Adams & Hulme 2001a; Hazzah *et al* 2014) but these incentives can be subject to the vagaries of sufficient funding and fail to account for the highly complex relationships that people may have with wildlife (Goldman *et al* 2010; Marchini & Macdonald 2012; Hazzah *et al* 2014). Ethnography may aid in identifying an alternative method of fostering ownership and pro-conservation behaviour change, whether an intrinsic value for that species is present or absent from local people's ontology. Studies focusing on pro-conservation behaviour change are sparse and there is a need for further work in this area. Applying the insights from the ethnography I present in Chapters 5 and 6, I demonstrate in Chapter 7 how inclusion of and engagement with local people in research activities can improve communication between conservationists and local people and empower them to become Barbary macaque conservationists, by changing their behaviour and that of their peer group towards the macaques.

Communicating effectively with local people is fundamental to successful conservation outcomes (Bickford *et al* 2012). Effective methods of communication, whether direct or tacit, can only be established if a conservation practitioner has a profound understanding of the social, cultural and political issues at his/her study site. This is particularly important in cases where local and scientific knowledge conflict (Dowsley & Wenzel 2008). Conservationists often assume that empirical findings will be sufficient to persuade local people to change long-held beliefs or behaviours when this may not be the case (Saunders 2011; Redpath *et al* 2013). In fact, conservationists' communication of data which oppose local beliefs has sometimes caused alienation and conflict among the very people they need to reach (Peterson *et al* 2013; Redpath *et al* 2013). In Chapter 5, my findings regarding the ownership of domestic dogs present in the forest conflict with those of shepherds. In Chapter 8, I present evidence that a carefully considered intervention can facilitate tacit communication of empirical data not concordant with local knowledge by providing relevant information to local people. Such an intervention can also achieve the goal of reassuring local people that they are important to conservation actors.

Finally, in Chapter 9, I appraise the effectiveness of collecting and analysing ethnographic data and applying grounded theory to conservation practice and the difficulties I encountered whilst doing so. The contribution of local people's knowledge is rarely explicitly recognised by conservationists, and I discuss the ethical issues surrounding the authorship of

publications when co-production of information is the aim of a study. I then present some conservation initiatives which I hope to conduct in the future. I conclude by presenting some recommendations for conservation practitioners who may wish to use the ethnographic approach in their work.

Chapter 2 – Background, study site and methods

2.1. Background

Years of working with wildlife has taught me that the support and involvement of local people is fundamental to the success of any conservation initiative. I believe that conservationists have a responsibility and a need to acknowledge that the people living in the area of a conservation initiative may view their environment in a very different way. My attempt to see the world through a different cultural lens was stimulated by my experience of working as a restoration biologist with the Native American Blackfeet Tribe. In 2001, I joined a team reintroducing the swift fox (*Vulpes velox*) to the Blackfeet Tribal Lands in northern Montana. The swift fox is a sacred species to the Blackfeet but, as with many other such species, had been extirpated locally due to the cumulative effects of the intensive agriculture which followed European colonisation (Carbyn *et al* 1994).

Monitoring reintroduced mammals post-release is standard practice for biologists but the Blackfeet, like other native Americans, were reluctant to "interfere" with the animals once released and were against the idea of radio-collaring them. However, from the second year of the release they permitted some of the released foxes to be radio-collared each year until the project ended. Unfortunately, the data were insufficient to satisfy the reviewers of the resulting manuscript. In fact one reviewer described the manuscript as being "not at all scientific". I expressed my frustration to the then Chief of the Blackfeet Fish & Wildlife Department, Ira Newbreast, who had championed the reintroduction. Ira replied in an email:

> *From a Native American standpoint, Blackfeet perspective if you will, the need for vindication and legitimacy through qualification, quantification and recognition are not often required in matters of the spirit and heart which is what this action [swift fox reintroduction] was, and is…[in] the view of many peoples, indigenous in particular. That is, cumulative factors (including spiritual, heartfelt and cultural values) must be taken into account then priorities may be set from there…The project worked because matters of the heart and spirit must guide the way. It was simply the right thing to do.*
> Ira Newbreast, 2005.

Apart from putting the bad review into perspective, Ira articulates how the project did not necessarily need approval from the scientific community for what it had achieved biologically as well as culturally. Ira's message encouraged me to reflect on how other cultures view wildlife and how gaining an increased understanding of this could improve my own professional practice, particularly as I planned to initiate my own conservation project.

In the rest of this chapter, I describe my study site and my study species, the Barbary macaque (*Macaca sylvanus*), and how I met my research assistant, Ahmed El Harrad. I then describe the Moroccan non-governmental organisation (NGO) which is the conservation project I refer to in this thesis. Finally I discuss how I collected and analysed my ethnographic data.

2.2. The study site

2.2.1. Morocco

The Kingdom of Morocco (also known as the Maghreb) is situated on the northwest coast of Africa at the entrance to the Straits of Gibraltar and the Mediterranean. The country had a population of 32.6 million people in 2012 (UN 2012). The official religion is Islam and Moroccans are predominantly of the Sunni Muslim sect. Phosphates, fish and citrus fruits are the main exports and the country depends heavily on tourism for foreign revenue. Around 49 % of the population live in rural areas and these represent 70 % of the country's poorest people (Anon 2000) which also have the lowest levels of literacy (Anon 2011b). The low literacy rate may be explained by the phenomenon of "de-schooling" which occurs when a child drops out of school early, often due to parental perception that education is of limited use to rural children (Tawil 2006). Morocco has a long tradition of migration to Europe and there are Moroccan populations living in many western European countries (van Dalen *et al* 2005).

With its high youth unemployment, Morocco did not escape the surge of political unrest that took place in North Africa and the Middle East in 2011. Demonstrations took place all over the country with subsequent rioting causing loss of life in one northern city. In the aftermath of this unrest, King Mohamed VI announced a review of the constitution (Anon 2011a). King Mohamed has made advances in increasing gender equality and educational opportunities, particularly in urban areas. My study site is situated in the region of Tangier-Tétouan which has had a tradition of rebellion against central government in the past. This defiance resulted in

political and economic neglect during the reign of the previous King, Hassan II (Joseph 1973; Tawil 2006). However his son, King Mohamed VI, has made efforts to heal these differences, making the first of regular visits to the impoverished provinces of the north when he ascended the throne in 1999 (Tawil 2006).

2.2.2. Geographic and natural characteristics of the study site

My study site, Jebel Bouhachem Nature Reserve (Figure 2.1) which I refer to as Bouhachem from hereon, is situated west of the Rifian mountain chain and exhibits similar climate and biodiversity to the Rif mountains which run down the eastern side of the region.

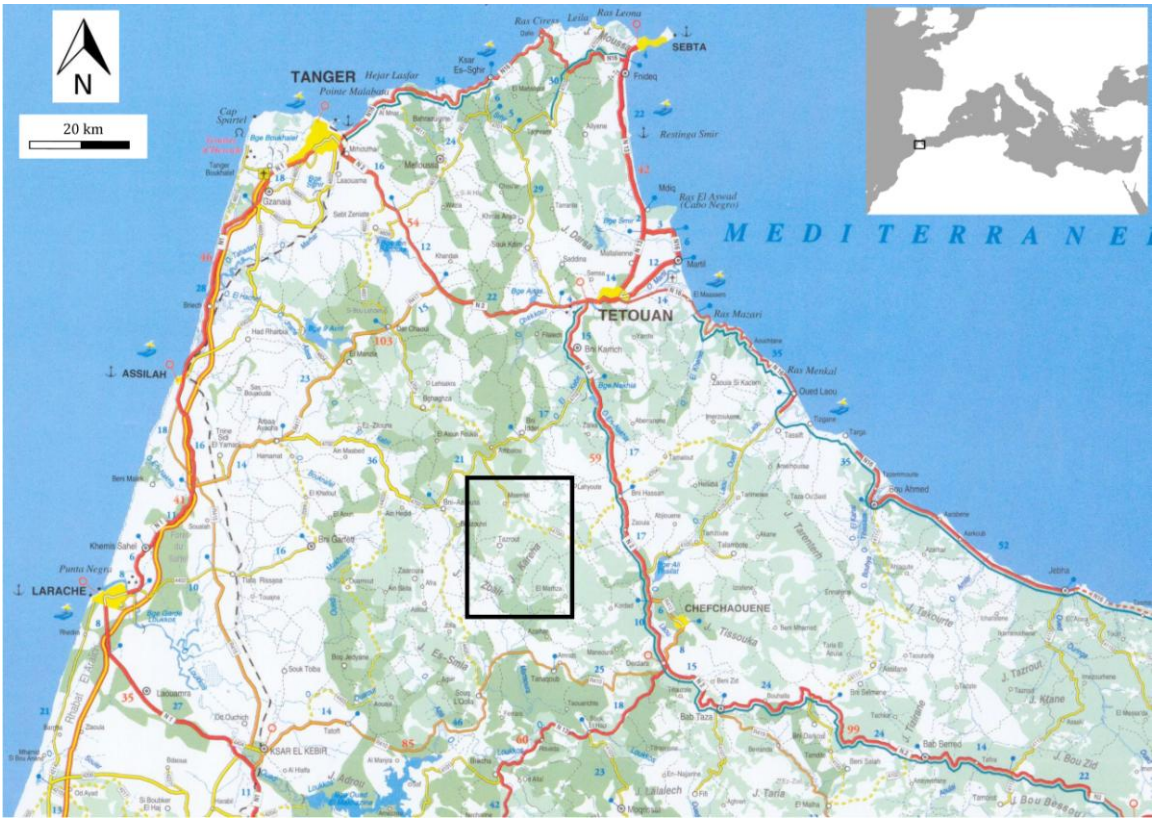

Figure 2.1. The location of Jebel Bouhachem Nature Reserve (SIBE) in northern Morocco

Bouhachem is an area of approximately 142km² and takes its name from its highest peak (Jebel Bouhachem) which reaches an altitude of 1681m. The climate in this area is typically Mediterranean and characterised by hot, dry summers and cold, damp winters with rainfall concentrated in spring and winter which often falls in torrential downpours. Total precipitation

averages 1,000 mm annually in the western Rif and has been recorded to rise over 2,000 mm annually at higher altitudes where snowfall can occur in winter (McNeill 1992). The position of Bouhachem between the Atlantic and Mediterranean coasts means that the mountains act as rain shadows and are thus subject to low cloud which can reduce visibility to just a few metres. The forest is an important source of water for villages and urban areas in its vicinity. Due to the hot, dry summers, fire is a common hazard in the area, either started accidentally by forest users or deliberately by farmers clearing forest and scrub for agricultural land. The northwest Rif (which includes Bouhachem) loses 1185 ha of forest annually through fire (Anon 1996). I was unable to locate more detailed information about the causes and history of forest fires at the study site. Damage by fire leads to habitat degradation, with particularly fierce fires destroying the fire-adapted native trees leaving the area to be colonised by shrub, often referred to as *matorral* in northern Morocco.

Sandstone formations are covered by nutrient poor, acid soils (Ajbilou 2006) which support mixed oak forests of evergreen cork oak (*Quercus suber*), and deciduous zeen (*Q. canariensis*) and Pyrenean oak (*Q. pyrenaica*). Planted and natural stands of an endemic maritime pine subspecies (*Pinus pinaster maghrebiana)* are found in the high altitude peaks with some mature cedar trees (*Cedrus atlantica*).

Larger mammals present at the study site include golden jackal, (*Canis aureus*), red fox (*Vulpes vulpes*), genet (*Genetta genetta*), wild boar (*Sus scrofa*) and the Barbary macaque. No systematic mammal surveys have taken place in the area apart from those for the Barbary macaque (Fa 1982; Waters *et al* 2007). Bouhachem is included in the Intercontinental Biosphere Reserve of the Mediterranean and is a component of the protected area network under the management of the *Haut Commissariat aux Eaux et Forêts et à la Lutte Contre la Desertification* (HCEFLCD). An area encompassing 8,000 ha of mid-altitude oak forest constituting about 75 % of the total area of forest in Bouhachem currently has protected status as a Site of Biological and Ecological Interest (*Site d'Intérêt Biologique et Ecologique* - SIBE) - commonly referred to as a nature reserve. As a SIBE or nature reserve, hunting is still permitted in some designated areas and is controlled by hunting associations based in the nearby city of Tétouan. The Tangier-Tétouan regional government initiated a pilot project for sustainable development and protection of rural areas around Bouhachem in 2001.

2.2.3. Villages and people of the study site

Bouhachem forest is situated at the intersection of three provinces: Larache, Chefchaouen and Tétouan – also referred to as the Jebela. Arabic is the predominant language and the people of the Jebela are Sunni Muslims. Unlike other areas of Morocco, group organisation in the Jebala is not based on a tribal or kinship system but organised around *qabilas*. This term is also used to refer to Bedouin tribal organisation which is kinship-based (Hart 2001). However, in the Jebela, the term is applied to territorial and political entities and thus unconnected to genealogy (Hart 2001). The *qabila* of the Jebela region is more accurately described as a:

> *Territorially defined administrative district rather than a genealogically defined autonomous tribe.* (Hart 2001:255).

However, people in the region identify themselves with their respective *qabila* (Munson 1990). The people of the Jebela have characteristic linguistic and clothing traditions and their houses are also typical to the area with traditional gabled roofs, and earth and straw walls which are limed and painted white (Scotto di Rinaldi 2003).

There is a local tradition of honouring holy men and their shrines in Bouhachem (Hart 2000). The shrine of one of the most revered of these holy men is located in the main town of the study site, Moulay Abd Es Salam (Figure 2.2). The site is popular with both urban and rural Moroccans and several annual religious festivals or *moussems* attract people in large numbers. Most of these festivals are related to the birthday of the Prophet Mohamed and so their dates are mobile. The first of July is the only fixed date in the calendar and this festival celebrates the Moulay himself and continues for a week. At this time, thousands of pilgrims converge on this small town to pay their respects. Other such sites with diminished religious significance occur in the study area, identified by the name of the holy man buried at each site.

Ten villages in three *qabilas* (Table 2.1) are adjacent to or directly on the periphery of the forest and are included in this study. I refer to these villages as the study villages or communities.

Table 2.1. The ten study villages in Bouhachem and their administrative categories with the number of households and dogs (where data are available)

Village	Commune	*Qabila*	Province	Number of households	Number of village dogs
Tazrout	Tazrout	Bni Aarouss	Larache	No data	No data
Slalem	Tazrout	Bni Aarouss	Larache	21	58
Lahcene	Tazrout	Bni Aarouss	Larache	39	84
Talajamine	Tazrout	Bni Aarouss	Larache	18	52
Almidene	Bni Lait	Bni Hassan	Tétouan	78	183
Remla	Al Ouad	Bni Hassan	Tétouan	No data	No data
Afertane	Tanakoub	El Akhmass	Chefchaouen	26	54
El Marzha	Tanakoub	El Akhmass	Chefchaouen	No data	No data
Adrou	Tanakoub	El Akhmass	Chefchaouen	No data	No data
Ouled ben Blal	Derdara	El Akhmass	Chefchaouen	No data	No data

These villages are situated in five communes (local administrative centres) (Figure 2.2).

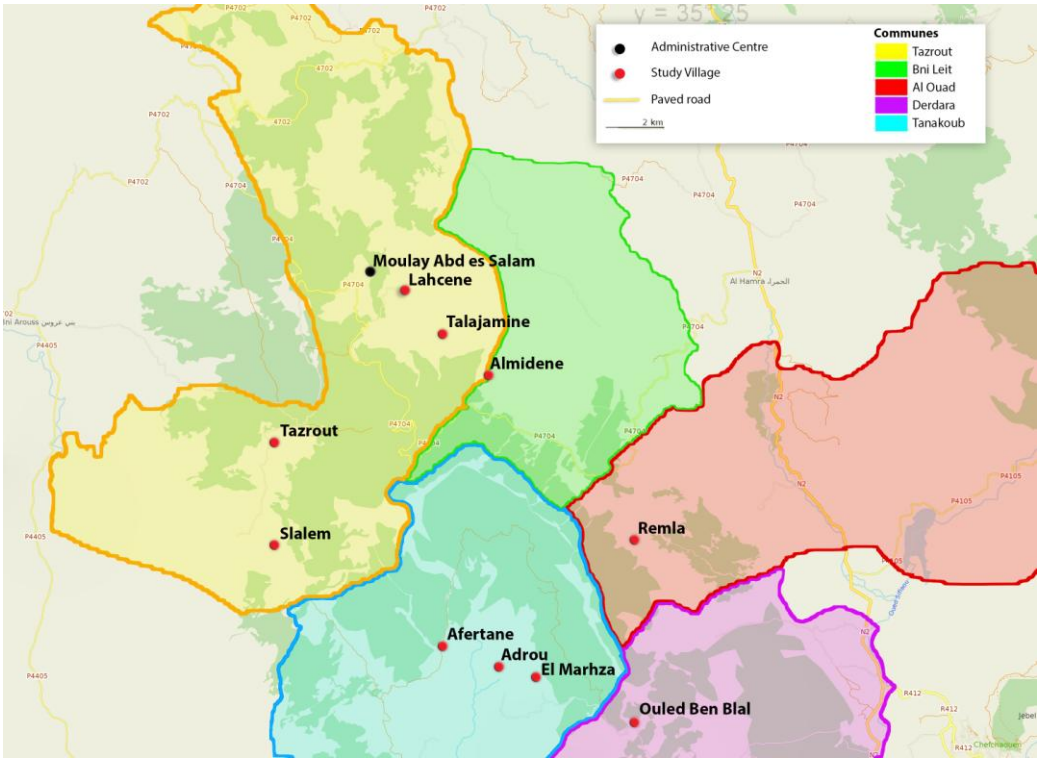

Figure 2.2. The location of Moulay Abd Es Salam and the ten study villages within their respective communes.

There has been no recent census at a household level so no population data are available. The three largest villages (Almidene, Lahcene and Tazrout) are accessible by paved road and also have small shops. At the time of this study, three villages (Ouled ben Blal, El Marzha and Remla), were accessible in good weather in a four-wheel drive vehicle, and four had no vehicular access (Talajamine, Slalem, Adrou and Afertane). A health centre is situated in the administrative centre of Moulay Abd Es Salam. There is at least one mosque in every village and all villages except for Slalem and Ouled Ben Blal have their own school: the children of Slalem attend the school in a neighbouring village while the children of Ouled Ben Blal do not go to school.

2.2.4. Agricultural practices at the study site

The study site is rural and land used for agriculture occupied 22% of its surface area according to the 1996 Census of Agriculture (Scotto di Rinaldi 2003). However, later surveys of land in 2009-2010 show that almost 40% of the study area is occupied by crops or post-fallow cropping (Chambouleyron 2013). Chambouleyron (2013) attributes this difference to continued forest or shrub clearance since the 1996 census. According to the agricultural census of 1996,

the average land holding was 3.73 ha per farm (Chambouleyron 2013). Most families own their land but the ownership may not be officially registered in their provincial office.

Most people in the area are agro-pastoralists and their main agricultural crops are einkorn (*Triticum monoccocum*), vegetables and fruit along with more water intensive crops such as tobacco (*Nicotiana* sp.) (Scotto di Rinaldi 2003). Where irrigation is impractical, the growing season is confined to spring and autumn (McNeill 1992). Agriculture is practised by the cultivation of vegetable gardens and fruit trees close to the house with main crop fields further away (Taiqui & Cantarino 1997) separated from the forest by an expanse of shrubby vegetation which varies in size. However, some of the fields of the villages of Talajamine, Tazrout, Remla and Ouled Ben Blal are adjacent to the forest itself. Most agricultural production is for the villagers' own consumption and any surplus is sold in weekly markets in Bni Aarouss, Bni Hassan and Tanakoub. Some villages in the study area cultivate cannabis (*Cannabis sativa*) as a cash crop. Cannabis cultivation, along with overgrazing, has been blamed for accelerating soil erosion in the Rif because very steep slopes are often deforested and ploughed to grow the plant (McNeill 1992; Moore *et al* 1998).

Due to the physical remoteness of their area, Moroccan communities living in mountainous areas depend on local resources and each other for various subsistence activities (Burli *et al* 2008). Collective work practices are common in Bouhachem villages. Women work together to collect fodder for livestock kept in the village and to collect firewood. Domestic livestock include goats *(Capra hircus),* cows (*Bos taurus*) and sheep (*Ovies aries*). Cows graze in the forest unattended but goats are herded actively and regularly into and out of the forest. Goat numbers vary and depend on the size and wealth of the family. Shepherds from some villages such as Talajamine and El Marzha form a team to herd their entire village's goats into the forest and back again. Other families with fewer goats operate a rota system combining the goats of 3 - 4 families which are then taken into the forest by one household member leaving others free for other tasks.

As well as grazing for their livestock, villagers use the forest of Bouhachem to collect non-timber forest products (NTFPs) such as mushrooms and medicinal plants, and apiculture is practised in some villages. There is no socio-economic information available regarding how important NTFPs are to local people's livelihoods (Chambouleyron 2013). Villagers also rely on collecting dead wood for fuel and harvesting timber for house construction.

2.3. The Barbary macaque

The Barbary macaque (Figure 2.3) is the only representative of the genus *Macaca* found outside Asia (Fooden 2007). Barbary macaques are found north of the Sahara in Morocco and Algeria and were previously present in Tunisia and possibly western Libya in recent times (Goudsmit & Brandon-Jones 2000).

Figure 2.3. A young male Barbary macaque

In the wild, Barbary macaques are now only present in fragmented populations in Morocco and Algeria. A free-ranging, but managed, Barbary macaque population on Gibraltar was introduced by the British in 1740. The Barbary macaque lives in a variety of habitats including oak, fir and cedar forest, and can also adapt to Mediterranean shrub or matorral (Fa 1982). It lives in multi-male multi-female groups with an almost equally balanced sex ratio (Fa 1982; Deag 1984; Mehlman 1986). In common with most members of their genus, Barbary macaques are opportunistic feeders with an omnivorous diet. During periods of food scarcity, the groups fission into sub-groups for foraging during the day and come together at night to sleep (Menard & Vallet 1997).

Surveys have shown that the population of Barbary macaques in the Middle Atlas Mountains of Morocco has declined over the last 10 years from an estimated 13,000 in 1984 (Fa *et al* 1984) to 5,000 in 2010 (Menard *et al* 2013). Increasing concern over the apparent decline of the species in the Middle Atlas (Camperio-Ciani *et al* 2005) and the Rif Mountains in the north of the country (Waters *et al* 2007) has led to the species being given Endangered status on the IUCN Red List on the basis of a population decline of >50% in the last three generations (Butynski *et al* 2008). The main cause of the species' decline is attributed to the drain on the Middle Atlas population by the capture of infants for the illegal pet trade (Menard *et al* 2013), although the capture, keeping and selling of Barbary macaques is illegal in Morocco. Causes of the decline of Barbary macaques in the north of Morocco are reported to include overgrazing by livestock communally pastured on the mountains, along with habitat fragmentation and destruction for agriculture (Fa 1982; Fa *et al* 1984). While reading the *IUCN Action Plan for African Primates* (Oates 1996) I noted that the conservation status of Barbary macaques (*Macaca sylvanus*) in the north of Morocco had received little attention. I arrived in northern Morocco in the autumn of 2004 with the intention of locating Barbary macaques in areas where they had last been surveyed by John Fa in 1980 (Fa 1982).

2.4. My research assistant, Ahmed El Harrad

During the preliminary survey work I conducted in the Jebela in 2004, I met Ahmed El Harrad, who was to become my good friend and also my key informant regarding all aspects of Moroccan religious, rural and cultural life in the north. One scholar describes the main characteristics of a key informant as having an understanding of the type of information required and why it is required, whilst doing their utmost to give or obtain that information (Bernhard 2006). I met Ahmed when I got into the Tétouan city taxi he was driving. I discovered that he was a keen outdoor enthusiast and had local knowledge of areas where Barbary macaques might still occur. I asked Ahmed if he would accompany me in a search for Barbary macaques in mountains close to Tétouan the following day and we sighted macaques where they had last been documented in 1975 (Alvarez & Hiraldo 1975; Waters *et al* 2007). Ahmed and I have been a team ever since.

2.5. The conservation project: Barbary Macaque Conservation in the Rif

In 2004, alongside the macaque population survey, I also conducted a questionnaire survey on human-wildlife conflict in the villages surrounding macaque habitat. I was surprised at how eager villagers were to discuss their situation with me and how much importance they attributed to having their voice heard regarding issues that directly affected them. I used a structured questionnaire to conduct this survey, so that I could analyse the data quantitatively. However, I found that the questionnaire was inadequate for the collection and analysis of local people's views of local wildlife and Barbary macaques in particular because the closed questions clearly suppressed the respondents' desire to expand on the topics covered. I also felt that some participants were concerned that they might give the "wrong" answer to the questions. My use of the questionnaire also made me feel uncomfortable because I felt I was taking or extracting information without giving anything in return.

I felt that any further research should be situated within the framework of a conservation project and I aimed to establish a long-term initiative. I envisaged my study fulfilling the criterion that fieldwork should be "a process of exploring issues of both practical and academic importance" (Eggerman & Panter-Brick 2011:38). For this process to work, flexibility is the key (Eggerman & Panter-Brick 2011). I needed the flexibility of an interdisciplinary approach to collect ethnographic data and, where possible, ecological data on the macaques. The conservation project itself commenced when I began my fieldwork in October 2009 and the project gained Moroccan charitable status as a non-governmental organisation (NGO) in 2010. Ahmed and I agreed that the name and logo of the NGO should reflect its geographical location in the north of Morocco hence Barbary Macaque Conservation in the Rif (BMCRif) with a logo which illustrates the focal species and our location (Figure 2.4).

Figure 2.4. The logo for Barbary Macaque Conservation in the Rif

The mission statement of BMCRif is:

> *This interdisciplinary Moroccan conservation NGO focuses on the Barbary macaque (Macaca sylvanus). This project aims to halt the decline of the Barbary macaque in Morocco by gathering scientific data, raising awareness, and working with local and national stakeholders to develop participatory programmes aimed at safeguarding the species, its habitats, and the health and livelihoods of the local people.*

In October 2009, the project staff consisted of me as director and Ahmed El Harrad as deputy director.

2.6. Methods

I collected the majority of the qualitative and quantitative data for this study from October 2009 to December 2010. I collected interview data from March to November 2010 with a break in August 2010 for Ramadan. When I was absent from the study site, Ahmed continued to collect quantitative data on the macaque groups. I visited the study site in April and May 2011 when I conducted opportunistic interviews with previous participants to obtain further data which I include in Chapters 6 - 8. The methods I used to collect quantitative data are

specific to Chapters 4 and 6 and I will describe them there. I collected all the qualitative data I present in each chapter from interviews and participant observation and I kept an ethnographic diary which I describe below.

2.6.1. Study participants

My choices of participants to produce information about the Barbary macaques in Bouhachem were the men and boys who worked as shepherds. Shepherds cover the same territory for long periods of time and, as a result may have detailed knowledge of local wildlife (Anadon *et al* 2009). Unlike other forest users, they are visible, relatively accessible and in the forest for most of the year. They are present in every village on the periphery of Bouhachem. Women in Bouhachem do not work as shepherds.

From October 2010, Ahmed and I explored and familiarised ourselves with the forest and chatted to any shepherds we encountered. I began to interview shepherds in March 2010. I describe our approach and interview techniques in more detail in Chapter 4. I interviewed five shepherds from each of ten villages situated on the periphery of Bouhachem forest about the location of Barbary macaques. We frequently encountered many participants after their initial interviews. These men often volunteered further information on macaque observations and talked about other subjects such as livestock predation and illegal activities. In addition I interviewed elderly village men who had spent time shepherding in their youth, and two anonymous individuals working in urban medical and veterinary centres respectively. Both these centres are run by the regional government.

2.6.2. Interviewing

All interviews were semi-structured because they enable interviewees to communicate their depth of knowledge and their thoughts about the subject matter in their own words (Huntington 1998; Drury *et al* 2011). Semi-structured interviews also allow the interviewee a degree of control over the interview process (Bryman 2001). All interviews were audio-recorded. During the interviews about macaque group locations (described in Chapter 4), shepherds spontaneously expressed their beliefs and views about Barbary macaques and I include these data in Chapters 5 - 8. The questions I asked in the first interview with an individual shepherd are presented in Appendix 1.

I also took advantage of other opportunities to interview shepherds and village men (who had all been shepherds before their marriage) informally to discuss subjects such as domestic animal management, the Spanish occupation and how villagers perceived outside agencies such as development NGOs and forestry officials. I wanted all interviews to be a positive social experience. By building a rapport with participants, I hoped that they would feel so comfortable with the process that they would approach us in the future when encountering us in the forest or elsewhere. In addition, I was aware that conservation organisations have been criticised for the extractive way they obtained data from informants as opposed to developing the rapport necessary for long-term anthropological work (Peterson 2010) and did not want to make this mistake myself. My relaxed approach meant spending differing amounts of time with each person depending on his desire to talk, and also sometimes steering the informant back to related topics such as the forest and its wildlife.

When I first began interviewing men about the macaques, it would often elicit amused and sometimes openly derisive responses if they were in a group. I felt this reaction was restraining less confident individuals from relaying information about macaques. After this experience, I tried to interview each shepherd out of earshot of others who might be accompanying him to ensure that the participants did not interfere with or overhear one another's responses. This also allowed me to treat each individual's information with the respect it deserved. These factors were more important at the start of the study than later on when our topics of discussion were more general and groups of shepherds seemed less inhibited about discussing subjects such as human-induced macaque mortalities without prompting from me (Chapter 6).

