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Conservation of the Uzbek Ustyurt saiga population: Assessing the drivers of illegal behaviour using the Theory of Planned Behaviour

By

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A report submitted in partial fulfilment of the requirements for the MSc and/or the DIC

September 2015

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SAIGA CONSERVATION ALLIANCE

Table of Contents

List of figures

List of tables

Abstract

The plight of the saiga antelope (*Saiga tatarica*) as one of the most threatened mammals in the world is a pertinent example of the consequences of illegal natural resource use. Despite international protection and conservation efforts, saigas continue to be hunted for both their meat and horns, making an improved understanding of the drivers of human decision-making a necessity to enable the design of more effective targeted saiga conservation efforts.

This study assesses the prevalence and motivations of saiga meat consumption in the Uzbek Ustyurt range of the saiga antelope. The Theory of Planned Behaviour, a psychological framework for the study of human decision-making, is combined with an emerging tool for estimating the prevalence of sensitive behaviours – the Unmatched Count Technique (UCT). A mixed-methods approach employing both quantitative household questionnaires and qualitative key informant interviews is used to better understand the social context of saiga conservation in the area.

Findings reveal that discussion surrounding the topic is extremely sensitive, with the application of the UCT having limited success. It is shown that while attitudes towards saigas are positive, traditional social norms continue to drive a high level of demand for its meat. However, as supply has decreased, so too has the consumption of saiga meat within local villages, with associated changes to poaching activity, means of procurement and the economic status of the people who purchase and consume it. Results are examined and used to make suggestions for further investigation and conservation action. This study joins a growing body of conservation literature in stressing the fundamental importance of addressing the drivers of human behaviour in order to reduce unsustainable resource exploitation and achieve long-term conservation goals.

Acknowledgements

1. Introduction

1.1. General introduction

Anthropogenic pressure on natural environments is resulting in unprecedented levels of biodiversity loss across the world (Vitousek 1994). This has attracted increasing international concern over recent decades, with collective efforts from governments, non-governmental organisations (NGOs) and research academics to better understand and manage the exploitation of natural resources (Bouwen & Taillieu 2004). Conservation interventions have traditionally been underpinned by rules designed to regulate, restrict or prohibit the use of biological resources (Keane *et al.* 2008). This has been applied across a variety of scales ranging from a multilateral treaty on the Convention of Biological Diversity (CBD), to regional and national efforts such as the EU fishing quota and the designation of National Parks.

The success of nature conservation, whether regarding single species or landscape-scale interventions, is therefore intrinsically reliant on human adherence to prescribed rules and regulations (Arias 2015). However, noncompliance appears to be rife, with activities such as illegal wildlife trade being ranked amongst the most widespread illicit activities occurring globally, particularly in the developing world (Haken, 2011). In order to reduce this illegal behaviour, as well as inform future decision-making, there is a strong need to first assess the prevalence and nature of involvement in such activities (Gavin *et al.* 2010; Nuno *et al.* 2013). However, the quantification of rule-breaking behaviours can pose substantial methodological difficulties due to the sensitivity of the information involved (Gavin *et al.* 2010).

To achieve positive conservation outcomes, the application of methods to effectively discern and quantify illegal resource use is required. Approaches employed in past studies have included law enforcement records, self-reporting and direct questioning (Gavin *et al.* 2010). Each of these is appropriate in certain circumstances, however all can be associated with high levels of bias. For example, response bias is particularly likely to feature when the information of interest is of a sensitive nature, increasing the likelihood of inaccurate self-reporting (Dalton *et al.* 1994). As a result, indirect

questioning techniques, which ensure the anonymity of responses, have been developed to reduce the likelihood of such errors in surveys (Warner, 1965). The application of indirect questioning techniques is historically lacking in conservation literature, however recent examples of successful use have been provided in the form of the Randomized Response Technique (RRT) (St John *et* al. 2010a) and the Unmatched Count Technique (UCT) (Nuno *et al*. 2013).

Although important, quantifying the extent of illegal activities is not enough to alone ensure the future success of biodiversity conservation. In order to effectively manage human behaviour, an understanding of individual decision-making processes is required (Holmes, 2003; St John *et al*. 2010b). This has led to a growing interest in the integration of social science with ecology within the field of conservation (Milner-Gulland 2012). The focus of such integration has developed over time, with shifts within literature away from the application of economic models, to a greater use of social-psychological frameworks as a basis for understanding human behaviour (St John *et al*. 2010b). In particular, through tracing attitudes, subjective norms and perceived behavioural control as underlying foundations of behaviour, the application of the Theory of Planned Behaviour (TPB) (Ajzen 1991) has provided a valuable framework in attempting to understand actions relating to resource use (St John *et al*. 2010b; Arias 2015).

Applying a theoretical framework to investigate the motivations surrounding illegal behaviour enables the design of targeted interventions. However, although recent studies have begun to tackle both the issues of quantifying illegal resource use (e.g. St John *et al*. 2010a; Nuno *et al*. 2013), and understanding the interactions between human behaviour and ecological systems (e.g. Holmes, 2003; Zubair & Garforth 2006), gaps remain in attempting to combine these two central elements of conservation. By linking social survey techniques such as the UCT, with psychological frameworks such as the TPB, a more thorough understanding of the factors influencing why compliance or noncompliance occurs may be identified (Fairbrass 2012; Arias 2015), and conservation strategies accordingly designed and implemented.

1.2. Case study: the saiga antelope

The saiga antelope (*Saiga tartarica*), a nomadic herding species found in semi-arid deserts of Central Asia, represents one of the most threatened mammals in the world, being classified as critically endangered on the IUCN Red List (Mallon 2008a). While active conservation measures have stabilised population numbers in parts of its range, the Uzbek Ustyurt population continues to be under serious threat. The antelopes are hunted both as a meat source, and for trade in their horns in the traditional Chinese medicine market (Bykova & Esipov 2004). Resultantly, the species has been listed by the Convention on Migratory Species (CMS) and CITES, and is nationally protected in all its range states (CMS 2014). Additionally, as part of on-going conservation efforts in Uzbekistan, the Saiga Conservation Alliance (SCA), established in 2006, has implemented community based conservation initiatives with the aim of improving public awareness of the issues threatening saigas (SCA 2009a; Bykova *et al*. 2014).

The legal protection of *S. tartarica* (CMS 2014), widespread saiga conservation efforts (Bykova *et al*. 2014), and the existence of evidence suggesting the continuation of illicit activities (Kühl *et al*. 2009; Hogg 2014), combine to make this an extremely pertinent species for study. The use of the UCT to determine the prevalence of saiga meat consumption in the pre-Caspian population of southwest Russia, revealed this illegal behaviour to be both high and widespread (Hogg 2014). However, uncertainty remains over the prevalence and motivations of such behaviour in the transboundary saiga population of the Ustyurt Plateau, which migrates between Kazakhstan and Uzbekistan (Phillipson & Milner-Gulland 2011).

Linking behavioural predictors to estimates of saiga meat consumption would improve understanding of how best to target saiga conservation on the Ustyurt. In conjunction with previous studies carried out in the area (Damerell *et al*. 2011; Kuhl *et al*. 2009; Phillipson & Milner-Gulland 2011), the characterisation of such relationships can help to assess the success of SCA programmes and target future initiatives. This is now of greater importance than ever following recent set-backs to saiga conservation stemming from the catastrophic collapse of the central Kazakhstan population this spring (CMS 2015) and the construction of a fence along the Kazakh-Uzbek border in 2012, severely limiting saiga migratory movements (Olson 2013).

1.3. Project aims

This project aims to evaluate the nature of illegal saiga meat consumption in Uzbekistan. In particular, this study will aim to:

1. Investigate the knowledge, attitudes, social norms and perceived behavioural control associated with the hunting and consumption of saiga antelope
2. Determine the prevalence of saiga meat consumption within communities on the Uzbek Ustyurt through the use of the UCT
3. Identify strengths and weaknesses of current strategies to provide recommendations for future saiga conservation and awareness initiatives

2. Background

2.1. Understanding drivers of human behaviour

The alteration of human behaviour is the primary focus of conservation interventions. However, the success of such interventions critically depends upon an accurate identification and thorough understanding of the predictors of the behaviour in question (St John *et al.* 2010b). Achieving this allows the implementation of more targeted strategies to prevent human-driven biodiversity loss (Holmes, 2003; St John *et al.* 2010b).

Growing concern surrounding human impacts on natural ecosystems, and a wider recognition that social science has an important role to play in conservation (Milner-Gulland 2012), has led to the emerging field of *conservation psychology* (Saunders 2003). This is an interdisciplinary subject, involving principles from ecological and social science disciplines to use "psychological principles, theories, or methods to understand and solve issues related to human aspects of conservation" (Saunders 2003). However, despite social science methods being increasingly applied in ecological research, challenges remain in designing such studies (St John *et al.* 2014).

Attitude has often been citied as an important determinant of behaviour, with the general belief that positive conservation attitudes are linked to pro-environmental conduct (St John *et al.* 2010b). However, investigations of such relationships have often found a mismatch between the attitudes held by respondents, and their behaviour relating to natural resource use (e.g. Arjunan *et al.* 2006). This mismatch has been attributed to studies attempting to link a particular behaviour to more general, or not directly related, attitudes (St John *et al.* 2010b). Assessments of the factors influencing behaviour should instead be made in relation to the specific behaviour of interest (Ajzen 1991; St John *et al.* 2010b). Additionally, the low explanatory power described by studies investigating attitude may arise from their failure to encompass variability attributable to other potentially important determinants of behaviour.

Numerous models exist which aim to define the inputs influencing a behavioural action. Of these, the frameworks most frequently applied to account for pro-environmental behaviour include: the norm-activation model (NAM; Onwezen *et al.* 2013), and the

theory of planned behaviour (TPB; Ajzen 1991; Bamberg & Möser 2007). The NAM places *personal norms*, determined by feelings of responsibility and moral obligation, as the primary driver of behaviour (Onwezen *et al.* 2013). Meanwhile, the TPB posits that intentions are determined by *attitudes*, *subjective norms*, and *perceived behavioural control*; with behaviour itself determined by intentions (Figure 2.1; Ajzen 1991). As a leading theory in social psychology, and a model that encompasses both self-interested and socially-motivated factors as foundations of behaviour, the TPB has been chosen as the methodological framework on which this study is based.
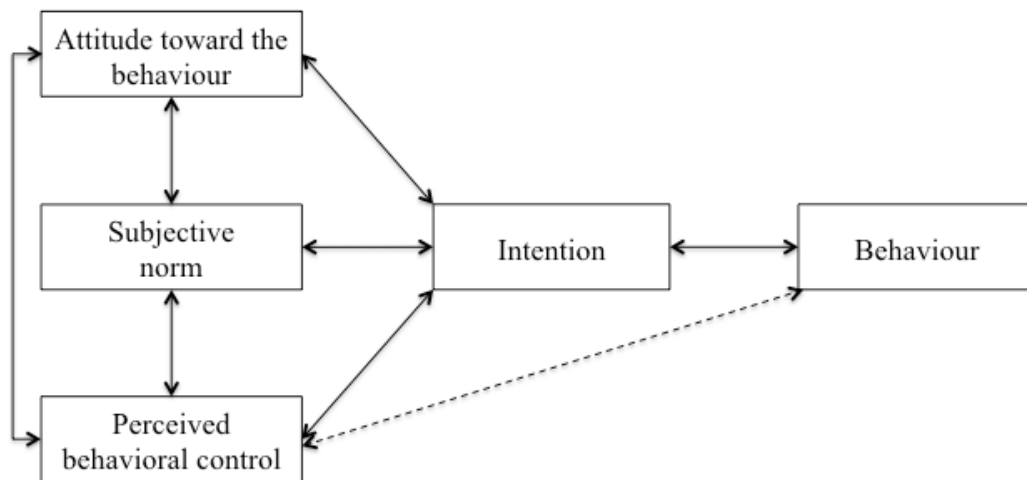
Figure 2.1. The Theory of Planned Behaviour (Ajzen 1991)

2.1.1. Theory of planned behaviour

The TPB was developed as an extension of the theory of reasoned action. Its application has been promoted as a means to aid the design of targeted interventions to alter a behaviour of interest (Ajzen 1991). This involves investigating three given drivers of behavioural intention: (i) attitude – an individual's view on a particular behaviour; (ii) perceived social norms – the social and cultural pressure felt to take part in a behaviour or not; and (iii) perceived behavioural control – an individual's perception of the ease or difficulty of carrying out the behaviour of interest (Figure 2.1). The relative importance of each of these factors is expected to vary across behaviours and circumstances (Ajzen 1991). Therefore each behavioural situation requires its own empirical study in order to identify the areas most suited for intervention.

A number of publications have promoted the use of the TPB in the context of conservation (St John *et al*. 2010b; Milner-Gulland 2012; St John *et al*. 2014). However, few studies have effectively applied the framework within the context of natural resource management (Williams *et al*. 2012; Mastrangelo *et al*. 2014; St John *et al*. 2014). One such investigation by Mastrangelo *et al*. (2014) successfully utilised the TPB to explain 41 per cent of variance in the intentions of rural landowners to conserve forest remnants on an agricultural frontier in Argentina. Findings revealed social norms and attitudes to have the largest direct impact on behavioural intention, with the authors therefore able to identify the factors most relevant to forest conservation intervention (Mastrangelo *et al*. 2014).

An additional driver of human behaviour often combined with the TPB is *knowledge*. Conservation interventions such as environmental education are carried out on the premise that knowledge is a driver of attitudes and social norms, with appropriate knowledge provision encouraging pro-environmental behaviour (Burgess *et al*. 1998; Bradley *et al*. 1999; Heimlich 2010). It is therefore pertinent to include this additional factor when attempting to assess the determinants of human behaviour. In the context of non-compliant behaviour, it is not just knowledge concerning ecology and species status that is relevant, but also knowledge surrounding the rules protecting the resource in question; individuals can only be expected to comply with restrictions if they are aware of them (Keane *et al*. 2011).

2.2. Quantifying sensitive behaviour

Illegal behaviour is a major threat to biodiversity across the world (Keane *et al*. 2008). Quantifying and understanding the nature of noncompliance in conservation is therefore a vital step in the design of effective natural resource management strategies. However, as the assessment of illicit behaviour involves investigations that respondents may perceive as entailing complications or implications, such research is deemed socially sensitive (Dickson-Swift *et al*. 2008).

Direct questioning has often been used as a method to measure and monitor resource use (Gavin *et al*. 2010). However, when sensitive topics are involved, studies are likely to be impaired by high levels of bias, even if accompanied by assurances of anonymity

(Dalton *et al.* 1994; Nuno & St John 2015). For instance, non-response bias may arise when individuals refuse to participate in surveys, resulting in a non-random sample group of interviewees. Additionally, respondents may feel obliged to lie in order to project a more favourable view of themselves, resulting in social desirability bias and thereby reducing the validity of data (King & Bruner 2000; St John *et* al. 2010a).

The challenges associated with the assessment of sensitive behaviours have long been acknowledged across a range of fields. This has resulted in the development of a variety of concepts and tools to better understand rule-breaking behaviour (Arias 2015). In particular, indirect questioning methods make it impossible to link individuals to potentially incriminating data (Warner 1965). This reduces the risk respondents feel when disclosing sensitive information, thereby increasing willingness to participate, and minimizing potential sources of bias (St John *et al.* 2010a).

The application of indirect questioning techniques in conservation has primarily focused on the Randomized Response Technique (RRT) (Warner 1965; Solomon *et al.* 2007; St John *et al.* 2010a). While different methods of implementation exist, the main premise of RRT is that a randomisation device is used to determine if the respondent answers a non-sensitive or sensitive question (Warner 1965). For example, in the 'forced response' RRT design utilised by St John *et al.* (2010a), participants either answer the sensitive question truthfully, or automatically say "yes" or "no", depending on the number rolled on a die (Lensvelt-Mulders *et al.* 2005). Although the interviewer is unaware of the option chosen, an estimate of the prevalence of the behaviour can be made through knowing the probability of the respondent truthfully answering the sensitive question.