Ahmed and I lived in a house in the village of Lahcene and were on very friendly terms with many villagers. I had raised funds to purchase a Land Rover and we often gave lifts to schoolchildren on our way to and from the study site. In the absence of any other all-terrain vehicles in the area, we also helped with medical emergencies, particularly in severe weather conditions. Our willingness to help probably facilitated our contact with interviewees. We also visited the other nine villages in the study area at least once to familiarise people with our presence. This proved worthwhile because, when we began work in a new area of the forest and encountered shepherds, they always greeted us because they had already heard of us and were amenable to being interviewed.

I speak very little Arabic and I was not fluent in the local dialect. I could, however, follow the gist of the preliminary semi-structured interviews as they unfolded. Ahmed conducted all the interviews with the villagers of Bouhachem and is referred to as the "Interviewer" in the following chapters. When I was unable to understand something well, I gestured to Ahmed and he translated roughly what was being said. I tried to do this as little as possible, however, as it tended to disrupt the natural flow of an interview. This probably meant that I missed some important nuances in the interview. I impressed this risk of missing important meanings on Ahmed during interview transcriptions. We used an Arabic/English dictionary when transcribing. In retrospect, I would make more effort to learn the language so I could follow conversations more easily. I conducted the interviews with city-dwellers in Spanish which is widely spoken in Tangier-Tétouan.

Throughout my fieldwork I kept an ethnographic diary (Sanjek 1990), recording observations and opportunistic conversations with people. I used the same notebook for my quantitative and qualitative data about the macaques. It became commonplace for the shepherds to see me with a notebook in my hand and I wrote about any encounters immediately after they occurred. I found the diary useful as it enabled me to pinpoint areas for further investigation. Re-reading the diary also enabled me to make sense of observations made at earlier stages of my work in the area.

2.6.3. Participant Observation

Participant observation is used by anthropologists as a method to observe human behaviour on a day-to-day basis with the aim of describing and explaining the social and cultural contexts and motivations for people's activities (Newing 2011). The observation of the focal group's activities can provide insight into sensitive issues (Drury *et al* 2011). Perhaps most important for conservation goals, it can "*Distinguish between what people say they do and what they actually do"* (Drury *et al* 2011:20). Participant observation can be conducted simultaneously with other research activities (Jones *et al* 2008). For example, I made observations on shepherd activities whilst in the forest looking for signs of macaques.

I focused on shepherds and their dogs which accompanied the goats into the forest from the ten study villages for participant observation. I also collected data on shepherds' presence or absence to ascertain whether their movements and use of the forest was seasonal.

I observed the behaviour of the shepherds with their goats and their dogs. On occasion I was in the forest when the shepherds were not aware of my presence. However, I always made myself known when it was opportune and safe to do so.

2.6.4. Data analysis

Ahmed and I transcribed audio-recorded interviews once a week. I explored each transcript noting emerging themes which I placed in coded categories. I then coded these data systematically using the software programme NVIVO 8. The analysis I present in this thesis concentrates on four main categories: shepherds' knowledge of Barbary macaques; shepherds perception of Barbary macaques and three other animals; shepherds self-reports of their behaviour when encountering Barbary macaques; shepherds self-reports of their behaviour change toward the species. My analysis thus follows an iterative grounded approach where I start with a research question and then identify emerging themes based on the qualitative and quantitative data (where applicable) as opposed to identifying them beforehand (Tadie & Fischer 2013). With reports of illegal activity, achieving an accurate picture of the actual situation is inherently difficult (Drury *et al* 2011; St John *et al* 2012). When illegal activity was mentioned, I used "between-subject triangulation", analysing accounts from several different people to ascertain their reliability (Newing 2011).

2.7. Ethics

At the start of each interview we asked each shepherd if he would like to participate in the study. Nobody refused. Ahmed then asked the shepherd if he would like to read an information sheet (Appendix 2). Most shepherds refused this offer, possibly to hide the fact that they had difficulty reading. Older informants could not see the sheets without their spectacles. In all such cases, Ahmed read out the information to them, asked if they understood it and if they had any questions. All informants declined to sign a consent form (Appendix 3) when it was offered due to their lack of confidence with pen and paper but all gave their verbal consent. All participants remain anonymous unless they indicated otherwise. To ensure continued communication with participants, I will translate an abstract of the project findings into Arabic and distribute it to all participants who express an interest in receiving it and to all *imams* in each village to read out in their mosques.

Some of the ethical issues surrounding fieldwork with primates have been discussed by McLennan & Hill (2013). Both primatologists and conservationists must be aware that their research is not conducted in a vacuum and their interactions with people will have implications for both the species which they are trying to conserve and the people who share that species' habitat (McLennan & Hill 2013). I knew it was of the utmost importance to conduct my research within the framework of the society in which I had chosen to work and that I was very much an outsider in a cultural, social and political situation very different to my own. One of my research aims was to gather and integrate the shepherds' knowledge about Barbary macaques with my own quantitative data (Chapter 4) which brings its own set of ethical issues, some of which I address in Chapters 4 and 9. Some of the activities discussed in the thesis such as macaque hunting are illegal and I have ensured that the identity of the men who admitted conducting this activity cannot be ascertained. I discuss further the ethics of intervening to stop such behaviour in Chapter 7, where I also discuss the negative social aspects of my presence which I was aware of and acknowledge that there may be others of which I am unaware.

This project gained approval from the Research Ethics and Data Protection Committee of the Department of Anthropology Department and the Life Sciences Ethical Review Process Committee of Durham University, in spring 2009.

2.7.1. Legal Authorisation

I obtained research permits annually from HCEFCLD for permission to collect data about the Barbary macaques, an example of which is included in Appendix 4. I also presented my passport details to the *Xalifa* (military chief) of the local commune of Tazrout in which I was living, along with my village address.

Chapter 3 – The context of conservation: historical, political and social influences on the villagers around Bouhachem forest

3.1. Introduction

Remote village communities in mountainous areas are often the focus for development and conservation interventions because their location makes them the last remaining habitats for many endangered species (Lanjouw 2008; Rovero *et al* 2009). Such village communities are usually marginalised and suffer numerous disadvantages due to their physical and political remoteness from centres of authority and power (Tawil 2006; Burli *et al* 2008). Understanding the historical, political and social influences in the context of past activities by outside agencies in such areas may provide conservationists with a more nuanced understanding of the communities with which they intend to work (Szabo & Hedl 2011).

Many countries with high biodiversity also have a history of colonial occupation by European powers which conservationists often fail to recognise (Redford 2011). Such occupations often served to intensify environmental exploitation in a country, particularly during the nineteenth and early twentieth centuries. Colonialists justified their treatment of people and places by portraying local inhabitants as incapable of managing natural resources (Leach & Mearns 1996; Adams 2003). The colonialist narrative persists in many African countries because it facilitates the portrayal of local people as incapable of managing important natural resources so that the state or development agencies can continue to monopolise their management (Leach & Mearns 1996; Adams 2003; Homewood 2005; Sillitoe 2010).

My aim in this chapter is to explore some of the contexts in which a colonial power and, later, outside agencies and institutions have affected and influenced the local people with whom I wished to engage. I begin by briefly reviewing the foreign occupation and what it meant for the Moroccan environment. I then provide ethnographic data from older people who describe the Spanish occupation and its effects on Bouhachem and its inhabitants from their own perspective. I explore how the villages around Bouhachem have remained politically and socially marginalised by the state and urban society post-occupation. I illustrate their marginalisation with ethnographic data from interviews with representatives from local governmental and non-governmental organisations (NGOs) and city-dwellers, as well as the villagers themselves. I illustrate how the existence of these social divisions and the outside

agencies' simplistic view of focal villages as homogenous communities have influenced development interventions and describe villagers' responses. I suggest this study provides evidence of Bouhachem villagers' continued exclusion from any meaningful participation in their own development and that of their area. I then consider how these historical, political and social factors might affect the development of conservation activities.

3.2. The European occupation of Morocco, 1912 – 1956

The southern Mediterranean countries of North Africa and the Middle East were occupied by European powers in the early twentieth century. The colonists portrayed North Africa as a fertile and thickly forested region which the Romans had used as a granary due to its high productivity and which had, they alleged, been destroyed in the 11th century by incoming Arab nomads and their herds (Davis 2005). The nomads were blamed for overstocking and overgrazing of rangelands causing serious habitat degradation over much of the region (Chatty 2003; Davis 2007; Gilbert 2013). This neo-colonialist version of history still causes conflict over conservation management between conservationists and pastoralists in North Africa and the Middle East due to its dismissal of the pastoralists' detailed knowledge of pasture management (Chatty 2003; Wachs & Tal 2009; Gilbert 2013). For example, Egyptian conservation discourse blames "primitive" Bedouin people for habitat destruction by overgrazing, thus justifying their exclusion from environment management plans (Gilbert 2013).

Both France and Spain exerted their control over Moroccan forests during their occupation 1912-1956 (Davis 2007). In French-occupied Morocco, the colonialists favoured thinning forests rather than intensive logging, whereas the Spanish concentrated on exploiting the cedar (*Cedrus atlantica),* pine (*Pinus pinaster*) and oak (*Quercus* sp.) forests in the north, selling logging areas to private companies (Mikesell 1960; El Abdellaoui 1999). The timber and charcoal produced were exported to Spain for ship construction and railway development (El Abdellaoui 1999). The Spanish had no socio-economic rural strategy during their occupation and this had long-term political and social repercussions for the north, as the region suffered disadvantage and marginalisation after the departure of the Spanish in 1956 (Tawil 2006). Since 1912, the state in one form or another has maintained control over forest land (Davis 2007). Post-occupation, all forests came under state jurisdiction and control of what is now called the *Haut Commissariat aux Eaux et Forêts et à la Lutte Contre la Désertification* (HCEFCLD) which adopted the Forest Code first laid down in 1917 by the French protectorate (Davis 2007). The

code includes legal controls on many traditional forest activities, including limiting access to non-timber forest products (NTFPs), such as mushrooms, cork oak bark and medicinal plants, on which many people depend for their subsistence livelihoods.

3.2.1. Bouhachem during the Spanish occupation

The remains of numerous Civil Guard and Forestry Service forts and outposts throughout Bouhachem are evidence of the previous heavy Spanish presence in the area (Figure 3.1). These buildings functioned as administrative centres to control the local population's activities in and around the forest.

Figure 3.1. The now derelict Spanish Civil Guard and Forestry Headquarters in Bouhachem

Some elderly people are still afraid to talk about the period of the Spanish occupation. One old man said:

> *Before when the Spanish were here, it wasn't like it is now. Now there is much more freedom.*

This description is from an old man who wished to remain anonymous:

If the Spanish knew you had been in the forest without their permission they tore a big strip off you and if they caught you with firewood they put you in prison.

The Spanish logging companies built tracks that are still visible throughout Bouhachem and developed a cable system for transporting large trunks long distances to be processed in the town of Bni Hassan. The logging system itself was highly mechanised and a machine, described by one elderly man as having "wheels like a tank", dragged the felled timber onto the tracks, to be transported by mules and horses to the cable system. Three elderly men, now in their eighties, who worked for the Spanish confirmed that mature Pyrenean (*Quercus pyrenaica)* and zeen oaks (*Q. canariensis*) were felled for export to Spain, but that cork oaks (*Q. suber*) were felled and burned *in situ* to make charcoal. Abd Es Salam Chitwan, 83, told me:

They [the Spanish] set fires that took three months to make charcoal because we put so many trees on them.

The evidence of this industrial-scale logging can be seen today in Bouhachem, where some areas used by the Spanish for intensive processing of timber products still bear the scars of such industry. There are also signs of the Spanish presence in some location names in the forest, such as the large space known locally as *El Cable* (the cable), the site of some of the most intense activity during the Spanish logging of the forest. Ahmed Sbach described the mountains as looking "shaved" after the Spanish had departed but he implies that the forest has now recovered from the intense activity:

The Spanish took the majority of the forest - they eliminated it. This forest has only got its strength again since the Spanish left.

3.3. Villagers and the state

Conservation is not a high priority for the Moroccan state with the forestry department seriously under-funded and forestry guards responsible for large areas of territory, with all the logistical difficulties this presents. Forest users are allowed to collect some NTFPs, such as mushrooms, if they obtain a permit from the regional forestry authorities. Medicinal plants and timber for local house construction can be harvested for domestic use without permits, although collection for commercial use is subject to a heavy fine. Forestry guards have powers

to arrest and fine individuals who break the law. An informant system enables the guards to maintain an appearance of control over illegal forest activities. One or two men from each village inform the guard about any alleged misdemeanours in their area. For example:

> *If the forestry guards find out from their "friend" that we are cutting wood they will fine us so hard we will be unable to raise our heads afterwards.* Anon, 80, Slalem.

The informant system had implications for my work, as one such informant befriended us around three months after we had begun our fieldwork. Ahmed and I were unaware of the man's role. However, after seeing Ahmed with the man, an elderly shepherd from the man's village told us "be careful, your new friend is a spy". We acted on this information because we had already observed the man talking to a forestry official in a local market and their demeanour seemed furtive. Any distrust or reserve the villagers may have felt over this relationship was quickly dissipated when the informant, no longer able to access information on our activities, engineered our sudden eviction from the house we were renting in a neighbouring village by informing the landlord that Ahmed was profiteering from the sub-letting of the house to "foreigners". People from the informant's village ensured that our homelessness was temporary by alerting us to alternative accommodation which we are still using as our base. The informant system has more serious consequences because informants are free to break the law without fear of discovery. In one example, a village informant entered into an arrangement with men from a nearby town with access to chainsaws and heavy vehicles. This equipment was used to fell and transport mature oak trees in Bouhachem for sale elsewhere. The practice continued for weeks because the forestry guard responsible for the area was unaware of the illegal activity. Local people expressed anger at this situation but felt helpless to prevent the practice, because their relationship with forestry officials is characterised by distrust and suspicion.

Despite its limitations, the use of a local informant system provides evidence that some local people are included in the enforcement of forest laws. However, the exclusion of the majority of local people from forestry management has practical implications for the forest as well as social implications for village life. The forestry department has limited capacity to ensure adequate forest protection and this is evident in cases of forest fires, which are usually fought collectively by villagers who are on hand and so see the fire first. Ahmed took part in this collective action on one occasion when a forest fire began in an area in which he was working.

Ahmed told me that it took approximately an hour for forestry staff to arrive, by which time other villagers had joined him and they had controlled the fire successfully. A village man articulated the sense of responsibility the villagers feel for the forest, suggesting they are well placed to participate in forest management:

> *We are the ones who look after the forest, how can anyone else look after the forest? Who will take care of it if we don't take care of it? If we see a fire, we immediately all go to put it out. Who is going to react as quickly as us? Nobody else! If we wait for the forestry guards to arrive they will find only scorched earth as the fire will have already destroyed everything by then. We know it's not good for us if there is a fire in the forest so we have to take care of it.*

The official exclusion of Bouhachem villagers from forest management extends to the current discussions to upgrade the legal status of Bouhachem from a *Site d'Intérêt Biologique et Ecologique* (SIBE) or nature reserve (Chapter 2) to National Park status. The main proponents for this upgrade in status are the HCEFCLD and the regional government of Tétouan-Tangier in partnership with, and aided financially by, the regional French government of Provence Alpes-Cote d'Azur. This change, first suggested in 2001, cannot occur until the Moroccan Parliament passes the relevant legislation. In 2012, due to concerns over slow progress, the Bouhachem Communities Group was formally established by decree of the Ministry of the Interior. Its mission is the creation and management of the National Park. The group consists of national and international NGOs with little or no input from local people who will be most affected by this change.

The Forest Code employed by the Moroccan State demonstrates the state's assumption that legal enforcement of forest laws is necessary to avoid extensive destruction of the forest by local people. The Moroccan authorities have so far eschewed the participatory forest management strategies employed in other countries such as India and Benin for example (Gadgil *et al* 2003; Idrissou *et al* 2011). This is unfortunate as local people see themselves as integral to the protection of the forest illustrated by their firefighting behaviour I describe above. Sadly, the villagers' distrust of forestry officials and their informants means that they are unable to approach these individuals when they observe transgressions of forestry law such as outsiders cutting timber for financial gain rather than domestic use.

3.4. Villagers and urban society

Urban areas in Tangier-Tétouan are now developing quickly due to the region's geographical position between the Atlantic and Mediterranean coasts. This development has led to a notable contrast between urban and rural populations, with city-dwellers disconnected from rural life and all it entails. Bouhachem villagers suffer social discrimination at all levels due to their poor literacy rates (Tawil 2006). They have been described by city-dwellers as "poor, illiterate and backward" (Joseph 1973:238). Villagers are also subject to city-dwellers' prejudice regarding their cultivation of cannabis (*Cannabis sativa*) (Joseph 1973). Some Tétouan inhabitants told me they believe villagers to be irresponsible and profligate because they spend their income from cannabis sales on consumer items such as property or cars, and not on their children's education. Some city-dwellers sent to work in the area mock the villagers. One elderly village man asked me:

> *Some men came here with equipment measuring something. I asked them what they were doing and they told me they were taking measurements to make a garden for us to grow mint for tea. Is that true?*

Another rumour started by a visitor from the city involved a fabricated story about the construction of a retirement home high in the mountains which would employ lots of local people. One shepherd told me:

> *They will build a big hotel in El Cable where rich people can come to breathe the mountain air. The man from Tangier told me that there would be work for us all.*

This example demonstrates that rumours can raise villagers' hopes. However, if these are unfulfilled, this can lead to resentment and hesitation to trust people from "outside". For example, a man from the same village told me that he had heard the story too but he said:

> *I don't believe that story as I heard it about five years ago. It's just the people in the city – they think it's funny to make things up because they think we are stupid.*

Urban prejudice towards villagers reaches official levels. When a young woman died of rabies in Lahcene after having been bitten by a domestic cat (*Felis catus*) in September 2010, I

wanted to ascertain why the authorities weren't vaccinating villagers against the disease. I spoke informally to an employee of an urban Rabies Prophylactic Centre who told me that local councils were responsible for vaccinating villagers in their area and that each course of vaccinations cost DH800 (€80). My informant said that people working with animals could be vaccinated free of charge so I asked if it would be possible to vaccinate shepherds. He replied in a shocked tone "No! The vaccination is meant for professional people like veterinary surgeons".

Since 2007 a programme of infrastructure development has been initiated in the region and has meant internationally funded programmes for improved road access and provision of electricity for some villages around Bouhachem. However, some villages still remain without vehicular access during the winter months. The non-attendance of teachers in village schools increases the problem of rural illiteracy. Many teachers, particularly women, prefer to live at their family homes in the city rather than stay in the very basic, cold and badly maintained accommodation provided for village teachers. They are frequently absent in winter when adverse weather conditions mean they are physically unable to make the daily journey to school. High levels of illiteracy in rural populations in the north of Morocco may lead urban dwellers to assume that villagers are unintelligent. This perception of subsistence people is common amongst the middle classes in other societies (Fairhead & Leach 1995). For example, local Bedouin people were looked down on as "ignorant illiterates" by middle class Syrians and excluded from participation in an ungulate reintroduction project in Syria (Chatty 2000). In Egypt, similar discrimination sustains urban notions of rural backwardness and validates rural groups' exclusion from society (Gilbert 2013).

3.5. Villagers and development agencies

The potential upgrading of Bouhachem to National Park status has attracted the attention of NGOs and projects to improve prospects for local people are being initiated with variable results. Villages in my study area are situated in three provinces so different villages are the recipient of different development efforts. For example, two villages (El Marzha and Ouled Ben Blal in Chefchaouen province), were the recipients of fuel-efficient bread ovens. The idea behind the ovens is to reduce the amount of wood being used for fuel and to reduce the amount of time women spend collecting the wood which is perceived by outside agencies as time-consuming and arduous (Figure 3.2).

Figure 3.2. Village women returning home with their loads of firewood

According to the manufacturer in Chefchaouen, each oven is meant to be shared by 5 - 6 households and the villagers must work together to build and maintain a shelter for it. A woman from Ouled ben Blal told me that “We don’t want these ovens as we all [each household] have our own”. I suggested that a fuel-efficient oven would require less work collecting firewood but she laughed and pointed to the store of large store of dead wood around her house “We have plenty of wood, that’s what the forest is for”. Her remark suggests that villagers perceive no shortage of firewood. Social factors might also explain the women’s resistance to the ovens as another woman told me, “We don’t mind collecting the wood; we all go together and sing as we work”. The outside agency responsible for the project failed to consider whether the collection of firewood could have positive social significance for village women. To date, neither village has used the ovens which remain where they were placed on delivery (Figure 3.3).

Figure 3.3. Fuel-efficient ovens in the village of Ouled Ben Blal

Development workers were left frustrated at the women's disregard of the ovens and were puzzled by what they perceived as their refusal to decrease their workload. It is unsurprising that some NGO employees express their frustration towards the villagers negatively. One told me:

> *The villagers are impossible to deal with as they are stubborn and don't want to change or listen to new ideas and they won't work together.*

Villagers are well-accustomed to working together as I describe above. The employee's perception of intransigence may stem from the villagers' reactions to the imposition of development initiatives on villages without prior consultation which might have identified the social significance of firewood collection for village women. As in subsistence communities elsewhere, Bouhachem villagers may "operate on a different logic and use their own institutions" (Klein *et al* 2007:461). It is thus imperative for outside agencies to understand that social as well as cultural mechanisms may affect project outcomes.

Another top-down development and conservation initiative had more serious consequences for one village. Increasing tourism to Bouhachem was the motive behind a NGO project that was nearing its conclusion when I began work in the area in autumn 2009. The project's main aim was to decrease grazing pressure on the forest by reducing the need for village families to keep goats. The project staff selected three households to benefit from this project in the village of Almidene in Bni Hassan *qabila*. The households were apparently chosen due to their position close to the paved road. By autumn 2009, each of these households had a building renovated to a standard the project team judged suitable for use as bed and breakfast accommodation by national and international tourists. The selection of just three families to benefit from the initiative caused a great deal of hostility amongst the other villagers, who felt excluded and resentful at what they viewed as injustice. One anonymous man told me:

> *Only three families benefit and we get nothing so we don't want these outsiders. Surely, if a project comes then everyone has to benefit. It's not fair that my neighbour gets hot water and electricity provided for him and I get nothing.*

The resentment felt by the excluded villagers culminated in a bad-tempered confrontation with the NGO responsible, which resulted in rumours spreading through the village that the whole forest would be enclosed by a fence and villagers would no longer have grazing rights for their livestock. The villagers were convinced that if found in the forest their goats would be impounded and forestry officials would fine the owners. This rumour increased resentment and hostility toward the NGO, as well as anxiety and apprehension amongst households in other villages as the rumour spread further. Villagers' anxiety reflects their worry that they will be permanently excluded from the forest when Bouhachem becomes a National Park. One villager expressed his frustration at their exclusion thus:

> *They [NGO] say they know better than us about the forest. They say that we (the villagers) don't know anything about it. They don't listen to us.*

The social disruption also affected the recipients of the project. One man felt so uncomfortable with the hostility that he moved his son's young family into the bed and breakfast accommodation where they still live. One of the family members who had benefited from the scheme also expressed his discomfort about being unfavourably singled out by other

villagers and told me how he was trying to ensure that other villagers benefitted from his good fortune:

> *Other families haven't profited so they have woken up (to that) and started to say bad things. The villagers say that only three families will benefit and that if something comes then everyone should benefit. I am one of the people who have benefitted but when I need to buy oil, or need another mule I will go and ask the neighbours so they will benefit too.*

This particular family confided that they lose money as they have no idea how to cost their service and believe they should treat their clients as honoured guests, often going as far as to kill a sheep. They, too, are now living in the bed and breakfast accommodation but still accept guests whom they house in the former family house, which has no modern amenities. Only one person's bed and breakfast has successfully attracted clients on a regular basis, possibly because the householder was the only person to own a mobile telephone at the time with the result that his was the contact number used on marketing materials.

The Almidene villagers' frustration at their exclusion from the bed and breakfast project illustrates how a remote village's social cohesion can be put at risk by well-meaning interventions by outside agencies (Agrawal & Gibson 1999; Homewood 2005). Social divisions could affect group collaboration, for example, fire-fighting efforts may be compromised by poor relations between households. My impression when talking to villagers was that poor communication had led to misunderstandings and then to outright conflict. Bouhachem is not unique in experiencing tacit or overt conflict between local people and outside agencies. Such disagreement over development issues is common elsewhere and leads to a situation where agencies fail to trust local people's knowledge or their ability to make decisions and, in turn, this distrust is reciprocated by local people (Sillitoe 2010; Fairet 2012). Such distrust may discourage local people from participating in future initiatives if they perceive that benefits are distributed unequally (Brandon & O' Herron 2004; Wells *et al* 2004; Waylen *et al* 2013).

3.6. Conclusions

The marginalisation of Bouhachem villagers by the occupying power, the state and urban society is demonstrated by their past and present exclusion from resource and conservation management and planning by outside agencies. The way local forestry authorities exert control over villagers' forest resource use by using local informants alerted me to the possibility that my work could be perceived as another example of state intervention in a different guise. In common with other pastoralist groups in the Middle East (Chatty 2003; Gilbert 2013), local people in Bouhachem are thought of as backward by the urban middle class and as needing assistance to develop. The villagers are conscious of this discrimination and demonstrated their resistance by explicitly confronting those they deemed responsible for a divisive development scheme. Such direct confrontation is rare among villagers and their reaction demonstrates the injustice they felt. As other scholars have pointed out resistance to top-down initiatives may serve to strengthen or preserve villagers' identities in the face of what they perceive as unnecessary interference in their lives and outside agencies' insensitivity to local institutions may only succeed in creating further hostility toward future interventions (Klein *et al* 2007).

Conservation activities should not contribute to local people's negative perceptions of and interactions with outside agencies which have been reported elsewhere (Carss *et al* 2009; Wadley *et al* 2010; Fairet 2012). To avoid perpetuating local people's marginalisation, I hope to draw them into macaque conservation activities rather than seeking to impose those activities upon them. As suggested by Gilbert (2013), I intend to span the social boundary to integrate, rather than objectify, local people and their knowledge into a research activity. In the next chapter I describe how I engaged with shepherds from ten villages on the periphery of Bouhachem to co-produce information by integrating different knowledge systems to survey Barbary macaques (*Macaca sylvanus*) in Bouhachem forest.

Chapter 4 – Integrating knowledge and co-producing information: a population survey of the Barbary macaque in Bouhachem forest, northern Morocco

4.1. Introduction

Social objectives, such as building trust and forging meaningful relationships amongst local and other stakeholders, are rarely identified as a priority by conservation scientists (Ban *et al* 2013). Perhaps the most damaging outcome of this perceived or actual neglect is that local people believe themselves to be less important than wildlife to conservationists (Hill 2002; Tumusiime & Svarstad 2011). Many conservation strategies do not reach their full potential or fail altogether because they exclude local people and their extensive environmental knowledge or ignore that knowledge in favour of more quantitative ecological research (Chatty 2003; Bell *et al* 2008; Waylen *et al* 2010; Reyes-Garcia *et al* 2013). Disregarding local people may cause resentment because they feel their knowledge is being ignored or perceived as invalid (Bell *et al* 2008; Carss *et al* 2009). This resentment may manifest itself in retaliatory killing of wildlife (Saunders 2011; Goldman *et al* 2013) which is then often perceived by conservationists as a conflict between local people and wildlife. Conservationists' subsequent attempts at conflict mitigation may then be undermined due to their superficial understanding of the complex social cultural and political issues involved. Conservationists who do not acknowledge the more profound issues underpinning such conflict will fail to engage and respond to local people causing an escalation in conflict and negative conservation outcomes (Madden & McQuinn 2014).

Ill-feeling towards conservation is not always explicit, however, and can be expressed more subtly through the withholding of information useful to conservationists, demonstrating apathy towards conservation interventions or disobeying laws relating to hunting or other use of local wildlife (Bell *et al* 2007; Holmes 2007; Fairet 2012). Local stakeholders who disobey wildlife laws may be demonstrating their resistance to a top-down system of conservation that disregards their own concerns (Theodossopoulos 2003; Bell *et al* 2007; Holmes 2007) and it may be difficult to restore good relations. For example, conservation agencies working on antelope reintroduction programmes in Syria discovered that their earlier exclusion of local Bedouin pastoralists from the activity necessitated the rebuilding of trust, which is slow to re-emerge once eroded (Chatty 2000).

It would, thus, appear prudent for conservation practitioners to heed the suggestion of various scholars to incorporate local people and their knowledge in research projects as an appropriate strategy to involve them in species conservation (Gadgil *et al* 1993; Berkes 2004; Idrobo & Berkes 2012; Rajamani 2013). For instance, including Scottish fishers as co-researchers in studies of the interactions between the economically important Atlantic salmon (*Salmo salar*) and two seal species, grey seal (*Halichoerus grypus*) and harbour seal (*Phoca vitulina*), inspired the fishers to feel "ownership" of the research and persuaded them to become actively involved in the seals and fisheries co-management process (Young *et al* 2010; Graham *et al* 2011). In Kenya, Maasai *Ilmurran* have been recruited by conservationists to monitor the African lion (*Panthera leo*) populations in their areas, prompting the men to refrain from killing the animals for social and cultural reasons (Hazzah *et al* 2014).

Many people gain knowledge about complex ecological systems through their subsistence activities (Gadgil *et al* 1993; Davidson-Hunt & Berkes 2003; Berkes & Davidson-Hunt 2006). A great deal of discussion has been devoted to how this knowledge should be described (Sillitoe 1998). It is frequently referred to as Traditional Ecological Knowledge (TEK) (Folke 2004; Shackeroff & Campbell 2007). TEK can be a useful source of information to complement scientific approaches to ecosystem management and conservation (Berkes 1999; Berkes *et al* 2007; Sutherland *et al* 2014). It is defined as:

> *A cumulative body of knowledge, practice, and belief, evolving by adaptive process and handed down through generations by cultural transmission. [It concerns] the relationship of living beings with one another and with their environment* (Berkes 1999:7).

TEK is also sometimes used to describe ecological knowledge about wildlife (Ferguson & Messier 1997; Inga & Danell 2012). However, an argument has been made to differentiate TEK from specific ecological knowledge of wildlife because the latter has geographical limitations and, unlike TEK, is not easily passed down. Instead, specific ecological knowledge of wildlife is acquired over the lifetime of the individual through their interactions with their environment (Gilchrist *et al* 2005; Dale & Armitage 2011). I acknowledge the risk that local knowledge is assumed implicitly to be subsumed by, and thus inferior to, scientific knowledge, which is global in context (Raffles 2002; Sillitoe & Bicker 2003) but I agree with Gilchrist *et al* (2005) that prefixing ecological knowledge with 'local' rather than 'traditional' when it refers to wildlife

knowledge is more accurate due to its parochial nature. I will thus use the term local ecological knowledge (LEK) from hereon.

Due to its dynamic and responsive nature, LEK is used by scientists to help monitor environmental changes attributed to global warming (Gill *et al* 2014; Klein *et al* 2014). Scientists also access LEK to assist in their assessments of the effects such changes are having on wildlife movements (Ferguson *et al* 1998; Service *et al* 2014). For instance, scientific data along with Inuit interview data from coastal British Columbia in Canada provided information on a recent range expansion for grizzly bears (*Ursus arctos*) providing a temporally detailed account of an important ecological process possibly in response to climate change (Service *et al* 2014). LEK can be influenced by ecological, political and economic factors and by the holder him/herself, so as well as including new knowledge, LEK is also responsive to outside influences, with the creation of hybridised knowledges which have both local and global roots (Spoon 2014). For example, changes in LEK occurring in young Nepali Sherpa were found to be more pronounced in those individuals involved in tourism. This involvement is influencing the younger Sherpas' relationship with place and is reflected in the way they interpret cultural beliefs (Spoon 2014). This responsive attribute of LEK may also be influenced by the presence and information sharing of incoming scientists and is certainly influenced by exposure to the media (Rudiak-Gould 2014).

LEK has recently been used to ascertain the presence and absence of various wildlife species (Ravaloharimanitra *et al* 2011; Starr *et al* 2011; Turvey *et al* 2014). For conservationists, establishing the location of a threatened species is an important first step in the development of an appropriate conservation strategy and the effective allocation of conservation resources (Padmanaba *et al* 2013; Turvey *et al* 2013). This key information provides baseline data to measure future trends in the status and abundance of a species in a study area (Padmanaba *et al* 2013). The integration of systematically collected scientific data - which I will refer to as conventional scientific knowledge (CSK) - with LEK may be a way of achieving the dual conservation goals of undertaking a wildlife distribution survey essential for conservation planning and including local people in research with the intention of enrolling them in conservation activities.

The Barbary macaque (*Macaca sylvanus*) in Bouhachem is a good candidate species for including local people and their LEK in distribution surveys because the macaque is the only non-human primate species in the region and is easily recognisable. As a group, shepherds from

the villages on the periphery of Bouhachem cover the majority of the forest, following the same route on a regular basis with their goats (*Capra hircus*), making them my first choice as participants in a Barbary macaque survey. Here, I describe how my inclusion of shepherds' Barbary macaque LEK fulfilled dual roles by establishing a positive dialogue with one group of local people who use the forest frequently and by facilitating the production of information on the distribution of Barbary macaques in Bouhachem forest. I begin by reviewing the challenges and benefits of including local people in research activities to integrate LEK and CSK for wildlife surveys. I then describe how I built a trustful relationship with shepherds. I present the practical considerations of co-producing information with shepherds about Barbary macaque locations in Bouhachem by describing how I developed my data collection methods and discussing the challenges I encountered integrating LEK with CSK and how I resolved them. I then discuss the characteristics of shepherds' Barbary macaque location LEK and present a map based on our collective knowledge of Barbary macaque locations in Bouhachem. Finally, I present shepherd's LEK regarding their perceptions of changes in Barbary macaque population status in Bouhachem in their lifetime. This study contributes to the burgeoning literature on the incorporation of LEK in wildlife surveys.

4.2. Challenges and benefits of knowledge integration

Both LEK and CSK systems are empirical because they are established through observation and experience (Berkes *et al* 2000). However, on a practical level, integrating different knowledge systems is a challenging process and the demarcations between LEK and CSK can be difficult to overcome (Robinson & Wallington 2012). Some scholars have pointed out that LEK can be inaccurate (Gilchrist *et al* 2005; Gilchrist & Mallory 2007; Ruddle & Davis 2011) leading to the suggestion that LEK should be scrutinised just as rigorously as CSK to ensure its reliability when used in a scientific context (Davis & Wagner 2003; O'Donnell *et al* 2010). In contrast, some social scientists believe that such caveats to the use of LEK are offensive to local people, as they imply that LEK is inferior to CSK (Palsson 1998; Brook & McLachlan 2008; Gratani *et al* 2011; Zukowski *et al* 2011). However, this is not necessarily the case: in a study in Australia, aboriginal people encouraged the scientific verification of their LEK so it could be understood and appreciated by scientists and included in management plans (Gratani *et al* 2011).

Despite the controversy over LEK validation, there is a growing integration of LEK and CSK for the purpose of wildlife management and conservation (Bell *et al* 2008; Gagnon & Berteaux 2009; Cornwell & Campbell 2012). The practical application of LEK in wildlife surveys by social and natural scientists can increase information about distribution and abundance for animals which occur over a wide geographical area, or for threatened or cryptic species (Gilchrist *et al* 2005; Turvey *et al* 2013; Ziembicki *et al* 2013; Turvey *et al* 2014). LEK may correlate closely with and corroborate CSK. For example, Chinese fishers' LEK correlated closely with quantitative data regarding the relative abundance and declining status of the highly threatened Yangtze finless porpoise (*Neophocaena asiaeorientalis asiaeorientalis*) (Turvey *et al* 2013). Similarly, Spanish shepherds' LEK provided distribution and abundance information for spur-thighed tortoises (*Testudo graeca*) comparable with those obtained using CSK (Anadon *et al* 2009). LEK can be more informative than CSK. For example, indigenous people's knowledge proved temporally and spatially more detailed than written records of historical fluctuations in caribou (*Rangifer tarandus*) populations (Ferguson *et al* 1998). Hunters' LEK significantly augmented scientific surveys of the endangered, nocturnal, small mammals of Hispaniola (Turvey *et al* 2014), cryptic nocturnal mammals in a protected area in Borneo (Padmanaba *et al* 2013) and the pygmy slow loris (*Nycticebus pygmaeus*) in Cambodia (Starr *et al* 2011). Finally, investigators' verification of local villagers' LEK resulted in a major increase in known range and population estimates of the Critically Endangered greater bamboo lemur (*Prolemur simus*) in Madagascar (Ravaloharimanitra *et al* 2011).

All the above studies validated LEK with a conventional research method producing information valuable to wildlife management and conservation. Like Dale & Armitage (2011), I acknowledge the long history of critical studies relating to knowledge and power relations in the ownership and validity of LEK. I am conscious of the risk of:

> *Disempowering local people by representing their knowledge in ways inaccessible to them and beyond their control and maybe even infringing their intellectual property rights.* Sillitoe & Bicker 2003:5.

Thus, I, along with Goldman (2007), prefer to *co-produce* new information of benefit to wildlife management or conservation with local people (Goldman 2007) rather than merely accessing their LEK. In the wider context of knowledge exchange, knowledge co-production is described as:

> *A process where knowledge is or can be produced through interaction with others, possibly with people with different perspectives and backgrounds, through cooperative endeavours and mutual learning.* (Fazey *et al* 2013:20).

Much of the literature on wildlife knowledge co-production focuses on the management of harvested wildlife to ensure its sustainability. In this context, knowledge co-production is used to interpret information from diverse stakeholders (Dale & Armitage 2011; Butler *et al* 2012; Idrobo & Berkes 2012). Knowledge co-production necessitates the building of trust between participants (Sillitoe 2010; Grimwood *et al* 2012).

4.3. Building trust

Building trusting relationships is essential for long-term collaboration in any knowledge exchange (Sillitoe 2010; Fazey *et al* 2013) and our regular contact with the shepherds enhanced and improved our engagement with these men. By the time I began interviewing; many shepherds were familiar with both Ahmed and me and were relaxed in, and accepting of, our presence. Male family members and friends of these shepherds seemed to feel acquainted with us through our existing connections and would share their knowledge of the macaques with us during our first meeting. We were the subject of discussion in the shepherds' villages and described as "good people"; the shepherds seemed satisfied that we were independent from local authorities and interested only in the macaques. An example of how shepherds related positively to us because of reports from peer group members comes from Mohamed Sbach, 35, from El Marzha. On our first meeting he said “I know I can speak in confidence to you because my brother told me I could”. This connection extended to shepherds from the remote villages of Afertane and Adrou, who introduced themselves when they encountered us in the forest and immediately began to talk about the macaques.

If we encountered a shepherd working alone, he often told us he was glad to see us because we were the only people he had encountered that day. During the study period, we became well known in the villages as well as among the shepherds. Some shepherds often called to tell us where they had seen macaques that day and brought their friends and family to meet us if we encountered them at weekly markets. This behaviour was probably more to do with demonstrating their easy and direct contact with the “macaque people” than the desire to communicate information. I took this to be a sign of the positive value they assigned to our

relationship and the confidence they had in us to positively respond rather than rebuff their overtures outside the forest.

4.4. Co-producing information in practice: challenges and solutions

I encountered numerous challenges whilst integrating LEK and CSK. Here, I describe the development of my methods, beginning with the pilot study and how I clarified the shepherds understanding of Barbary macaques as group-living animals. I continue with the various challenges I encountered in the integration of LEK and CSK, describing how I developed practical strategies to overcome them and co-produce information with shepherds on the location of Barbary macaques in Bouhachem.

4.4.1. Clarifications and orientations regarding Barbary macaque presence in Bouhachem

In October 2009, Ahmed and I tested the semi-structured interviews with four shepherds in an area of Barbary macaque habitat with similar characteristics to those of the Bouhachem study area. Ahmed and I had previously worked in this area, north of Moulay Abdessalam, in 2007 and confirmed the presence of two macaque groups. During the pilot study interviews, I discovered that it was easier to interview shepherds alone because the subject matter aroused so much amusement during encounters with more than one man. This behaviour meant that we had to abandon two interviews as the men did not attend to the interviews as much when in company as they did when interviewed alone. When I asked if the remaining two shepherds knew where Barbary macaques were located, both men repeated location names and one called us back to tell us he had omitted a location. The location names the men gave us accorded with our previous observations of the two macaque groups in the study area suggesting that the question was unambiguous. However, the shepherds had some difficulties in relaying the information, suggesting they needed an aid to memory.

To facilitate the shepherds' recall of groups, I asked shepherds if they could draw a sketch map of macaque locations, using circles to symbolise each location. Sketch maps are a reliable way to collect spatial representations of an individual's environment (Blades 1990) and are used successfully in participatory rural appraisal studies where people draw maps of resources that are important to them, particularly if the subject of study is a discrete entity

(Sillitoe *et al* 2003). The co-production of "boundary objects" (Star & Griesemer 1989) such as maps may serve as mediators between individuals whilst embodying the knowledge of the people who produce them (Goldman 2009). The majority of shepherds preferred not to draw their own maps, due to a lack of confidence in using pen and paper, so Ahmed drew all but two of the maps. With three exceptions (elderly men unwilling to admit their sight was poor), most shepherds checked that Ahmed was placing the circles representing each group precisely on the paper according to their instructions and this activity appeared to aid their recall. I used this method for every interview regarding Barbary macaque location LEK in the study area.

In October and November 2009, Ahmed and I explored Bouhachem forest on foot. During this familiarisation exercise, we often encountered shepherds and other forest users. To acclimatise the men to our presence, we always engaged them in conversation and asked the shepherds if our location had a name and the names of any obvious landmarks nearby. We recorded these locations with a handheld Global Positioning System (GPS). A minority of place names differed among the *qabilas* of El Akhmass and Bni Aarouss but in general this was a matter of dialect rather than places having completely different names.

I also recorded any sightings or signs of macaques with a GPS. Signs included macaque vocalisations, faeces and/or extensive feeding signs, such as moss stripping and turned rocks. Barbary macaques strip moss from tree trunks whilst foraging and turn over rocks to locate invertebrates or other food items (Figure 4.1) (Mehlman 1988).

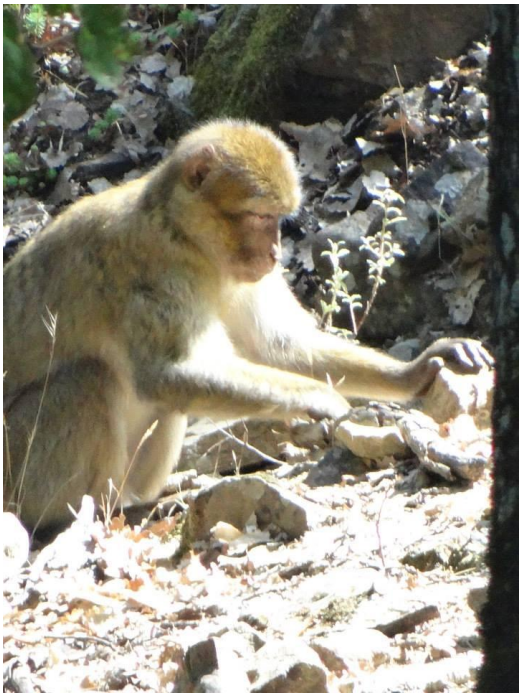

Figure 4.1. A Barbary macaque searching for invertebrates underneath a rock

The macaques use trees and rock clusters as sleeping sites in Bouhachem. I identified these as habitual sleeping sites by the large quantity and differing age of faeces lying on rocks or beneath a cluster of trees as in Figure 4.2.

Figure 4.2. A large quantity of macaque faeces of various ages under a habitual Barbary macaque sleeping site in a zeen oak (*Quercus canariensis*)

Between March and November 2010, Ahmed and I interviewed five shepherds from each of ten villages situated on the periphery of Bouhachem forest about their LEK of macaque locations (N = 50). The men were aged 16 - 84 years. Seven of the men I interviewed were married and ascend the mountains with the goats intermittently. The majority of participants were aged 16-27 and were unmarried. The remainder were older men over 50 years whose children had grown up and left their village. I describe the semi-structured interview process in Chapter 2. The questions forming the basis of the interview can be found in Appendix 1. I interviewed shepherds wherever I encountered them in the forest so was able to collect data for potential Barbary macaque locations for most of the survey area and could also begin systematic location visits from March 2010.

I began each interview by establishing that each shepherd understood that Barbary macaques are group-living animals as this knowledge is fundamental to the survey effort. To ascertain this, I first asked “How do macaques live”? Without fail, participants answered this with "They eat..." followed by a macaque food item, such as acorns. As this is useful information, I retained this question but added “Do macaques live alone?” to elicit information on sociality, resolving the issue of misinterpretation that my earlier poor phrasing had prompted.

I found that all shepherds held a clear view of the macaques’ social structure. For example:

> *They are together, they live together, they sleep together and they move together.* Abdultif, 19, Slalem.

> *They don’t mix and they don’t get on with other groups - they fight. Each group keeps to its own place*. Ahmed Chichuruhi, ~80, Tazrout.

Barbary macaque groups can fission and some shepherds demonstrate awareness of this behaviour:

> *They live in families. They have a system like the goats so when they go somewhere they go together. If they separate they do a little group here, a little group there.* Mohamed El Mochta, 57, El Marhza.

The groups sometimes divide up in the day but in the evening they come back to one site and the young ones play. Nordeen Karmoun, 28, Lahcene.

The shepherds recognise the macaque groups' tendency to move around and not be found in just one place. Said Chakaroni, 22, from Adrou describes how he perceives macaque group movements:

Said Chakaroni: *The monkeys move about, you don't always find them in the same place but, even if they move about, they return to their own site. They go to find food and return home like the goats.*

Interviewer: *Are these places you name used by the same group?*

Said Chakaroni: *No, each one is used by different groups, each group is separate.*

Shepherds know that macaques have places that are important for feeding and for sleeping. Abdessalam Luxor, 50, Almidene asked:

Do you want the places they spend most of their time or where they move to during the day to feed?

After he gave us the location names he said:

Those are the sites they spend most of their time eating. The groups make a trip but they return to their own site to sleep.

Shepherds told me that they recognised different groups of macaques from their locations in the forest. For example:

As we herd the goats, we follow their path and see the first group [of macaques], we keep following the goats' path and we see the second group. Nordeen Marzo, 23, Lahcene.

The shepherds were aware that the macaques occurred all over the forest but expressed reluctance to provide information which they felt might be inaccurate:

> *There are macaques all over this forest – from here to Bni Hassan, but this is what I know – I don't know about the other mountains.* Mohamed Stitoo, 60, Slalem.

> *There are other groups but we don't go as far as the places they live. These groups [gestures to his map] are the ones I know very well.* Eunys Marzo, 40, Lahcene.

Some shepherds' LEK was incorrect regarding Barbary macaque behaviour. One elderly man told me that Barbary macaques looked after injured conspecifics, and four young men aged ~16-18 years informed me that the macaques threw stones at people. The latter observation may allude to occasions when the macaques dislodge stones and rocks as they climb rapidly away from people. With the exception of these incorrect beliefs, most of the shepherds' observations reveal that they have knowledge about Barbary macaques, making them good candidates with whom to co-produce information about the distribution of the Barbary macaques of Bouhachem.

4.4.2. Integrating Barbary macaque location LEK and CSK

Ahmed and I visited 52 of the 59 locations named by shepherds as Barbary macaque locations once each in March and April, again in May and June and again in October and November 2010 to check for macaque presence or signs. Of the seven locations we did not visit, six were named by three shepherds from Afertane in October 2010, and we had insufficient time to visit these sites. One location (Aen ech Cheriff) was very large and inaccessible, being composed of steep, rocky, escarpments and deep canyons and we were unable to survey this area completely due to safety concerns. The results of the interviews with shepherds are presented in Table 4.1.

Table 4.1. The name and physical description of each Barbary macaque location named by shepherds. The locations are ordered by the number of times they were named by shepherds

Barbary macaque locations named by shepherds	Physical description of location	Number of shepherds naming each location	Number of villages whose shepherds name the location
El Hanuk	Rocky outcrop	14	5
Dar de Monte	Marja[2]	13	4
Nzaha Tazrout	Marja	12	4
Tabout	Forest	11	4
Oued de Silem	Canyon	8	3
La Risha	Rocky outcrop	8	3
Mantar Marja	*Marja*	8	4
Lota Teshta	*Marja*	7	4
Aen ech Cheriff	Escarpment	7	2
Marja Mezba	*Marja*	6	2
Boosti	Canyon	6	2
Oued de Kanna	Canyon	6	2
Silha	Escarpment	6	3
Nbeta Slalem	*Marja*	6	4
Simlil del Bab el Marz	Escarpment	5	3
Sidi Hachem	Forest	5	3
Koralalia	Rocky outcrop	5	3
Marja Ghatwil	*Marja*	5	2
Tat Sefah	Escarpment	5	2
Mukail Dashmak	*Marja*	5	2

[2] A *marja* is a grassy clearing often associated with water.

Barbary macaque locations named by shepherds	Physical description of location	Number of shepherds naming each location	Number of villages whose shepherds name the location
Mukasba	Escarpment	4	1
El Ratba	*Marja*	4	1
Habimluk	Forest	4	1
Takont	Escarpment	4	1
El Cable	*Marja*	4	2
Sidi Imam	Summit	4	2
Dar Hamden	*Marja*	3	1
Siloom	Large rock	3	1
Howta del Ausch	Canyon	3	1
L'Ain de Nzaha	Summit	3	2
Jema de Jbel	Forest	3	2
Handak Kherba	Canyon	3	2
Lisiak	*Marja*	2	1
Cherif de Zaitoun	Escarpment	2	1
El Mouzghir	Village	2	1
El Maa Tisnewa	Escarpment	2	1
Sefah de Ouled Ben Blal	Escarpment	2	1
Talaka del Rad	*Marja*	2	1
El Belaa	Summit	2	1
Handak Ararak	Canyon	2	2
El Kherba	Forest	1	1
Sahn de Krud	Rocky outcrop	1	1

Barbary macaque locations named by shepherds	Physical description of location	Number of shepherds naming each location	Number of villages whose shepherds name the location
Cafeza	Summit	1	1
Arasch	Summit	1	1
El Mukail el Ali	*Marja*	1	1
Kherba del Abdulhak	Large rock	1	1
La Rayeche	Forest	1	1
Lorfadukduk	Large rock	1	1
Sefah Delegdem	Summit	1	1
Bab Tafrout	Summit	1	1
Syflia	Forest	1	1
Matang	Escarpment	1	1

I was able to observe macaques in 56 % of the locations named with 25 % of locations yielding signs (Table 4.2) suggesting that shepherds' Barbary macaque LEK is a reliable indicator of the species' presence.

Table 4.2. Evidence of Barbary macaque presence from my three site visits to each of the 52 locations named by shepherds March-November 2010

Sighting or sign of Barbary macaques during three visits	Locations named by shepherds	% of locations
One sighting	4	8
Two sightings	11	21
Three sightings	14	27
Signs and sleeping sites	13	25
No sighting or sign	10	19

In Figure 4.3., I present the results of my visits to 52 of the locations shepherds stated that Barbary macaques could be found. Some shepherds stated that Barbary macaques could be

found on mountain summits throughout the survey area. Only summits topped with rocky outcrops yielded regular signs or sightings of Barbary macaques, which use the outcrops as sleeping sites. For example, Barbary macaques frequently passed the night at El Hanuk, La Risha, and Koralalia, judging by the large quantities of faeces of differing freshness that I encountered during each site visit. The other summits named by 1 – 3 shepherds are mostly bare of mature trees and rocks and appear to be inhospitable habitat for macaques suggesting this particular LEK is incorrect.

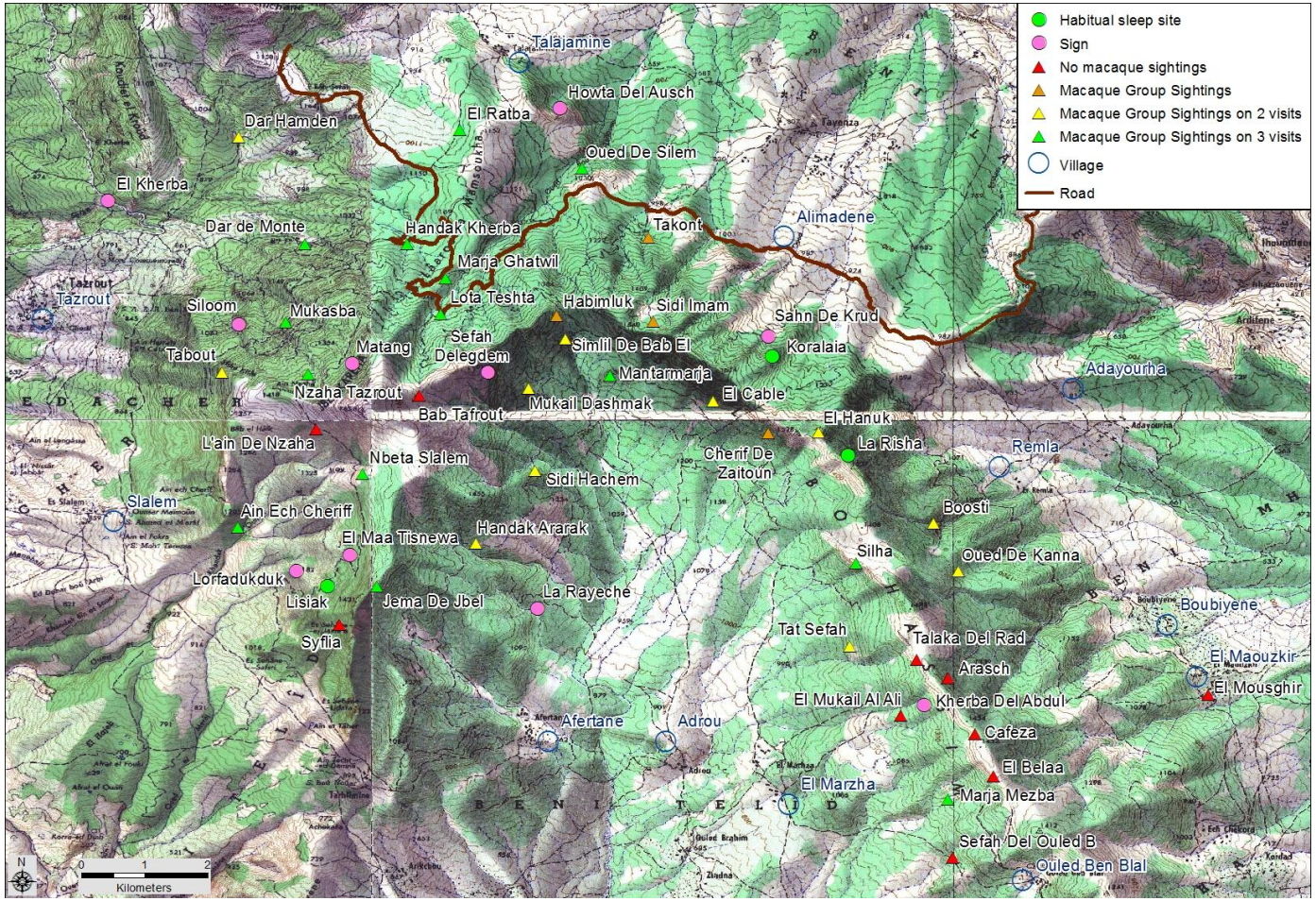

Fig. 4.3. Results of my visits to the sites named by shepherds in Table 4.2. as locations of Barbary macaque presence

4.4.3. The characteristics of shepherds' Barbary macaque location LEK

In general, shepherds' LEK of macaque locations radiated out from the area of forest closest to their village and ended at or near the periphery of their goats' habitual grazing areas. A shepherd's LEK often showed partial consensus with that of men from other villages as well as his own because the routes used to and from their common grazing areas overlapped. The shepherds base their orientation in the forest on toponymic features such as watercourses, peaks and rocky outcrops, and *marjas*, which vary in size from a few m² to around 1500 m². *Marjas* are important landscape features for the shepherds of Bouhachem and make up 30% of the Barbary macaque locations they named. I frequently observed macaques feeding in *marjas*. The macaques are very visible as they run across the open clearings into the surrounding trees on sighting human observers.

In common with other people's LEK (Goldman 2007; Turvey *et al* 2014), shepherds' LEK of Barbary macaque locations has its own characteristics. Apart from prominent physical landmarks, shepherds name forested areas if the area has religious significance, taking the name from the holy men who are buried at the site, such as Sidi Hachem and Sidi Imam. Areas also have historical significance; for instance, Dar de Monte is named after the civil and forestry guard headquarters situated at this site during the Spanish occupation. The most frequently named sites in Table 4.1 are situated on regular travel routes for villagers, used to access a local administrative centre (Dar de Monte) and to visit other villages (El Hanuk), and communal grazing areas used by shepherds from the villages of Bni Aarouss *qabila* to graze their herds in the summer months (Nzaha Tazrout). As I explain in more detail in Chapter 2, *qabilas* are defined as administrative districts rather than tribal territories (Munson 1981) and their existence influences some shepherds' macaque LEK. For example, the macaque location LEK of Almidene shepherds ends abruptly at the border between Tétouan and Larache provinces, accurately echoing the border between the *qabilas* of Bni Hassan and Bni Aarouss. Abduleela (23, Slalem) spoke about one such boundary whilst close to the border of his *qabila* of Bni Aarouss saying:

> *They are the El Akhmass [qabila] macaques from here. From this point on I have no more knowledge.*

Interestingly, shepherds from the El Akhmass *qabila* do not refer to any borders and their LEK includes macaque groups found in the forest territory of the Bni Aarouss *qabila*. Informal conversations revealed that the Bni Aarouss *qabila* has a turbulent history with that of El Akhmass which may explain the discrepancy in macaque location LEK between shepherds from these *qabilas*. Shepherds from neighbouring *qabilas* use different names for the same location in border areas. For example, one *marja* is called Mukail Dashmak by El Akhmass inhabitants but is referred to as Marja Khallinja by the shepherds from Bni Hassan.

The borders of the village fields of Talajamine and Remla are adjacent to forest used only by shepherds from those villages. Shepherds from both villages provided information on Barbary macaque presence unique to their respective villages. For example, Ahmed Chitwan, 33, of Talajamine and three other Talajamine shepherds named two macaque locations unnamed by shepherds from any other villages. Mr Chitwan specifically asked Ahmed to draw these two areas separately from the others he named to emphatically represent what he perceived as their isolated position on the periphery of the forest, immediately adjacent to his village (Figure 4.4).