The application of RRT to estimate rule-breaking among fly-fishers found that results from this technique yielded higher estimates of the prevalence of noncompliance than self-completed questionnaires (St John *et al.* 2010a) – a direct questioning method often used to guarantee anonymity. The authors therefore called for a wider application of the technique in conservation. However, the methodology has been criticized for its complexity, which has been shown to create feelings of suspicion in some respondents, with response rates often being lower for RRT than direct-questioning techniques (Coutts & Jann 2011; Phillipson & Milner-Gulland 2011).

2.2.1. The Unmatched Count Technique

The Unmatched Count Technique (UCT) (also called the Item Count Technique) is an alternative indirect questioning method, which has recently gained attention in conservation research (Dalton *et al*. 1994; Nuno *et* al. 2013). Respondents are randomly divided into two groups. Both groups are given the same questions and asked to state how many answers from a given list of statements applies to them, without divulging which are true. The control group is given a list of non-sensitive items, while the treatment group receives an identical list, with the addition of the behaviour of interest. A base rate for the sensitive behaviour may be estimated by calculating the difference in the mean scores between the groups (Dalton *et al*. 1994). By generating an estimate of the prevalence of a potentially incriminating behaviour, whilst making it impossible to link this information to any particular individual, the UCT decreases the likelihood of social desirability bias.

Despite findings that the UCT outperforms the RRT in a range of evaluations (Coutts & Jann 2011), few studies have demonstrated its application in the field of conservation. Nuno *et al*. (2013) utilized the UCT to estimate the prevalence of illegal bushmeat hunting in the Serengeti, with results revealing that eighteen percent of respondents were involved in this illegal activity. Linking these findings to socio-economic characteristics enabled the identification of the drivers influencing participation in hunting. Assessments of potential survey biases showed that the majority of respondents found the UCT questions easy to understand and were comfortable answering them, with the authors recommending the UCT as a tool for investigating noncompliance in conservation (Nuno *et al*. 2013).

There are a number of assumptions associated with the UCT that should be considered when designing studies utilising the technique. Firstly, the assignment of respondents to the control and treatment groups must be entirely *random*. Secondly, there should be *no design effect*, so that the inclusion of the sensitive topic in the treatment list does not alter responses to the control items. Finally, it is assumed that there are *no liars* amongst respondents (Glynn 2013).

In order to reduce the risk of violating the second and third assumptions, careful consideration of the control items is required to ensure that they are non-sensitive in nature, whilst being related to the sensitive behaviour in question (Imai 2010). The non-sensitive items should include one item of extremely low prevalence and one of extremely high prevalence so as to limit the likelihood of floor or ceiling effects (Glynn 2013). Even with the assumption of random allocation satisfied, the difference in means between the groups may not be entirely related to the number of respondents choosing the sensitive behaviour. Therefore a large sample size is necessary in order to minimise this uncertainty (Dalton *et al*. 1994). This is a requirement that has been cited as a criticism of the method (Blair & Imai 2012); however, large sample sizes are also important in the administration of the RRT and other indirect questioning techniques (Nuno & St John 2015).

In order to explain *why* a non-compliant behaviour is carried out despite its potential implications, indirect questioning methods such as the UCT may be used in conjunction with social-psychological theories such as the TPB (Arias 2015). Social surveys investigating relevant determinants of behaviour may be coupled with the UCT, in order to generate an estimate of behaviour and populate the TPB framework. In this way, the importance of knowledge, attitudes, social norms and perceived behavioural control may be assessed in relation to actual behaviour.

2.3. Case study

2.3.1. The saiga antelope: ecology and status

The saiga antelope (*Saiga tatarica*) is a nomadic species inhabiting the semi-arid landscapes of Central Asia. There are two sub-species in existence: *S. t. tartarica*, found in four populations within Russia, Kazakhstan and Uzbekistan; and *S. t. mongolica*, which is now endemic to Mongolia (Figure 2.2; Milner-Gulland *et al*. 2001). As the only migratory wild ungulate in its range, saigas have a vital influence on ecosystem structure, providing an important food source for raptors and predators, as well as maintaining floral diversity through grazing (Bekenov *et al*. 1998; Phillipson & Milner-Gulland 2011).

Figure 2.2. Saiga antelope populations, with approximate range areas and country borders. *Saiga tatarica tatarica*: 1 Kalmykia, 2 Ural, 3 Ustyurt, and 4 Betpak-dala populations; *Saiga tatarica mongolica*: 5a Shargyn Gobi population and 5b Mankhan population, Mongolia. (From Milner-Gulland *et al.* 2001)

Once roaming in herds of up to 100,000 individuals, the saiga antelope has been hunted for its meat, horns and hide throughout recorded history. Over-exploitation caused population levels to reach near-extinction in the early 20th century (Bekenov *et al.* 1998). However, the enforcement of strict Soviet conservation measures enabled a recovery in saiga numbers; a trend aided by the high fecundity of the species, with females reaching sexual maturity after eight months and exhibiting frequent twinning (Milner-Gulland *at al.* 2001).

The dissolution of the Soviet Union in 1991 marked another turning point for saiga populations. A decrease in conservation efforts, deterioration of rural communities, and opening of international boarders facilitating trade, led to the over-exploitation of natural resources, with dramatic increases in the illegal trade of saiga products such as horn and meat (Kühl *et al.* 2009). In particular, male antelopes have been targeted by poachers for their horns, which are traded to East and South-East Asia for use in Traditional Chinese Medicine (Milner-Gulland *at al.* 2001; Kühl *et al.* 2009). Such selective hunting has led to a skewed sex ratio in saiga populations, contributing to a 95 per cent reduction in their population over the two decades following Soviet collapse

(Milner-Gulland *et al*. 2001). Resultantly, the saiga antelope is now listed as critically endangered on the IUCN Red List (Mallon 2008a).

Coordinated international planning for saiga conservation began in 2006, with the signing of the Convention on Migratory Species' (CMS) Memorandum of Understanding on saiga conservation (CMS 2010). Conservation measures, coupled with favourable environmental conditions, have led to the stabilisation of, and even increase in, population numbers in parts of the saiga's range. However, a catastrophic die-off amongst the Betpakdala population in May 2015 has been a major set-back to conservation efforts, with an estimated death-toll of over 200,000 individuals representing more than half of the total estimated saiga population (SCA 2015). The reasons for the deaths remain under investigation, but this set-back makes the need for conservation intervention against other drivers of saiga decline (e.g. poaching and infrastructural pressures), more imperative than ever before.

2.3.2. The Ustyurt saiga population

The Ustyurt Plateau maintains the only saiga population that has a significant trans-boundary component, with migration routes taking herds across the border from Kazakhstan to Uzbekistan during the winter months. It is the saiga population suffering the most severe on-going decrease in numbers, currently estimated to number around 1,000 individuals, down from 10,000 in 2008 and 200,000 in 1999 (E.J. Milner-Gulland pers comm.). In addition to poaching pressure, the development of oil and gas infrastructure in the form of gas pipelines, major roads, and railway lines, has affected the Ustyurt ecosystem and impacted saiga movements (Bykova & Esipov 2004). More recently, the construction of a fence along the Kazakh-Uzbek border in 2011-12 directly blocks saiga migration routes, with evidence suggesting that it has already contributed to severe declines in the Ustyurt saiga population (Olson 2013; Bykova *et al*. 2015).

Transect surveys conducted in the Karakalpak Ustyurt, Uzbekistan, monitored 244-317 individuals in May 2012, declining to 12 individuals in September 2012, with none observed in either September 2014 or February 2015 (Bykova *et al*. 2015). This marks a crisis point for the Ustyurt saiga population. While potential mitigation measures

regarding the border fence are under discussion, poaching continues to be a major factor threatening the remaining individuals (E. Bykova pers comm.).

2.3.3. The Uzbek Ustyurt: Social context

The Republic of Uzbekistan is a resource-rich country located in Central Asia, with a human population numbering 30 million individuals (UNDP 2013). Gradual economic growth led to the country's reclassification from a low-income to a lower middle-income nation by the World Bank in 2011. However, gross domestic product (GDP) per capita remains low, being estimated at $3,287 per annum, ranking it at 162 out of 230 countries in the world (CIA 2014). Additionally, there is considerable regional variation in wealth within the nation. In particular, the Republic of Karakalpakstan, within which lies the winter range of the Ustyurt saiga population, has been deemed as having the highest poverty risk of all regions in Uzbekistan (Phillipson & Milner-Gulland 2011).

Recognised as a sovereign state within Uzbekistan, the Republic of Karakalpakstan is home to approximately 5.6 per cent of the country's population, yet has a GDP worth only 2.4 per cent of Uzbekistan's total (Bikbaeva & Gaibnazarova 2009). The Aral Sea catastrophe, high levels of desertification and past biochemical weapons research, have led to Karakalpakstan facing some of the worst environmental, health and economic problems in Central Asia. The ethnic makeup of the region's population, with a third being ethnic Karakalpak, contrasts to Uzbekistan as a whole, where 80 per cent of the population is listed as Uzbek, and less than three per cent Karakalpak (CIA 2014). While the extraction of oil and gas resources is growing in the region, local inhabitants feel few economic benefits, with many Karakalpaks emigrating to neighbouring Kazakhstan and Russia in the face of unemployment (Omirbek 2015).

Poverty and a lack of alternative livelihood options have been frequently cited as motivations for the hunting of saigas. In particular, hunting male individuals for their horns has been highlighted, with 1kg of product being worth between $250-750 (Phillipson & Milner-Gulland 2011). Such activities were particularly rife during the 1990s, when the goal of procuring horns was so high that the remaining saiga carcasses were often left at kill sites (Kühl *et al*. 2009). However, the role of saigas as a meat source is also a major motivation for hunting activity (Kühl *et* al. 2009; Damerell *et al*.

2011). This has increasingly been the case with the current low population numbers making targeted hunting for males extremely difficult and less profitable.

Saiga meat has historically been a traditional part of the cuisine of the region, and has been found to be cheaper than major alternative meats in Uzbekistan (Kühl 2008; Damerell *et al*. 2011). This has led to it being referred to as "the meat of the poor" (Kühl 2008). However, more recent investigations have found that a range of prices exist across the trade system, with saiga meat now being viewed as a luxury in some areas, such as by some people in Russia (Hogg 2014). Despite the uncertainty concerning saiga meat trade and demand, and the acknowledgement that meat consumption is an important factor that continues to fuel poaching, there has been a much weaker focus on it as compared to the horn trade. A study by Hogg (2014) utilised the UCT to shed light on the nature of such activities in Kalmykia, Russia, revealing high existing demand for saiga meat, and a range of views regarding its qualities. A similar investigation within the Uzbek Ustyurt is necessary in order to improve current understanding of the human dimensions surrounding saiga poaching, trade and consumption. In particular, attitudes towards saiga meat consumption and to poaching for horns appear to be very different among local people, with the latter being viewed more negatively (Damerell *et al*. 2011). This suggests that conservation action to promote changes in the social norms regarding the consumption of saiga meat may be required in order to decrease demand for it; thereby reducing associated pressures on the species.

2.3.4. Saiga legal protection and conservation initiatives

S. tartarica is listed under the Convention on Migratory Species (CMS) Appendix II and in Appendix II of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). It is a legally protected species in all its range states. Within Uzbekistan, anyone found in the possession of saiga or their horns may be fined up to 50 times the national minimum salary per animal and face the chance of imprisonment (Appendix 4, Code 9 on the use of Plants and Animals, Criminal Code of Uzbekistan) (national minimum salary is UZS 107,635 (US$42) per month; UzReport 2014). However, whilst confiscations of illegal equipment used for saiga poaching have

taken place, in practice, few fines or imprisonments have ever been administered in Uzbekistan.

In addition to legal protection, public engagement and education initiatives have been carried out by the Saiga Conservation Alliance (SCA) in communities within the saiga range. This includes an education programme on saiga conservation in schools (Steppe Wildlife Club); annual events in local towns and villages to raise awareness regarding the species (Saiga Day); and an alternative livelihood scheme that enables the establishment of embroidery collectives (Bykova *et al*. 2014).

2.3.5. Survey site details

The Uzbek Ustyurt measures about 110,000 km^2 in size, accounting for 60 per cent of the area of Karakalpakstan. Permanent human settlements have been established since the 1970s, following rapid development of gas extraction (Phillipson & Milner-Gulland 2011). They tend to be located along the parallel constructs of the Kungrad-Beyneu railway, gas pipeline and highway (Figure 2.3).

The village of *Kubla-na Ustyurt* is a small settlement of 43 households (Fig 2.3). Located close to the Aral Sea, the sea's demise has led inhabitants who once fished to rely more heavily on hunting (Synnott 2015). A previous study found that as a result of unemployment, a large proportion of Kubla-na Ustyurt's male population was involved in saiga poaching and trade (Bykova & Esipov 2004). *Kyr-Kyz* contains approximately 200 households. Its location by a railway and compressor station, and proximity to the town of Kungrad, may make involvement in poaching and reliance on hunted meat less likely in this village (Phillipson & Milner-Gulland 2011). *Jaslyk* and *Karakalpakia* are both relatively large villages with 799 and 710 households, respectively. However, a high level of emigration to Kazakhstan has seen a change in population demographics in recent years. Both villages have been previously identified as focal points for poaching activity and the smuggling of saiga products into Kazakhstan (Bykova & Esipov 2004; Kühl *et al*. 2009; Phillipson & Milner-Gulland 2011).

Figure 2.3. Location of survey sites within Central Asia. Map inset shows a magnification of the hatched area over the Republic of Karakalpakstan, displaying survey villages, the Uzbek boarder and the path of a major railway line and road cutting through the Ustyurt Plateau.

3. Methods

3.1. Study site

This study was conducted in the Republic of Karakalpakstan, Uzbekistan in May and June 2015. Surveys were carried out in two villages within the range of the Ustyurt saiga population – Kubla-na Ustyurt and Kyr-Kyz – with three and six days spent in each location, respectively (Figure 2.3). In addition, a number of key informant interviews were conducted in the cities of Nukus and Tashkent, the capitals of Karakalpakstan and Uzbekistan.

Study communities were chosen based on their location within the saiga range; small size allowing for a representative sampling of households; and likely involvement in the consumption of saiga products (based on previous studies, e.g. Phillipson & Milner-Gulland 2011). Original survey plans had also included the larger villages of Jaslyk and Karakalpakia (Figure 2.3), however restrictions on researcher movements made this unfeasible.

3.2. Research methods

Quantitative and qualitative social research techniques were utilized for data collection. This mixed-methods approach enabled the study to draw on the strengths of each technique: in-depth information from a small number of qualitative interviews involving people with specialist knowledge could be combined with more widely representative data from a questionnaire survey of a larger sample of the population (Newing 2011). Additionally, results from each source could be triangulated, thereby reducing the uncertainty that is involved in the study of sensitive issues (Gavin *et al*. 2010; Newing 2011). As such, this research took a two-pronged approach to evaluating the nature and prevalence of saiga meat consumption and the factors influencing it:

1) Key informant (KI) interviews
2) Standardized household questionnaire surveys

Village surveys were carried out by a team of researchers from local partners, employing an immersive strategy that involved walking on foot from house to house

and living with local families. Due to restrictions imposed on movement, UK researchers (including the author of this study) were unable to partake in data collection within the villages. However, several training days were run by the UK researchers and a guideline document was written and translated into Russian for the local team members (Appendix 8.1). Key informant interviews in the cities of Nukus and Tashkent were conducted by the author (LK) with a Russian interpreter.

Relevant authorities and the heads of each village administration were approached before data collection. This served the purpose of informing them of the aims of the project and the duration of work in the area. All respondents were made aware that participation in the questionnaire and/or interview was voluntary, that information collected was anonymous, and that questions could be skipped, or the interview stopped, at any point.

3.3. Methodological framework

The theory of planned behaviour is used as a framework to assess the factors driving the behaviours of purchasing and consuming saiga meat. This includes the variables of attitude, social norms and perceived behavioural control (Ajzen 1991). Additionally, general attitudes and knowledge are assessed as further determinants of environmental behaviour. The relationships expected based on theoretical groundings and previous empirical findings are outlined in table 3.1 and figure 3.1.