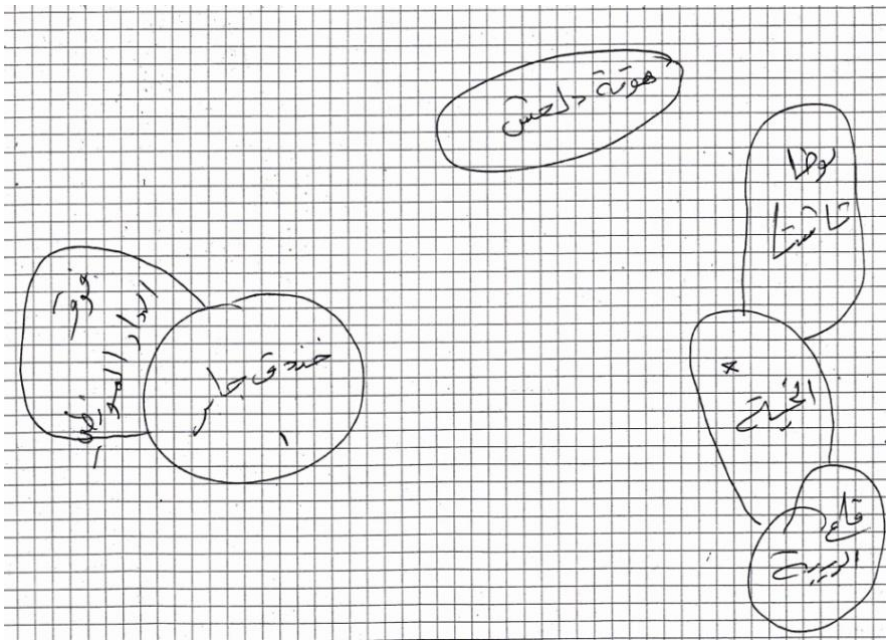

Figure 4.4. A map drawn by Ahmed under instruction from Talajamine shepherd, Ahmed Chitwan. Each Barbary macaque location is denoted by a circle. Note Mr Chitwan's separation of two circles representing Barbary macaque presence on the left to denote the area of forest close to his village and away from the main forest area

4.4.4. My reflections on shepherds' Barbary macaque location LEK

Cultural anthropologist Donna Haraway argues that knowledge creation is embodied and affected by the social, temporal and spatial circumstances of the person creating that knowledge, so it will always be partial and not all encompassing (Haraway 2009). This study supports that view from both the shepherds' and my own perspective. Congruent with other studies' findings that people rely on physical landmarks to orient themselves (Feinberg *et al* 2003; Fosset 2003), I found that Bouhachem shepherds have their own system of mentally mapping their environment which, like that of Irish fishers (McKenna *et al* 2008), is not represented in documented form. The combined effort of embodying the shepherds' information about macaque locations in a map aided the knowledge co-production process in this study and developed dialogue, facilitating our ongoing communication with the shepherds. The representation of shepherds from the ten villages compensated for the parochial nature of shepherds' LEK and combining their knowledge enabled me to map macaque presence over most of the available habitat in Bouhachem forest. I was mindful that LEK can be influenced by exposure to outside sources so at the end of the survey period, I asked four previous participants to provide their list of Barbary macaque locations for a second time. All four named the same locations as they had in their first interview suggesting that their interactions with us had not affected their Barbary macaque location LEK.

In accordance with other studies using LEK in wildlife surveys (Ferguson & Messier 1997; Mallory *et al* 2003; Gilchrist *et al* 2005; Turvey *et al* 2014), this study demonstrates the spatial and cultural issues that characterise LEK as a wildlife survey method. The shepherds' macaque location LEK is relayed through their knowledge of Bouhachem's topography. In common with other peoples worldwide (Davidson-Hunt & Berkes 2010; Gilmore *et al* 2010; Meilleur 2010), local topography has physical, functional, cultural and historical significance for shepherds in Bouhachem.

4.5. Shepherds' LEK of Barbary macaque numbers

In closing each interview, I asked the shepherd how many macaques he thought were in each group he had identified. Many did not know because the macaques in Bouhachem flee from people travelling on foot. Thus shepherds observed macaques either running away or moving high in the trees:

We cannot count them because when they are in the trees and they see us they jump about. How can we count them? Sinfodel, 45, Afertane.

I can't tell you how many because sometimes there are a lot and sometimes only a few - they can't be counted. Anonymous, 41, Almidene.

Just one shepherd reported an event when he had the opportunity to count a macaque group:

One day it was snowing and in Ain ech Cheriff I counted 50 animals coming out of a cave into the snow. Mohamed Stitoo, 60, Slalem.

4.5.1. Shepherds' LEK regarding changes in the Bouhachem Barbary macaque population

During their interviews, three elderly shepherds described how the Spanish captured young macaques and exported them to Spain for sale as pets and to zoos during the occupation, which ended in 1956. All three men said that many macaques were killed during these drives, which took place "frequently" during spring and summer. Amely El Katay, 83, from Slalem, describes what happened:

Mr El Katay: *In the time of the Spanish they used to hunt them. The Spanish boss would come and the villages would be sent to the mountain. They [the Spanish] would tell us to get macaques.*

Interviewer: *How many villages?*

Mr El Katay: *Often around three or four, plus all the villages' dogs. They would drive the group of macaques into trees and they would cut all the trees down around the trees where most of the macaques were hiding.*
Interviewer: *Why?*

Mr El Katay: *Because the macaque is intelligent so when it feels the tree move it will jump to another. They made this trap so that when the macaque descended from the tree they would catch it.*

Interviewer: *Did they take any in particular?*

Mr El Katay: *The small ones as they would send them to Spain.*

Interviewer: *How many did they take?*

Mr El Katay: *There was a short period between each macaque trapping session but they occurred frequently. There were lots of people and dogs and many macaques were killed by dogs.*

The hunting and capture of Barbary macaques along with the destruction and disturbance of their habitat would have affected the population of macaques in Bouhachem negatively. The decrease in the macaque population is described by Ahmed Sbach:

When they [the Spanish] were cutting down the oaks, the macaques emigrated. During this time there were very few left. The Spanish took away all the big trees and left a lot of small trees but these didn't have many acorns so the macaques didn't have much to eat. Only a few macaques remained but they returned when the forest came back.

These three men agreed with 30 other shepherds that the macaque population had increased in Bouhachem forest in recent times. Shepherds gave a number of reasons for this increase, but most claimed it was due to winters being less harsh than they were 20 years before. For instance:

They are increasing now because there isn't the snow like before. The snow killed them.

Eleven shepherds believe that increased rainfall leads to higher mast harvests so the macaques have plenty of food over the winter months and suffer lower levels of mortality due to cold. For example:

Years ago when there was a lot more snow many [macaques] died. It rains more now so there are more acorns in the autumn and the macaques have plenty to eat over the

winter and don't have to dig through deep snow to find them. Mohamed Sbach, 45, El Marzha.

This general opinion that the population increase is caused by the less severe winters and high acorn harvests is in accordance with a study showing that many days of snow cover during the severe winter of 2008 – 2009 was associated with the mortality of 30 macaques in two study groups in the Middle Atlas (McFarland & Majolo 2013) and with research demonstrating that water is the key factor in seed production for a related Mediterranean oak species, the holm oak (*Quercus ilex*) (Perez-Ramos *et al* 2010). The shepherds' assertions that mast production has been high due to increased winter rainfall is worthy of more detailed investigation.

4.6. Conclusions

My study demonstrates how an anthropological concept (LEK) can interface with scientific study. Working with local people and their LEK necessitates the consideration and inclusion of many different factors in the knowledge-sharing phase which in this case has provided the most detailed information to date on the distribution of Barbary macaques in Bouhachem forest. Collecting reliable population data on groups of non-habituated primates living in difficult topography is a challenging undertaking whatever method is used (Hanya 2003; Li & Rogers 2007; Davenport et al 2008). The method I describe here limits the possibility of producing information on Barbary macaque abundance due to the difficulty in verifying discrete groups. To achieve this, I need to collect data by regularly observing groups where I can identify individuals and thus collect data on group size and composition and daily movements. Verifying density and group size for a sub-section of a population before surveying over a larger area may provide more reliable results, (for example, see Menard *et al* 2013). LEK has been hailed as a rapid and economic method of surveying wildlife (Anadon et al 2009) but this was not my experience, as it took me a long time to verify locations named by shepherds due to the area's difficult topography and often inclement weather. In this study, I might have decreased the amount of time I spent seeking shepherds in the mountains by going to their villages and interviewing them there. This may well have resulted in more guarded conversations, however, particularly during the discussions of illegal behaviour I describe in Chapter 6. It would also have been difficult to interview each man individually out of earshot of his friends. In the future, I will schedule the verification of Barbary macaque presence for the autumn months to take

advantage of the higher visibility of the groups in that period – a strategy which has been recommended by other Barbary macaque researchers (Menard & Vallet 1993).

It is unrealistic to expect every individual's LEK to be entirely accurate or all-encompassing (Gilchrist *et al* 2005; Davis & Ruddle 2010; Ruddle & Davis 2011). Such acknowledgements of the possible limitations of integrating LEK with CSK are necessary to accommodate possible misunderstandings and to integrate the two knowledge systems for the benefit of species management and conservation globally. In common with Gratani *et al* (2011), I suggest that verifying or validating LEK is "not an intrinsically disrespectful process" as long as it is conducted as sensitively and inclusively as possible so both local and scientific knowledge types are acknowledged and treated equitably. Our engagement with shepherds may have achieved, in a small measure, a blurring of the boundaries between local people and outside agencies (which I describe in the previous chapter) to become "a site for the social production of knowledge" (Raffles 2002:326).

Despite the practical limitations of co-producing information by incorporating LEK with CSK, the technique has enormous benefits in terms of establishing a dialogue and close relationships with a group of people who regularly use Barbary macaque habitat. The issue of communication is an important one, because even different groups who speak the same language will inevitably ascribe diverse meanings to specific words and categories (Casagrande 2004). I tried to overcome such obstacles by careful communication with Ahmed, who was acting as translator, but it meant that I had to be (and still am) alert for the occurrence of misunderstandings. Despite these difficulties, our different perspectives combined to provide information that has significance for applied conservation practice in Bouhachem.

I suggest that this method can be used as an effective alternative to conventional survey methods when species conservation is the main priority because it can establish a primary link between local people and conservation actors enabling increased dialogue and cooperation between the two. In this chapter I have ascertained that shepherds have detailed knowledge of Barbary macaque locations in the landscape. In the next chapter, I will examine how shepherds view the Barbary macaque along with three other species - one wild and two domestic whose interactions influence Barbary macaques in Bouhachem forest.

Chapter 5 – Managing metaphorical boundaries and borderlands: shepherd-animal relations in Bouhachem forest

5.1. Introduction

The social, historical and symbolic meanings attendant on a particular animal species, whether domestic or wild, shape the way in which it is treated by people (Richards 2000; Costa *et al* 2013; Goldman *et al* 2013). These meanings contribute to the way in which people make sense of the world around them (Moore 2010). Engaging and connecting with local people can provide an understanding of how they relate to wildlife (Kuriyan 2002) as such understanding can diverge considerably from that of conservationists (Milton 2000; Adams 2007).

One anthropologist has argued that the division of nature and culture encourages a desire to organise relations between humans and animals by the use of metaphorical boundaries - used by people in an effort to distinguish themselves from animals (Douglas 1966). However, post-modernist anthropologists argue that such metaphorical boundaries are a western construct and not culturally universal so fail to feature in explanations of many people's natural and social worlds (Descola 1996; Corbey 2005). Even within western culture certain animals do not fit easily into rigid categories – these animals are described as "anomalous" (Douglas 1966; Knight 2003; Cassidy 2012). An example is the wolf (*Canis lupus*), the ancestor of the domestic dog (*C. familiaris*). The wolf was previously almost universally feared for its perceived, inherent evil in Euro-American societies but is now seen by environmentalists as a positive symbol of pristine wilderness (Emel 1998). This contradiction in the symbolic meanings assigned to the wolf results in long and costly conflicts over the return or reintroduction of the species in areas where it has been extirpated by anthropogenic influence (Wilson 1997; Bangs *et al* 2005).

Including people in research activities provides an opportunity to ascertain how they view diverse species. Discovering how people perceive the species of conservation concern can lead to the development of a strategy more attuned to local perceptions which may, in turn, inspire more people to participate in conservation activities (Kuriyan 2002; McLennan & Hill 2012; Costa *et al* 2013). To achieve this understanding, conservation practitioners can obtain a nuanced and sensitive appreciation of local people's perceptions of wildlife by collecting and analysing ethnographic data (Goldman *et al* 2010). In many areas, wildlife and domestic

livestock coexist so understanding people's perceptions of both may have important implications for conservation strategy (Goldman *et al* 2010).

In domesticating some animal species by altering their behaviour and appearance, people adapted their own social and cultural processes and, in some cases, evolved from hunter-gatherers towards pastoralism and farming (Ingold 1980). Ingold (2000) interprets the main result of the advent of animal domestication as leading from an egalitarian, sharing, hunter-gatherer society to a pastoral society based on domination of humans over animals and, by extension, of humans over one another. This shift inevitably affected relations not just between humans and animals but also among humans and facilitated the beginnings of human disengagement with nature itself (Ingold 2000). Anthropologists tend to view people living in hunter-gatherer societies as very much a part of nature, whilst pastoralists and farmers are often portrayed as being in conflict with nature (Roskaft *et al* 2007; Cassidy 2012).

The Barbary macaque (*Macaca sylvanus*) shares its forest space with other wildlife species such as the golden jackal (*C. aureus*) but during daylight hours, shepherds accompany some of their domestic animals into the forest. I begin by reviewing boundary theory and the part it plays in the animal ontology of Muslims. I go on to explain how people's difficulty in managing strict boundaries leads to the existence of fuzzy areas called borderlands which can be physical or metaphorical places inhabited by animals. I present ethnographic data to examine shepherds' ontologies of the Barbary macaque alongside three other species. The domestic goat (*Capra hircus*) is relevant to Barbary macaque conservation because the goats' nutritional needs bring the shepherds into the forest, while goats are also important to local people for economic reasons. The goats must be protected from a wild predator, the golden jackal, by the domestic dog (*C. familiaris*). My study contributes to further understanding the importance of human-animal relations for conservation by placing the focal species, the Barbary macaque, within the context of shepherds' ontology of other wild and domestic species using the same habitat.

5.1.1. Metaphorical boundaries, animals and Islam

In some cultures, animal domestication, aided by religion, has been used to strengthen the culturally-constructed boundaries deployed by people to protect themselves and their livestock from wild animals (Douglas 1966; Ingold 1980). In some monotheistic religions, such as

Judaism and Islam, a particular animal is categorised as fit or unfit for consumption using strict criteria. In Islam, the metamorphosis of people into primates and pigs (*Sus* sp.) after incurring God's displeasure automatically endowed both these species with *harām* (forbidden) status as degraded humans (Cook 1999). The goat, as a cloven-hoofed ruminant, meets the criteria necessary for consumption by followers of Islam. Goat slaughter must follow particular rituals to give the meat the *halāl* (permissible) status that renders it edible (Boyazoglu *et al* 2005). The Prophet Mohamed deemed all canids to be *harām* in Islam so their flesh is never eaten and Muslims generally avoid physical contact with dogs. Dog saliva is a subject of concern in Islam with various cleansing rituals performed if the saliva comes into contact with a person or a receptacle used for eating (Foltz 2006). Muslims' often intense hostility to the dog stems from the idea that the Prophet Mohamed did not tolerate dogs, although the only mention of the dog in the Qur'ān is positive (Foltz 2006). Much of the religious law about dogs comes from *ahadīth* (literally translated as traditions). *Ahadīth* are sayings of The Prophet Mohamed carefully authenticated by scholars of Islam (Perlo 2009). Various *ahadīth* report the Prophet as saying that angels will not enter a house if a dog has been inside and one states that Mohamed recommended the killing of all dogs save those used for guarding or shepherding (Foltz 2006).

Douglas (1966) suggests that such religious pronouncements are not referring to the hygiene of specific species. She suggests that animals judged as sinful are stigmatised with the aim of establishing and maintaining groups and boundaries within human societies rather than for reasons of persecution or fear of the animals themselves (Douglas 1966). Despite these rigorous metaphorical boundaries, some wild and domestic species do not fit easily into such rigid categories due to conflicting associations with different spaces or spheres (Serpell 1995; Hill & Webber 2010). Additionally, wildlife and people and/or their domestic livestock physically share some wild spaces in what animal geographers refer to as the borderlands (Wolch & Emel 1998; Collard 2012; Cassidy & Mills 2013).

5.1.2. The borderlands: people's problems with boundary maintenance

The borderlands are described as a physical space where people and wildlife come into direct contact with sometimes fatal results for humans as well as wildlife (Wheatley *et al* 2002; Knight 2003; Gore *et al* 2005; Collard 2012). In these areas, boundaries may become blurred because people are living alongside nature. In this situation, wild space and human space cannot be neatly assigned to nature and culture respectively. For example, the red fox (*Vulpes*

vulpes) has successfully adapted to city living in the UK and is tolerated by urban residents. However, this tolerance can be tested if an individual fox exhibits its "wild" side by demonstrating unusually aggressive behaviour toward people. The resulting media furore causes a polarisation of people's views of whether the foxes should be dealt with i.e. killed and exemplifies the difficulties people have with boundary management in a world where wild species have made cities their home, blurring a wild-domestic boundary (Cassidy & Mills 2013). However, borderlands are not just indicators of shared physical space; they may also constitute metaphorical places when there are difficulties in categorising a species because of its particular characteristics or role in human society.

Many cultures find primates hard to categorise (Hill & Webber 2010). Primates are liminal, and are more likely to become stigmatised than other species as their ambiguity causes problems in the maintenance of strict boundaries between animal and human (Douglas 1966; Nyanganji *et al* 2010). Primates inhabit a metaphorical borderland, and much effort has been expended in western culture to underline people's distance from primates whilst simultaneously recognising human characteristics in them (Corbey 2005). The perceptions of local people who deal with wild primates in their environment on a daily basis can vary greatly and can often explain why a primate may be persecuted in one culture and tolerated in another (Knight 2003; Lee & Priston 2005; Hill & Webber 2010).

The distribution of the Barbary macaque in the southern Mediterranean has meant its exploitation in trade for thousands of years (Goudsmit & Brandon-Jones 2000). Barbary macaque osteological remains have been discovered in a Roman fort in Yorkshire, UK (Massetti & Bruner 2009), mummified in an Egyptian tomb (Goudsmit & Brandon-Jones 1999) and the petrified body of a juvenile Barbary macaque has been found in the Italian city of Pompeii (Bailey *et al* 1999). Despite this long relationship, no investigations have taken place to study people's perceptions of the Barbary macaque in any area of its distribution.

5.2. Shepherd-animal relations in Bouhachem

I now investigate the shepherds' relationships with Barbary macaques, goats, golden jackals and domestic dogs and analyse how these interactions affect the macaques and the shepherds' lives.

5.2.1. The Barbary macaque

Drawing attention to the Barbary macaque among shepherds resulted in mixed reactions. As I discuss in Chapters 2 and 4, when I began to talk about the macaques to groups of men, they commonly ridiculed the animals and each other. However, a different picture emerged when I interviewed shepherds individually. A common theme was to allude to the metamorphic status of primates in the Qur'ān:

> *They were humans before so it's not good to bother them.* Sinfodel, 25, Afertane.

> *Macaques can see well but they don't have a good sense of smell because they used to be people so they are similar to people. They have five fingers and five toes on each hand. They have a beard like a man and the little ones are like human babies.* Mohamed Tarher, 74, Adrou.

Some shepherds talk about the macaques positively, alluding to their human-like physical attributes, and viewing them anthropomorphically as sociable and family-oriented.

> *They are the people of this forest.* Said Chakaroni, 27, Adrou.

> *They live as if they are in a village.* Nordeen Karmoun, 28, Lahcene.

> *There are no animals that feel such a lot for their young as macaques do.* Mohamed Tarher, 74, Adrou.

> *A macaque had lost its baby and when she found it again she hugged it like a mother hugs her baby. They are just like a family, just like us.* Anonymous, ~40, Almidene

On two occasions shepherds liken macaques to domestic animals as opposed to people, describing them as feeding on grass "like goats do". Likening macaques to goats and sometimes to people places macaques in human space rather than wild space.

Other men mentioned how male macaques guard their group:

The macaques have guards. Everyone else is going about their business but the guard is checking the situation and when he sees or hears something that might be dangerous, he shouts like this [impersonates a macaque alarm bark] and they all rush into the trees. Abdessalam Chitwan, 70, Talajamine.

This shepherd perceives this behaviour to be in response to danger, mostly from canid predators. For example:

The things that damage them [the macaques] are the feral dogs in the forest and the jackals. Ahmed Sbach, ~56, Tazrout.

Some shepherds are also keen to point out that the macaques' vigilant behaviour made them feel safe in the forest with their goats:

When you go in the mountains and you see them [the macaques] you know there is a high level of safety and there are no jackals or snakes or anything. If you hear them shouting, you know there are jackals, dogs or people around. Mustafa, 34, Remla.

For this shepherd, the macaques appear to have the same concerns about safety in the forest as he does and warn him of possible dangers so are useful. Another shepherd pointed out that the macaques were useful in a different way:

They help us by dropping acorns on the [forest] floor for our goats to eat.

Others are not so positive with eight shepherds expressing unease or fear about the size and strength of male macaques. For example:

The macaques scare me if I am alone [they are] dangerous. Anonymous, 20, Remla.

If you bump into them you are frightened. Sometimes there are macaques who want to demonstrate their dominance. Only God has stopped them understanding our weakness so they won't attack us because they are stronger than we are. One male macaque could fight five people with the strength he has. If they knew that they wouldn't allow us in the forest! Ahmed, 65, Afertane.

The demonstration of dominance that this shepherd refers to is the branch-shaking display adult male macaques make in response to perceived threats (Mehlman 1996). Another shepherd refers to this explicitly:

> *A male macaque can push the oak trees back and forth with his strength. He's strong!* Sinfodel, 25, Afertane.

However, shepherds also admitted that macaques were afraid of both dogs and jackals in the forest because "they kill the macaques".

When I asked shepherds how they would feel if the macaques disappeared altogether from the forest, the majority expressed disbelief that the species could ever disappear. However, when a few took the time to imagine such a scenario they responded thus:

> *If I went to places I usually saw them [the macaques] and didn't see them I would feel lonely.* Nordeen Karmoun, 28, Lahcene.

> *No more? I would feel that the mountain is empty like a bottle of water without the water.* Mustafa, 34, Remla.

> *No! If they [the macaques] finish then so do people and the world.* Mohamed Stitoo, 60, Slalem.

Others appeared not to care whether the macaques were there or not:

> *No more macaques? I am going to feel that they were here once and now they are not.* E. Chakaroni, 35, Adrou.

> *For me if there are macaques or not I don't care.* M. Hereda, 23, Remla.

For some shepherds, there is nothing noteworthy about their encounters with macaques, while others enjoyed such encounters. When I asked how they felt when they saw the macaques, the reply varied from:

It's all the same to me whether I see them or not - they are just there in the forest. If I see them I carry on with my work, I don't have time to watch them. Ahmed Karmoun, 60, Talajamine.

To:

I like seeing the macaques. If I don't see them it's like I am missing something. Abdultif, 19, Slalem.

The shepherds allude to the macaques' religious metamorphosis from human to animal but do not appear to view it negatively. Animist people sharing habitat with chimpanzees (*Pan troglodytes verus*) in Guinea Bissau also share the belief that these primates were previously human but transgressed local moral codes and were changed into chimpanzees by a supernatural power (Costa *et al* 2013). Like the Barbary macaques in Bouhachem, this status does not necessarily mean these primates are disliked by the people living alongside them. In this study, the shepherds' ontology reflects the ambivalence detectable elsewhere in the traditional Islamic views of primates related to the positive and negative characteristics shared by both human and other primates (Kruk 1995).

In shepherds' ontology, the Barbary macaque appears to occupy a metaphorical borderland where clear categorisation is difficult. The shepherds allude to this situation themselves when they compare the macaques' behaviour to that of people and may be conscious that the boundary separating them from the macaques can be crossed by either species. Many shepherds deal with their difficulty and unease concerning the anomalous position of the macaque by using mockery and amusement to make a clear division between them. I suggest that a spectrum of perceptions exists in the shepherds' ontology of the macaques and men who are positive about the animals do not voice these opinions when in the presence of their peer group. As in Bouhachem, mockery has also been used in Japanese culture to create a firm dividing line between people and primates (Ohnuki-Tierney 1987).

5.2.2. The domestic goat

My interviews revealed that the majority of households in the villages around Bouhachem own goats, in varying numbers. Shepherds, who are young men and boys, take the goats out to pasture in the mountains at around 9 am every morning depending on weather conditions and return them to the villages just before dusk, which varies depending on the time

of year. Many shepherds freely admitted that they did not know the exact number of goats in their herd and that they had lost goats to predators in the past. Shepherds in Bouhachem are often responsible for 100 or more animals and shepherds from the villages of Adrou and El Marzha in Bouhachem often take herds of more than 300 goats over long distances through rocky, heavily forested areas. These large herds require the efforts of many shepherds as the animals are spread out over very wide pastures and thus vulnerable to predation and to getting lost. Indeed, we once returned a group of over 30 goats forgotten or lost in the forest by shepherds from one village. One shepherd voices his concern:

> *If you are in the forest you are always worried because the goats go in different directions and don't travel as a herd so you must guide them to try and keep them together.*

I observed that the shepherds spend a great deal of energy and time keeping the goats moving together. Abdulhafed from El Marzha told me:

> *Goats like to go where they want but we can't permit that as we would not be good at our job.*

The goats also dictate where and when the shepherds can rest and eat. Although the goats have favoured resting places where they rest and ruminate, they do not always settle in these places. Even if they have begun to eat, the shepherds have little choice but to accompany the goats as they move off. I never saw shepherds beat goats although they do throw stones and branches at the herd in an attempt to keep them from going in a direction undesirable to the shepherds.

The goat is ostensibly kept for its meat. At religious festivals, goats can be sacrificed instead of the ritual ram (*Ovies aries*), by people suffering from diabetes as goat meat contains less fat than mutton and Moroccans perceive this as being healthier for diabetics. I have seen numerous goats sold for this purpose during Īd al-Adha in Tangier-Tétouan region. Despite this ready market, most Bouhachem households appear reluctant to sell animals for slaughter during religious festivals. This reluctance may stem from the villagers' perception of their goat herds as a symbol of their financial security. For example, one villager told me:

If you have goats then you have money. If you don't have goats then you don't have money.

Despite this assertion, households keep fewer goats than they did in the past according to some elderly men. Mr Chichuruhi comes from the village of Tazrout where there were only five shepherds at the time I conducted this study, all but one of whom was over 50 years old. Mr Chichuruhi explains why he believes goat keeping has declined:

There used to be many more goats than there are now. In the old days, the small boys took the goats and became shepherds but now they go to school and when they grow up they go to the city. I have five sons but only one of them has stayed in the village the others have gone to the city. Ahmed Chichuruhi, ~80, Tazrout.

Finding boys or young men to undertake what is undoubtedly arduous work is becoming more difficult. Younger shepherds are easily distracted whilst in the mountains and some admitted that they only knew they had lost a goat if the owner remonstrated with them or they found it dead the following day. Goats that are freshly killed and left by a predator cannot be eaten by practising Muslims as the meat is classed as carrion and therefore *harām.* One man, tired of trying to find reliable shepherds, diversified by selling his goats and investing in a business:

I had 200 goats and my sons worked as shepherds. Now they have gone [to the city]. I tried to employ other people as shepherds but they weren't very good so I sold all my goats and bought this shop. Anon, ~79.

Despite the apparent decrease in goat keeping, the majority of villagers in Bouhachem do keep goats and take good care of them. Goat kids are kept within the family household, even entering the domestic quarters until they are around six weeks old and judged able to keep up with the herd when it is taken into the mountains. When goat kids are born whilst the nanny is grazing in the mountain pastures the shepherd carries them himself so they do not fall prey to predators.

Some people seem much attached to their goats and allude to them sentimentally:

If you lose a goat it's like you've lost a member of the family. Mohamed, 57, El Marzha.

One shepherd describes his feelings the day after his family sold some of their goats:

> *Yesterday we sold five goats. We were always with these goats and took care of them and now we miss them*. Abdultif, 19, Slalem.

As noted elsewhere in Mediterranean ethnography, goats are valued for their utility and must "earn their keep" (du Boulay 1974; Theodossopoulos 2003). In Bouhachem, as elsewhere, goats are commonly used by poorer people as a form of investment or "banks on hooves" and sold to obtain cash for unforeseen circumstances such as family illness (Peacock 2005). However, as Theodossopoulos (2005) has pointed out in his work on Greek villagers' relationships with their domestic animals, their feelings about their charges are not easily categorised into utilitarian and non-utilitarian dichotomies. For the shepherds of Bouhachem, the goats are a source of income or wealth but some also appear to feel emotionally attached to them. Therefore, goats represent more than just the material wealth of a family and protecting the goats from predators in the forest is of the utmost importance to the shepherds.

5.2.3. The golden jackal

Bouhachem shepherds worry about potential predation on their animals by wild carnivores. They share this preoccupation with many pastoralists and ranchers globally, (Espuno *et al* 2004; Bangs *et al* 2005; Dickman *et al* 2014). There are several carnivore species in Bouhachem, but the one that looms largest in the minds of the shepherds is the golden jackal. Golden jackals are common in Bouhachem where the shepherds refer to them as *dib*. *Dib* translates literally from the Arabic as wolf and I will refer to the animal as the *dib* from hereon. Most shepherds mention the *dib* as a major predator of livestock In Bouhachem, and the species is such a major and daily preoccupation for the shepherds that their routes and resting places in the forest are determined by its potential presence. Bilal, 27, from El Marzha told me:

> *There are places in the forest that are closed [where secondary vegetation is thick and difficult to penetrate for people] and there might be dib there, so we like the marjas [green, open spaces] where we can keep an eye on the goats and where we can eat our meal in peace.*

A shepherd will change his route if there has been a recent attack on goats by the *dib* in an area he normally uses. Bilal told me:

> *If a dib has attacked goats in an area we don't go to that site until 2 - 3 days have passed.*

Shepherds also refrain from ascending the mountains if low-lying cloud hinders visibility because they believe these conditions allow the *dib* to attack the goats more easily. Despite listening to the older shepherds' tales of *dib* predation very young shepherds are not truly cognisant of the reality of life as a shepherd until they get distracted in the forest and lose their goats. Reality hits when they find the bloody evidence of their neglect in the form of a predated goat. One shepherd called the *dib* "our teacher", explaining that young shepherds need to lose goats to the *dib* at least once whilst learning the job so they understand that shepherding is a serious responsibility, rather than a game. One shepherd seemed to acknowledge the *dib's* role in teaching young shepherds to mind their herds when he implied that bad husbandry could be to blame for some losses saying:

> *It's a good thing that the dib is around because boys tend their animals more carefully. Many boys do not know that they have lost a goat until they find its remains in the forest the next day.*

Shepherds apprehend and comprehend the *dib* in their own distinct way, describing it as a "dangerous enemy" which "needs to be controlled" but it also merits a grudging respect. A shepherd's ability to protect his goats from the *dib* initiates him on his path to becoming a useful contributor to household wealth. The *dib* has very real consequences for shepherds not just for their and their families' livelihoods but for their identity and reputation as shepherds. The *dib* and its predatory behaviour is thus a challenge to a man's identity as a shepherd. Like the red fox in the UK, the *dib* is what Marvin describes as "a rival competing with human interests" and an "illegitimate killer" predating on goats which rightfully belong to and should be killed by people (Marvin 2000).

To understand the shepherds' local ecological knowledge (LEK) of carnivores in Bouhachem, I showed photographs (see Appendix V) of five Moroccan carnivore species plus two domestic dogs to twenty shepherds aged 14 - 64 years. Of these species, three are found in

Bouhachem: the genet (*Genetta genetta*), the red fox and the golden jackal. I included the otter (*Lutra lutra*) and the Iberian wolf (*C. lupus signatus*), which are not found in Bouhachem, to test the shepherds' accuracy at species identification. Of the two domestic dogs, one was typical of village dogs in the area and one showed a strong resemblance to a German shepherd. 50 % (N = 10) of the respondents came from the village of Talajamine where both dogs originated. All respondents identified at least two carnivore species. Both the wolf and the jackal were identified as *dib* by all respondents and all, apart from the two youngest respondents, identified the red fox correctly. The youngest respondents also incorrectly identified the German shepherd type dog as a *dib*. This misidentification illustrates the novice status of the young shepherds. Domestic dogs regularly kill *dib* (Figure 5.1) and many shepherds told me they had seen *dib* carcasses. No participants identified the otter indicating that their carnivore LEK is generally reliable.

Figure 5.1. A *dib* killed by dogs – July 2010

The shepherds' identification of both the golden jackal and the Iberian wolf as present in Bouhachem may be explained by the striking physical similarities between the Bouhachem *dib* and the Iberian wolf. Recent research has reclassified the golden jackal as a subspecies of wolf, the African wolf (*Canis lupus lupaster*) in the neighbouring country of Algeria and elsewhere in North Africa (Gaubert *et al* 2012). However if the animal present in Bouhachem is indeed reclassified it is unlikely to have any influence on the shepherds' perception of their old

enemy, the *dib* as a proximate and ever present threat to their goats when they are in the forest.

5.2.4. The domestic dog

The domestic dog occupies an ambiguous place in shepherd ontology and the way it is perceived and treated is highly dependent on the context of its behaviour.

5.2.4.1. The dog as protector

The *harām* status of dogs is not explicit in the Qur'an. However, it is clear that dogs are regarded as ritually unclean by most people in Bouhachem. In Bouhachem villages, the domestic dog is used as a livestock guarding dog and rarely shares a close relationship with its owners. Dogs are only accepted in public spaces as working animals and are prohibited from the private space of the house. When out in the forest, I often observed shepherds kicking and throwing stones at dogs with no apparent reason other than they were too close to people so might contaminate them. Shepherds do not name their dogs and when they discovered that I had named mine, they found it very amusing.

Among shepherds in Bouhachem, a dog's aggressive behaviour is rewarded or severely and sometimes fatally punished depending on its context. Shepherds perceive canine aggression as favourable as it is the dogs' job to defend the goat herds from danger from humans and wild animals such as the *dib*. Within the village boundary, however, shepherds severely punish dogs which have exhibited untoward aggression towards humans. One dog was beaten so badly by its owner for aggression that it lost a hind leg. It is quite common for young, inexperienced dogs to kill a goat whilst out with the herd. These dogs are killed immediately by the shepherd because they turn from protector to predator and exhibit wild behaviour within metaphorical human boundaries.

Despite the dog's importance as a livestock guard, shepherds do not selectively breed from individuals which show particular aptitude for protecting goats against the *dib*. Dogs start to accompany the herds to the forest from around three months of age and are trained "by an older dog which teaches them their job" according to Mr Rachmon. These young dogs' immaturity as well as their inadequate training explains their failure to protect the herd against

the *dib* or their propensity to be easily distracted by signs of other wildlife including the macaques:

> *I see the dogs bothering the macaques for half an hour and a dib could come and eat a goat whilst they are away.* Bilal, 27, El Marzha.

5.2.4.2. The dog as predator

Shepherds from five villages reported losing livestock to a dog pack which they said hunted in the forest. The shepherds usually referred to these dogs as “devils” and reported that the animals killed livestock and wildlife including the macaques. The shepherds perceive these dogs as feral and categorise them, like the *dib*, as illegitimate killers. All the men agreed that the feral dogs were in good condition. One old shepherd told me:

> *They are fit like the wild boar, because they eat well and they eat [wild] boar, monkeys and cows.*

We observed two separate attacks on Barbary macaques by dogs during the study period and Ahmed again encountered dogs attacking a Barbary macaque in March 2014 (Figure 5.2). He intervened to stop the attack which the macaque survived (Figure 5.3).

Figure 5.2. A dog pack attacking a Barbary macaque in Bouhachem forest in February 2014

Figure 5.3. The Barbary macaque after the attack pictured in Figure 5.2

I photographed 67 dogs both with shepherds and ranging unaccompanied in the forest and used these photographs to identify and connect the majority of dogs to their home village. I also made *ad hoc* observations of three packs of dogs leaving their home villages, entering nearby forest and exhibiting active hunting behaviour. My photographic database clarified that all but three of the dogs I observed in 2010 were in fact free-ranging, owned dogs from villages around Bouhachem. Only three dogs appeared to be living feral in the forest. These dogs were in very poor health and disappeared in the winter of 2010.

My observations conflicted with the shepherds' belief that the dogs observed hunting in the forest were indeed feral. Like Italian farmers, who rarely acknowledge domestic dog predation on livestock, preferring to blame the wolf (Ciucci & Boitani 1998), the Bouhachem shepherds are reluctant to blame village dogs for livestock predation. People's information about their immediate environment is based on many years of experience and, as has been demonstrated in the previous chapter, can be of great value in species surveys. In this case, however, the shepherds' local ecological knowledge (LEK) regarding the dogs was incorrect, suggesting that the shepherds do not recognise village dogs apart from their own because they do not view dogs as individuals. Dogs have little value to people and are easily replaceable. The lack of care and attention that dogs receive from shepherds may increase the dogs' need to enter the forest and fend for themselves by predating on livestock, macaques and other wildlife.

5.2.4.3. The dog as a liminal animal

Like the Barbary macaque, the domestic dog is not categorised easily on the wild-domestic continuum, but for different reasons. Scholars suggest that it is the dog's liminality and its close relationship to the wolf that gives it potential to revert to "wild" behaviour, along with its existence on both sides of the metaphorical boundary in relation to humans, which inspires this hostility (Douglas 1966; Serpell 1995). Additionally, the relationship between people and their dogs in Bouhachem is seriously affected by the dog's position in Islam as *harām*. However, unlike the Barbary macaque, it does not have the distinction of having once been human. The domestic dog moves freely between village and forest, being neither truly wild nor truly domestic but liminal, occupying the in-between world of the borderlands. I suggest that it is the dog's liminality which explains the differing treatments it receives for aggressive behaviour in wild or human space in Bouhachem.

5.3. Conclusions

As Knight (2003) has pointed out, the emphasis on nature-culture, and thus human-animal difference, and its influence on the western conception of boundaries and their maintenance between humans and animals can obscure the far greater complexity of human-animal interactions in diverse ecological and cultural settings. Shepherds in Bouhachem have a clear anthropocentric attitude towards the animals I discuss here but their relationship to these animals, like that of Greek villagers, is not strictly utilitarian and exploitative (Theodossopoulos 2005). Despite stigmatisation of primates in Islam, Barbary macaques in Bouhachem appear to be viewed positively by many individual shepherds but universally mocked when shepherds are in groups. The least complicated relationships occur between the shepherds and the species firmly at the extremes of the wild-domestic continuum - the goat and the *dib*. The shepherds' obsession with the *dib* reflects their concern about the safety of their goats in the wild space of the forest. Religion can, and does, affect shepherds' views of different species, as demonstrated here by the inferior position of the domestic dog in the shepherds' ontology. The reality of such perceptions is illustrated by the contemptuous and often violent way shepherds treat dogs despite their utility as livestock protectors. The dog acts as mediator against the effects of a wild canid, the *dib*, although it is unclear if the shepherds understand the relationship between the species. Both canids predate on livestock, as well as on the Barbary macaque, but shepherds' local ecological knowledge classes dogs which do this as feral. My observations and photographs place these dogs as village dogs but communicating this information to shepherds without privileging my knowledge over theirs presents its own set of problems which I discuss in Chapter 8. Figure 5.4 illustrates the shepherds' perceptions of the relationships among four different species in Bouhachem. Disaggregating these relationships, as I have done in this chapter, reveals their complex, diverse and dynamic interconnections.

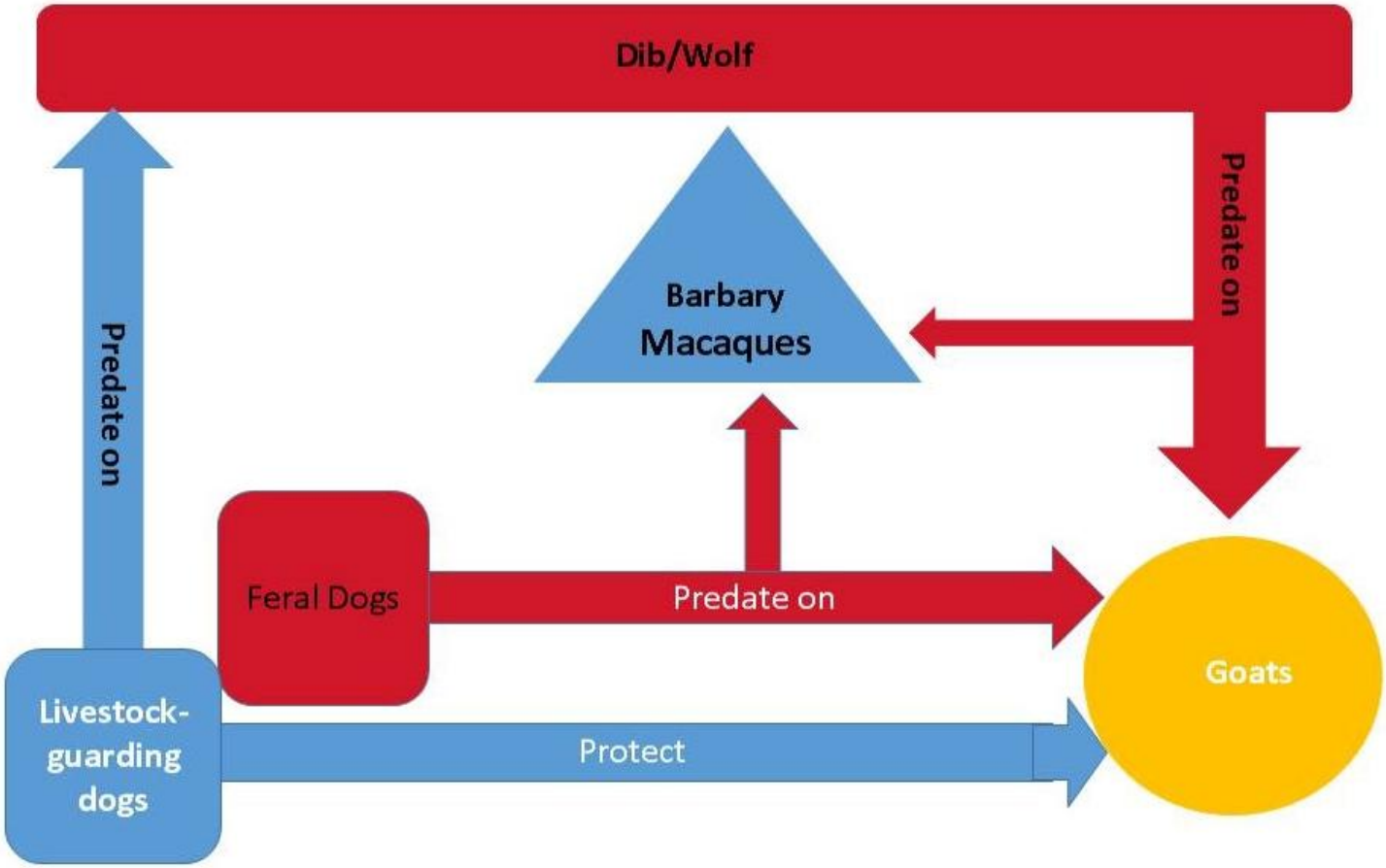

Fig. 5.4. My summary of shepherds' perceptions of the relationships between Barbary macaques and three other species that use Bouhachem forest. (Red represents the *dib* and feral dogs as wild animals, yellow represents the goat as a domestic animal and blue represents Barbary macaques and livestock-guarding dogs as liminal animals).

Mismatches between the perceptions of local people and conservationists have been found for several primate species (Strum 2010; Saunders 2011; Costa *et al* 2013) but I suggest that although shepherds' perceptions of the macaques in this study are complex and often undefined, some men appear to value the presence of the macaques in the forest just as I do. I have found that reflecting on and understanding the diverse ways shepherds view the macaques has provided me with increased insight into how to proceed with conservation actions which may prove effective in Bouhachem. In the next chapter, I will explain how the Barbary macaque's ambiguous position in shepherds' ontology protects them when they leave the forest to raid village fields, but leaves them isolated and vulnerable to predation by shepherds and their dogs when Bouhachem becomes a physical borderland where negative cross-species interactions take place.

Chapter 6 – Breaching the boundaries: physical interactions between Barbary macaques, shepherds and their dogs

6.1. Introduction

People's behaviour when in contact with wildlife is dependent on their social and cultural perspectives of the environment, which provide them with knowledge, assumptions, and values that guide their activities (Milton 1996; Berkes 1999). Physical encounters between people and wildlife can have unpredictable and often negative consequences for wildlife depending on the context (Hill 1997; Knight 2003; Treves 2008; Cassidy & Mills 2013). Some macaque species are commensal with people due to their ability to live in anthropogenically altered environments (Richard *et al* 1989; Wheatley 1999). Additionally, human-macaque interactions occur in diverse contexts such as crop-raiding, hunting, and via human ownership of dogs (*Canis familiaris*) which harass macaques.

Macaques, with their expansive ranges, large group sizes and omnivorous, adaptable diets are frequent crop-raiders in Asia (Campbell 2000; Wheatley *et al* 2002; Lee & Priston 2005; Sprague & Iwasaki 2006; Riley 2007). Cultural beliefs, values and customs can play a large part in how crop-raiding macaques are tolerated, resulting in a continuum of tolerance-intolerance. At one end of the continuum, one group of indigenous farmers in Sulawesi whose culture emphasises the interconnectedness of people and nature practice tolerance to crop-raiding Tonkean macaques (*Macaca tonkeana*) and no retaliatory killing takes place (Riley 2010). In the middle of the continuum, long-tailed macaques (*M. fascicularis*) around temples in Bali are regarded as sacred and fed by visitors, but when the macaques venture outside temple areas into neighbouring fields, they are persecuted and sometimes shot (Schilaci *et al* 2010). At the negative end of the spectrum, more extreme measures such as trapping and selective shooting are used for species such as long-tailed macaques on Ngeaur Island, Republic of Pilau and bonnet macaques (*M. radiata*) in South India (Wheatley *et al* 2002; Chakravarthy & Thygaraj 2005).

Macaques are also killed for reasons other than crop-raiding (Chakraborty *et al* 2014; Lane-DeGraaf *et al* 2014). Macaques are amongst the primate species commonly used in traditional folk medicine in Asia (Alves *et al* 2010) and hunting for the bushmeat trade has caused the serious decline of the crested black macaque (*M. nigra*) in Sulawesi (Melfi 2010) and

the Arunachal macaque (*M. munzala*) in the eastern Himalayas (Chakraborty *et al* 2014). There is a report of shepherd boys and their dogs hunting and killing Barbary macaques (*M. sylvanus*) in the Ghomara region in northern Morocco (Mehlman 1984) possibly for sport.

Owned and feral domestic dogs also present a threat to macaques as they harass, hunt and kill the animals without human encouragement. A review of such attacks found that commensal macaques were killed by dogs in India (Anderson 1986). Dogs are a serious threat to Japanese macaque (*M. fuscata*) infants in the country's various monkey parks which provision wild macaque groups for tourism (Knight 2011). In Laem Son National Park in Thailand, the presence of domestic dogs is negatively correlated with a low proportion of infants in some groups of Burmese long-tailed macaques (*M. f. aurea*) although no actual predation events were observed (Gumert *et al* 2013). Even if such attacks do not lead to direct macaque mortalities, domestic dogs may exert negative influences on groups by harassing and chasing them, resulting in increased stress and energetically costly behaviour (Anderson 1986; Lenth 2008; Gumert *et al* 2013). Although such attacks are not a direct human-wildlife conflict, they constitute an anthropogenic influence which should not be ignored.

In Chapter 5, I revealed how the Barbary macaque inhabits an ambiguous position in shepherd ontology. In this chapter, I describe how this ambiguity is embodied in real time relationships using shepherds' accounts of how they interact physically with Barbary macaques in both agricultural and forest space in Bouhachem. I report my findings regarding local people's reactions to crop-raiding by Barbary macaques in Bouhachem and describe an incident where people punish, rather than kill, macaques in their attempts to deter them from entering their fields. I speculate that this activity is related to the anomalous position the macaque occupies in shepherds' ontologies and reflects their own concerns about social exclusion. I continue by describing how Barbary macaques are treated in the forest when young shepherds use their dogs to hunt, capture and kill them in a negative cross-species encounter. I speculate that the shepherds' behaviour toward the macaques is dynamic, changing according to a shepherd's age and related to his own position in village society. Finally, I describe how the shepherds' behaviour is linked directly to the additional harassment and killing of macaques by domestic dogs when unaccompanied by shepherds. This chapter contributes to the broad agenda on human-wildlife conflict, highlighting the importance of ascertaining the social influences that underlie the disjunction in the behaviours exhibited by shepherds when they find themselves in proximity to Barbary macaques in Bouhachem.

6.2. Physical interactions between Barbary macaques, shepherds and their dogs in Bouhachem

6.2.1. The physical consequences of Barbary macaque crop-raiding

During the semi-structured interviews I describe in Chapter 2, shepherds from five villages told me that Barbary macaques raided their wheat fields and fruit trees. Shepherds from the remaining four villages said that their fields were too far from the forest to be accessible to macaque crop-raiders. All shepherds who mentioned macaque crop-raiding stated that it took place only in June and July, just before the crops were ready for harvesting and when fruit was ripening. Most of these men acknowledge there is little food for the macaques in the forest until mid-August, when the Pyrenean oaks (*Quercus pyrenaica*) begin producing acorns. For instance:

> *The macaques are hungry in summer. They start coming down more often to look for food. When they are really hungry they come right down to the house because we have fruit trees nearby. They stay in the forest for the rest of the year as the acorns will last them for six months because they can find them on the ground after they have fallen from the trees.* Abduleela, 25, Slalem.

Another shepherd interprets the macaques' situation sympathetically:

> *They only come down when there is not enough food in the forest because they never come down when acorns are plentiful.* Mohamed Stitoo, 60, Slalem.

The fields of the five villages where macaque crop-raiding occurs are accessible to the macaques for various reasons. In the cases of Talajamine, Ouled Ben Blal, Tazrout and Remla, villagers cultivate fields on the forest edge or in the forest itself; in Slalem, they cultivate fields close to a forested canyon, which provides a corridor for macaques to access crops. The Barbary macaque in Figure 6.1 was sitting in the potato field to the right of the photograph when I first observed him. This field is only 6 m from the forest and other members of the macaque group were in the vicinity, closer to the forest edge.

Figure 6.1. A male macaque next to a potato field outside Ouled Ben Blal village

Apart from dogs, few deterrents are used to protect the crops from the macaques. Abduleela told me:

> *They are afraid of the dogs and if we didn't have the dogs they [the macaques] would eat everything.*

Macaques can wreak additional destruction on fruit trees and crops that causes more concern to respondents than the crop consumption itself. For instance:

> *They eat a lot and they break my trees. I don't mind them coming to my farm and eating the fruit but I wish they wouldn't break my trees*. Bashir, 30, Tazrout.

Six shepherds from four different villages recounted a similar story of how they deal with macaques they have trapped. They do not kill the trapped animal but appear to punish it for its crop-raiding behaviour:

> *We catch a macaque and sew a hat on its head or put a tin can round its neck with stones in it to make it rattle, so that the other monkeys, when they see him, run off. We let the macaque go and he runs after the others but they run faster than him because they are frightened of him.* Anonymous, 45, Slalem.

The shepherds find it amusing to recount how the macaque runs after its group as the group, in turn, run away from an individual looking unusual or "human". Their apparent amusement at this practice could be an attempt to hide their unease regarding the plight of the solitary macaque always running after its group. This practice is ongoing: in early June, 2010, a shepherd told me that a Talajamine villager had caught a macaque and placed a stone-filled tin around its neck. During the rest of June, Talajamine shepherds frequently told me that they had sighted a solitary macaque, ceasing their reports when the animal presumably rid itself of the tin or died. I was unable to determine if crop-raiding decreased as a result of the attempted deterrent but it is difficult to deter other macaque species from crop-raiding (Priston 2005; Linkie *et al* 2007). For example, bonnet macaques quickly learned to avoid a hunter who was selectively shooting members of their group on visits to raid plantations in South India (Chakravarthy & Thygaraj 2005).

Barbary macaques are the only wildlife species in Bouhachem that people trap and release. I mentioned in the previous chapter that shepherds and their dogs routinely kill the *dib* for predating on livestock. Shepherds report the wild boar (*Sus scrofa*) as the most frequent and damaging crop-raiding species in the area. Wild boars, like primates, are *harām* in Islam (Chapter 5). Villagers regularly report wild boar crop-raiding to the forestry authorities who issue permits for hunters who are enthusiastically assisted in the hunt by villagers. The villagers appear to accord the macaques very different treatment because they told me they do not report macaque crop-raiding to the authorities. Their assertion was corroborated by the authorities' lack of awareness of the macaques as a crop-raiding species in Bouhachem when I mentioned it to them.

Mature men's reluctance to kill the macaques may relate to their recognition of the macaques as family-oriented. This recognition makes the men sympathetic to the macaques explaining that they want to "teach them a lesson" rather than kill them for their incursion into human space. This preference for punishing rather than killing macaques when they are caught is evidence of the dilemma people have in managing the human-animal dichotomy regarding

primates. The shepherds know it is unusual to see a macaque alone in the forest and villagers' attempts to deliberately alienate a macaque from its group may reflect their own fear of social exclusion should they behave in an uninhibited, macaque-like way and thus transgress the strongly held social conventions in their own society. Being estranged from your social group is, to these men, a punishment worse than death itself.

6.2.2. Hunting of Barbary macaques by shepherds in Bouhachem forest

During my interviews with mature men in Bouhachem they sometimes recounted incidents of purposely persecuting and killing macaques for fun when they were younger, and some referred to the continued existence of this practice. For instance Mustafa says "People kill them [the macaques] and they haven't done anything". Mohamed Bouali, a mature shepherd from Almidene, recalled an event in which he had participated some years previously:

> Mr Bouali: *I took the goats up with three other boys and seven dogs. At about midday we got a macaque trapped in a tree with no way to escape. One lad went up to get it. It came down the tree but found the dogs below. We got the macaque off the dogs and played with it for a while. Whilst we did this, the goats disappeared and we went to find them leaving one boy with the macaque. We heard the boy shouting so ran back. He said the macaque had attacked him and he dropped it. However the macaque was unable to escape because we had given it a good beating so we threw it to the dogs.*
>
> Interviewer*: When did that happen?*
>
> Mr Bouali: *Seventeen years ago before I was married and had children. It was the last time – I never did it again.*
>
> Interviewer*: Why?*
>
> Mr Bouali: *Because it was wrong and goes against what is written in the Qur'an.*

Due to the illicit and opportunistic characteristics of these events, I never actually witnessed one and the shepherds doing the hunting never mentioned it to us while they continued the practice. However, in autumn 2010, I interviewed a 27 year old shepherd who admitted that he

had recently killed macaques for fun. Like other shepherds, he makes it clear that the participants know that what they are doing is illegal. He describes what happens when a macaque group is encountered:

> Shepherd: *The young boys starting work as shepherds bother macaques daily even though they know it is against the law. When they see a macaque group they attack it. They aren't always successful but they get about one macaque a month. [Begins to use plural pronouns and past tense] When we saw macaques, we called the dogs together and encouraged them to harass the monkeys. When the macaques were in a tree, we cut the branches to stop them escaping and encouraged the dogs to bark so when the macaque fell the dogs would catch it. When it was a big macaque, the dogs killed it. We would get the small ones off the dogs and play with them then return them to the dogs to finish off.*
>
> Interviewer*: What did the other macaques do?*
>
> Shepherd: *The macaques always began to scream before we did anything, and when we got one they would move away from the scene but keep screaming. If they saw a dead one, they would form a group and move away from the site. They would scream for about 20 minutes.*

I was doubtful that the macaques would "fall" out of the tree without some sort of assistance and indeed an older man revealed that:

> *If the macaques went into the tree and stayed there, we surrounded the tree and pelted the macaques really hard with rocks.*

In this scenario, the macaques fall to the ground, incapacitated by the youths' rock pelting and are then extremely vulnerable to attack from the waiting dogs. The event is a negative cross-species encounter where dogs are pitted against adult macaques. Youths deliberately remove the smaller macaques from the dogs and, according to the shepherd above, he and other youths would:

Shake them [the macaques], break their limbs and try to make them talk and after they became unconscious we returned them to the dogs.

I asked the shepherd if he thought the macaques felt the loss of a group member. His answer was emphatic:

Absolutely, they feel the loss absolutely - like people do - you know? When we get older we don't give any importance to hunting the macaques. You aren't going to get anything if you attack one. Men don't take any notice of macaques. When we grow up we have more feelings.

In this statement, the shepherd acknowledges the similarity in the sociality of macaques and people and recognises the loss that death brings to both. His remark that sensitive feelings come with maturity accords with Mr Bouali's statement that when he got married and had a family he stopped hunting the macaques. Young shepherds must assure adequate nutrition for the goats which represent their families or villages' accumulated wealth. However, this means they must spend long periods of time in the wild space of the forest which may serve to make them liminal in villagers' perceptions. In the forest, they are free of the social restrictions and boundaries that inhibit their village life, and establish the difference between themselves and the animal kingdom. Aided by their dogs, they torture and kill another liminal being, the Barbary macaque, despite observing that the remaining macaques "feel" the loss of group members.

One boy of six years old told me he hated seeing the macaques killed but the older boys forced him to go with them, making him complicit in the activity. One shepherd corroborated this when he said:

Shepherds learn this behaviour from one generation to the other. *The older ones stop but they have already taught the habit to the younger ones who then continue doing it.*
Ahmed Chitwan, 27, Talajamine.

Some mature shepherds seem to find the practice inexplicable because of the macaques' resemblance to people and one stated:

I couldn't bother them but there are people who bother them. Why do they bother them, the poor things? They are like us. Ahmed Sbach, 80, El Marzha.

I suggest that the point when a shepherd stops participating in the practice of macaque predation is related to his marital status. Shepherding is perceived as a low status job in the study villages. Boys begin work as full-time shepherds at 8 - 14 years, often leaving school prematurely, because they are perceived by their parents to be more useful tending goats. This de-schooling (see Chapter 3) is common amongst shepherds in Bouhachem and explains why so many men of all ages were reluctant to draw their own maps of macaque group locations (Chapter 4). Full-time shepherding continues until a man prepares to marry at around the age of 25 – 30 years. After he is married, he is "promoted" to working the land and caring for his family, with only occasional shifts as a shepherd. He may return to shepherding when he is over 50 years old if his children have migrated out of the area and he has no grandsons to do the job (see Chapter 3). Many young men express discontent with their lives as shepherds, but admit that they have no opportunity to train for alternative employment because many of them are illiterate due to the premature curtailment of their education. Bilal is one such young man. He says:

I can't do anything else. I am not happy, I do it [shepherding] with an effort. I am always in the forest and I don't see anybody except the other shepherds.

Bilal also alludes to his low status within the family, with his father and elder, married brothers deciding when he undertakes his shepherding duties.

Interviewer: *How many times a week do you bring the goats into the forest?*

Bilal: *Almost every day as they only give me a rest day for two days every two months*.

Interviewer: *Who are they*?

Bilal: *My father and my elder brothers.*

This study endorses others which state that although many wildlife species are protected from any type of hunting by laws, such laws are not always sufficient to ensure

species protection (Jachmann & Billiouw 1997; Gore *et al* 2008; Keane *et al* 2008). It is hard to ascertain if young shepherds have always hunted and killed the macaques or if it is a practice acquired during the Spanish occupation when the macaque drives I describe in Chapter 4 were commonplace and motivated by commercial gain. Illegal activities tend to be under-reported for fear of reprisals from authorities, although this may be less of an issue if law enforcement is low (Torangeau & Yam 2007; Razafimanahaka *et al* 2012), as is the case in Bouhachem. Illegal killing of wildlife is a difficult topic for direct study due to its illicit nature, and it is problematic to obtain accurate quantitative data on the numbers of animals killed illegally (Cross *et al* 2013; Newing & St. John 2013). I was unable to determine how many macaques were actually killed by shepherds annually because of the illicit nature of the practice and conflicting reports from shepherds. Bilal estimated about one macaque per month whereas another shepherd from the same village said that by the time the boys had finished, the ground would be littered with dead macaques. The reality may lie somewhere in between but even low intensity hunting pressure can be enough to negatively affect primate densities (Marshall *et al* 2006).