Table 3.1. Study hypotheses and supporting statements

Expectations	Supporting arguments	References
A. Greater knowledge of wildlife, saiga ecology and rules will lead to more positive attitudes and decrease the likelihood of involvement in saiga exploitation and eating saiga meat	Knowledge shown to lead to increased pro-environmental behaviour	Bradley *et al*. 1999
	General theoretical assumption of "knowledge to attitude to behaviour" causality, supported by TPB linking all elements of the framework	Ajzen 1991; Heimlich 2010
B. Demographic and socio-economic status will impact TPB elements, with favourable situations decreasing likelihood of involvement in saiga-related activities and consumption	Poverty linked to illegal natural resource use.	Mainka & Trivedi 2002
	Lack of livelihood options shown to be motivation for hunting saiga, with consumption of saiga meat linked to poorer households	Kühl *et al* 2009; Phillipson & Milner-Gulland 2011; Hogg 2014
C. Attitudes, social norms and perceived behavioural control will be correlated, with favourable responses decreasing the likelihood of eating saiga meat and partaking in related activities	Based on the TPB, with empirical studies providing evidence of links between the TPB elements within a conservation context	Ajzen 1991; Williams *et al*. 2012; Mastrangelo et al. 2014; St John et al. 2014
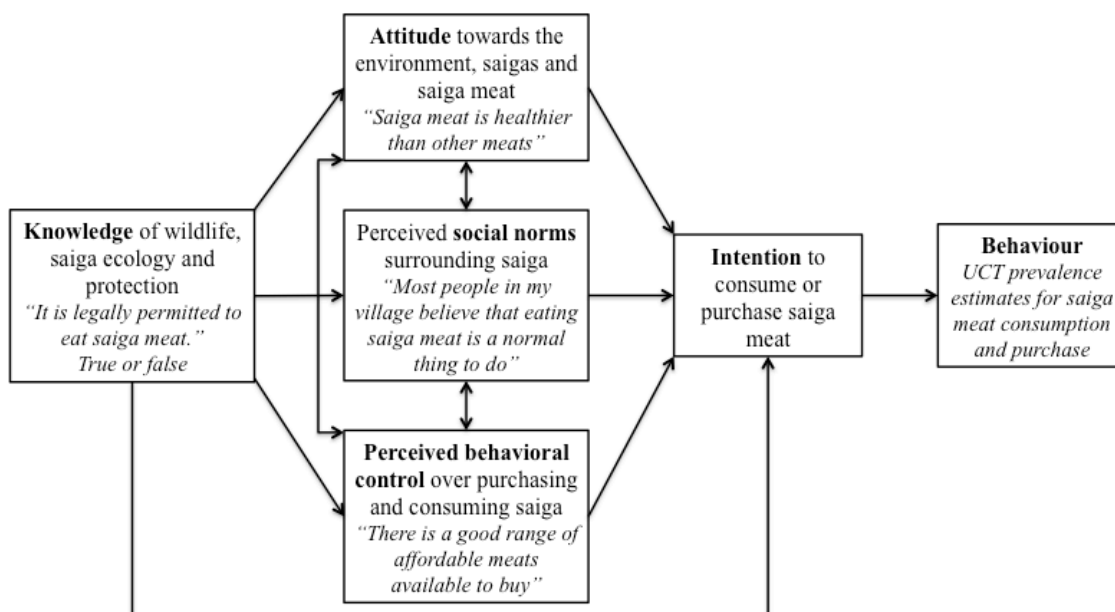
Figure 3.1. Components of Ajzen's (1991) Theory of Planned Behaviour adapted for this study. Example statements measuring each construct within the household questionnaire are included, with answers corresponding to a Likert scale of agreement.

24

3.4. Questionnaire survey

Questionnaires were administered face-to-face in the Karakalpak, Uzbek or Russian language depending on the preference of the respondent. All households were approached in each village, representing a census survey. If the household head was not available for questioning, the next available adult was approached. The questionnaire was divided into 10 sections (Appendix 8.2), with questions largely based on those used in previous social studies relating to saiga conservation (Damerell 2011; Phillipson & Milner-Gulland 2011; Hogg 2014; Mabbutt 2014), thereby enabling comparisons of results to be made.

Section 1 – a series of questions aimed at collecting individual-level information on the socio-demographic situation of the respondent. This included education and employment status in addition to basic demographic data.

Section 2 – attitudes to the steppe environment were explored using three statements with a six-point Likert scale of agreement from "strongly agree" to "strongly disagree". This links to the component of "attitude" in the TPB and served as a warm-up section to familiarise the respondent with answering questions related to the environment before sensitive topics regarding saigas were broached.

Section 3 – the UCT was employed to calculate prevalence estimates on engagement in hunting, consumption of saiga meat, and purchase of saiga meat. Respondents were asked how many activities they had performed or items consumed over the preceding 12-month period. This section was placed early on in the questionnaire to precede the introduction of saigas as a topic, so as to prevent respondents being put on guard. Additionally, the questions were ordered in increasing sensitivity to minimize the design effects which are unavoidable in sensitive list experiments (Ajzen 2006).

Non-sensitive warm-up questions were included regarding television programmes watched, and food dishes consumed. These served the purpose of familiarising the respondent with the technique and enabling the interviewer to ensure that the method was understood. Non-sensitive items for the UCT answers were selected in conjunction with local researchers on a training day held by LK (Appendix 8.4). Respondents were

randomly assigned to either the treatment or control group for each question by presenting both lists face down on pieces of coloured card, with the respondent selecting which card to answer from each time. While choices are expected to be random, bias in choosing a particular colour may arise for various reasons. Resultantly, the proportion of respondents in the treatment and control groups for each question was examined in analysis.

Despite employing an indirect method, the questions were designed to include the four elements recommended by Ajzen (2006) as required in order to define the behaviour of interest: Target, Action, Context, and Time (TACT). For example, in Q3.4 (Appendix 8.2), although not mentioned directly, the target is saiga and is included in the treatment card. Eating is the action of interest, with the number of meats considered the context and a 12-month period defined as the time.

Section 4 – questions concerning ecology and conservation in the Steppe were included in order to generate a knowledge measure. This consisted of an animal photo quiz based on previous saiga studies investigating knowledge (Mabutt 2014), and a series of true or false questions regarding saigas. Each correct response was scored +1, to give an overall knowledge score out of a total of eight points. Knowledge was included as an element which has been found to influence pro-environmental behavior (Gifford & Nillson 2014), with a question regarding the knowledge of rules included as an important consideration when assessing compliance (Keane *et al.* 2011).

Sections 5-8 – each of these sections related to an element of the theoretical constructs of the TPB. A six-point Likert scale of agreement was used to investigate the strength and direction of attitudes, social norms and perceived behavioural control regarding saigas and the consumption of saiga meat.
- Sections five and six aimed to assess the attitudes of respondents to the consumption of saiga meat, and to saiga in general. Following findings that investigating general attitudes towards the environment is of limited use to identify the predictors of specific behaviours (St John *et al.* 2010b), this investigates more explicit attitudes as compared to the questions included in section two of the questionnaire

- Section seven investigated the perceived social norms surrounding saiga conservation and meat consumption

- Section eight focused on four main elements of perceived behavioural control: the availability of alternative meats, ease of procuring saiga meat, likelihood of being served saiga in other households, and the penalties involved with hunting saigas.

Section 9 – this section was included to assess the levels of awareness surrounding each of the public engagement initiatives run by SCA, and determine if the respondent had taken part in them. Based on SCA's theory of change, it is expected that exposure to these initiatives would increase knowledge, improve attitudes and alter perceived social norms (table 3.1; figure 3.1).

Section 10 – based on previous studies in the saiga range (Hogg 2014; Phillipson & Milner-Gulland 2011), the final section consisted of fixed response multiple-choice questions to assess local opinion on the drivers behind poaching and the barriers to controlling ongoing engagement in such activities. This will help to inform SCA's activities through better understanding how local people perceive threats to saigas and the effectiveness of different conservation approaches.

3.5. Questionnaire pilot

Fellow researchers and students in the UK reviewed the household questionnaire before the translated Russian version was piloted on eight researchers from local partners in Uzbekistan, and six randomly selected respondents in the city of Nukus. This enabled an assessment of the suitability and ease of delivery of the questionnaire, and provided the research team with experience in applying it and explaining the UCT section in particular.

Several adjustments were necessary to correct mistakes made during translation, however, no questions required amendment or removal. When asked about the UCT section, all respondents reported that the questions were either easy or very easy to understand, and that they felt comfortable or very comfortable answering them. Additionally, all respondents felt that their answers were anonymous. This is consistent

with respondents' perceptions of UCT when used to assess the prevalence of illegal bushmeat hunting in the Serengeti (Nuno *et* al. 2013), and supports the use of the technique to minimize response bias often associated with sensitive subjects (Dalton *et al*. 1994).

3.6. Key informant interviews

Semi-structured interviews were conducted to explore the knowledge of Key informants on the illegal trade and consumption of saiga products (Appendix 8.5). Interviews were designed to be flexible, allowing for the elicitation of any specialist knowledge the respondent might have surrounding the topics of: hunting; trade and consumption of saiga meat; attitudes and law enforcement; recent events and future saiga conservation. Several sections were based on themes explored by Phillipson & Milner-Gulland (2011). This allows comparisons to be made between the studies, acting both as a means of triangulating findings and indicating developments in saiga trade since the earlier investigation.

Given the highly sensitive nature of the topic and general reluctance to share knowledge regarding it, respondents were identified opportunistically. Within the villages, respondents displaying a high level of knowledge and willingness to communicate during the household questionnaire were asked if they could take part in a key informant interview. Within the cities of Nukus and Tashkent, relevant organisations and notable individuals known to local partners were approached to be interviewed (Appendix 8.7). Interviews were followed up by chain referral where possible, with names of other potential interviewees requested.

3.7. Data analysis

3.7.1. Prevalence of behaviours

Data from the UCT section of the questionnaire was used to estimate the proportion of the surveyed population partaking in sensitive behaviours relating to saigas. The following equation was used:

$$p = \bar{x}_B - \bar{x}_A \qquad (1)$$

where p is the estimate of prevalence and $\bar{x}_B$ and $\bar{x}_A$ are the mean number of items chosen in the treatment and control groups, respectively. Welch's t-test was used to estimate standard error values.

3.7.2. Modelling UCT responses

The effects of socio-demographic factors, knowledge scores and attitudinal scores on prevalence estimates were explored through the use of generalized linear models (GLM). Univariate and multivariate linear models were fitted with household variables, knowledge scores and attitude scores in turn, with an interaction term for card type included (treatment or control) (Holbrook & Krosnick 2010).

3.7.3. Predictors of behaviour

3.7.3.4. Knowledge

Overall knowledge scores were assigned as the total number of questions answered correctly in section four of the questionnaire. A series of linear models were fitted to examine the association of knowledge scores with a variety of potential explanatory variables (table 3.1).

3.7.3.5. Attitudes

Likert scale answers to questions assessing attitudes to the environment, saiga meat and saiga in general, were assigned scores ranging from -2, for strongly negative responses towards saiga or the environment, to +2 for strongly positive responses. In order to determine if the scores from each question could be summated to form an overall composite score, the internal consistency between the questions was measured using Cronbach's alpha. This is a statistical test used to assess inter-rater reliability (Reynaldo & Santos 1999); an unacceptable level of agreement between the questions would indicate that they are measuring different elements of the respondents' attitudes, deeming them unsuitable to be combined. The internal consistency measures provided by George and Mallory (2003) are used as an indicative guide (table 3.2). Linear models were formed to test for associations between attitudes and socio-demographic variables, knowledge scores, other elements of the TPB and prevalence estimates (figure 3.1; table 3.1).

Table 3.2. Classification of internal consistency using Cronbach's alpha (George & Mallory 2003)

Cronbach's alpha (α)	Internal consistency
α ≥ 0.9	Excellent
0.9 > α ≥ 0.8	Good
0.8 > α ≥ 0.7	Acceptable
0.7 > α ≥ 0.6	Questionable
0.6 > α ≥ 0.5	Poor
0.5 > α	Unacceptable

3.7.3.6. Social norms and perceived behavioural control

The responses to questions in sections seven and eight were first explored graphically. Likert scale answers were assigned scores ranging from -2 for strongly disagree, to +2 for strongly agree. Statistical tests were carried out to determine associations with any potential explanatory variables (figure 3.1; table 3.1).

All analyses were performed using the R program v.3.0.1 (R Core Team 2014), with the *psych* package used to calculate Cronbach's alpha (Revelle 2015). Maps were drawn using Quantum GIS (QGIS Development Team 2014).

3.7.4. Qualitative data analysis

Information gathered from key informant interviews were examined for common ideas and patterns. The focus of analysis was placed on the key themes included in the interview design, with findings used to reinforce or contrast with results from the household questionnaires and previous studies, thereby acting as a means of triangulation. Additionally, any important unexpected information gained has been highlighted and discussed. Interesting comments and observations made by respondents to the household questionnaires were analysed in a similar fashion.

4. Results

All households within the villages of Kubla-na Ustyurt and Kry-Kyz were approached, with a total of 104 respondents to the household questionnaire. Refusal to respond was high, with 47 individuals declining to participate (31% of households in which people were present; 24% in Kubla-na Ustyurt and 34% in Kyr-Kyz). Additionally, three respondents stopped the questionnaire partway through its completion. This suggests that the topics involved are highly sensitive in nature, with the most common reasons given for not participating being that the respondent was "afraid" (n=10) or did not want to incur "additional problems" (n=3). Researchers were prevented by local authorities from conducting the study in Jaslyk and Karakalpakia, with reasons behind the decision being unclear. The demographics of respondents are outlined in Table 4.1, where it can be seen that the majority were male and of Kazakh ethnicity. Of the respondents working, by far the most common employer in both villages was the local compressor station (50%).

Fifteen key informants were interviewed, with details of respondents listed in appendix 8.7. Three KIs were identified in each village following household interviews. Six KIs from Nukus and three from Tashkent were identified through contacts known to collaborators at the SCA.

4.1. Prevalence of sensitive behaviours

Respondents to the treatment and control groups for each UCT question did not significantly differ in demographic attributes (chi-squared tests; Appendix 8.8), thus satisfying the assumption of random assignment. There were 104 responses to each of the five UCT questions, with the number of individuals in the treatment and control groups varying but not significantly differing between each question (chi-squared; $\chi^2 = 5.7$, df = 4, $p = 0.219$). This suggests the absence of selection bias which may have arisen if respondents had linked the coloured card options to their corresponding groups.

Table 4.1. Socio-demographic summary of respondents to the household questionnaire

Variable	Level	Count (N=104)	Proportion (%)
Gender	Male	63	61
	Female	41	39
Village	Kyr-Kyz	82	79
	Kubla-na Ustyurt	22	21
Age	16-20	3	3
	21-40	49	41
	41-60	43	41
	60+	9	9
Ethnicity	Karakalpak	15	14
	Uzbek	33	32
	Kazakh	54	52
	Other	2	2
Employment status	Working	70	67
	Unemployed	4	4
	State pension	16	15
	Student	1	1
	Homemaker	11	11
	Other	1	1
Education	None	5	5
	Primary	1	1
	Secondary	85	82
	Higher	13	13

Significant differences between the mean treatment and control group scores were only found in two of the five questions (Figure 4.1). This revealed that the prevalence of hunting activity is 45% (±19), whilst the non-sensitive food question estimated 38% (±18) of respondents had eaten kebab in the preceding 12 months. Whilst hunting is legal and assumed non-sensitive, it is a relevant topic as hunters are a potential interest group in saiga conservation. In the three remaining UCT questions, prevalence estimates were found to be higher in the control than in the treatment groups, however these differences were not significant (Figure 4.1). Therefore it was not possible to generate prevalence estimates for the two main behaviours of interest from the data gathered in this study (the purchase and consumption of saiga meat).