Perhaps more important than ascertaining the extent of illegal hunting accurately is an understanding of why people decide to take part in illegal activity to find appropriate ways to discourage it (Keane *et al* 2008). Interpreting the motivation behind behaviours that are negative to conservation aims is particularly relevant when wildlife is hunted and killed for purposes other than subsistence needs. For instance, hunters who caused deliberate suffering to wolves (*C. lupus*) before killing them during the species eradication programme in the United States may have been punishing individual animals for their perceived defiance in breaching people's metaphorical boundaries by killing their livestock (Emel 1998). Macaque hunting in Bouhachem could be interpreted as similar to ritual male initiation ceremonies conducted in many societies, generally involving the killing of a wild animal - more usually a carnivore (Emel 1998; Goldman *et al* 2010). Such ritual killings are believed by the Maasai in East Africa to deter lion (*Felis leo*) predation of their livestock but they also serve as important manhood rituals where young men prove they are able to protect their community (Goldman *et al* 2013). Such animal practices are very powerful as a basis for creating difference, and can serve as a defining moment in the social construction of the human-animal divide (Elder *et al* 1998).

The younger shepherds' need to create this division may result from their ambiguous position in village society. Like their accomplices, the livestock-guarding dogs, they straddle boundaries, inhabiting the borderlands between wild and human space, while socially they are

considered neither adults nor children but somewhere in between. Conversely, mature men, with their position in village society secured, do not feel any desire to persecute the macaques but despite criticising the practice in private conversations with me, they did not openly condemn the boys for macaque hunting.

The evident difference in shepherd behaviour is social in nature, related to the status he attains by his marriage. Marriage and family life place married men irrevocably in the human space of the village with all the social interactions and recognition of kin relationships and responsibilities that involves. This change in a shepherd's status makes macaque killing unacceptable. Apart from the mortalities caused by deliberate killings, the shepherds' encouragement of the dogs to hunt macaques has serious ramifications for conservation. The dogs are accustomed to harass the macaques without the presence of shepherds. This harassment is accepted amongst all shepherds so they do not curtail their dogs' behaviour.

6.2.3. Dog harassment and predation of Barbary macaques

I recorded a total of 30 events of dog harassment on 11 macaque groups between November 2009 and December 2010. The highest rates of occurrence (N = 17) occurred during the months of April and May when I witnessed attacks on 15 of 35 observation days. In general, morning attacks lasted from seven minutes to two hours and 15 minutes, with a mean length of 42 minutes (N = 9). Late afternoon attacks were much shorter and lasted 8 - 27 minutes with a mean of 15 minutes (N=21). The mean number of dogs observed to take part in attacks was four, with a range of 1 - 18. The dogs were accompanying shepherds and herds on the majority of occasions (59 %), with 19 % of attacks by unaccompanied dogs and 19 % by dogs accompanying mushroom collectors. It was unclear whether dogs in the remaining 3 % of attacks were accompanied or not, but I did not detect any human in the vicinity. The largest pack of 18 dogs was unaccompanied. The longer morning attacks may have energy costs for the macaques as the dogs' presence impedes the macaques' terrestrial foraging. This is a subject worthy of further investigation.

As well as the dog attacks on adult macaques I describe in Chapter 5 and above, I observed three infant macaque mortalities caused by dogs between mid-April and mid-May 2010. I found two male infant bodies intact (one of which is shown in Figure 6.2), but only an infant macaque's head in the third incident.

Figure 6.2. A Barbary macaque aged 8-10 months killed by dogs in Bouhachem forest

One dog carried an infant's body in his mouth for 12 minutes before dropping it and returning to his herd. The accompanying shepherd was unaware that one of his dogs had killed an infant macaque. When I showed a dead infant to two groups of shepherds, four teenage boys were impassive, whilst two mature shepherds expressed sadness and blamed the *dib*. When I told them what had happened one of these shepherds said: "If this happens then the shepherds must shout at their dogs". This may not be easy as the mean number of dogs accompanying a small herd of ~50 goats is seven. The range is 1 – 16 dogs, the latter accompanying the Talajamine village's herd of around 300 goats. This herd is generally accompanied by 8 – 10 shepherds. Shepherds are aware that the dogs are harassing the macaques. For example:

Anonymous: *The dogs bother them a lot. The dogs hold them at bay.*

Interviewer: *When does that happen?*

Anonymous: *It always happens, every day.*

Some shepherds complained that their dogs were too easily distracted by the macaques and preferred harassing them to protecting the herd.

The dogs go after macaques and they can waste a lot of time bothering them. Even when a dog is looking after the goats, he hears the other dogs barking at the macaques and he rushes off to join in. Bilal, 27, El Marzha.

A typical response from a shepherd when asked about his dogs' behaviour was:

Interviewer: *What do you do when the macaques are in the tree with the dogs below?*

Mohamed Bouali*: There is nothing we can do. It's normal that the dogs bother the macaques.*

One mature man had a different view:

*The dogs like playing with the macaques but the worse thing is when the shepherds encourage the dogs to do this. The dogs don't have any responsibility; it is people who are responsible for these attacks as they do not try to control the dogs. (*Anonymous).

Researchers working on wildlife predation by dogs in Chile suggest that dog interactions with wildlife are related to the dog's role in the household (Sepulveda *et al* 2014). The feral dogs I identify in Chapter 5 are livestock-guarding dogs who accompany the goats with or without their owners whilst other village dogs rarely if ever enter the forest. I suggest that, in Bouhachem, a dog's macaque predation behaviour depends on its role, as livestock guarding dogs are accustomed to entering the forest and to pursuing macaques whilst other village dogs are not. I intend to test this hypothesis in further research on the role of dogs in wildlife predation in Bouhachem. Dog predation may have the potential to affect Barbary macaque infant survivorship in Bouhachem substantially. It is also an important factor in Barbary macaque conservation elsewhere as the domestic dog has been cited as a frequent predator of Barbary macaques in the Middle Atlas. There, scientists recorded dogs snatching infants from adult male macaques on six occasions (Camperio-Ciani & Mouna 2006).

The macaques' immediate flight response in reaction to sighting either people on foot or their dogs is likely due to the harassment and persecution from both which I describe in this chapter. Primates and dogs have potentially negative relationships elsewhere. For instance, in Uganda, people use dogs to harass and chase chimpanzees (*Pan troglodytes*) away from crop

fields. This strategy leads to tense mixed species encounters between unaccompanied dogs and chimpanzees outside the context of crop-raiding (McLennan 2010) and increasing spatial overlap between domestic dogs and chimpanzees (*P.t. verus*) in Guinea Bissau make physical interactions resulting in injury more likely (Hockings *et al* 2012). My observations of Barbary macaque groups through the year in Bouhachem leads me to speculate that they modify their behaviour and use of habitat in reaction to shepherd and dog movements as predator avoidance is a key driver of primate behaviour elsewhere (Coleman & Hill 2014). This possible predator avoidance behaviour by the macaques is worthy of future investigation.

6.3. Conclusions

Men punish but do not kill Barbary macaques for breaching the boundary between the wild space of the forest and the human space of agricultural land. I suggest that the absence of lethal retaliation by men towards crop-raiding Barbary macaques in Bouhachem means conflict over subsistence resources is not a serious threat to the Barbary macaque population in Bouhachem. Elsewhere, subsistence farmers tolerate crop-raiding incursions by wild macaques if there are no underlying human-human conflict issues (Sha *et al* 2009; Riley & Priston 2010; Nijman & Nekaris 2013). This study provides another position on the continuum of tolerance-intolerance of crop-raiding macaques where farmers catch and punish Barbary macaques, apparently in the belief or hope that the "marked" macaque will act as a negative example to other members of its group and deter them from future crop-raiding. The men's behaviour also suggests that they believe the macaques are able to learn so should be given the opportunity not to transgress further. This behaviour concurs with the some of the shepherds' statements regarding the macaques' similarities with people which I describe in the previous chapter.

This study also endorses other scholars' assertions that people's attitudes towards wildlife and its conservation are not always consonant with their behaviour, (Waylen *et al* 2009; St John *et al* 2010; Heberlein 2012; Delibes 2013). The situation in the forest is very different as the wild-domestic continuum collides resulting in negative consequences for the Barbary macaque when shepherds and dogs cross the boundary from human to wild space. The forest becomes a physical borderland as boundaries shift according to the time of day and season. In this study, the complex and mutable nature of the shepherds' relationship with the macaques is revealed in the self-reported actions of younger shepherds with their killing of macaques possibly alleviating tensions caused by their low social status in the villages. The hunting is

driven by preference rather than material need. In the forest or wild space, Barbary macaques become, to use Donna Haraway's word, "killable" (Haraway 2008) by young shepherds aided by their dogs which continue the harassment and killing of macaques without the need for human encouragement. There is evidence that not all shepherds condone macaque hunting although many admit to having participated in it when younger. Thus a shepherd's social status and his behaviour toward the macaques appear to change with marriage and maturity. In the next chapter, I speculate that the change brought about when a shepherd marries might be positively accelerated for the benefit of younger shepherds and Barbary macaque conservation.

Chapter 7 – Choosing to conserve: social factors influencing pro-conservation behaviour change among Bouhachem shepherds

7.1. Introduction

Hames (1991) succinctly points out that conservation is "a matter of performance not intent" (p.76) and suggests that a culture of conservation requires two social mechanisms. These social mechanisms constitute adherence to the conservation behaviour by the practising group, and the group's protection of the resource from outsiders (Hames 1991). Nolan has added to these criteria by suggesting that creating a culture of conservation requires people to be as willing to impose social sanctions overtly by using confrontation and disapproval for negative conservation behaviour within their society as they are to express approval for positive conservation behaviour (Nolan 2013).

Inducing pro-conservation changes in people's behaviour is one of the most important challenges facing conservationist practitioners today (Gore *et al* 2008; St John *et al* 2010; Schultz 2011; Keane *et al* 2012; Verissimo 2013). Conventional interventions such as conservation education programmes are not automatically effective in changing behaviour. For instance, raising awareness of conservation amongst hunters in Trinidad resulted in them exhibiting a positive change in attitude toward the species of interest, but this was not matched with a corresponding decrease in hunting behaviour (Waylen *et al* 2010). Chilean fishermen positively value seabirds as indicators of good fishing grounds but the men still hunt the birds for use as bait and collect their eggs (Suazo *et al* 2013). These examples demonstrate the frequent, but often unacknowledged, mismatch between attitudes, beliefs and conservation behaviours (Waylen *et al* 2009).

The social and psychological factors involved in people's orientations towards conservation are often overlooked (Marchini & Macdonald 2012). For example, illegal hunting can be curbed by increased regulation or economic incentives but, if the underlying behavioural norms regarding the behaviour remain unchanged, people may return to hunting when regulations are no longer enforced or incentives end (Pretty 2003). Schultz (2011) suggests that conservation efforts to alter perceptions and practices may be more effective if they target behaviours in which only a small proportion of the population is engaged.

In my study area, people do not kill the Barbary macaque (*Macaca sylvanus*) for subsistence or habitually capture it for the wildlife trade. However, as described in detail in the previous chapter, macaques are hunted and killed by a relatively small group of young, unmarried shepherds aged 19 – 27 years whose practices differ according to age and marital status. These variables make the Barbary macaque a good candidate for the fostering of a culture of conservation among younger shepherds. In this chapter I describe how shepherds changed their group norm from macaque persecution to macaque conservation. I begin by reviewing the existing evidence for factors that influence pro-conservation behaviour change. These factors are: sharing knowledge about local wildlife, the participation of conservationists in community life and the influence of key individuals in changing peer group norms. I also briefly review the potential for negative social influences to affect people closely associated with a conservation project. I continue by discussing how knowledge of local cultural and social factors influenced my strategy of continued positive engagement and extended knowledge sharing with shepherds. I then present ethnographic data from opportunistic encounters with shepherds that occurred from June to November 2010, after I had conducted interviews with these men for the Barbary macaque survey (Chapter 4). The data demonstrate how shepherds began to reflect on their relationship with the conservation team and the macaques, resulting in a cessation of macaque hunting. In support of the enduring nature of this change in shepherds' behaviour towards the macaques, I include data from encounters with shepherds in April and May 2011 and a video taken by a shepherd on his mobile telephone in 2011. I suggest that our sustained positive engagement with shepherds from five villages instigated a change in their group culture from macaque hunting to macaque conservation, meeting both Hames' (1991) and Nolan's (2013) criteria. Finally, in an attempt to reflect on the potentially negative effects caused by my team, I illustrate how we, inadvertently, affected the social cohesion of shepherd groups and of village life. This study contributes to understanding how incoming conservation actors can generate positive changes towards conservation by exhibiting cultural sensitivity, and maintaining constructive relationships with members of the society in which they are working.

7.2. Factors influencing positive conservation behaviour change

Proximity to wildlife may increase the likelihood of pro-conservation behaviour. For example, living close to koala (*Phasclarctos cinerus*) habitat in Australia positively influenced people's willingness to participate in conservation management for the species (Shumway *et al* 2014). Similarly, improving local people's knowledge about saiga (*Saiga tartarica*) encouraged

behaviour change and positive opinions toward the species (Howe *et al* 2011). However, proximity may also impede the development of pro-conservation behaviour as subsistence communities sometimes assume that the species they share space with, and encounter often, are common and widespread (Abd Mutalib *et al* 2013). For example, people living close to Sclater's guenon (*Cercopithecus sclateri*) habitat in Nigeria expressed surprise and pride on discovering that this primate species was unique to their area (Baker *et al* 2009).

The informal contact encouraged by conservation actors' participation in community life has been shown to build trust with local people and encourage their more positive attitudes to conservation initiatives in Tanzania (Newmark *et al* 1993). Despite the potential benefits of such inclusion, conservation actors may be inclined to isolate themselves from local communities because they originate from outside the area, have very different educational or ethnic backgrounds and feel little inclination to engage meaningfully with local people to explain their work (Fairet 2012). Conservation actors who participate in community life may facilitate understanding of their perspectives and goals among local people which assists the development of appropriate programmes when pro-conservation behaviour change is the goal.

Social relationships between conservation actors and local people are rarely discussed in relation to conservation outcomes but may be crucial to conservation success (Wadley *et al* 2010). Positive social processes proved important in the emergence of waterfowl conservation amongst Yup'ik hunters where good relations between wildlife managers and users influenced pro-conservation behaviour (Zavaleta 1999). However, the positive or negative role and influence of individuals in conservation scenarios has rarely been examined unless they occupy powerful positions (Wadley *et al* 2010; Young *et al* 2010; Saunders 2011). For example, a decision taken by a high-ranking official in the Zanzibar Department of Commercial Crops, Fruits and Forestry resulted in unfair distribution of compensation amongst farmers for the endemic Zanzibar colobus' (*Procolobus kirkii*) crop-raiding activities, causing resentment towards the ecotourism initiative developed to improve the species' conservation prospects (Saunders 2011). Some individuals in communities may inspire respect among their peer group and be able to influence that group's behaviour. The influence of key individuals is supported by the finding that the uptake of a turtle-excluding device by fishers in one area was higher than in other parts of its distribution. This higher uptake was strongly influenced by the fishers' acquaintance with the designer, a fellow fisher and member of their peer group (Jenkins 2010). Similarly, identifying key individuals in Pantanal ranching communities of Brazil to condemn the

socially acceptable practice of jaguar (*Panthera onca*) killing has been recommended by scholars in lieu of ineffective legal sanctions and economic incentives to stem locally important cultural and social behaviour (Marchini & Macdonald 2012). Such individuals may have key roles in the process of changing a prevailing group norm. This role merits further examination as certain individuals can exert powerful influences on a project's success, because their opinions are important to other peer group members and possibly to individuals in wider village society.

Identifying influential individuals can be challenging, particularly when the focal species is stigmatised by local communities or where killing the focal species has strong connections with cultural identity (Richards 2000; Marchini & Macdonald 2012). Gaining local support for the conservation of a species that is the subject of derision and where its proponents are mocked for their interests is also a challenge. Mockery, embarrassment and gossip are powerful instruments in controlling people's behaviour and inhibiting individualism and entrepreneurialism in conservative societies (Russell & Harshbarger 2003). These strong social controls may have negative effects on attempts by outside agencies to work with specific communities. The presence of foreign researchers can inspire curiosity, fear and interest at all levels of local society (McLennan & Hill 2013). Many individuals working in the field of primate conservation fail to reflect on the, sometimes considerable, effect their presence may have on the social and political processes in local communities (Lee 2011; McLennan & Hill 2013). Conservation actors frequently employ local counterparts as field assistants as this is generally viewed as a way to benefit communities, but it can have mixed consequences for the employee (McLennan & Hill 2013). For example, local field assistants employed by a foreign scientist studying chimpanzees (*Pan troglodytes schweinfurthii*) in Uganda became subjects of jealous gossip and rumour amongst local villagers, who also assumed the assistants were paid large salaries (McLennan & Hill 2013).

7.3. Changing behaviour

Like Wadley *et al* (2010), I believe that positive social relationships between conservation actors and local people can have significant influence on conservation outcomes, particularly if such outcomes rely on encouraging substantial behaviour change within small, local groups. As a conservation actor and an outsider to the community in which I work, I faced a dilemma over how, or even whether, I should actively try to change the behaviour of shepherds who were capturing and killing Barbary macaques. When attempting to prevent the

killing of endangered species to ensure their future survival, conservation actors often neglect social and cultural issues, preferring to depend on economic incentives coupled with legal mechanisms to prevent illegal killing of wildlife (Holmes 2007; Marchini & Macdonald 2012). The imposition of restrictive conservation regulations often generates conflicts between local communities and conservation actors (Bell *et al* 2008; Saunders 2011; Fairet 2012). My seeking assistance or support from formal institutions, given the local communities strained relationships with them (Chapter 3), would have risked compromising my team's independence as a non-governmental organisation (NGO) and caused me to be viewed by villagers as a "spy". I considered that jeopardising our positive and close relationship with the shepherds was not in the long-term interests of our conservation project. My final concern centred on my speculation that the youths' behaviour functions symbolically to construct a divide between two liminal beings - the youths and the macaques - and could have important meaning for the youths as they pass from boyhood to adulthood (Chapter 6). If hunting is associated with social and cultural identity then badly informed action taken to enforce behaviour change amongst key groups may cause undesirable behaviour to escalate (Hoon Song 2000; Goldman *et al* 2013).

7.3.1. Continued engagement

An important factor in my reflection on how to proceed was the change in hunting behaviour related to a shepherd's age and social status with men ceasing to hunt macaques on their marriage and subsequent entry into adult society (Chapter 6). Such behavioural flexibility might mean I could facilitate behaviour change favourable to Barbary macaque conservation in younger shepherds by continuing constructive, genuine and frequent engagement with shepherds in the forest and on visits to their villages.

A positive sign that shepherds were reacting favourably to our presence and their inclusion in my research came in April 2010, when one of our neighbours told me that the boys of Lahcene (where we live) had stopped killing macaques "Because you are their friends and it [macaque hunting] is wrong". I can place other changes and self-reports of behaviour change in some individuals relative to their participation in the Barbary macaque survey (Chapter 4). For instance, visitors to Bouhachem ask shepherds to obtain infant macaques for them, and shepherds are evidently aware that infant macaques have an economic value due to the Spanish practice of capturing macaques during the occupation (described by elderly informants in Chapter 4). Such an incident happened in July 2010, and is also the first instance of a

shepherd using the phrase “our macaques” to me. Mr Rachmon, an elderly shepherd from Almidene who we encountered frequently, recounted how a Moroccan visitor to Bouhachem offered him 100 dirham (roughly £7) to trap an infant macaque, which Mr Rachmon refused. Mr Rachmon expressed his disgust to us that the man thought he could buy one of “our” macaques so cheaply and take it to live in the city when “They [the macaques] belong here in the forest with us”. This sentiment was reiterated by Lahcene villagers a few weeks later in August 2010, when four different men reported an incident of an infant macaque being exploited for tourism above Lahcene village. One man told Ahmed “A man from outside Bouhachem has one of our macaques”. The shepherd’s words imply that some men were beginning to feel protective of the macaques. Ahmed went to the location the callers specified and found a man with an infant macaque that he was using to collect money from visitors to the area. The man willingly gave the infant to Ahmed, along with information about where he had found it. Ahmed then returned the infant to its wild group.

In our consecutive encounters, some shepherds began to reveal their intrinsic interest in the macaques and my and Ahmed’s presence made it socially acceptable to discuss the animals without fear of being mocked or shamed and without them ridiculing or mocking the macaques and each other as occurred previously. Shepherds were also changing their behaviour. In October 2010, a shepherd from the village of Slalem told me that due to our regular visits, boys in his village no longer persecuted the macaques:

> *There are many people who have become more educated and don’t go torturing or killing the macaques. They don’t bother them anymore because they see you a lot. Before you came, they used to kill a lot of macaques with their dogs. They have changed and talk a lot about the macaque people who come to visit them in the forest. Last year I know more than six macaques were killed by boys and their dogs and now they [the boys] feel very sorry that they did that. The animals don’t do anything and it’s not right to torture them.*

As I reported in the previous chapter, some shepherds provided retrospective reports of their involvement in macaque hunting spontaneously during our encounters in 2011. For example, in May 2011 a group of six El Marzha shepherds, without prompting from me, began discussing how they used to kill many macaques. One told me that it was such a popular pastime that:

We would leave the goats to start the journey home on their own and we would go to hunt the macaques with the dogs.

I asked them why they had stopped and another shepherd explained how his engagement with us directly inspired his decision to stop hunting the macaques:

After always talking about the macaques to you and telling you what we know [about the macaques], we started to believe that it was wrong to kill them and now we don't kill any – we leave them in peace.

The rapidity with which the shepherds ceased to hunt the macaques strengthens the likelihood that our engagement with the men contributed to this change. Other scholars have noted that being listened to and treated with respect is a priority for many participants in research projects (Eggerman & Panter-Brick 2011) and it was very important to both Ahmed and me to ensure that our encounters with shepherds were always affirmative. These good relations provided the basis for the shepherds' voluntary cessation of macaque hunting.

7.3.2. Knowledge-sharing

Sharing knowledge also played an important part in changing the perceptions of some shepherds. During our encounters, the shepherds would enquire about our work, which gave me the opportunity to talk about the macaques and their importance, especially to explain that they are found only in Morocco and Algeria, and are Endangered. I also shared information on the macaques' social behaviour, using examples such as infant caring and male vigilance. These characteristics of macaque behaviour are observed and viewed positively by many shepherds, as I describe in Chapter 5. I also described the macaques' ecological role, which directly benefits the forest and thus the goats grazing there.

The Barbary macaques' comparative scarcity seemed to alter some men's perceptions of the species. My strategy of information-sharing inspired increasing interest in the macaques among some shepherds who took advantage of their proximity to the animals to observe them more closely, as acknowledged by Abduleela in November 2010:

Abduleela: *My knowledge of the monkeys has improved a lot since I met you.*

Interviewer: *Why?*

Abduleela: *When I see them [the macaques] I look at them more closely, I've been doing that since the day when you first came to the village and asked me what I knew about the macaques. If I see anything strange I call you. It's good to talk to you because you are interested in the macaques too.*

Interviewer: *Do you talk to people about our work?*

Abduleela: *Yes, I tell them that these people check the macaques and are concerned about this animal.*

Abdulhafed, from El Marzha, acknowledged our inclusion of the shepherds' knowledge of the macaques in the survey presented in Chapter 4 and our shared information about the macaques' role in the forest in November 2010 by saying:

This animal was without help but now rescue has come and it is being helped and now all the people see and respect the work. Before, the macaques had no importance. Generally shepherds are now saying that there are people from far away who work with us in the forest and who are here to study the macaques and so we treat the macaques with care.

Ahmed Chitwan alludes to his positive feelings about our mutual sharing of Barbary macaque information during an encounter with us in October 2010. In his words:

A. Chitwan: *There are many people now who think this work is very good. For me this is a good change and I hope it will develop if God wills.*

Interviewer: *How have things changed?*

A. Chitwan: *Before you came, we didn't realise how much we knew about the macaques and now we know that they too have their job in the forest and that [knowledge] is important and in the interests of everyone, people and animals.*

7.3.3. Influence of key individuals

Ahmed's role as my research assistant and translator during the data collection period was fundamental in encouraging and maintaining the shepherds' support for and participation in the conservation project. As well as working under my guidance during interviews, he was able to ensure that the shepherds felt at ease and relaxed in our presence. Our relationship was one of reciprocal trust and we were able to inspire the same in the shepherds. Ahmed is from Tétouan but, due to his excellent social skills and relaxed manner, he does not patronise the shepherds or villagers: although such an attitude often characterises the relationship between villagers and urban inhabitants, as I describe in Chapter 3. Ahmed's presence and work as a translator minimised the possibility of miscommunication or cultural misunderstandings between me and the shepherds. Strong interpersonal relationships are a fundamental part of local culture and these relationships become even more pronounced in the remote areas of Bouhachem where shepherds graze their goats. We probably provided a distraction from daily life for these men and they always greeted us cheerfully and inquired after our wellbeing.

Some individual shepherds began to take a lead in making macaque hunting socially unacceptable. For example, when Abduleela encountered a group of boys persecuting macaques, he intervened and expressed his disapproval. He told us:

> *I found a group of shepherd boys who had caught an infant and were playing with it. I was angry with them as I know these macaques are special now and we must all look after them not hurt them. I took the baby off them and told them they should be ashamed. Its mother came back and called for it so I put it in a tree and moved away and as I moved away its mother came and got it.*

A shepherd from Almidene also applied social enforcement, using shame to dissuade boys from hunting macaques but also telling me why he believes they do it:

> *When I see the little ones who want to play with the macaques without reason I stop them and say you mustn't bother them – why do you do it? This game will give you nothing and you don't have any reason to bother the macaques. Let them live as you are living. Do you like it if someone hits you without reason? These boys are living in the*

mountains and they haven't studied well and they don't have the information or knowledge.

A shepherd from Tazrout expressed the view that shepherds need to share their information with peer group members and explain why torturing and killing the macaques is unacceptable. He told me:

I pass my knowledge to other shepherds and tell them it isn't good or right [to attack the macaques]. If one shepherd is informed then he should tell the other shepherds to stop attacking the macaques so they don't disappear from the forest.

Talajamine shepherd Ahmed Chitwan now demonstrates his interest in the macaques in public, rather than keeping it secret for fear of being shamed or mocked. In July 2011, he used his mobile phone to make a video of his rescue of an infant macaque that had been left on the forest floor by its group in their flight response to a sudden attack by dogs. Ahmed Chitwan passed the video to Ahmed and we transcribed it. In this dialogue with other shepherds, Mr Chitwan expresses various emotions toward the infant, both physically, by allowing it to cling to his leg and by patting its head, and verbally, as he tries to reassure the infant and to communicate his empathy toward it as another sentient being. He also expresses extreme disapproval of a mature shepherd by shaming him for his suggestion that they try to sell the infant:

Ahmed Chitwan: *Look how he cries for his mother. Look at him, he is like a human baby! Don't be afraid we'll take you to your mother. There, there [pats the infant's head].*

Mature shepherd: *They sell these macaques at a good price. We can take it to the road and see if someone wants to buy it. In Jemaa-el-Fnaa [square] in Marrakech they have small monkeys which they use for entertainment. Foreigners come to Marrakech to see that.*

Ahmed Chitwan: *Are you going to sell one of our macaques – to make money? Shame on you! That's not right. Are you going to take money to ruin his life? He is going back to his mother and not to Marrakech.*

Ahmed Chitwan then placed the infant in a tree and the shepherds left.

Not all shepherds felt that social pressure from their peer group was sufficient to stop people from hunting macaques. For instance, one shepherd, Bilal, stopped hunting macaques of his own volition but believes that other shepherds will not stop without an authority figure telling them to do so. He is also sceptical of the power of education to change macaque hunting behaviour and he felt that we, the conservation team, should play a more obvious role in stopping the practice. He explained:

> *When an attack happens it's necessary for someone to tell them [the boys] to stop because it is prohibited to hit the macaques and for the dogs to bark at them. Education is good but it won't stop these boys. You speak to the people and tell them that it is illegal to attack the macaques. A person must guard the macaques who can then speak to the boys if he sees an attack.*

Bilal also understands that his and other shepherds' dogs have a harmful effect on the macaques. In the same interview he told me:

> *Now the boys have stopped [killing the macaques] but the dogs still go after them. We must prohibit the dogs from coming into the forest and train others [dogs] so they don't chase the macaques. We must stop the usual dogs from coming into the forest so only trained dogs can go up and help protect the goats from the dib.*

Bilal had already begun to limit the number of dogs which he allowed to accompany his goats into the forest. In October 2010, both he and Abdulhafed told me that they take fewer dogs because "It is easier to control two or three to stop them bothering the macaques". My observations suggested that this was true: I had previously counted 5 - 9 dogs accompanying these men and their goats. I observed the same shepherds three times in November 2010 and seven times between April and May 2011, and on all of these occasions they had four or fewer dogs accompanying their herds.

I suggest that the shepherds have fulfilled the three criteria that Hames (1991) and Nolan (2013) state are necessary for a culture of conservation. The shepherds are practising the first of Hames' criterion of restraint by initiating, and adhering to, a self-imposed ban on hunting

the macaques. Hames' second criterion is met because shepherds are protecting the macaques, by refusing to sell macaque infants to outsiders despite being offered such opportunities. These changes are voluntary and there is no threat of punishment for those who do not comply, although they may attract verbal or social sanctions from other peer group members fulfilling Nolan's (2013) criterion requiring people to impose social sanctions overtly using confrontation and disapproval.