Based on the methodological framework used (figure 3.1) and the hypotheses laid out in table 3.1, attempts were made to form univariate linear models to link hunting behaviour with a variety of potential predictor variables. This included: socio-

demographic variables, knowledge scores and the constructs of the TPB. Scores for the perceived behavioural control question "there is a good range of different affordable meats available to buy" was linked to hunting behaviour (t = 2.29, df = 99, p = 0.024), with those who agreed with the statement more likely to have partaken in hunting activities. No other variables displayed a significant relationship.
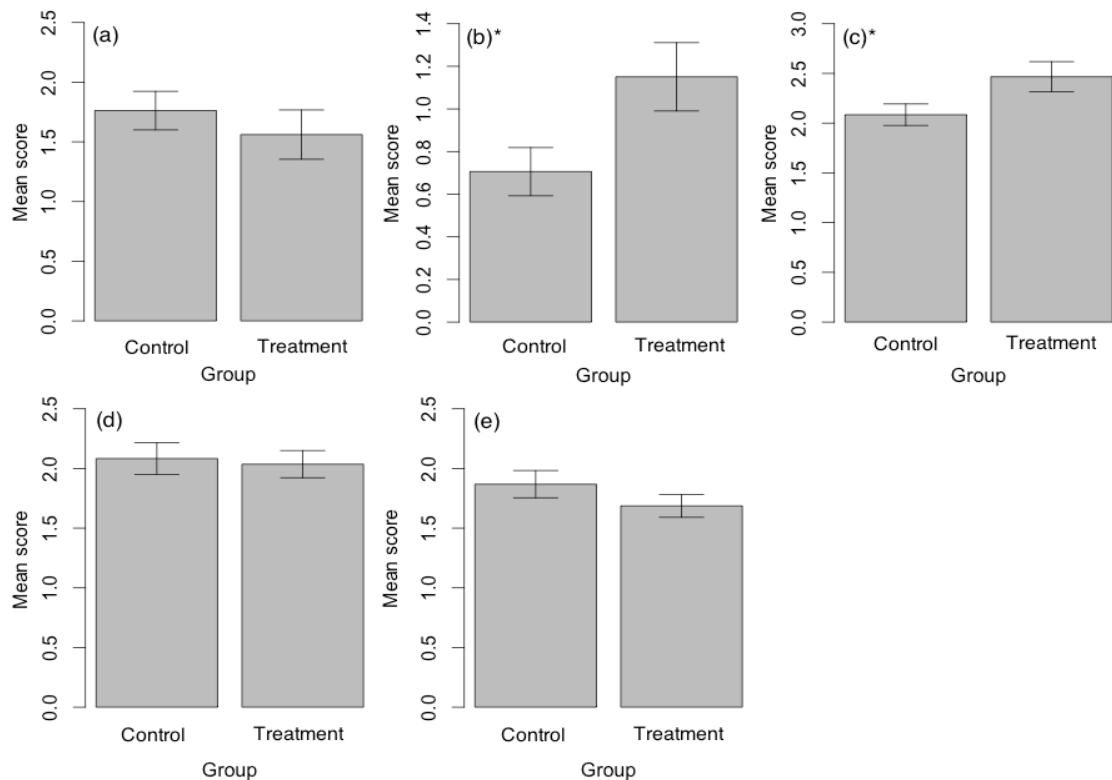
Figure 4.1. Mean and standard error of control and treatment group scores from each of the UCT questions: (a) TV programmes watched (treatment item: Zakovat), (b) outdoor activities done (hunting), (c) food dishes eaten (kebab), (c) meats eaten (saiga) and (e) meats bought (saiga) over 12-months. Graphs marked with * were identified as having significantly different scores between groups. See Appendix 8.4 for full item lists.

4.2. Knowledge

Knowledge scores were positively skewed, with a mean value of 5.6 out of a possible total of 8, and a range from 2 to 8 points (Appendix 8.9). Respondents fared particularly well on the animal picture questions, with 86% gaining the maximum possible total of 4 points. Knowledge on the ecology of saigas was lower, with only 6% of respondents correctly answering "true" to the statement "the colour of saiga changes between summer and winter". A higher proportion of respondents (31%) were aware that it is legally prohibited to eat saiga meat, however 40% of respondents still answered this incorrectly. Cronbach's alpha revealed internal consistency to exist between results on

the different knowledge questions (α=0.6). Although agreement was relatively low, this indicates that individuals who scored well on questions regarding saiga ecology were more likely to be aware of whether saiga meat eating is legal.

Each demographic variable was modelled individually against knowledge scores, with all significant variables then combined in a multivariate model. The minimal adequate model showed gender, village and employment status were all significantly associated with knowledge (table 4.2). Males and individuals from Kubla-na Ustyurt scored more highly, as did respondents who were unemployed or receiving a state pension.

Table 4.2. Results of the GLM of the effect of socio-demographic variables on knowledge scores. The estimated slope ($\pm$SE), test statistic (t) and p-value significance are given. df = 99

	Slope Est ±SE	t	p
Intercept	4.15 ± 0.42	10	< 0.01*
Gender Male	0.81 ± 0.31	2.64	0.01*
Village Kubla-na Ustyurt	0.67 ± 0.33	2.03	0.05*
Employment State Pension	1.14 ± 0.56	2.03	0.04*
Employment Student	1.04 ± 1.46	0.71	0.48
Employment Unemployed	1.89 ± 0.74	2.56	0.01*
Employment Working	0.72 ± 0.49	1.48	0.14

*$p<0.05$

4.3. TPB determinants of behaviour

Attitudes towards saiga and their conservation were generally positive, with 95% of respondents believing that the state should increase the protection of saiga, whilst 93% viewed possible extinction of saiga from Uzbekistan negatively (Table 4.3). Whilst generating less unanimous responses, targeted attitudes towards saiga as meat tended to be negative in terms of its implications on the species. The majority did not agree that only poor people would want to eat saiga meat (64% strongly disagree or disagree), or that it is only eaten on special occasions (69% strongly disagree or disagree), suggesting that it is something which is demanded from a wide demographic on a regular basis. While answers regarding the health benefits of saiga meat varied, respondents mostly agreed with the statement that it is eaten as it is healthier than alternatives, corroborating the findings of previous studies (Damerell 2011; Phillipson & Milner-Gulland 2011). The healthy nature of saiga meat was also mentioned by a number of key informants.

Questions regarding saiga meat had a relatively high proportion of "unsure" responses, suggesting the perceived sensitivity of the topic (table 4.3). More general attitudes regarding the environment show that respondents do not feel that the Ustyurt is currently in a good condition, but believe that the needs of people should be considered above wildlife.

There was not sufficient reliability to combine answers to form composite scores for attitude to the environment (Cronbach's alpha; α=0.24) or attitude to saiga meat (α=0.057), with internal consistency ranked as "unacceptable" (table 3.2). Therefore each question is henceforth viewed as a separate element, with scores analysed individually rather than as a composite. Although still low, internal consistency was shown between questions designed to test general attitude to saigas (α=0.53), enabling their summation, with a mean positive composite score of 3.16 for attitude to saigas (from a possible range of -6 to +6).

Individuals with higher wildlife and saiga knowledge had significantly more positive attitudes towards saigas and their conservation (Spearman's rank; r_s = 0.434, p<0.01). Attitudes on the environmental condition of the Ustyurt varied between the two villages

Table 4.3. Response proportions to statements given regarding attitudes (%) (SD = strongly disagree, D = disagree, N = neutral, A = agree, SA = strongly agree, DK = unsure, NA = no response). Most common responses to each statement are in bold (N=104)

Statement	SD	D	N	A	SA	DK	NA
Attitude to the environment							
The environment of the Ustyurt is currently in good condition	1	**57**	10	24	6	3	0
The State should only care about protecting wildlife once it has met the needs of local people	1	15	3	**68**	9	4	0
You can hunt any animal, if it does not harm the environment	2	**64**	1	28	1	4	0
Attitude to saiga as meat							
People eat saiga because it is healthier	2	31	2	**42**	2	19	2
Only poor people would want to eat saiga meat	2	**63**	3	13	0	17	2
People eat saiga meat only on special occasions	2	**67**	2	11	0	16	2
Attitude to saiga							
I would not mind if there were no more saiga in this country	16	**74**	0	6	0	2	2
The State should increase the protection of saiga	0	0	0	**81**	14	2	3
The saiga is a symbol of the beauty of the steppe	0	1	0	**78**	14	4	3

surveyed, with inhabitants of Kyr Kyz being more negative (t=-2.44, df=103, *p*=0.017).

A highly significant correlation was found between answers to the attitude statement "I would not mind if there were no more saiga in the country" and the perceived behavioural control statement "it would be possible to get saiga meat if I wished to buy it" (t=3.10, df=100, *p*<0.01). This suggests that individuals who are able to procure saiga meat are those least concerned with saiga conservation.

Social norm statements on the use of saiga products elicited a variation of answers to statements regarding community feeling on eating saiga meat and hunting saigas for their horns (table 4.4). This therefore does not strongly indicate whether local perceptions are aligned with positive conservation values, especially as none of the scores were significantly related to village or any other demographic variable. Interestingly, answers to the statement "most people in my village believe that eating saiga meat is a normal thing to do" differed significantly between individuals who had correctly identified that eating saiga meat is not legally permitted, and those who had not (t=2.21, df=99, *p*=0.03). Respondents who had correctly answered the knowledge question were more likely to disagree with the statement.

Responses to questions regarding perceived behavioural control (table 4.5) displayed strong consensus on the uncommonness of being given saiga meat when eating at other households (89%) and the high penalties faced for killing saiga (87%). Perceptions were more split on the range of affordable meats available and possibility of procuring saiga

Table 4.4. Response proportions to statements given regarding social norms (%) (SD = strongly disagree, D = disagree, N = neutral, A = agree, SA = strongly agree, DK = unsure, NA = no response). Most common responses to each statement are in bold (N=104)

Statement	SD	D	N	A	SA	DK	NA
I feel the same way about using saiga as other people in my village	2	**64**	0	13	0	19	3
Most people in my village believe that eating saiga meat is a normal thing to do	2	38	1	**39**	0	17	3
Most people in my village believe that hunting saiga for their horns is a bad thing to do	0	35	0	**45**	4	14	3
People's views about eating saiga meat are the same as they have always been	0	**65**	0	16	2	14	3

meat. However, these differences could not be satisfactorily explained by any demographic variables tested. Several respondents recounted having attempted to procure saiga meat but being unable to. One female explained that her family had not purchased it in the past year due to low availability, but stated that: "we eat saiga meat when it is available, just like the rest of the village". This suggests feelings of low behavioural control regarding the purchase of meat.

Table 4.5. Response proportions to statements given regarding perceived behavioural control (%) (SD = strongly disagree, D = disagree, N = neutral, A = agree, SA = strongly agree, DK = unsure, NA = no response). Most common responses to each statement are in bold (N=104)

Statement	SD	D	N	A	SA	DK	NA
There is a good range of affordable meats available to buy	1	**47**	1	44	0	3	4
It is not common to be given saiga meat when eating at other households	11	**78**	0	6	0	3	3
It would be possible to get saiga meat if I wished to buy it	12	**42**	0	20	0	23	3
People found to have killed saigas face a heavy penalty	0	3	0	**77**	10	7	4

4.4. Perceptions of threats, poaching and trade

Hunting by humans was viewed as the biggest current threat to saigas (36%; figure 4.2), supporting findings from a similar study in Kalmykia, Russia, and previous studies in Uzbekistan (Hogg 2014; Damerell *et al*. 2011; Phillipson & Milner-Gulland 2011). However, climate change related issues featured more highly in this study, with 22% of people placing extreme weather as the greatest threat to saigas and 12% of people blaming a lack of grass. Additionally, although not included as an option in the questionnaire, two respondents mentioned the recently erected Kazakh border fence as a major threat. This topic also featured highly within key informant interviews, with nearly all respondents being indignant about its construction, arguing that it would have negative consequences for saigas whilst having little impact on deterring criminal activity. The majority "no response" counts could be explained by people claiming that they did not know the answer; however, this is likely to be linked to an unwillingness to discuss the issue rather than solely attributable to ignorance.
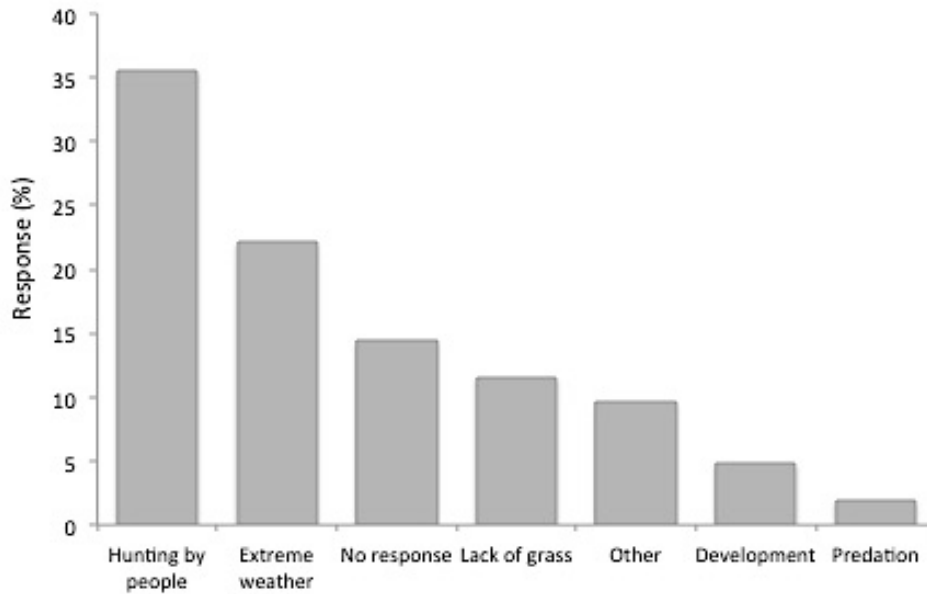
Figure 4.2. Respondent perception of the greatest threat to the saiga antelope (N=104)

Income was cited as the main driver of saiga hunting behaviour, with the most frequently chosen answers being that it is used to supplement income (34%) and diet (13%) or that it acts as a main income source (13%; figure 4.3). This was largely supported by KI interviews, where economic factors, and primarily a lack of jobs, were the most commonly cited drivers for hunting. Despite tradition and culture being least frequently viewed as the main driver of hunting behaviour (3%), it was mentioned by several KIs, with one asserting that it is often viewed as a hereditary profession (K001). Additionally, a respondent to the household questionnaire commented that: "people in the village have nothing to do but work…the only entertainment is hunting". This supports KI claims from the 2011 Phillipson & Milner-Gulland study that a lack of diversions caused young men to hunt. The high proportion of "no response / unsure" answers may be attributed to a general reluctance to answer this question, with many individuals simply stating that saigas are no longer hunted in the area.
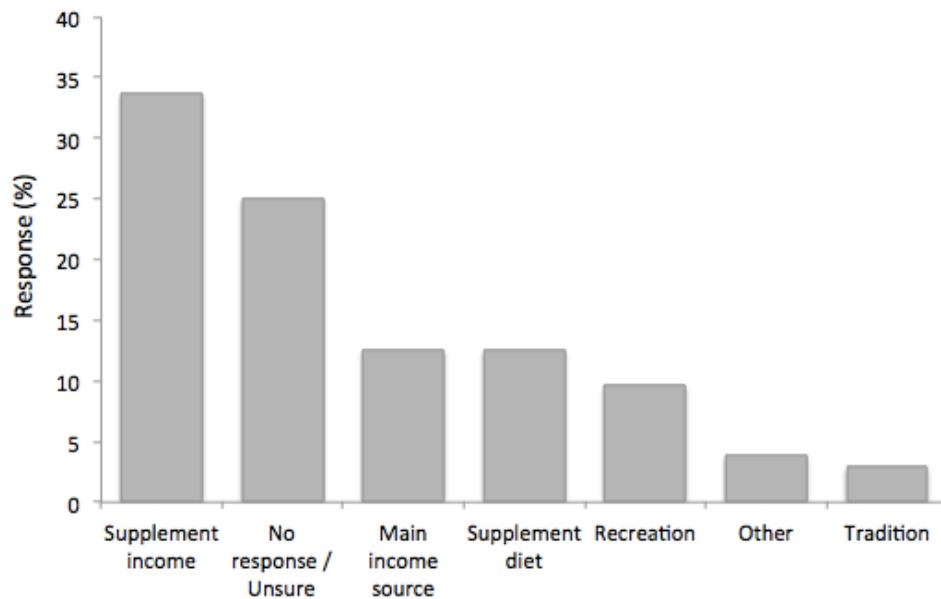
Figure 4.3. Respondent perception of the top reason for engaging in hunting of saiga (N=104)