Individuals who view themselves as being connected with nature are more likely to exhibit conservation behaviour (Schultz 2001). The social sanctions are employed by a small minority of individuals who have an intrinsic interest in their environment and, in engaging with us, have found a legitimate way to express that interest. Such individuals played an indispensable role in changing peer group behaviour because people look at others' behaviour for cues on how to react to new situations in accordance with the social norm (Schultz 2011). These individuals were motivated to provide this new norm. Identifying such individuals (if they do not identify themselves as they did in this study) must be a first priority in a programme of pro-conservation behaviour change. Our positive partnership with these men highlights the importance of personal relationships and trust in maintaining effective communication and connections. In this study, individual shepherds acted as conduits of information about us and the macaques using informal communication networks amongst peer group members in the same age cohort. They also became role models and guides to younger peer group members stimulating changes in younger boys' behaviour and norms. In general, the reports of behaviour changes some months after the onset of the LEK survey (Chapter 4) suggest that our continued engagement fostered a situation where shepherds felt secure enough to discuss their recent hunting behaviour without fear of repercussions thus endorsing Waylen *et al's* (2010) suggestion that positive conservation outcomes are more likely within a supportive cultural context and conservation actors' genuine engagement with that context.

I infer from the reluctance of other shepherds to admit to or discuss their past macaque hunting behaviour that their own religious and moral code meant that they were aware that the suffering they inflicted on the macaques was wrong. However, in the forest, away from the social controls of village life, religious tenets are easily forgotten and social group norms prevail. Despite the consumption of primates being *harām* (forbidden) in Islam, killing them is not prohibited. For example, Muslim hunters in Nigeria shoot primates for sale for consumption by other ethnic groups (Nyanganji *et al* 2010) and a small percentage (3 %) of Muslim survey

respondents in Kalimantan villages stated that they had killed orang-utans (*Pongo* sp.) as recreation or for sport (Davis *et al* 2013). However, killing an animal for purposes other than consumption or defence is specifically forbidden in the Qur'an (Foltz 2006). Religious and moral implications may have encouraged the respected, older shepherds to guide the younger boys and to express their disapproval of macaque persecution activities when they deemed it necessary. In a study at two different sites in south-eastern Nigeria, researchers found that, although most people no longer practised animism, having converted to Christianity, adherence to taboos preventing the killing of Sclater's monkey (*Cercopithecus sclateri*) was influenced by people's fear of supernatural retribution at one site and social disapproval by their community at the other (Baker *et al* 2014). In the same study in Nigeria, Baker *et al* (2014) found that Christians who attended church on a regular basis were more likely to consider monkeys unimportant. However 90 % of respondents at both sites agreed that killing monkeys was unacceptable (Baker *et al* 2014). These findings suggest that religious tenets and social disapproval are both important factors in people's attitudes to killing primates. Both were important factors in the Bouhachem shepherds' voluntary cessation of Barbary macaque killing. However, this change was greatly influenced by our regular encounters with the shepherds and the discussions that ensued. Such encounters gave these shepherds a new perspective on the macaques, increased their status in their villages and empowered them within their peer group. Religious tenets and social disapproval were then enlisted by key individual shepherds to persuade their peers to stop killing macaques. A similar reaction has been noted elsewhere, when farming behaviours favourable to conservation, such as setting aside land for wildlife, become symbols of status and prestige in tightknit rural groups, farmers feel more incentive to participate (de Snoo *et al* 2013). Conversely, scholars have suggested that lack of status or prestige attached to an agri-environmental schemes may explain European farmers' reluctance to join (Burton *et al* 2008).

7.4. Negative consequences of the conservation team's presence

We inadvertently inspired negative interactions and I discuss two of which I am aware in this section. I describe in the previous chapter how I showed some shepherds the body of an infant macaque that had been killed by a dog to ascertain their reactions. One group of shepherds who saw the body consisted of key individual Ahmed Chitwan and a large number of Talajamine shepherds. They asked to whom the dog belonged and Ahmed (El Harrad) told them before I could ask him not to (to protect the owner). When we passed these shepherds' habitual

resting place a few hours later, I noted the Talajamine shepherds were not sitting with the shepherd who owned the dog responsible for the infant's death. This shepherd was completely unaware of what his dog had done. Ahmed Chitwan told me a few days later that they had not wanted to socialise with the shepherd because his dog had killed the infant macaque. Although this social sanction demonstrated how strongly the shepherds felt about the infant's death, the circumstances were unfortunate. I explained to Ahmed that we could not repeat that mistake as it might disrupt the social cohesion so important for shepherds whose work can sometimes be physically dangerous.

In March 2011, I began to employ forest user Mohamed Chitwan, who was very knowledgeable about the macaques. Mohamed expressed a great deal of excitement at the idea of working with us, but we both failed to consider how the stigma attached to the macaques by villagers, who, unlike the shepherds had very little contact with us, would be the cause of embarrassment to his family. Shame is a powerful instrument in the traditional villages of Bouhachem and is often used by urban visitors to assert their authority and dominance over villagers (Chapter 3). Unbeknownst to either Ahmed or me at the time, Mohamed's employment caused a substantial deterioration in his family's relationships with fellow villagers. Villagers gossiped and speculated unfavourably about his role in the research as well as about the research itself as they attributed various activities such as hunting, feeding and playing with the macaques to his role. Peer group disapproval had a negative effect on Mohamed Chitwan's family, as they suffered ridicule and social alienation due to his change in employment. This type of behaviour has been reported elsewhere (Russell & Harshbarger 2003; McLennan & Hill 2013). As I describe in Chapter 5, the macaques are generally derided and mocked in Bouhachem village society, reflecting their ambiguous position in local people's ontology. The macaques provided a convenient way for the villagers to demonstrate their resentment at what they perceived to be the family's good fortune. Other scholars have noted similar patterns and attribute them to local people's belief that being associated with foreign researchers, along with the possession and use of expensive equipment, brings special benefits to an individual (McLennan & Hill 2013). Mohamed's neighbours perceived a positive change in his status and hence a change in the *status quo* of village society. Mohamed's family thus stood out from the rest, creating differentiation with the potential to cause division.

In April, Ahmed visited the family home in Talajamine, and Mohamed's wife and daughter began to cry as they told him that the mockery from the villagers was unbearable.

When I asked Mohamed about the situation, he told me that each time he returned from the forest, his wife told him that he had to resign because the family could not tolerate the teasing and gossip. However, Mohamed told me that he had hated his previous employment and was now very happy working in the forest "in nature with polite people", so even though he was sorry for the distress to his family he felt that it would pass and he really wanted to continue to work with us and the macaques.

The Chitwan family's difficult situation continued until June 2011, when a female relative studying in Tétouan visited the village and Mohamed's wife asked her opinion of the situation. The relative said that the villagers were wrong to bother the family of someone doing such an important job and that the Barbary macaque conservation project was famous in Tétouan. She attributed the villagers' behaviour to feelings of jealousy, saying that if they were given the opportunity to work with the team, they would not refuse. After this visit, one of Mohamed's daughters began to volunteer with us occasionally and his wife began to tell everyone about her husband's work and sometimes accompanied him into the forest. The villagers still mocked the family, but the family had been empowered by the opinion of one of their city-dwelling relatives and were able to ignore the villagers' teasing. The source of the Chitwan family's eventual empowerment reinforces the existence of the urban-rural divide I discuss in Chapter 3, with the opinion of a city dwelling relative counting for more than the collective opinion of the villagers with Mohamed's family. The villagers ceased trying to upset the family after a few months when they realised their teasing was no longer having any effect.

7.5. Conclusions

Continuing our engagement and sharing knowledge about Barbary macaques legitimised shepherds' intrinsic interest in the species and empowered them to make the transition from participants or bystanders to conservation actors. My study illustrates that local people may have very accurate local ecological knowledge of a species inhabiting their own area (Chapter 4) but are bereft of information regarding the species in a wider geographical or zoological context (this chapter). In these shepherds' new roles they made macaque conservation, rather than macaque hunting, socially legitimate within their peer group and established themselves as role models to encourage groups of shepherds to voluntarily stop macaque hunting and act to prevent illegal capture and trade of Barbary macaques by outsiders. Similarly, but for different reasons, Mohamed Chitwan's family have now become

strong supporters of Mohamed's work. I demonstrate here that when conservationists consistently communicate with and allow local people the space to decide for themselves if a change in behaviour is necessary then social mechanisms can be more effective than formal institutions in encouraging a change in behaviour which is positive for species conservation. Although a small minority of shepherds now understand the necessity of preventing their dogs from harassing the macaques, changing such a deeply engrained norm will be a challenge. Similarly, preventing unaccompanied dogs visiting the forest is a problem that will be difficult to resolve. In the next chapter, I discuss how I initiated a programme which offers rabies vaccinations for villagers' dogs with the dual aims of communicating controversial information and attempting to positively link villagers to Barbary macaques and their conservation.

Chapter 8 – Communicating for conservation in Bouhachem: achievements and limitations

8.1. Introduction

In any conservation or wildlife management initiative, conflict can arise when conventional scientific knowledge (CSK) differs from local ecological knowledge (LEK) (Dowsley & Wenzel 2008). For example, there are differing opinions about polar bear (*Ursus arctos*) population status between Inuit hunters, who believe the population is increasing, and western biologists who state that polar bear numbers are declining due to the effects of climate change. The conflict centres around a CSK recommendation that more stringent hunting controls are administered to prevent further declines in the population but Inuit subsistence hunters refuse to accept the need for such controls (Dowsley & Wenzel 2008). In this case, CSK has the benefit of a general overview of data from the Artic whereas Inuit polar bear LEK is, by its very nature, much more localised making it potentially more fallible at the population level (Dowsley & Wenzel 2008). LEK may also be unreliable for identifying threats to a population if participants fear repercussions should they report illegal activity (Turvey *et al* 2013). Inuit hunters attributed the dwindling populations of some seabird species to changes in their distribution rather than a decline in their numbers, and continued to harvest the animals unsustainably - their apparently incorrect LEK being a consequence of geographic scale rather than lack of knowledge (Gilchrist *et al* 2005). Whatever the reasons, the communication of CSK which differs from LEK may challenge local people's identities and serve to make their belief in incorrect LEK more entrenched. Such conflicts between the differing realities of scientists and local people are common in human-wildlife conflict situations with local people's perceptions of crop or livestock loss often lacking any correlation with those of CSK (Inskip & Zimmermann 2009; Rigg *et al* 2010; Webber & Hill 2014).

I have described in previous chapters how dogs (*Canis familiaris*) play a role in the protection of goats in the forest, but hunt Barbary macaques (*Macaca sylvanus*) with and without the encouragement of shepherds. Additionally, shepherds blame the loss of livestock on the *dib* (*C. aureus*) and/or what they believe to be a pack of feral dogs living in the forest. My research identified these dogs as owned, but free-ranging village dogs (Chapter 5). In this chapter, I use material relating to dogs, particularly the supposedly feral pack, to discuss the practical problems of communicating CSK as a conservationist.

I begin by reviewing the problems of communicating controversial (CSK) without privileging it over LEK followed by the difficulties encountered when communication fails. Such a failure is attested to when local people express belief that conservationists override their needs in favour of those of endangered species. I describe my resulting rationale for developing a Dog Health Programme (DHP) in Bouhachem, the cornerstone of which was to vaccinate village dogs against rabies. I recount how I became aware of the significance of engaging with villagers regarding their dogs to explain why I wanted to design a programme relevant to local people's concerns that relates domestic dog welfare to Barbary macaque conservation.

The aims of the Dog Health Programme are:

- To communicate my findings regarding the dogs' ownership to shepherds and other local people without causing conflict between conventional scientific knowledge and shepherds' local ecological knowledge.
- To assure villagers that we value them and their domestic animals as well as macaques.
- To establish a mutually positive link between the Barbary macaque population and local people by collaborating with villagers to improve the health of their domestic dogs and reduce the risk of rabies transmission to people and livestock.

I explain that the programme was successful in the first two aims but failed to link the presence of the Barbary macaques directly with the benefits of the DHP. This chapter contributes to the conservation debate by suggesting conflict between CSK and LEK might be avoided by tacitly rather than directly communicating unwelcome or controversial information in some situations.

8.1.1. Communicating controversial information

Communicating information in an open and direct manner is considered best practice in any conservation effort (McGreavy *et al* 2012; de Nooy 2013). However, conservation actors cannot avoid moral or political differences simply by presenting quantitative data, which may create rather than mitigate conflict, because "cultural values rather than scientific discoveries motivate society" (Peterson *et al* 2002:948). In some societies, direct communication is considered culturally inappropriate (Ferguson *et al* 1998; Watson & Huntington 2008). In such circumstances, communication may be more effective if it is tacit rather than direct to avoid loss of credibility for either conservationists or local people.

On occasions when CSK disagrees with LEK, scientists need to exercise sensitivity in communicating the discrepancy as there may be social, cultural or political reasons for the existence of incorrect LEK (Peterson *et al* 2013). Badly managed communication of such discrepancies has led to costly, acrimonious and long-term disputes where views become polarised and entrenched (Wilson 1997; Peterson *et al* 2002; Skogen *et al* 2008). In Zanzibar farmers' belief that Endangered Kirk's colobus (*Procolobus kirkii*) destroyed their valuable coconut crop was not corroborated by CSK. Scientists demonstrated that the colobus did not destroy the plants but actually improved coconut yields through their browsing behaviour (Siex & Struhsaker 1999). By privileging CSK over LEK, however, local authorities were able to justify the non-payment of compensation to farmers for damage caused by the colobus' crop-raiding. The authorities assumed that the evidence presented by scientists would be enough to convince the farmers to cooperate. To encourage this acceptance, the authorities belittled local cultural beliefs that the colobus was poisonous and killed trees and crops by feeding on them. As a result of their LEK being undervalued, local people are now excluded bystanders rather than active participants in colobus conservation activities (Saunders 2011).

8.1.2. Communicating conservation goals by benefitting people

Addressing development goals to gain the support of local people and contribute positively to their livelihoods is common in conservation activities (McShane & Wells 2004; Martin *et al* 2010). However, large-scale, expensive initiatives commonly referred to as Integrated Conservation and Development Projects (ICDPs), do not always generate the expected behaviour change and support from local people necessary for positive conservation outcomes (Murphree 1994; Songorwa 1999; Arjunan *et al* 2006; Martin *et al* 2010). Qualitative studies show that local people living in the vicinity of some ICDPS are either ambivalent about conservation or somewhat resistant to it because they feel excluded from meaningful decision making (Pujadas & Castillo 2007; Saunders 2011; Tumusiime & Svarstad 2011). Others feel ignored by conservationists and perceive themselves to be less important than endangered wildlife. For instance, one villager living close to Bwindi National Park in Uganda, which is home to the Critically Endangered mountain gorilla (*Gorilla beringei beringei*), said:

> *Sometimes we feel like the gorillas are treated as more important than us (Tumusiime & Svarstad 2011:254).*

This sentiment is echoed in Indonesia; many people cannot comprehend why there is so much international interest in the orang-utan (*Pongo* sp.) which they view as just another "monkey". One Indonesian politician has felt obliged to publicly state that people's interests must take precedence over the welfare and conservation needs of this species (Meijaard *et al* 2012). Conservationists cite ecological reasons to justify orang-utan conservation (Meijaard *et al* 2012) but this probably means little to many local people who perceive orang-utan conservation as a low priority or an obstacle to their own development.

One approach to reassure communities of their value to conservationists is to work with them to combat diseases which are transmitted between people, wildlife and livestock (Rubanga *et al* 2013). Several NGOs have initiatives focusing on human and animal health coming under the banner of One Health (Cleaveland *et al* 2014). One Health is a collaborative approach to combat emerging infectious diseases between both people and domestic livestock (Cleaveland *et al* 2014). However, such health initiatives have also benefitted both human and wildlife health, most notably in the great ape habitats of the Virunga Volcano region, Gombe Stream National Park in Tanzania and Bwindi National Park in Uganda (Collins 2003; Group 2004; Kalema-Zikusoka 2005).

A notable zoonosis is rabies, with domestic dogs as the main reservoir. Rabies kills around 55,000 people annually, with 99 % of these deaths taking place in the developing world (Knobel 2005). In over 95 % of human rabies cases, the disease is transmitted by a bite from an infected dog (Hampson *et al* 2009). Scholars consider rabies elimination and control an exemplar of the One Health approach (Day 2011; Cleaveland *et al* 2014). In ICDPs in parts of East Africa, village dogs are vaccinated against rabies primarily to prevent transmission of the disease to wild carnivores (Randall *et al* 2006; Fitzpatrick *et al* 2012). These programmes are not used explicitly to link carnivore conservation to human and domestic animal welfare but local communities benefit indirectly from a decrease in rabies cases (Fitzpatrick *et al* 2012).

In Morocco, rabies claimed the lives of ~22 people per year between 1978 and 2008, with a mean of 406 reported cases in animals in the same period. A third of these cases were dogs (Fassi-Fihri 2008). The majority of owned dogs serve as guard dogs (66 %) or livestock guarding dogs (31 %) and occur mainly in rural areas, where they roam freely for a large part of the day (Fassi-Fihri 2008). A national campaign to eradicate rabies began in 1986, with free vaccinations offered to dog owners at the veterinary service offices in large provincial cities. The

campaign has had limited success because it does not consider the rural dog population (Fassi-Fihri 2008). Another major zoonosis in Morocco is cystic echinococcus (Azlaf & Dakkak 2006). This disease is caused by the common tapeworm (*Echinococcus granulosos)* and passed via dog faeces to humans and livestock. Human infection by this parasite can lead to the formation of hydatid cysts in the brain and other major internal organs and this causes serious illness and hospitalisation with 3 % human mortality annually in Morocco (Azlaf *et al* 2007). Domestic dogs thus pose a real threat to human health in Morocco.

8.2. My rationale for developing the Dog Health Programme (DHP)

In summer 2010, we became aware that some villagers had misinterpreted our activities and were spreading rumours that we were feeding, trapping or shooting the macaques. This level of misinformation about the project's activities was a cause for concern as it demonstrated a lack of effective communication between us and the villagers. With a history of exclusion from development projects directly concerning local people, and their resistance to the imposition of top-down development initiatives (Chapter 3), I was mindful of the potential problems this failed communication could invoke.

I had found that in Bouhachem rabies affects the health of people, their domestic animals and wildlife. Livestock mortalities from rabies were reported to us anecdotally by shepherds and human mortalities are rare but do occur. As I report in the previous chapter, we observed adult macaques surviving attacks by domestic dogs, with the resultant risk of the injured individual contracting rabies from a potentially rabid dog. A rabid macaque attacking people could have disastrous consequences for both people and macaques and possibly encourage a return to, and potential increase in, the persecution and killing of the species I describe in Chapter 6. Such a scenario was possible as, according to villagers, dogs from villages around Bouhachem have never been vaccinated against rabies. The authorities had relied on culling what they believed to be feral dogs in the past, but this approach was abandoned due to fears for human safety in the forest.

To ascertain the legal requirements of dog ownership and to find out more about how feral dogs and diseases such as rabies are dealt with officially in northern Morocco, I interviewed a member of the government veterinary service in Tétouan hereon known as Mr S. Mr S. told me that it is a legal requirement for owners to collar their dogs, as his department

considers un-collared dogs to be feral and thus subject to lethal control. The service undertakes rabies vaccination programmes regularly in the province, usually setting up in a large town where people can bring their dogs for a free rabies vaccination. Mr S did not know the percentage rate of vaccination coverage in each town, as he had no information on the total dog population in the areas concerned. In accordance with the information from the villagers, Mr S. could find no recent records of visits to Bouhachem to vaccinate dogs against rabies. He was very open to the idea of the DHP and willing to provide us with free rabies vaccines along with the official certificates of vaccination, detailing the vaccination batch number, the physical attributes of the dog and the identity card number of its owner. A UK veterinary practice donated worming medication to be administered to every dog to control tapeworm infestations.

The possibility of working with the villagers to manage the dog population was hindered by their belief that there was a pack of feral dogs reportedly living in the forest. I tentatively conveyed my findings (Chapter 5) that the feral dogs were village dogs to four shepherds sympathetic to the work of the conservation project. I was met with general amusement or a tendency to disagree with the information. For example, one said:

> *No, no, that can't be true! My dogs recognise my cows and goats so they won't kill them!*

Similarly, a younger shepherd assured me that the village dogs only accompanied him and the goats into the forest and never went there alone.

8.3. Conducting the Dog Health Programme

I chose three villages for the first phase of the DHP because we knew that their inhabitants asked lots of questions about what we were doing but the shepherds seemed unable or unwilling to provide sufficient information to satisfy the villagers' curiosity. Parts of the villages of Lahcene and Almidene were accessible by paved road but, in general, the majority of households were accessed on foot. The third village, Talajamine, did not then have vehicular access, necessitating a two hour walk from the nearest vehicular access point. One week before the DHP began, a young woman died of rabies in Lahcene after having been bitten by a cat four weeks earlier. At this point the DHP attracted the attention of the local officials,

who were under pressure from village residents to prevent further deaths. I was concerned that if we were accompanied by people from the local authorities, their involvement would compromise our independence as a non-governmental organisation (NGO) and villagers would feel pressured to get their dogs vaccinated. After numerous discussions the officials concerned were content that the organisation of the DHP was satisfactory and agreed to let us conduct the programme as we wished.

We first conducted house to house visits to explain the programme, enquire whether households wished to participate and to ascertain how many dogs we would be vaccinating. Around 20 % of households did not own a dog whilst the remaining households owned 1 - 7 dogs which were used for guarding the property, or guarding the property and livestock guarding. Livestock guarding dogs did not necessarily belong to shepherds but habitually accompanied goats to pasture. Almost all dog owners wanted their dogs vaccinated and wormed. During this preliminary visit we prepared the official rabies vaccination certificates (mentioned above) with information about each dog and its owner. We made a connection between the macaques, the DHP and the conservation team by wearing t-shirts with the project logo (Figure 2.4, Chapter 2) on the front. On our second visit, we vaccinated all dogs from participating households against rabies if possible, and dosed all the dogs with medication against *E. granulosus* and other internal parasites. We gave the owners collars so that they could decide for themselves whether they wished to place them on their dog. We used a different colour of collar for each village (Figure 8.1, Table 8.1).

Figure 8.1. A girl from Lahcene village placing a yellow collar on her family dog

We completed the certificates and retained them for validation by official signature and stamp by the provincial veterinary authorities.

We were unable to vaccinate all the dogs because some were too old, too young or pregnant. Some dogs were accustomed to accompanying the goats into the forest and their owners could not restrain them from leaving. We vaccinated some of these dogs in the forest a few days later when they were presented to us by the village shepherds. Four Almidene shepherds declined to participate in the DHP. However, when we returned to the village for the second day of vaccinations, all four men approached the team requesting that we vaccinate their dogs, which we duly did. The overall vaccination coverage rate achieved for the three villages ranged 60 – 81 % (Table 8.1). Vaccination coverage of 60 %, is the accepted level for the eventual eradication of rabies from an area (Hampson *et al* 2009).

Table 8.1. Numbers and Percentage of Domestic Dogs Vaccinated in Three Villages in Bouhachem in October 2010

Village	Colour of collar	Total No of dogs	No of females	No of males	Vaccinated	% Vaccinated
Lahcene	Yellow	84	17	67	63	75
Almidene	Green	183	28	155	148	81
Talajamine	Pink	52	9	43	31	60
Total		**319**	**54**	**265**	**242**	

When I asked 20 dog owners if they would take their dogs to Moulay Abdessalam should the regional veterinary authorities set up rabies vaccination outreach there, all of them said they would find it impossible as their dogs could get lost, be attacked by other dogs, or attack people on the way to the town. In Lahcene, three householders expressed dissatisfaction that the authorities were not vaccinating villagers in light of the recent death of one of their neighbours from rabies.

We returned the completed vaccination certificates to householders in November 2010. I took the opportunity to ask some villagers for their views on the DHP. One Almidene man described it as "a very good thing" but did not think that people saw any connection between the Barbary macaques and the DHP. However, when I rephrased the question and asked him if he thought they saw a connection between the conservation team and the DHP, he said:

Yes of course - you study the macaques and you made this programme for the dogs.

When I asked him what would have happened if the team had not offered the vaccinations, he stated that: "the dogs would not have been vaccinated". When I asked if running this type of programme again might inspire more interest and support for our work with the macaques, he replied:

Yes because people now understand the project more in my village.

Ahmed Chitwan was adamant that Talajamine villagers understood the connection between the conservation team and the DHP, although not with the macaques. He stated:

Yes it's very good. If you follow it up, it will develop more, because the people want to know more. There are many people who know the project very well but there are people who still don't know it very well. But people who don't know it very well they don't want it but when they know what it's about they want it. I explained it [the DHP] to younger boys so they would understand about your work. Ahmed Chitwan, 27, Talajamine.

There was, however, some confusion among younger boys from Almidene who had only ever seen us in the village vaccinating dogs. In the four weeks that followed the DHP, very young boys on sighting us in the forest, would begin shouting excitedly that we injected [vaccinated] the macaques. On each of the four occasions this happened, the experienced shepherds would correct them and tell the boys that we observed the macaques and counted them. One older shepherd explained further indicating that he understood the rationale behind the DHP very well:

They [me and Ahmed] do not vaccinate the macaques. The macaques don't need to be vaccinated as they live in the forest. Village dogs must be vaccinated and given potatoes [refers to internal parasite medication administered in mashed potato] to keep our livestock and us well.

In spring 2011, I asked shepherds about the situation of the feral dog pack. Four shepherds from DHP participating villages said that there were no feral dogs, whilst seven others informed me that the feral dogs had moved from the area but that the *dib* predations were worse than ever. In contrast, shepherds from villages which had not been offered the DHP reported that the feral dog pack had increased in size and had killed many cows (*Bos taurus*) in the forest over the winter. The shepherds from the three DHP villages understood through their observations of collared dogs that the dogs were from those villages, and so no longer mentioned the pack of feral dogs.

8.3.1. Successes of the Dog Health Programme

Conservation researchers need to be aware that direct communication may be inappropriate when applying their findings to real life situations and people. By communicating tacitly rather than directly in situations where the latter may be unwelcome it is possible to avoid a build-up of resentment, subversive behaviour and ultimately full blown conflict with the

very people who have to co-exist with the species we are trying to conserve. The tacit communication of CSK regarding the non-existence of a feral dog pack in the forest did not jeopardise the good relationship we have developed with the shepherds. This way of communicating also avoided a polarisation of views over discrepancies between LEK and CSK and resulting conflict which has been documented elsewhere (Dowsley & Wenzel 2008; Carss *et al* 2009; Saunders 2011). The shepherds observed the collared dogs in the forest, and assimilated the information that these dogs had owners. They then adapted their LEK by blaming the *dib* for increased livestock predation. In communicating that the pack of feral dogs did not exist, I overcame a serious obstacle to tackling the problem of unaccompanied dogs hunting in the forest. The DHP has thus prepared the way to empower villagers to control the dog population and I hope to provide them with the opportunity to have their bitches sterilised in a long-term strategy to control the dog population and the incidence of rabies in the study area.

I was unable to assess how, if at all, the DHP changed villagers' perceptions of the macaques or inspired interest in macaques. However, our strategy of visiting every household in a village to ascertain if they were dog owners and our subsequent engagement with many villagers established our reputation as "good people", and villagers' goodwill toward the project team has continued. Some villagers do connect us with the macaques as they inform us if they see or hear anything noteworthy regarding the animals. Participation in the DHP did not have any financial benefit for the villagers, reinforcing the suggestion that although financial incentives are important, they are not the only incentive to which local people respond in conservation initiatives (Kuriyan 2002; Campbell & Vainio-Mattila 2003; Moore 2010; Wyman & Stein 2010; Hazzah *et al* 2014). The success of the DHP in terms of how the villagers valued it can be ascertained by the requests of representatives from four other villages to participate in the programme.

Most people from Lahcene (where the human mortality from rabies occurred) seemed satisfied when project team members explained that dog vaccinations would decrease the risk of rabies being transmitted to people and their livestock, but we felt this explanation did not completely satisfy the three villagers who asked why we did not vaccinate people. The DHP was much appreciated by the authorities and enabled them to present the programme to their superiors as an active response to the human mortality in Lahcene without compromising our independence. Despite the free provision of rabies vaccines for dogs, the strategy of

administering them in a nearby town discourages rural dog owners from participating due to the logistical difficulties of travelling any distance with untrained dogs. When we offered the people the opportunity of village visits, they were keen to participate. Such a high uptake of the vaccinations indicates that if we continue the DHP, along with a dog sterilisation programme, then human and livestock mortalities from rabies may decrease in these three villages. This would provide the salient and meaningful benefits to local communities which might result in stimulating their interest in conservation activities (Brosius & Hitchner 2010).

In the previous chapter I reveal that social mechanisms were important for the voluntary cessation of macaque hunting by shepherds. In this chapter, I illustrate that again, social factors were extremely important in recruiting shepherds and others to activities initiated by the conservation team. The four shepherds who initially refused the vaccinations found they had excluded themselves from what had become a social activity - something the whole village had participated in - with the dogs' coloured collars a symbol of that participation. The majority of villagers welcomed the initiative, viewing it as salient to their lives, directly benefitting themselves and their livestock.