Respondents' suggested priorities for saiga conservation focused on legal means of protection, with increased ranger patrols (29%), establishment of protected areas (25%) and heavier penalties for being caught (14%) ranking as the top three most frequently chosen options (figure 4.4). Several KIs also mentioned the importance of strengthening the enforcement of penalties, primarily highlighting the current large distances between ranger headquarters and poaching activity. However, the majority of KIs focused on the importance of improving public awareness and knowledge surrounding saigas, especially amongst children. A school teacher interviewed (K006) claimed that it is only
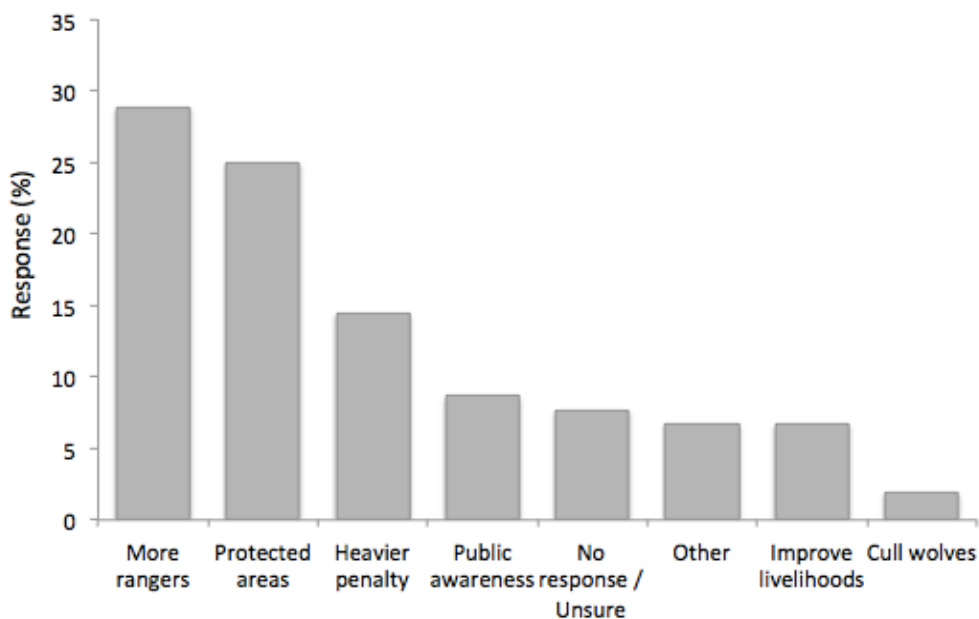
Figure 4.4. Respondent opinion on the top priority action required for saiga conservation

through environmental education events carried out in recent years that saiga have begun to be viewed as a "heritage symbol": "in the past, people only thought of the practical side".

4.5. SCA public engagement activities

Awareness of SCA outreach activities was relatively low, with 26 respondents having heard of Saiga Day (SD), 11 of Steppe Wildlife clubs (SWC) and 13 of SCA's Embroidery Programme (n = 101). Of these, eight people had attended a SD, while only one respondent had a child who previously participated in SWC and one had previously been part of an Embroidery Programme. Informal and graphical analyses suggest that those aware of SCA's projects and who had attended SD tended to gain a higher score in the knowledge section of the questionnaire (Appendix 8.10). However, this was not supported by statistical analyses using linear models, with awareness of SCA's programmes having no significant impact on knowledge scores or attitude.

4.6. Trade and consumption of saiga products

All key informants recognised that there has been a large reduction in the population of saigas over recent years, with this being reflected in a decrease in the trade of saiga products. KIs from the local area generally claimed that trade in saiga meat no longer exists in their villages, however, the possibility of procuring it from Jaslyk and Karakalpakia was mentioned; the two villages to which researchers from this study were denied access. This was echoed by KIs interviewed in Nukus. K001 and K003, both research scientists who spend significant periods of time on the Ustyurt plateau, recounted seeing saiga meat sold and consumed in Jaslyk in recent years. The general consensus is that the sale of the meat is carried out in a secretive fashion.

There was a strong theme that saiga is now seen as a luxury meat for people living in towns and cities, with special orders being placed with poachers: "Even people from Nukus order saiga meat…it is very prestigious to treat guests at a New Year party to saiga meat" (K301). This emerging issue of placing advance orders for meat is likely to be due to the longer distances required to travel to find saiga. Poachers were quoted to make a 300 km round-trip to reach saiga range areas from Jaslyk, consuming 40L of

petrol worth a total of UZS 120,000 (US$46) (K003). The increase in effort per unit catch is reflected in an increase in the price of saiga meat compared to previous studies. Figures quoted ranged from UZS 12,000-20,000 (US$4.60 to 7.70) per kg. This is a substantial rise from the UZS 4,000-7,000 value found by Phillipson & Milner-Gulland in 2011 (US$2.30 to 4), even when accounting for Uzbekistan's inflation rates over the past four years, which would have led to an expected current price range of US$3.10 to 5.40 (based on data from CIA 2014). This led to two KIs claiming that it is now of a similar price to alternative meats such as beef or mutton.

One KI (K003) identified shepherds as being a significant aid to poaching activity by alerting poachers of any approaching rangers. Additionally, in recounting an occasion when sharing a lift with poachers in the steppe in April 2015, he described them receiving a call from shepherds informing them of the whereabouts of a group of saiga. This reveals the important role that shepherds may play in the continuation of poaching on the Ustyurt Plateau, by lessoning the difficulty of locating groups of saigas.

In addition to the aforementioned priority actions for saiga conservation (increasing knowledge provision and penalty enforcement), other areas mentioned were improving livelihoods, ensuring the availability of alternative meats (K103 and K202) and the removal of the Kazakh-Uzbek border fence. Discussion regarding the fence is of particular current interest and was a theme deemed important by KIs both from the local area and those more removed. However, coming up with a solution was seen to be problematic: "If the Uzbek and Kazakh governments collaborate, something can be done about the situation but this is very difficult…The solution could be to have more corridors in the fence, but poachers would be easily able to target these areas" (K101). In fact, several respondents stated that poachers had been concentrating efforts around a 12 km gap in the fence, which had been formed as a mitigation measure for wildlife movement.

All KIs believed that the majority of people are aware of the status of saiga populations and the illegality of trade in their products, however most stated that this does not have a significant impact on behaviour. Several KIs attributed this to the difficulty of significantly altering attitudes regarding saiga use that have been the norm for millennia: "the mentality of our people has not yet grown" (K003). Surprisingly, most

KIs claimed that saigas are viewed in a utilitarian way, contradicting findings from the household questionnaires where 92% of respondents agreed or significantly agreed with the statement: "the saiga is a symbol of the beauty of the steppe".

5. Discussion

This study combines the use of a psychological framework with an emerging indirect questioning technique within the field of conservation, in order to better understand the social context of saiga conservation on the Uzbek Ustyurt. Findings indicate that discussion surrounding the topic of saiga poaching and consumption is extremely sensitive, particularly amongst local inhabitants on the steppe. Comparisons with previous studies show that trade in saiga meat and attitudes surrounding it have evolved over recent years as saiga populations have declined. In this chapter, results will be discussed, with the potential causes for findings investigated and placed within the context of wider conservation concerns. The implications of results will be examined and suggestions for further study and conservation action proposed.

5.1. Saiga meat consumption: examining sensitive topics in sensitive areas

The application of the Unmatched Count Technique to estimate the prevalence of sensitive behaviours had limited success within the context of this study. Whilst hunting activity was revealed to be carried out by 45 per cent of respondents, the main target behaviours of saiga meat consumption and purchase failed to generate significant prevalence estimates. This was in contrast to the application of the same technique within a study carried out in Kalmykia, Russia, where it was estimated that 34 per cent of households had consumed saiga meat over the preceding six months (Hogg 2014). This difference may be due to the discussion of saiga-related activities being of even greater sensitivity within Uzbekistan than it was in Kalmykia; a possibility substantiated by the higher proportion of refusals to respond (31 per cent as opposed to 23 per cent in Hogg's 2014 study).

The high perceived sensitivity associated with saiga consumption might have meant that its inclusion in the treatment list altered responses to the control items, thereby violating the UCT assumptions of no design effect and no liars (Glynn 2013). The fact that the mean score generated for the control group was greater than for the treatment group indicates that this may be the case. It is also possible that the relatively small sample sizes attained prevented significant estimates being generated; something that seems particularly likely considering that the non-sensitive question regarding TV programmes

also failed to generate a prevalence estimate (figure 4.1). However, the fact that confidence levels were not very high indicates that sample size alone was not the issue. Nevertheless, the need for a large sample size in order to yield accurate prevalence estimates is a frequent criticism of the UCT (Dalton *et al*. 1994; Blair & Imai 2012). This was difficult to achieve due to restrictions placed on researcher movements within the Ustyurt Plateau, with sampling in the larger villages of Jaslyk and Karakalpakia not being possible.

The research challenges faced therefore included the growing political sensitivity surrounding the region of Karakalpakstan (Omirbek 2015) as well as the sensitivity associated with the topic of saigas. An examination of previous studies in the region suggests that while the discussion of saiga-related activities has long been deemed sensitive, this has been a growing issue over recent years (Kühl *et al*. 2009; Phillipson & Milner-Gulland 2011). Focusing on the village of Jaslyk, while Kühl's survey in 2004 received frank responses, Phillipson & Milner-Gulland found inhabitants much less willing to participate in 2011, with researchers this year being completely denied access to the village. Despite some issues, the 2011 study succeeded in utilising the randomised response technique to estimate that 11 per cent of respondents came from a household where saiga meat had been consumed within the previous year.

The increasing difficulty of engaging local inhabitants and the local authorities in conservation research in Karakalpakstan may warrant a change in the approach taken to the study of saigas in the area. For example, the presence of researchers from the UK posed an issue in gaining access to some areas, thereby supporting the case for increased capacity building to enable entirely local-led field research. Additionally, on-going monitoring of saiga trade and consumption in the local area would not only assist in gaining a fuller picture of saiga activities, but may also help to build more long-term and trusting relationships with local people (Kühl *et al*. 2008; Phillipson & Milner-Gulland 2011). This is important as even research partners from Uzbekistan are often viewed as outsiders and treated with suspicion in local Karakalpak villages.

Important lessons on the use of the UCT within the field of conservation can be gleaned from this study. The need for a large sample size is particularly likely to be an issue when working amongst small, remote communities with a limited number of potential

respondents. However, this study still suggests that the UCT is a viable option for investigating sensitive behaviours in conservation. Reflecting findings from Nuno *et al*.'s study in the Serengeti (2013), all respondents to the pilot questionnaire stated that they were comfortable answering the UCT questions and felt their answers to be anonymous. Additionally, despite the unease respondents displayed in discussing saiga-related topics, none exhibited any particular mistrust of the UCT; reflecting its successful application to investigate similar behaviours in Kalmykia, Russia (Hogg 2014). This is a far improved outcome from attempts to administer an indirect questioning method in the form of the RRT within the same study area. Trials in 2011 deemed that the RRT was "overly complex, poorly understood and mistrusted by respondents", with the section subsequently removed from the questionnaire (Damerell *et al*. 2011). Therefore where conditions are appropriate and an ample sample size available, the UCT remains a promising tool for the investigation of sensitive behaviours within conservation, warranting further research into its application.

The high number of refusals to interact with researchers suggests that there is a substantial level of non-response bias throughout the questionnaire. Therefore while the data collected remain useful in understanding factors relating to saiga trade and consumption, it is likely that they reflect a non-random sample of the population (Dalton *et al.* 1994; Blair & Imai 2012). Resultantly, results may not be representative of views from the village as a whole, with data collected in relation to the prevalence of saiga meat eating and buying rendered inaccurate (Blair & Imai 2012). This supports the use of a mixed methods approach in the investigation of sensitive subjects. The triangulation of quantitative and qualitative survey techniques enables information that is lost through response to questionnaires to be gleaned from individuals with more knowledge or a greater willingness to participate, and allows cross-checking to ensure the credibility of results (Duraiappah *et al* 2005).

5.2. The changing nature of the saiga meat trade

Qualitative information indicates that levels of both the consumption and purchase of saiga meat are significantly lower than in previous years. This was mentioned by all KIs and a number of respondents to the household interviews, with the trend largely attributed to the decline in saiga numbers rather than the enforcement of rules or

increased knowledge regarding their status. In fact, it appears that the demand for saiga meat is far higher than the current level of supply, with one household respondent in Kyr-Kyz recounting how she had attempted to order saiga meat from Karakalpakia and Kubla-na Ustyurt with no success. This reflects Hogg's findings in Kalmykia (2014) that although consumption of saiga was lower than alternative meats, there would be many people interested in buying it if it was available.

The low availability of saiga meat has led to changes in poaching activity, its procurement and the economic status of those who purchase and consume it. While saiga hunting used to be regularly carried out during the appropriate seasons, with the majority of meat then sold directly to local inhabitants from poorer households (Kuhl *et al.* 2009; Hogg 2014), this study revealed a strong emerging theme of pre-orders being made. One KI explained that poachers now "hunt when they receive orders from rich people" (K301), the majority of whom live in urban areas such as Nukus. Attitudinal changes from viewing saiga as "a meat of the poor" (Kuhl *et al.* 2009) to now considering it a "luxury" meat reflects trends seen in other systems. As a wild meat becomes scarcer, it is often the case that it evolves from being treated as a protein source for many, to being seen as a luxury food for a smaller, wealthier section of society (Mainka & Trivedi 2002).

The apparent change in the principal consumers of saiga meat may warrant a change in the direction of future saiga conservation initiatives in Uzbekistan. Currently, the majority of public engagement work carried out by SCA is targeted towards inhabitants of villages located on the Ustyurt Plateau (Bykova *et al.* 2014). While this remains an important target group, the majority of local inhabitants appear to have been priced out of the saiga meat market, making a case for conservation initiatives to also include wealthier urban consumers who now appear to be driving the trade. However, this is likely to pose various challenges, with a need to first identify those involved and to explore the best means by which to alter their behaviour.

For the first time, this study has revealed the role of shepherds in saiga poaching. It was asserted that shepherds alert poachers to the location of saigas on the steppe and to any approaching rangers (K003). This is a role that may have developed with the increasing

difficulty of, and distance required to find saigas and is likely to have been facilitated by the greater availability of mobile communication technology.

The apparent relationship between poachers and shepherds may help to explain the strong unwillingness of shepherds to discuss the trade in saiga products with researchers in 2011, despite their apparent knowledge regarding it (Phillipson & Milner-Gulland 2011). This situation suggests that it may be worthwhile to target shepherds in conservation initiatives, with the potential to use them as conservation monitors rather than aids to poaching. Previous conservation initiatives targeting specialist groups who pose a threat to wildlife have shown positive outcomes. For instance, an integrated education and awareness programme carried out in Murchison Falls Protected Area, Uganda, successfully targeted animal poachers with many subsequently renouncing poaching and joining projects to discourage such activities (Kato & Okumu 2008). Such an approach would be in accordance with the SCA's focus on conservation through long-term solutions and its objective "to advance the education of the public in the conservation and protection of [the saiga antelope]" (SCA 2009a). It would also compliment an on-going participatory monitoring scheme on the Ustyurt, which is largely staffed by ex-poachers (SCA 2009b).

5.3. The importance of knowledge in saiga conservation

In the context of the theory of planned behaviour framework employed in this study (figure 3.1), knowledge was found to have the highest number of significant links with the other elements investigated. Knowledge scores were positively correlated with scores for attitudes to saigas, supporting previous findings and conservation theory (Heimlich 2010; Damerell 2011; Samuel 2011; Hogg *et al.* 2015) as well as hypothesis A (table 3.1). If this is taken in the context of causality from "knowledge to attitude to behaviour" which is often used as the theoretical basis of environmental education campaigns (Burgess *et al.* 1998; Heimlich 2010), it provides evidence in support of the educational and engagement activities being carried out by the SCA (Bykova *et al.* 2014). Additionally, the importance of knowledge and public engagement was highlighted by a significant number of KIs who believed that it should be amongst the priority actions for saiga conservation (K001, K003, K006, K101, K102, K302).

Despite this, nearly all accounts from KIs claim that there is little link between knowledge of saiga status and human behaviour. Most respondents believed people to be aware of the species' listing in the Red Book of Uzbekistan and the illegality of the trade and consumption of saiga products, but did not think that this has an effect on behaviour. These findings support a number of studies suggesting that positive attitudes towards a resource are not necessarily linked to positive conservation action (Kuhl *et al*. 2009; Waylen *et al*. 2009; St John *et al*. 2010b). This is theoretically supported by criticisms of 'deficit' models, which often assume that education on environmental issues results in pro-environmental behavior through altering attitudes (Burgess *et al*. 1998). However, this could not be quantitatively tested due to a lack of behavioural estimates.

A significant relationship was shown to exist between knowledge about the illegality of eating saiga and the social norms surrounding the statement "most people in my village believe that eating saiga meat is a normal thing to do". This indicates that the knowledge of conservation rules is important in shaping respondents' perceptions of the social and cultural pressure felt to take part in the behavior (Ajzen 1991; Steinmetz *et al*. 2014). However, it may be the case that the relationship was an artefact of social desirability bias, with respondents who were aware of the rules being more likely to lie in order to project a favourable view of themselves (Dalton *et al*. 1994; King & Bruner 2000). Either way, it is undeniable that in order for people to comply with conservation rules, they must first be aware of them (Keane *et al*. 2011). This makes the relatively low level of knowledge surrounding the illegality of eating saiga meat (34%) worrying, with an effort to increase awareness in the villages of Kyr-Kyz and Kubla-na Ustyurt required.

The association of knowledge scores with various demographic variables (table 4.2) partially supports expectation B (table 3.1), which hypothesised that the TPB elements would be impacted by demographics and socio-economic status. Females were shown to have significantly lower knowledge scores than males, in accordance with common findings that women tend to have less extensive environmental knowledge than men (Kollmuss & Agyeman 2002). This suggests that attempting to target females in future awareness and education initiatives may be beneficial, especially as women tend to be

more emotionally engaged in, and concerned about, environmental destruction, and more willing to change (Kollmuss & Agyeman 2002).

Inhabitants of Kubla-na Ustyurt had a higher knowledge score than Kyr-Kyz. This is despite the greater presence of the SCA in Kyr-Kyz, where a Steppe Wildlife Club is based and Saiga Day is held each year (Bykova *et al*. 2014). This suggests that current SCA activities may require greater exposure in order to reach a wider audience, with differences in the proportion of respondents who had heard of SD and SWC not varying between the two villages. This is especially pertinent following Hogg *et al*.'s (2015) finding that inhabitants of the Ustyurt had lower knowledge scores than other areas within saiga population ranges.

5.4. A need for alternative meats

The high prevalence of hunting behaviour revealed by the UCT (45% ±19) was positively correlated with respondents' perceived behavioural control surrounding the availability of affordable meats. This suggests that rather than simply being a recreational activity, hunting may be an important source of meat provision. This is important, as hunters are a potential interest group in saiga conservation (Hogg 2014) and such findings point to the lack of meats available for purchase. In fact, no shop selling meat exists in either village. The lack of commercially available meat, coupled with the fact that the tradition of raising livestock is relatively weak in Uzbekistan (Phillipson & Milner-Gulland 2011), means that village inhabitants must either hunt or travel relatively long distances in order to readily obtain meat. As one KI put it: "it is much easier to go to the steppe and hunt there than to drive to the nearest town" (K202).

Although hunting behaviour is not necessarily related to saigas or other illegal wildlife activity, the hunting community may opportunistically kill saiga for personal use (Hogg 2014). This is especially likely as a lack of alternative meat sources is liable to place conservation concerns behind concerns regarding the need for food, following the often-exhibited link between rural poverty and illegal resource exploitation (Mainka & Trivedi 2002). This was addressed by one KI who, in response to being asked what measures should be taken to decrease the consumption of saiga meat, stated that: "other types of meat should be made available and there should be enough for everyone"

(K103). This is not only important for the conservation of saiga, but also of other declining animals in the region.

With saiga now being less readily available, one KI (K303) noted that hunters are increasingly targeting goitered gazelles (*Gazella subguttuosa*); a species currently listed as "vulnerable" on the IUCN Red List (Mallon 2008b). Resultantly, engaging the hunting community in conservation initiatives may be a worthwhile future option, as suggested by Hogg's study in Kalmykia (2014). Additionally, in order to decrease hunting activity, it is necessary to secure alternative affordable meat sources. This would help to reduce the external factors acting as a barrier to decreasing local demand for saiga meat, with evidence showing that pro-environmental behaviours can only take place if the necessary infrastructure is provided (Kollmuss & Agyeman 2002).

5.5. Understanding the determinants of behaviour

Positive attitudes displayed towards the saiga antelope (table 4.3) reflect the findings of previous studies (Khul *et al.* 2009; Phillipson & Milner-Gulland 2011; Hogg 2014). However, as other authors also concluded, this was not mirrored in the perceived social norms associated with the consumption of saiga products, with 39 per cent of respondents feeling that the majority of people in their village "believe that eating saiga meat is a normal thing to do". Although investigating links to actual behaviour was not possible in this study, this discrepancy between attitudes and perceived social norms is likely to impact behaviour (figure 3.1; Ajzen 1991).

The mis-match between behavioural action and attitude towards saigas has previously been primarily attributed to poverty, with the assumption that people are driven to rule breaking due to unfavourable circumstances (Kuhl 2009; Phillipson & Milner-Gulland 2011). However, the revelation that saiga meat is still widely demanded despite the decrease in its price, and positive attitudes towards saiga meat found in this study (table 4.3) and others (Damerell *et al.* 2011; Hogg 2014), suggest that there are other important factors involved.

The dominant culture of consuming saiga meat is likely to affect behavioural action through social norms (Ajzen 1991; Hogg 2014; Mastrangelo *et al.* 2014). In particular,

traditional norms in culture and diet appear to have a strong influence on the demand for saiga, with one KI declaring that hunting and consumption continues because "we have it in our genes. We are nomadic people and the saiga have been here since the mammoths" (K001). This supports previous studies on environmental behaviour, which have found "old behaviour patterns" to be a significant barrier to pro-environmental action, even in the face of positive knowledge, attitudes, social norms and behavioural control (Kollmuss & Agyeman 2002).

Understanding the intricacies of the factors of the TPB is therefore a complex task, requiring an appreciation of the historical as well as current relationship between humans and saigas. Whilst 92 per cent of respondents to the household interview agreed or strongly agreed that "saiga is a symbol of the beauty of the steppe", the majority of KIs asserted that people do not feel a spiritual or emotional connection with the species, solely viewing them in a practical way. This apparent contradiction may be explained through a comment made by a respondent to the household questionnaire: "I love saigas… I want the number of saigas to be restored so that I can buy its meat". This indicates that the respondent's professed regard for saigas is largely attributable to the benefits gleaned from it, rather than any importance placed on the species' intrinsic or ecological value.

These findings support recommendations that specific attitudes should be investigated in order to better understand a given behaviour (Ajzen 1991; St John *et al*. 2010b). Although the sensitivity of the subject prevented direct questioning of respondents' attitude towards eating saiga meat, more targeted consideration of attitudes revealed that it is viewed as being healthier than alternatives and demanded by a wider demographic of society than simply the poor (table 4.3). This more compellingly suggests that respondents are likely to exhibit the behaviour of saiga consumption than would be expected from more general statements regarding the saiga antelope. This is an important consideration in conservation action; if the exploitation of the saiga antelope and perceived qualities of its meat are tightly ingrained in communities, villagers may continue to demand it despite price increases, and even if the suggestion of providing alternatives is met (Phillipson & Milner-Gulland 2011).

The split in perceived social norms concerning community views on saiga hunting (table 4.4) contrasts with Hogg's study in Kalmykia (2014), in which 82 per cent of people supposed the wider community to view saiga hunting as unacceptable. This may be attributable to ethnic differences in attitudes and tradition, with saigas being revered as holy animals in the Kalmyk culture. Public engagement activities may therefore benefit from placing a greater focus on attempting to alter social norms regarding saiga meat consumption. This is of value as evidence suggests without alterations in underlying social norms, people often revert to past behaviour when enforcement weakens (Steinmetz *et al.* 2014). However, as the tradition of treating saiga as a game animal appears ingrained, it may instead be more beneficial to work with existing social norms. Therefore promoting the conservation of saiga as a means to enable future hunting and consumption when populations recover may be a more successful means of engaging local support.

Another interesting finding concerning the determinants of behaviour was the correlation between attitude surrounding the extinction of saiga in Uzbekistan and perceived behavioural control on whether it would be "possible to get saiga meat if I wished to buy it". Assuming that those able to procure saiga meat are the ones who are most likely to do so, this suggests that those displaying the behaviour are least concerned with saiga conservation. However, this contradicts previous assertions that local importance placed on saigas is primarily due to their practical worth.

The main findings regarding the TPB are summarised in figure 5.1, with areas for future work incorporated. In particular, it appears that whilst attitudes and social norms point towards a general intention to consume saiga meat, the low availability of the meat has resulted in a decrease in behavioural action. Therefore although the behavioural outcome now more closely aligns with conservation goals, a continuation of work to tackle the underlying drivers of behaviour is required. This is important in achieving more long-term sustainable change, ensuring that people do not revert to past patterns if the situation alters (Kollmuss & Agyeman 2002; Steinmetz *et al.* 2014).
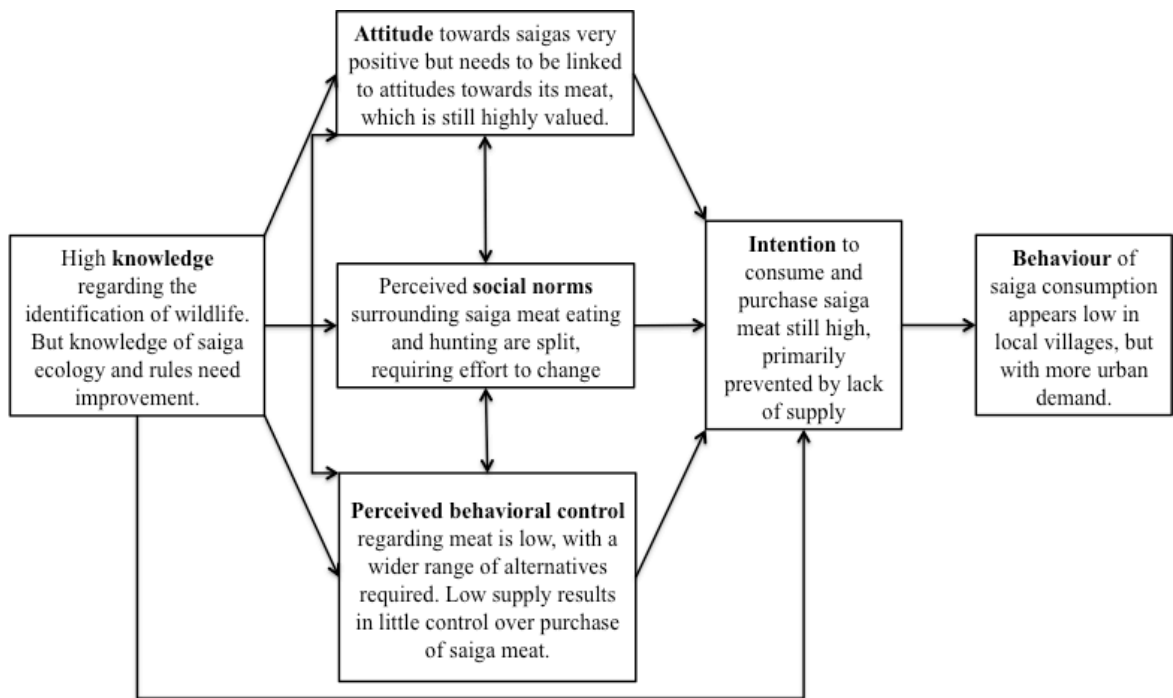
Figure 5.1. Components of Ajzen's Theory of Planned Behaviour (1991) adapted to summarise relevant results from this study.

5.6. Challenges and the way forward

Asking household respondents and KIs about their perception of the major threats facing saigas enabled the identification of local concerns and presented insights into the direction in which future conservation initiatives should take.

The escalated prominence of environmental change related issues since previous studies is worrying (Phillipson & Milner-Gulland 2011; Hogg 2014). Alterations in environmental conditions were not only linked to saiga numbers, but also to an increase in health problems amongst the local population. Aside from the wider implications that this entails in an area already facing pressing societal issues (Bikbaeva & Gaibnazarova 2009), the perceived severity of environmental problems may create a barrier to people changing their saiga consumption behaviour. This is supported by the notion of the "value-action gap" in which individuals fail to exhibit pro-environmental behaviour as they feel that they are unable to influence the situation (Blake 1999). Accounts of corrupt governance and the involvement of officials in illegal resource use are likely to add to this, with individuals feeling less responsibility over environmental issues, reflecting an external locus of control (Blake 1999; Kollmuss & Agyeman 2002).

The emergence of the Kazakh-Uzbek border fence as a contributing factor to severe declines in the Ustyurt saiga population (Olson 2013) further moves the perception of responsibility away from the inhabitants of local Ustyurt villages. This is an issue requiring urgent collaboration and action on an international level. However, with locals evidently still demanding and procuring saiga products where available, community interventions continue to be imperative. Efforts should be made to alter more specific attitudes towards the use of saiga meat, particularly informing individuals that their actions can have a direct impact on saiga populations. This would help internalise the locus of control (Kollmuss & Agyeman 2002; Samuel 2011). Continued growth in SCA activities would enable a wider audience to be reached, potentially impacting social norms, especially through targeting children (Samuel 2011). This can be a powerful conservation tool, with outreach activities shown to have a greater role than law enforcement in the alleviation of poaching pressures within a South-East Asian system (Steinmetz *et al.* 2014).

Both household respondents and KIs mentioned improved law enforcement as a priority for saiga conservation, highlighting a need for more rangers and protected areas. The imminent re-designation of the Saigachy Reserve, a protected area designed primarily for the conservation of saigas, should benefit this situation (Esipov *et al.* 2009). Interestingly, while the improvement of livelihoods was highlighted as a priority by several KIs from Nukus and Tashkent, it did not feature highly in household questionnaires, being mentioned by just 7 per cent of respondents (figure 4.4). This is a big contrast to Phillipson & Milner-Gulland's study in 2011, where 28 per cent placed "increased income" as the best means of reducing poaching and trade of saigas. This may reflect increases in the price of saiga meat and changes in the nature of consumers. Despite this perception, it is likely that poverty continues to drive poaching, which tends to be viewed as an unpopular livelihood activity in the area (Kuhl *et al.* 2009). Additionally, a need for cheap and accessible meat may lead to the hunting and depletion of other wild animal populations such as the goitered gazelle. Resultantly, interventions aimed at enhancing livelihoods and achieving conservation objectives should remain a priority on the Uzbek Ustyurt (Phillipson & Milner-Gulland 2011).

6. Conclusions

The importance of understanding the decision-making processes involved in behaviours driving biodiversity loss has been increasingly acknowledged in the field of conservation (St John *et al*. 2010b). Through the use of an integrated framework, invaluable insights into the issues surrounding saiga conservation on the Uzbek Ustyurt have been gained, helping to achieve the aims set out for this study.