8.3.2. Limitations of the Dog Health Programme

I suggest that the DHP could be interpreted as a "boundary object" much like the maps that were the medium of communication between the shepherds and me during data collection in Chapter 4. Such boundary objects can facilitate communication between people of different cultural and social backgrounds but collaborators can often erroneously assume that everyone shares the same interpretations of and motivations for their participation (Saj *et al* 2006). I suggest that my lack of consideration for the heterogeneity of motivations among DHP participants led to my failure to establish a positive link between the macaques and the villagers although the DHP did establish a link to between the villagers and the conservation team.

In future activities the connection between the macaques and the DHP needs to be made much more explicit with appropriate communication activities. A similar failure in connecting beneficial programmes to conservation activities occurred in Zanzibar, with local people unaware that their prized microcredit facility was directly related to the presence of an ICDP set up to protect the Endangered Kirk's colobus (Saunders 2011). Livestock vaccination

programmes may have unforeseen socio-economic and ecological outcomes with implications for wildlife conservation (Homewood *et al* 2006) and one possible negative outcome of this programme may be an increase in the dog population, with more animals entering the forest to hunt due to increased longevity as a result of the treatments. So far there is no evidence of an increase, but I hope to conduct further research on village dog demographics and behaviour.

Unfortunately, when we initiated the second phase of the DHP in 2011, we discovered that we were no longer permitted to vaccinate dogs without the supervision of a Moroccan veterinarian. This came as a surprise, as no official mentioned this to us in 2010. We were thus constrained to working only two days in the field, vaccinating ~50 dogs in two small villages. We have, however, been given permission to continue the programme in collaboration with the authorities and an attending government vet.

8.4. Conclusions

This case study describes the implementation of a modest programme which will become an important component of a long-term conservation strategy driven by a small, locally based NGO. The DHP successfully communicated the information that a feral dog pack was not present in the forest to shepherds from the DHP villages. When direct communication may be culturally inappropriate or unwelcome, tacit communication provides a way to present information that local people can assimilate for themselves avoiding loss of credibility for them and conservation actors. Failure to communicate effectively by conservation actors may hinder activities to mitigate problems that need to be addressed.

The DHP has both human and animal welfare benefits, and fits within the framework of the Moroccan campaign to eradicate rabies and thus improve human and animal health. In Tanzania, vaccinating dogs against rabies had the indirect benefit of controlling rabies in wildlife (Fitzpatrick *et al* 2012) and the DHP may act to lower the risk of rabies transmission to Barbary macaques at risk of attack and injury by dogs in Bouhachem forest. The DHP may also facilitate the development of management strategies which balance Barbary macaque conservation needs with the important role dogs play in protecting villagers' livestock in the forest. The overwhelming benefit of the activity was to successfully convey the message that the conservation team is committed to local people as well as to the conservation of the Barbary macaque.

Chapter 9 - Discussion & conclusions

9.1. Thesis summary

This study demonstrates how including local people in a research initiative and analysing ethnographic data to provide insight into how they view and behave towards an Endangered primate, the Barbary macaque (*Macaca sylvanus*) and applying these findings to the development of conservation activities can provide positive outcomes for this species in one area of its distribution. My major findings can be summarised as follows: Chapter 3 provides the historical, political and social context for local people's experiences with outside agencies. These experiences appear to have been characterised by a history of exclusion from decision making about the forest they use to sustain their livelihoods, as well as negative discrimination by urban dwellers at many levels. In Chapter 4, I describe how I included shepherds in my research by integrating their local ecological knowledge (LEK) about macaque locations with my own conventional scientific knowledge (CSK) to co-produce information about Barbary macaque presence in Bouhachem. In Chapter 5, using ethnographic data, I interpret the position of the Barbary macaque, along with goats (*Capra hircus*), the golden jackal (*Canis aureus*) and domestic dogs (*C. familiaris*) in shepherd ontology. In Chapter 6, I explore how the anomalous position of Barbary macaques in shepherds' ontology influences their physical interactions with the animals, which vary according to a shepherd's age and social status. In Chapter 7, I describe how my continued engagement with shepherds resulted in a change in culture from macaque hunting to macaque conservation. In Chapter 8, I contrast the successful communication of CSK regarding dog ownership and our interest in human welfare with my failure to establish a direct and positive link between the macaques and the villagers. In this chapter, I relate how my findings suggested and facilitated my actions. I then review my experiences in applying an interdisciplinary approach. Co-producing knowledge with local people has ethical implications for authorship and I explore ways in which other authors have dealt with this phenomenon. I briefly discuss our plans for future conservation and community work. I follow this by summarising the main points of the study. I then discuss the sustainability of my approach and present recommendations for conservationists interested in working with communities drawn from my own experience conducting this study. I draw final conclusions about the benefits of using ethnography in conservation activities.

9.2. Implications of this study for practising conservationists

The meaningful inclusion of local people in conservation initiatives is a complex undertaking and the poor quality of relationships between the various actors involved, along with, often unacknowledged, imbalances in power relationships, has caused the failure of many strategies (Russell & Harshbarger 2003; Geoghegan 2009). The lack of trust and engagement between local people and officials due to perceptions of corruption has been documented elsewhere (Fairet 2012). In Bouhachem this was characterised by poor communication and relationships between villagers and outsiders regarding conservation and development issues. Thus, the most important conservation action of the whole study was my frequent, regular and genuine contact with the shepherds in the forest.

Shepherds are key players in the Barbary macaques' future both in Bouhachem and elsewhere in Barbary macaque distribution. Their participation in the population survey and subsequent pro-conservation behaviour change endorses the findings by various scholars that when people are connected in groups and networks and their knowledge is sought, incorporated and built on, they are more likely to participate in resource management or conservation initiatives (Kuriyan 2002; McNeely & Scherr 2003; Pretty & Smith 2004; Graham *et al* 2011; Young *et al* 2013). My and Ahmed's regular personal contact with shepherds contributed to their feelings of inclusion and may have inspired 'ownership' of the research and the macaques, much like fishers involved in research to identify the scale of predation by grey (*Halichoerus grypus)* and harbour seals (*Phoca vitulina*) on Atlantic salmon (*Salmo salar*) in Scotland (Young *et al* 2010). Regular contact with the shepherds, facilitated by Ahmed's presence, allowed me to establish trust between us. Establishing "*trustful relations is a time-consuming business"* (Sillitoe 2010:25), and short-term or sporadic engagement proved counter-productive to positive outcomes in participatory projects in Iceland and Benin where it was cited as a problem in maintaining trust between participants (Berglund *et al* 2013; Idrissou *et al* 2013). These examples and this study highlight the importance of consistent contact with and commitment to local people by conservationists.

Integrating CSK and shepherds' macaque location LEK in this study ensured an exchange of information and a meaningful dialogue between shepherds and conservation team members. The shepherds' knowledge of the macaques is epistemologically sound and related to their physical environment. In the light of these survey results, the Bouhachem population of Barbary

macaques becomes important in a global context because it occurs in contiguous forest habitat and groups are unhabituated so not susceptible to the ill effects of unmanaged primate tourism such as those observed in the Middle Atlas population (Marechal *et al* 2011; Menard *et al* 2013; Borg *et al* 2014). The co-production of information in this study illustrates the potential for integrating CSK and LEK to survey group living diurnal primates which inhabit remote mountainous areas. We have since successfully conducted an integrated LEK/CSK survey for another Barbary macaque population in the region, revealing that this population is also larger and more widespread than reported previously by Fa (1982).

My inclusion of other species important to the shepherds provided me with extremely useful insight into how they viewed both wild and domestic animals and how these perceptions influence Barbary macaque conservation. Shepherds' relationships with goats and the *dib* were uncomplicated, relating directly to one species' role as prey and the other's as predator. In stark opposition to this clear division, the shepherds' ontology regarding the macaques reveals some ambiguity where the dualist categories of man and animal, nature and culture are indivisibly entwined. The shepherds' macaque ontology is influenced by the Islamic view of primates as degraded humans, but not entirely explained by it. In my preliminary contacts with groups of shepherds, I thought that the macaques had little intrinsic value for local people but, on interviewing individual shepherds, I discovered that some had an interest in the macaques which they kept hidden for fear of ridicule from their peers. The shepherds' relationship towards their dogs is also ambiguous in that they appear to resent the dog's presence whilst accepting its necessity as a protector of livestock. The position of dogs in Bouhachem village society mirrors the position of dogs elsewhere, symbolically existing "between the human and non-human worlds" (Serpell 1995:254). Perhaps because of their anomalous position in shepherds' ontology, dogs play an important role in assisting shepherds' macaque hunting activities as well as being macaque predators in their own right.

With the ethnographic data from my conversations with shepherds I was able to map the symbolic meanings that the macaque has for them onto the spatial realities of their physical interactions with the species enabling me to reflect on and interpret the different behaviour exhibited by men when in physical proximity to the macaques. The shepherds now have a less parochial view of the macaques because they know the species occurs in very few places, of which Bouhachem is one. Our interactions with the shepherds and our overt interest in the macaques, has legitimised this species among the men who interact with it most often. Some

shepherds see themselves and their Barbary macaque LEK as playing a role in conservation and this is inspiring local ownership of the species.

It is often the case that instead of being provided with the information or means to change their behaviour local people are forced to change their behaviour through legislation, which may have the opposite effect to that required for species conservation (Bell *et al* 2008; Carss *et al* 2009; Fairet 2012; Goldman *et al* 2013). However, common ground can exist between conservationists and local people when the latter are not driven by utilitarian concerns. I suggest that, at my study site, social mechanisms are more effective than state intervention by way of law enforcement to inspire positive conservation action. In my study area, local people do not hunt the focal species for food or capture it for the pet trade, and the use of a social mechanism - shame - by respected peer group members was enough to change the shepherds' culture of macaque hunting. This suggestion is supported by an inclusive approach which has inspired pro-conservation behaviour change in southern Kenya. This compared two different approaches to human-wildlife conflict affecting lion (*Felis leo*) conservation and found that an incentive-driven approach to compensate herders for livestock losses was only partially successful with some lion killing continuing, whilst a programme employing local people, Maasai *ilmurran*, as "lion guards", fulfilled dual goals of incorporating cultural values and eliminating lion mortalities. The eradication of lion killing in this case was partially attributed to a social mechanism whereby the lion guards reminded other Maasai *ilmurran* that they would lose their jobs if lions became extinct in the project area. This was enough to discourage lion killing as, in Maasai tradition, it is socially unacceptable to cause trouble for another person (Hazzah *et al* 2014). There is no room for complacency on my part, however, as the shepherds acting as macaque advocates are all of marriageable age and in transition from youths to mature men. It is thus important to continue my engagement with shepherds of all ages, reinforcing trust, and providing continuation in the hope that the voluntary change becomes a permanent change.

In this study, I was able to identify issues that were important to shepherds, their domestic animals and macaques. Tacit, rather than direct, communication avoided the loss of credibility and potential conflict which could have followed my insistence that my data, disproving the existence of a feral dog pack, could not be wrong, with the implication that the local people were. The exclusion of villagers detailed in Chapter 3 when a non-governmental organisation (NGO) selected only three households to benefit from an ecotourism development

was divisive. To establish a positive connection between villagers and macaques I needed to develop an activity which villagers perceived as beneficial to themselves, which included all households, and with participation voluntary rather than forced. My planned intervention, the Dog Health Programme (DHP), had the development and conservation objectives of improving the health of domestic dogs to safeguard human health in the target villages, and possibly reduce the risk of rabies transmission from dogs to wildlife and livestock. It also served to establish our concern regarding issues affecting local people and their livestock. I suggest that my lack of consideration of the existence of a heterogeneity of motivations in DHP participants led to the failure to establish a positive link between the macaques and the villagers, although it did establish a link between the villagers and the conservation team. In the transmission of messages to improve human health, scholars suggest that such messages should not just be culturally appropriate but "culturally compelling" (Eggerman & Panter-Brick 2011). I now need to make the link between our interventions, the macaques and the villagers "compelling".

9.3. Reflections on the use of ethnography in conservation management

Both the scientist (me) and the shepherds participating in this study observe macaques as they move through the forest, but from different perspectives. In order to fully appreciate these different perspectives I attempted to develop the ability to reflect on and interpret how my presence and that of the conservation team was influencing local people's perceptions about the macaques. Although I have a graduate qualification in psychology, this tends to quantitative rather than qualitative data interpretation to further its aims. Analysing ethnographic data entailed working in a very different way and looking at the world through a very different lens. I underestimated the time it would take to understand the discipline as far as it related to conservation practice. Environmental anthropologists speak a different language, one that can be very hard to learn (Adams 2007). Some anthropologists freely acknowledge this, believing that it may be responsible for the failure of the discipline to participate in conservation projects (Milton 1996; Sillitoe 1998). Problems can be exacerbated by the lack of social science training for conservation managers, who may not be motivated to struggle with such a different way of thinking (Adams 2007; Verissimo 2013). However, some scholars are trying to demystify this language for conservationists (Moon & Blackman 2014). The most difficult task for me was to try to integrate CSK and LEK in Chapter 4 in a way that would be accessible to others. I first wrote the chapter in a conventional scientific format but this proved too inflexible to be able to incorporate how my constant reflection on the data facilitated the evolution of data collection

and analysis. In Chapter 4, I discuss the practical considerations that natural or social scientists may encounter if they attempt to replicate this survey, either in Bouhachem or elsewhere. Writing this discussion has caused me to reflect that, like the shepherds, I also express my Barbary macaque group LEK through my knowledge of Bouhachem's topography.

A population estimate is important to understand the status of a species but is not the only factor to consider. The use of qualitative as opposed to quantitative data remains an obstacle between social scientists and some natural scientists who are integrating social science into their research programmes because qualitative data do not readily provide measureable outcomes. There is a strong desire to ensure the outcomes are measureable because numbers are easily audited. The economic and sometimes logistical constraints of collecting reliable scientific data, along with the general desire for numbers in western culture, results in pressure on scientists to provide these numbers despite doubts regarding their accuracy in areas where the field methodology is imprecise (Mehlman 2008). This pressure comes from larger conservation NGOs who are themselves pressured to provide such data for donors (Goldman *et al* 2013).

I strongly suggest that the use of structured questionnaires by conservationists attempting to include a social science component in their research may be inadequate in the quest to achieve a greater understanding of the factors characterising the complicated relationships between people and primates. The diverse social, cultural, political and historical factors which influence the lives of people and primates and, indeed, many other wildlife species can only be investigated fully using qualitative methods ideally within an interdisciplinary framework. In this study I am doubtful that I would have discovered the widespread hunting of macaques by shepherds using a questionnaire as this method of eliciting information may have inhibited shepherds' responses. The analysis of ethnographic data also required a reflexive awareness of my own biases as a western conservationist which greatly assisted my conservation practice.

A single researcher using both qualitative and quantitative methods avoids the problems of communication which have been cited as a barrier to meaningful progress within interdisciplinary conservation project management teams (Fox *et al* 2006; Marzano *et al* 2006; Roy *et al* 2013). An independent interdisciplinary researcher also benefits from learning opportunities which are not impeded by top-down internationalised conservation organisations

(van Helden 2009). I was at liberty to adjust conservation activities conducted at the study site myself instead of working within an existing strategy which may not have suited the local sociocultural situation. I was able to broaden my approach to include domestic dogs and tailor it to the specific values and culture of small communities - a strategy which has been recommended by scholars working elsewhere in Africa (Hazzah *et al* 2014). Smaller teams are better placed to establish a social connection with local people than larger scale landscape conservation projects whose team has a much greater area to cover but which may be better placed to conduct wide ranging ecological data collection. I believe that our availability to help villagers in times of need has facilitated our inclusion into village life. Thus, although villagers' attitudes to the macaques were ambiguous, their attitudes toward us were very positive. This can be difficult for conservationists to achieve in anthrocentric societies where wildlife is viewed as utilitarian and there may be a mismatch in the different actors' perceptions of priorities (Meijaard *et al* 2012). Thus it is important for practising conservationists to explicitly and genuinely value both people and wildlife, using interdisciplinary methods to develop strategies for the benefit of both.

9.3.1. Publishing co-produced information – authorship issues

I hope that this study can play a part in synthesising and disseminating Barbary macaque LEK to the wider scientific community, within a framework of a collaborative partnership based on mutual respect on which conservation initiatives are developed and conducted. I am however, aware that the ecological information I present in this thesis also belongs to my fellow co-producers, the shepherds of Bouhachem. As with other examples of knowledge co-production (Huntington *et al* 1999; Noongwook *et al* 2007), publication of information regarding the Barbary macaque population brings up ethical issues.

> *Collaboration in all forms deserves recognition throughout the research process, no less in authorship than elsewhere* (Huntington 2006 p iv).

In many of the recent publications which have accessed LEK for wildlife survey work, the authors have thanked their local collaborators in the acknowledgments but to the best of my knowledge, few have included them as co-authors. In any publications which result from the survey work in Chapter 4, I intend to follow the examples of Huntington *et al* (1999) and Noongwook *et al* (2007) that included the names of the Inuit communities participating in their

studies as co-authors. Over 50 men participated in my study and some of them wished to remain anonymous whilst others gave only their first name. To resolve this issue, I will include the "Shepherds of Bouhachem" as a group author of presentations and the paper(s) I intend to prepare for publication where relevant. This may prove problematic for journal editors as none of the shepherds can read English and cannot thus approve the manuscript. Huntington (2006) suggests that:

> *So long as the authors' list includes those who deserve credit and those who can take responsibility, then the authors collectively satisfy the criteria for authorship.* (Huntington 2006 p.iv).

The co-production of information with people who may not be academically trained or even literate may mean a shift in emphasis "*from responsibility towards credit, from a purely academic statement to one that is also a social statement"* (Huntington 2006). Such a shift may not make a big difference to the local people concerned but may act as a reminder to conservationists that they are not unique in having empirical knowledge about wildlife.

9.4. Future directions

Many scientists are cognisant of the difficulties in conserving primates and attempting to assist local communities (Setchell 2013). My long-term aim is to maintain my relationships with the shepherds as well as extending and developing the conservation team's relationship with villagers. I hope to make the Barbary macaque a positive symbol for conservation and development in the area and foster a robust, resilient and long–term contribution to macaque conservation by local people. We are currently building a conservation and education centre one of whose aims is to offer training to local people in sustainable livelihood and agricultural practices. Such a centre will facilitate the empowerment of village women, who are not as mobile as men and cannot leave their families for extended periods and who prefer to work with their familiars (Chapter 3). Capacity building has been found to be highly concordant with successful conservation outcomes in community conservation initiatives elsewhere (Brooks *et al* 2012).

We hope to extend the Dog Health Programme to all the villages around Bouhachem and also offer dog sterilisations. Evidence from practical trials and modelling indicates the most

effective way of controlling or eradicating rabies is to combine vaccinations with surgical sterilisation of domestic dogs (Reese & Chawala 2006; Carroll 2010) We will be designing an interdisciplinary project to evaluate the epidemiological benefits to villagers and their livestock, along with measuring any changes in the number of dogs accompanying goats into the forest and the dogs' behaviour toward the macaques. In addition, I am considering how to offer villagers help in the training of dogs to increase their livestock guarding capabilities and decrease the occasions and levels of macaque harassment.

The sustainability of this approach depends on my constant reflection on how local people view us, our activities and the macaques. Such reflection has allowed us to adapt to changing situations but the process has been very difficult to explain to my project staff, whose culture and education system does not encourage intense examination of social issues. In this respect, the ethos of the project would probably change if I left to work elsewhere. I hope to develop a network of the men who have an intrinsic interest in the macaques and other wildlife to work in Bouhachem as guides and macaque monitors, but embedding local people in the project has been difficult due to funding constraints. Nevertheless, in 2014 we employed key individual, Ahmed Chitwan who, upon his marriage, considered leaving his village for the city. Hazzah *et al* (2014) found employing local Maasai *Illmurra*n to be the most effective way of protecting lions in southern Kenya. Delivering tangible benefits such as the dog vaccination programme and the construction of a centre offering capacity building opportunities for local people may contribute substantially to the sustainability of the villagers' way of life, the forest, the macaques and the longevity of the conservation project and its innovative approach.

One potential barrier may be the perception among urban, educated Moroccans that CSK is more valid than LEK. Similar perceptions have been reported from Mexico among local experts and middle class conservationists (Haenn *et al* 2014). I therefore hope that my inclusion of the shepherds of Bouhachem as a group in publications may assist in breaking down the boundaries between the villagers and urban society which I report in Chapter 3. I urge the Moroccan authorities to consider the meaningful inclusion of local people in a more participatory forest management policy.

9.5. Conclusions

During this study I have learned that conservation strategy should be continually evaluated to respond to the fluid social dynamics of local communities. I am conscious that I must consistently monitor my perceptions as well as those of local people to prevent mistakes in conservation strategy. Local circumstances can quickly alter, with the potential consequence of changing local people's current, generally positive view of the macaques into an overtly negative one. I would find it very useful to have the project evaluated by an environmental anthropologist. Their independent analysis and reflection would assist me in making adjustments to any of our conservation activities which might be causing resentment among local people.

There is no universal panacea for conservation issues (Ostrom 2007) and initiating and undertaking an interdisciplinary research study whilst managing a conservation project is a complex challenge. In this study, the lack of habituated Barbary macaque groups in Bouhachem limited the amount of ecological and behavioural data I could collect. However, an ethnographic approach has been fundamental to understanding the social and cultural factors underlying shepherds' relations with macaques. I also found reflection on ethnographic data was extremely important for evaluating how to act - or, indeed, whether to act. I learned a great deal about effective conservation practice whilst undertaking my research. The following points are what I believe to be good practice for conservationists engaging with communities:

- Incoming conservationists should inform themselves of the potential political, social and historical factors which will inevitably influence local people's perceptions of them.

- Political and social factors are prone to change, so conservationists should not become complacent about the existing *status quo*.

- Conservation practitioners need to acknowledge that there are different types of knowledge and co-producing knowledge with others is dependent on its social context as much as on the knowledge gathering itself.

- LEK is useful for gathering data on a focal species. In the context of conservation, however, it provides an entry point into engagement with local people by including

them in the conservation research effort which may be the first step in gaining their trust and support.

- Conservation practitioners should prioritise ethnographic research on how local people view and behave toward the primate species of conservation interest to avoid inappropriate education and awareness strategies.

- Through the above exercise, conservationists may be able to identify individuals with an intrinsic interest in wildlife who are willing to act as a link between conservation teams and local groups to accelerate pro-conservation behaviour change.

- Through ethnographic data analysis, conservationists can identify if social mechanisms will be more effective in fostering pro-conservation behaviour change than the use of formal institutions.

- The most important thing I learned was to actively listen to local people and take time to reflect on what they told me thus avoiding potential errors in communication and strategy development.

I have been unable to find a similar example of ethnographic data being used to drive primate conservation strategy, suggesting that my approach is unique. This study strongly suggests that local people are very capable of understanding conservation principles when included in research activities, and respond positively to genuine and consistent engagement. The shepherds of Bouhachem demonstrate they are capable of conserving Barbary macaques and openly appreciate support from the conservation team. The villagers clearly value the opportunity to participate in the Dog Health Programme which provides health benefits to both them and their domestic animals. In this study area, a one dimensional strategy concentrating only on the focal species would have alienated local people.

This thesis illustrates that many challenges and solutions to Barbary macaque conservation issues in this area of their distribution are social and cultural rather than ecological. The insight I obtained from ethnographic data leads me to believe that ethnographic data collection and analysis may be more useful than ecological data in the first instance for a primate conservation project when the threats to endangered primates are anthropogenic.

Appendix 1

Interview questions for the local ecological knowledge survey of Barbary macaque locations

What's your village called?

How old are you?

How do macaques live?

Do macaques live alone?

Can you tell me where macaque groups live?

Can you tell me how many are in each group?*

*Changed to which is the biggest and which is the smallest group?

Are there more macaques now or in the past?

How would you feel if the macaques disappeared from the forest forever?

Appendix 2

Participant Information Sheet

Title of project: Conservation of Barbary Macaques in Bouhachem, Northern Morocco

Date: 30th April, 2009

Siân Waters, PhD Candidate, University of Durham, Durham UK & Rue Fes No. 22, 93000, Tétouan, Morocco

Tel: 06 62535042

You may remember us when we were in the area last year. We are scientists who would like to find out more about this area including how you manage your livestock and your fields and how you get along with the animals living in the mountains. We would like to meet with your shepherds and your herds when they go out to pasture to see how far they travel and where they go. The information we collect will be used to try to understand the problems you face whilst doing your job in this area. If you decide to help us then no one will need to know who you are or the name of your village. The information we collect will be used for scientific purposes like reports and publications but there is no guarantee that things will change for you if you agree to help us. If you have any questions at any time then please feel free to ask us. If you get tired of us then you can tell us to go away at any time.

It will take a long time to collect enough information and at the end of the study, we sincerely hope that what we find will inform us in our activities to benefit you, your families and your livestock. In order to do this we will invite all participants to hear about what we find and we will discuss all the ideas and opinions that you might have about our findings.

Appendix 3

Participant Consent Form

Title of Project: Barbary Macaques in Bouhachem, Northern Morocco

Have you understood the Participant Information Sheet? YES / NO

Have you felt able to ask questions and to discuss the study? YES / NO

Are you happy with the answers to your questions? YES / NO

Have you received enough information about the study? YES / NO

Do you consent to participate in the study? YES / NO

Do you understand that you can leave the study at any time

without having to tell us why you want to leave ? YES / NO

Signed ..... **Date** .....

(NAME IN BLOCK LETTERS) .....

Signature of witness ..... **Date** .....

(NAME IN BLOCK LETTERS) .....

Appendix 4

An example of a research permit

My permits were provided by the *Haut Commissariat aux Eaux et Forêts et à la Lutte Contre la Desertification*

المملكة المغربية
Royaume du Maroc

Le Premier Ministre

Haut Commissariat aux Eaux et Forêts
et à la Lutte Contre la Désertification

الوزير الأول

المندوبية السامية للمياه
والغابات ومحاربة التصحر

DECISION N° 102 HCEFLCD/DLCDPN/DPRN/CFF

Portant autorisation de permis scientifique

LE HAUT COMMISSAIRE AUX EAUX ET FORETS
ET A LA LUTTE CONTRE LA DESERTIFICATION

Vu le Dahir du 21 juillet 1923 sur la police de la chasse, tel qu'il a été modifié et complété ;

Vu l'Arrêté du Ministre de l'Agriculture et de la Mise en Valeur Agricole n° 582/62 du 3 novembre 1962 portant réglementation permanente de la chasse, tel qu'il a été complété et modifié ;

Vu l'arrêté du Haut Commissaire aux Eaux et Forêts et à la Lutte Contre la Désertification, portant ouverture, clôture et réglementation spéciale de la chasse pendant la saison 2008/2009 ;

Vu la demande présentée le 11.05.2009 par le Doyen de la Faculté des Sciences de Tétouan, en vue d'obtenir un permis scientifique pour réaliser une étude sur les populations du singe magot (*Macaca sylvanus*) dans la région de Tétouan et Chaouen, au bénéfice de Messieurs Mustapha Aksissou de l'Université Abdelmalek Essaadi (Tétouan) et Ahmed El Harrad de l'Association du Sport d'Alpinisme de Tétouan et Mesdames Siân S.Waters et Maria Elisa Hobbelink du Royal Zoological Society of Scotland (Grande Bretagne);

Vu le but scientifique du permis demandé.

DECIDE

Article premier : Messieurs Mustapha Aksissou et Ahmed El Harrad et Mesdames Siân S.Waters et Maria Elisa Hobbelink sont autorisés à effectuer une étude portant sur le recensement, l'écologie, le comportement et la conservation des populations du singe magot dans les régions de Tétouan (Ghorghiz) et Chaouen (Bouhachem, Kelti et Moulay Abdessalam).

Article deux : les permissionnaires sont tenus d'informer, au moins cinq (5) jours à l'avance, les Autorités Provinciales de Tétouan et Chaouen ainsi que le Directeur Régional des Eaux et Forêts du Rif (Tétouan) des dates et lieux où ils comptent effectuer cette étude.

Article trois : les bénéficiaires sont tenus de fournir au Haut Commissariat aux Eaux et Forêts et à la Lutte Contre la Désertification un rapport sur le déroulement et les résultats de l'étude.

Article quatre: la présente autorisation est valable du **10/06/2009** au **09/05/2010** inclus. Elle est consentie à titre essentiellement révocable et le bénéfice peut à tout moment être retiré aux bénéficiaires si le Haut Commissariat aux Eaux et Forêts et à la Lutte Contre la Désertification estime cette mesure opportune et motivée, notamment dans le cas où les bénéficiaires contreviendraient aux dispositions des dahir et arrêtés susvisés ainsi qu'à celles de la présente décision.

Article cinq : La présente autorisation devra être présentée à toute réquisition des agents chargés de la surveillance, de la police de la chasse et de la protection de la nature.

Rabat, le 02 JUIN 2009

Le Haut Commissaire aux Eaux
et Forêts et à la Lutte Contre
la Désertification

Signé : Dr. Abdeladim LHAFI

Direction de la Lutte Contre la Désertification et de la Protection de la Nature مديرية محاربة التصحر و حماية الطبيعة
3, rue Haroun Arrachid, Agdal-Maroc 3، زنقة هارون الرشيد، أكدال- المغرب
Fax : 037.67 26 28 : الفاكس. Tél : 037 67.39.32 الهاتف:
Siteweb : www.eauxetforets.gov.ma : الموقع الإلكتروني

Appendix 5

Photographs used in my survey of shepherds' local ecological knowledge of carnivores in Bouhachem

The photographs are in the order in which I presented them to shepherds.

Figure 1. Red fox (*Vulpes vulpes*)

Figure 2. Golden Jackal (*Canis aureus*)

Figure 3. Common genet (*Genetta genetta*)

Figure 4. Otter (*Lutra lutra*)

Figure 5. Domestic dog *(Canis familiaris*)

Figure 6. Domestic dog (German shepherd type)

Figure 7. Iberian wolf (*Canis lupus signatus*)

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