Truly understanding the factors that shape environmental behaviour is not a straightforward task. However, while it is impossible to fully summarise the complexity of human behavior in a single framework (Kollmuss & Agyeman 2002), the use of the TPB is of huge benefit in determining the relative importance of drivers of behavior and enabling a methodological approach to be taken in the study of social factors in ecological issues (St John *et al*. 2014). This study has reiterated how the difficulty of such research is enhanced when studying topics of a sensitive nature (Gavin *et al*. 2010; St John *et al*. 2010a; Arias 2015). Despite applying the UCT, prevalence estimates could not be generated for the sensitive topics of interest. Therefore, although it remains an important emerging tool for investigating sensitive behaviours (Nuno *et al*. 2013), its limitations should be noted when considering its application within a study. Additionally, there are a growing number of alternative specialized questioning techniques being recommended for use within the field of conservation, each warranting further empirical research (Nuno & St John 2015).

The strength of taking a holistic approach to investigating the interactions between human behaviour and ecological systems has been displayed in this study. Despite set-backs to data collection, the use of an integrated framework, mix of quantitative and qualitative survey techniques, and asking local people and key informants for their ideas on the way forward, made it possible to identify key trends and variables associated with the trade in saiga meat. This supports previous assertions that a robust and varied methodology is required to investigate and influence behavior within social-ecological systems (St John *et al*. 2014).

For conservation campaigns to be successful, action should be taken to address the entire range of factors impacting people's relationships with the conservation target, requiring an integrated effort from a range of disciplines (Sala *et al.* 2000). While large-scale issues such as climate change and infrastructural developments need to be urgently addressed, a continued focus on smaller-scale human-wildlife interactions remains imperative; after all, human resource use is the underlying driver of these factors (Vitousek 1994). Gaining an understanding of behaviour not only highlights conservation-related issues, but also helps to identify wider social and economic issues resulting in unsustainable practices. This is imperative in achieving conservation goals, with action to empower local people and prevent them from feeling that the locus of control is external being extremely important (Blake 1999). Therefore the growing amount of research on the human side of applied ecology is extremely encouraging (St John *et al.* 2014). Continued effort and development in this field can only improve the chance of successful conservation for saigas and other wildlife populations; a global pressing concern considering the high estimates of current and future extinction rates (Pimm *et al.* 2004).

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8. Appendices

8.1. Researcher guidelines

Research Aims

This project aims to investigate the prevalence of illegal trade and consumption of saiga meat on the Uzbek Ustyurt and the factors motivating such behaviour. This builds upon previously conducted research in the area, in order to evaluate the current situation and recent trends. Through such findings, the strengths and weaknesses of current conservation strategies may be identified and recommendations for future initiatives provided.

Social surveys of local people will be undertaken, with two forms of data-collection utilised:
> (a) Structured household-level questionnaires and
> (b) Semi-structured key informant interviews.

In order to investigate sensitive behaviour relating to saiga, household questionnaires will utilise the unmatched count technique (UCT) – an indirect questioning method to estimate the prevalence of saiga meat eating and buying. Additionally, questionnaires will cover the socio-demographic status and knowledge towards local wildlife of respondents. To gain a thorough understanding of the motivations behind actions regarding saiga products, questions will be based around three processes identified to drive behavioural intention: attitude, social norms and perceived behavioural control.

Respondents for the key informant interviews will be selected opportunistically. Open-ended questions will be used to explore their knowledge regarding the trade and consumption of saiga products. This will provide more in-depth qualitative information to supplement quantitative data collected from household questionnaires.

Household questionnaires

The household questionnaire will form the majority of the research. We will try to visit as many households as possible to gain a representative picture of each village. In each household, the household head, or whoever is present and willing to respond, will be interviewed. The questionnaire should be carried out in the language of their choice (Russian, Uzbek or Karakalpak) and should take between 20 to 40 minutes.

- Answers will be recorded on the questionnaire sheet with the village name and date filled in and each questionnaire numbered consecutively
- Introduce yourselves and the research, stressing that answers are anonymous – if the respondent is uncomfortable with any questions, they do not have to answer them

- Section 3 (UCT) is an important part of the questionnaire, designed to ensure anonymity when answering sensitive questions
  - There are 5 questions in total, with the last two relating to sensitive saiga-related behaviour – ensure the respondent understands the technique before moving on to these
  - Remember to note down the colour of card chosen for each question as well as the answer
  - NB. There is an error in the Russian answer sheets to be aware of: Q3.2 should read "outdoor activities" rather than "sport"
- Throughout the questionnaire, note down any extra comments of interest that the respondent makes
- If it seems that a respondent has valuable information about saiga consumption and trade, ask if he or she would be willing to give a more detailed key informant interview, or recommend any others

Pilot – the questionnaire has been tested in Nukus with no issues arising. However, as the situation in the villages is different, the first day of sampling can be seen as a pilot. This involves observation to see if there are problems with any specific questions. In particular, answers to the UCT questions should not be 0 or 4/5 – if this occurs frequently (~20% of the sample in the first few days), or there are frequent issues with a particular question, please contact me urgently as changes may have to be made.

Data inputting – a spreadsheet has been prepared for the data collected. Please try to input data regularly (at the end of each day if possible).

Key Informant Interviews

The KI interviews are designed to elicit as much information as possible regarding saiga use. Interviewees may be notable people in the community, or be identified opportunistically as having good knowledge and a willingness to be interviewed from either household surveys or concurrent focus groups being carried out regarding the Saigachy Reserve.

There is a list of questions we would like to be covered in these interviews. However, different respondents will have different types of knowledge and will therefore respond in different ways. The interviewer should be able to lead the discussion with the aim of covering as many of the questions as possible, but also allow flexibility and freedom for the interviewee to speak as necessary and explore any particular points of interest.

Unlike the HH questionnaire, where a large sample size is important, the vital element of KI interviews is the quality and depth of information received. Therefore only a few interviews per village may be sufficient, but it is important to make as detailed notes as possible of the entire interview (in a separate notebook). The length of interviews may vary from 30 minutes to 1 hour, depending on the respondent. Basic socio-demographic data should be recorded in line with the HH questionnaire (gender, age group, ethnicity, employment).

8.2. Household questionnaire (English)

Date:	Interview number:
Village:	
Interviewer name:	

Briefing

Good morning / afternoon. My name is *<interviewer's name>*. I am carrying out a questionnaire on behalf of Laura Kor, who is a student at the university of London in the UK. For her Masters research project she is interested to learn about the lives and views of people on the Ustyurt Plateau and particularly their views about the environment.

The questionnaire should take about 25 minutes and will be anonymous. I will not record your name or share any of your answers with anyone else. If you uncomfortable with any of the questions you do not have to answer them, and you are free to stop at any time. Are you happy to take part?

1. Socio-demographic information

1.1. Gender:
     a) Male   ☐   b) Female   ☐

1.2. Age
     a) 16-20   ☐   b) 21-40   ☐   c) 41-60   ☐   d) 60 + ☐

1.3. Education
     a) Primary   ☐   b) Secondary   ☐
     c) University degree ☐   d) None   ☐

1.4. Ethnic group
     a) Karakalpak   ☐   b) Uzbek   ☐
     c) Kazakh   ☐   d) Russian   ☐ e) Other   ☐

1.5. Employment status
     a) Working   ☐   *Please specify…………….*
     b) Unemployed (with profession)   ☐   *Please specify…………….*
     c) Unemployed (no profession)   ☐
     d) State pension   ☐
     e) Student   ☐
     f) Homemaker   ☐
     g) Other   ☐   *Please specify…………….*

2. Attitude to Environment
Please indicate how much you agree or disagree with the following statements (there are no right or wrong answers, please just say what you think) <show card>

2.1. The environment of the Ustyurt is currently in good condition

Strongly disagree	☐	Disagree	☐	Neutral	☐
Agree	☐	Strongly agree ☐		Unsure	☐

2.2. The State should only care about protecting wildlife once it has met the needs of local people

Strongly disagree	☐	Disagree	☐	Neutral	☐
Agree	☐	Strongly agree ☐		Unsure	☐

2.3. Hunting any animal is acceptable if done sustainably

Strongly disagree	☐	Disagree	☐	Neutral	☐
Agree	☐	Strongly agree ☐		Unsure	☐

3. Unmatched Count

I am going to use a game with cards to ask about activities that people do and foods that they eat. The method ensures that your answers are completely anonymous. Each time I will ask you to pick one of two cards, and look at the list of things on them. I will then ask HOW MANY of these things you have done over the past 12 months. I don't want to know which ones, just how many.

3.1. I will start with a question on TV programmes to show you how the method works. Please choose one card and look at the list on it. I want you to tell me **how many** of these programmes you have watched over the past 12 months. Please do not tell me which ones you have watched. *<Place cards face down and shuffle>*

<div align="center">0   1   2   3   4   5</div>

Card chosen: Green ⇒ **A. Control** card ☐   Blue ⇒ **B. Treatment** card ☐

NB. If they do it wrong, i.e. name the sports or point to them, explain that you only want the number. Do it again until they get it right.

3.2. The next card is about outdoor activities. Please choose one card and look at the list on it. I want you to tell me **how many** of these activities you have done over the past 12 months. Please do not tell me which ones you have done. *<Place cards face down and shuffle>*

<div align="center">0   1   2   3   4   5</div>

Card chosen: Green ⇒ **A. Control** card ☐   Blue ⇒ **B. Treatment** card ☐

3.3. The next card is about food. Please choose one card and then look at the list on it. I want you to tell me **how many** of these food items you have **eaten** over the past 12 months. Please do not tell me which ones you have eaten. *<Place cards face down and shuffle>*

<div align="center">0   1   2   3   4   5</div>

Card chosen: Green ⇒ **A. Control** card ☐   Blue ⇒ **B. Treatment** card ☐

3.4. The next card is about meat. Please choose one card and then look at the list on it. I want you to tell me **how many** of these meat items you have **eaten** over the past 12 months. Please do not tell me which ones you have eaten. *<Place cards face down and shuffle>*

<div align="center">

0   1   2   3   4   5

</div>

Card chosen: Green ⇒ **A. Control** card ☐   Blue ⇒ **B. Treatment** card ☐

3.5. I am going to show you the same cards about meat. Please choose one card and then look at the list on it. I want you to tell me **how many** of these food items you or a member of your household have **bought** over the past 12 months. Please do not tell me which ones you have bought. *<Place cards face down and shuffle>*

<div align="center">

0   1   2   3   4   5

</div>

Card chosen: Green ⇒ **A. Control** card ☐   Blue ⇒ **B. Treatment** card ☐

4. Knowledge
The next few questions will focus on your knowledge of nature.

4.1. Can you name these Steppe animals? *<show photos>*

a) ……………………………   b)……………………………   c)………………………………   d)……………………………

The rest of the survey will focus on the saiga antelope. Please indicate if you think the following statements regarding saiga are true or false.

4.2. Both male and female saiga have horns

<div align="center">

True ☐   False ☐   Unsure ☐

</div>

4.3. The colour of saiga fur changes between summer and winter

<div align="center">

True ☐   False ☐   Unsure ☐

</div>

4.4. Saiga usually give birth to three or more offspring

<div align="center">

True ☐   False ☐   Unsure ☐

</div>

4.5. It is legally permitted to eat saiga meat

<div align="center">

True ☐   False ☐   Unsure ☐

</div>

5. Attitude to saiga as meat
Please indicate how much you agree or disagree with the following statements (there are no right or wrong answers in the following sections) <show card>

5.1. Saiga meat is healthier than other meats

Strongly disagree	□	Disagree	□	Neutral	□
Agree	□	Strongly agree □		Unsure	□

5.2. Only poor people would want to eat saiga meat

Strongly disagree	□	Disagree	□	Neutral	□
Agree	□	Strongly agree □		Unsure	□

5.3. Saiga meat is good for special occasions

Strongly disagree	□	Disagree	□	Neutral	□
Agree	□	Strongly agree □		Unsure	□

6. Attitude

6.1. I would not mind if there were no more saiga in this country.

Strongly disagree	□	Disagree	□	Neutral	□
Agree	□	Strongly agree □		Unsure	□

6.2. The State should increase the protection of saiga.

Strongly disagree	□	Disagree	□	Neutral	□
Agree	□	Strongly agree □		Unsure	□

6.3. The saiga is a symbol of the beauty of the steppe.

Strongly disagree	□	Disagree	□	Neutral	□
Agree	□	Strongly agree □		Unsure	□

7. Social norms

7.1. I feel the same way about using saiga as other people in my village.

Strongly disagree	□	Disagree	□	Neutral	□
Agree	□	Strongly agree □		Unsure	□

7.2. Most people in my village believe that eating saiga meat is a normal thing to do.

Strongly disagree	□	Disagree	□	Neutral	□
Agree	□	Strongly agree □		Unsure	□

7.3. Most people in my village believe that hunting saiga for their horns is a bad thing to do.

Strongly disagree	□	Disagree	□	Neutral	□
Agree	□	Strongly agree □		Unsure	□

7.4. People's views about eating saiga meat are the same as they have always been

Strongly disagree	□	Disagree	□	Neutral	□
Agree	□	Strongly agree □		Unsure	□

8. Perceived behavioural control

8.1. There is a good range of different affordable meats available to buy
Strongly disagree	□	Disagree	□	Neutral	□
Agree	□	Strongly agree □		Unsure	□

8.2. It is not common to be given saiga meat when eating at other households
Strongly disagree	□	Disagree	□	Neutral	□
Agree	□	Strongly agree □		Unsure	□

8.3. It would be possible to get saiga meat if I wished to buy it
Strongly disagree	□	Disagree	□	Neutral	□
Agree	□	Strongly agree □		Unsure	□

8.4. People found to have killed saigas face a heavy penalty
Strongly disagree	□	Disagree	□	Neutral	□
Agree	□	Strongly agree □		Unsure	□

9. Involvement in community engagement initiatives

9.1. Are there any conservation actions or public education activities for saiga in the local area?

     Yes   □   No   □

If yes, what are they?

9.2. Have you heard about the Saiga Day festival?

     Yes   □   No   □

If yes, have you ever attended Saiga Day?

     Yes   □ *Please specify year(s)…………………………*   No   □

9.2. Have you heard about Steppe Wildlife Clubs?

     Yes   □   No   □

If yes, do you have children involved with the Steppe Wildlife Club?
Yes, currently involved	□	Yes, involved in the past	□
No	□	No children	□
Unsure	□		

9.3. Have you heard about the Saiga Conservation Alliance Embroidery Programme?

     Yes   □   No   □

If yes, have you ever been involved as a member of the embroidery programme?

    Yes, currently involved □   Yes, in the past □   No   □

10. Perceptions of drivers and barriers to poaching and control

10.1. In your opinion, what is the greatest current threat to saiga (tick one)?

Extreme weather	□	Development and infrastructure	□
Hunting by people	□	Predation (e.g. by wolves)	□
Lack of grass	□	Other *(Please specify)*…………………………	□

10.2. Thinking about saiga, what might be the top reason (*mark with star*) and supplementary reasons (*tick as many as desired*) for hunting?

Main source of income	□	To supplement other income	□
The supplement diet	□	Tradition/cultural importance	□
Recreation	□	Other *(Please specify)*…………………………	□

10.3. If you were in charge of saiga protection, what would be the top priority action for saiga conservation that you would implement (tick one)?

Public awareness and education	□	More ranger patrols	□
Protected areas	□	Improve local livelihoods	□
Heavier penalty if caught	□	Cull wolves	□
Other *(Please specify)*……………………………□			

11. Opinion on UCT

Finally, we would like to know what you think about the section of this questionnaire with the game where you had to pick a card and tell us how many activities you have done.

11.1. How easy or difficult was it to understand these questions?

    Very easy □   Easy □ Difficult □   Very difficult □   Neutral □

11.2. How comfortable did you feel answering these questions?

Very comfortable □ Comfortable □ Uncomfortable □ Very uncomfortable □ Neutral □

11.3. Do you think your answers were anonymous?

    Yes   □   No   □   Unsure   □

Thank you very much for answering this survey. Do you have any more comments you would like to make about saigas or about other things we have talked about?

8.3. Household questionnaire (Russian)

Дата:	Номер интервью:
Поселок:	
Имя интервьюера:	

Краткое представление

Доброе утро/вечер. Меня зовут….
Я провожу опрос от лица Лауры Кор, студентки университета в Лондоне, Великобритания. Она ведет исследовательский проект с целью получения степени магистра, и для этого ей необходимо изучить быт и воззрения людей, живущих на плато Устюрт, и в частности их отношение к экологии.

Интервью займет примерно 25 минут и будет проводиться анонимно. Я не буду записывать Ваше имя и никому не скажу, как вы ответили на вопросы. Если вам не понравится какой-либо вопрос, вы можете не отвечать на него. В любой момент по вашему желанию мы можем прекратить опрос. Вы согласны поучаствовать?

1. Социально-демографические данные

1.1. Пол: а) Мужчина ☐ б) Женщина ☐

1.2. Возраст: a) 16-20 ☐ b) 21-40 ☐ c) 41-60 ☐ d) 60 + ☐

1.3. Образование

    a) Начальное ☐ b) Среднее ☐

    c) Высшее ☐ d) Без образования ☐

1.4. Национальность

    a) Каракалпак ☐ b) Узбек ☐

    c) Казах ☐ d) Русский ☐ e) Другая ☐

1.5. Занятость

    a) работает ☐ *уточните……………*

    b) безработный (имеет профессию) ☐ *уточните ……………*

    c) безработный (нет профессии) ☐

    d) пенсионер ☐

    e) студент ☐

    f) домохозяйка ☐

    g) другое ☐ *уточните……………*

2. Отношение к экологии

Пожалуйста, укажите, насколько Вы согласны или не согласны с данными ниже утверждениями (учтите, пожалуйста, что правильных или неправильных ответов быть не может, просто скажите, что вы думаете по этому поводу) <показать карточку>

2.1. Экология Устюрта находится в хорошем состоянии

Абсолютно не согласен	☐	Не согласен	☐	Нейтрально	☐
Согласен	☐	Полностью согласен	☐	Не уверен	☐

2.2. Государству надо заботиться об охране природы только после того, как оно позаботится о местном населении

Абсолютно не согласен	☐	Не согласен	☐	Нейтрально	☐
Согласен	☐	Полностью согласен	☐	Не уверен	☐

2.3. Можно охотиться на любое животное, если это не приносит вред окружающей среде

Абсолютно не согласен	☐	Не согласен	☐	Нейтрально	☐
Согласен	☐	Полностью согласен	☐	Не уверен	☐

3. Непарные числа

Я хочу сыграть с вами в игру с использованием карточек и узнать, чем здесь занимаются люди и что они едят. Вы можете быть абсолютно уверены, что о ваших ответах никто не узнает. Когда я попрошу, вы возьмете одну из двух карточек и прочтете на ней список действий. Затем вы должны сказать, СКОЛЬКО действий из этого списка вы выполняли за последние 12 месяцев. Мне не нужно знать КАКИЕ из этих действий, мне лишь нужно знать, сколько.

3.1. Давайте начнем с вопроса о телевизионных программах. Я покажу вам, как нужно отвечать. Выберите, пожалуйста, одну карточку и взгляните на список ТВ программ на ней. Теперь скажите, **сколько** программ из списка вы посмотрели за последние 12 месяцев. Пожалуйста, не говорите мне, **какие** программы вы смотрели. *<Положите карточки лицом вниз и перемешайте>*

0   1   2   3   4   5

Выбранная карточка:Зеленая ⇒**А.** Карточка **контроля**☐   Зеленая ⇒**Б.** Карточка **опыта** ☐

NB. Если они делают что-то неправильно, например, называют программу или показывают на нее, объясните, что вы хотите знать лишь количество программ. Если они не поняли, повторяйте до тех пор, пока они не начнут все делать правильно.

3.2. Следующая карточка содержит названия видов спорта. Пожалуйста, скажите **сколькими** из этих видов спорта вы занимались в последние 6

месяцев. Но, пожалуйста, не говорите мне, какими именно видами вы занимались. <*Положите карточки лицом вниз и перемешайте*>

$$1 \qquad 2 \qquad 3 \qquad 4 \qquad 5$$

Выбранная карточка:Зеленая ⇒**А.** Карточка **контроля**☐ Зеленая ⇒**Б.** Карточка **опыта** ☐

3.3. Сейчас я покажу вам карточки с названиями разных блюд и прочитаю их названия. Пожалуйста, скажите мне, **сколько** из них вы ели в последние 12 месяцев. Но, пожалуйста, не говорите, какие именно вы ели. <*Положите карточки лицом вниз и перемешайте*>

$$1 \qquad 2 \qquad 3 \qquad 4 \qquad 5$$

Выбранная карточка: Зеленая ⇒**А.** Карточка **контроля**☐ Голубая ⇒**Б.** Карточка **опыта** ☐

3.4. Я покажу вам карточки с названиями разных видов мяса и прочитаю их названия. Пожалуйста, скажите мне, **сколько** из них вы ели в последние 12 месяцев. Но, пожалуйста, не говорите мне, какие именно виды мяса вы ели.< *Положите карточки лицом вниз и перемешайте* >

$$1 \qquad 2 \qquad 3 \qquad 4 \qquad 5$$

Выбранная карточка:Зеленая ⇒**А.** Карточка **контроля**☐ Зеленая ⇒**Б.** Карточка **опыта** ☐

3.5. А теперь я покажу вам те же карточки с названиями разных видов мяса. Пожалуйста, посмотрите на список и скажите, **сколько** из них вы **покупали** за последние 12 месяцев. Но, пожалуйста, не говорите мне какие именно виды мяса вы покупали. <*Положите карточки лицом вниз и перемешайте*>

$$1 \qquad 2 \qquad 3 \qquad 4 \qquad 5$$

Выбранная карточка:Зеленая ⇒**А.** Карточка **контроля**☐ Зеленая ⇒**Б.** Карточка **опыта** ☐

4. Знания
Следующие несколько вопросов будут касаться ваших знаний о природе.

4.1. Сможете ли вы назвать этих степных животных? <*показать фотографии*>

а)...............................б)....................... в)........................ г)...............................

Теперь мы поговорим о сайгаке. Пожалуйста, скажите, насколько правдивы следующие утверждения.

4.2. Самцы и самки имею рога

  правда ☐ ложь ☐ не уверен ☐

4.3. Окраска сайгака меняется летом и зимой

  правда ☐ ложь ☐ не уверен ☐

4.4. Сайгаки обычно рожают трех и больше детенышей

  правда ☐ ложь ☐ не уверен ☐

4.5. Есть мясо сайгака законно

  правда ☐ ложь ☐ не уверен ☐

5. Отношение к мясу сайгака
Пожалуйста, укажите степень согласия или несогласия со следующими утверждениями в (в следующих разделах нет правильных или неправильных ответов) <показать карточки>

5.1. Люди едят сайгачатину, потому что она полезнее для здоровья, чем другое мясо.

| Абсолютно не согласен | ☐ | Не согласен | ☐ | Нейтрально | ☐ |
| Согласен | ☐ | Полностью согласен | ☐ | Не уверен | ☐ |

5.2. Мясо сайгака это «мясо для бедных людей»

| Абсолютно не согласен | ☐ | Не согласен | ☐ | Нейтрально | ☐ |
| Согласен | ☐ | Полностью согласен | ☐ | Не уверен | ☐ |

5.3. Люди едят мясо сайгака только в особых случаях.

| Абсолютно не согласен | ☐ | Не согласен | ☐ | Нейтрально | ☐ |
| Согласен | ☐ | Полностью согласен | ☐ | Не уверен | ☐ |

6. Отношение к сайгаку

6.1. Мне все равно, если в этой стране больше не будет сайгаков.

| Абсолютно не согласен | ☐ | Не согласен | ☐ | Нейтрально | ☐ |
| Согласен | ☐ | Полностью согласен | ☐ | Не уверен | ☐ |

6.2. Государство должно усилить охрану сайгака.

| Абсолютно не согласен | ☐ | Не согласен | ☐ | Нейтрально | ☐ |
| Согласен | ☐ | Полностью согласен | ☐ | Не уверен | ☐ |

6.3. Сайгак является символом степной красоты.

| Абсолютно не согласен | ☐ | Не согласен | ☐ | Нейтрально | ☐ |
| Согласен | ☐ | Полностью согласен | ☐ | Не уверен | ☐ |

7. Социальные нормы

7.1. Мое отношение к употреблению сайгака в пищу, использованию его рогов и т.д. совпадает с отношением большинства людей в нашем поселке.

Абсолютно не согласен	☐	Не согласен	☐	Нейтрально	☐
Согласен	☐	Полностью согласен	☐	Не уверен	☐

7.2. Большинство людей в нашем поселке уверены, что есть сайгачье мясо это нормально.

Абсолютно не согласен	☐	Не согласен	☐	Нейтрально	☐
Согласен	☐	Полностью согласен	☐	Не уверен	☐

7.3. Большинство людей в моем поселке уверены, что охотиться на сайгака ради рогов – очень плохо.

Абсолютно не согласен	☐	Не согласен	☐	Нейтрально	☐
Согласен	☐	Полностью согласен	☐	Не уверен	☐

7.4. Сейчас люди относятся к употреблению сайгачатины в пищу так же, как и всегда.

Абсолютно не согласен	☐	Не согласен	☐	Нейтрально	☐
Согласен	☐	Полностью согласен	☐	Не уверен	☐

8. Восприятие поведенческого контроля

8.1. В продаже имеется большой ассортимент мяса

Абсолютно не согласен	☐	Не согласен	☐	Нейтрально	☐
Согласен	☐	Полностью согласен	☐	Не уверен	☐

8.2. Односельчане часто угощают вас сайгачатиной, когда вы приходите к ним в гости.

Абсолютно не согласен	☐	Не согласен	☐	Нейтрально	☐
Согласен	☐	Полностью согласен	☐	Не уверен	☐

8.3. Если я захочу купить мясо сайгака, это будет возможно.

Абсолютно не согласен	☐	Не согласен	☐	Нейтрально	☐
Согласен	☐	Полностью согласен	☐	Не уверен	☐

8.4. Люди, убившие сайгака, несут суровое наказание, если их застали на месте преступления.

Абсолютно не согласен	☐	Не согласен	☐	Нейтрально	☐
Согласен	☐	Полностью согласен	☐	Не уверен	☐

9. Участие в общественных мероприятиях поселка

9.1. Проводятся ли какие-либо мероприятия по сохранению сайгака или общественно-просветительские мероприятия по повышению знаний об этом животном в вашем регионе?
Да ☐ Нет ☐

Если да, что это за мероприятия?

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9.2. Вы слышали когда-либо о Дне Сайгака?
Да ☐ Нет ☐

Если да, участвовали ли вы когда-либо в Дне сайгака?
Да ☐ *Укажите год (ы)....................*
Нет ☐

9.3. Слышали ли вы когда-либо о Степном Экологическом Клубе?
Yes ☐ No ☐

Если да, то участвует ли кто-либо из ваших детей в работе Степного Экологического Клуба?
Да, сейчас участвует ☐
Да, в прошлом участвовал ☐
Нет ☐
У меня нет детей ☐
Не уверен ☐

9.4. Слышали ли вы когда-либо о Программе по вышивке, подготовленной Альянсом по сохранению сайгака?
Да ☐ Нет ☐

Если да, участвовали ли вы когда-либо в этой программе?
Да, сейчас участвую ☐
Да, участвовал в прошлом ☐
Нет ☐

10. Понимание механизмов, поддерживающих и сдерживающих браконьерство и осуществление контроля

10.1. Как вы думаете, что на данный момент представляет наибольшую угрозу для сайгака? (Поставьте галочку напротив соответствующего пункта)

Сложные погодные условия □
Развитие и инфраструктура □
Охота □
Хищники (например, волки) □
Отсутствие или недостаток корма (травы) □
Другое (уточните)........................... □

10.2. Как вы думаете, почему люди охотятся на сайгака? Поставьте крестик напротив главной причины и галочки напротив второстепенных причин (можете поставить сколько угодно галочек)

Основной источник дохода □
Дополнительный источник дохода □
Дополнительная еда □
Следование обычаю/традиции □
Развлечение □
Другое (уточните)........................... □

10.3. Если бы вы занимались проблемой сохранения сайгака, что бы вы сделали прежде всего? (Поставьте галочку напротив выбранного пункта)

Повысил бы знания и осведомленность местного населения □
Увеличил бы количество инспекторов □
Организовал бы охраняемые территории □
Повысил бы уровень жизни местного населения □
Ввел бы более суровое наказание за убийство сайгака □
Сократил бы количество волков □
Другое (уточните)............................ □

Большое спасибо вам за то, что ответили на наши вопросы. Вы хотите что-либо добавить по сайгаку или каким-либо другим темам, которые мы здесь обсуждали?

8.4. Item lists for UCT questions. Control and treatment cards were printed on green and blue card respectively and placed facedown for respondents to choose which to answer from. ("Behaviour of interest" displayed in italics for clarity)

Control cards

Treatment cards

A. TV Shows

Habar / Ahborot (daily news)

Tangim (soap opera)

Taxliknoma (weekend news)

Mening bogim ("My Garden")

B. TV Shows

Habar / Ahborot (daily news)

Zakovat (Game show)

Tangim (soap opera)

Taxliknoma (weekend news)

Mening bogim ("My Garden")

A. Activities

Farming

Gardening

Wood collection

Plant collecting

B. Activities

Farming

Gardening

Wood collection

Hunting

Plant collecting

A. Food items

Plov

Besh barmak

Pizza

Sushi

B. Food items

Plov

Besh barmak

Pizza

Kebab

Sushi

A. Meat items

Sheep

Camel

Beef

Hare

B. Meat items

Sheep

Saiga

Camel

Beef

Hare

8.5. Key informant interview (English)

Good morning / afternoon. My name is *<interviewer's name>* and this is *<second interviewer's name>*. We are carrying out research on behalf of a student at the University of London in the UK. For her Masters project she is interested to learn about the lives and views of people on the Ustyurt Plateau and particularly their views about the environment and wildlife.

Today we will be gathering information about the trade and consumption of saiga products in the local area. Your opinions and knowledge on the subject would be very useful to help us understand the role that saiga play in local lives on the Ustyurt Plateau. All your answers will remain anonymous. If you find any of the questions sensitive or difficult, you do not have to answer them and can stop the interview at any time! Are you happy to take part?

NOTE: as many of these questions should be covered as possible, however not all may be relevant to each respondent, so allow for some flexibility. When an informant raises an interesting point, the interviewer should attempt to explore the subject by instigating further discussion. The points in brackets are possible follow-up questions – to be asked if they are not addressed spontaneously.

Date:
Village:
Interviewer name:

1. Socio-demographic information: gender, age group, ethnic group, education level, occupation.

   Trade and consumption – saiga meat

2. Could you describe the prevalence of saiga meat consumption in the area? (How commonplace it is for local people to buy and eat saiga meat)

3. Could you describe the trade in saiga meat? (Consider the percentage of meat consumed in locals households vs. further afield)

4. How is saiga meat sold? (Publically or privately)

5. How does the price of saiga meat compare with other available meats such as lamb and beef? (If known, ask for prices per kg)

6. Is saiga meat traded between Uzbekistan and Kazakhstan? If so, in which direction is trade carried out?

   Hunting saiga

7. What is that balance between hunting saiga for meat or horns?

8. What are the main reasons for:
   a. Hunting saiga
   b. Consuming saiga meat

9. Have you noticed changes to the quantity of the following in the past 5 years:
   a. Saiga being hunted
   b. Meat consumed locally
   If yes, what have these changes been and why may they have occurred?

Attitudes and law enforcement

10. Are people aware that hunting, trade and consumption of saiga products is illegal?

11. Are people aware that saiga is listed in the Red Book of Uzbekistan?

12. What kind of effect does/would this knowledge have on behaviour?

13. Moving away from meat, how do people view saiga as an animal? (E.g. seen as a "symbol of the Steppe" or just viewed in a practical way)

Recent events and future conservation

14. Have you heard of the Saiga Conservation Alliance and their public awareness events such as Saiga Day or Steppe Wildlife Club? If so, do you think this is an effective way to decrease the trade and use of saiga products?

15. Have you heard of the boarder fence built between the territories of Kazakhstan and Uzbekistan? (*If not, give brief description.*) What do you think of this fence: has it changed people's daily lives, saiga movements or hunting patterns and behaviours?

16. What measures could be taken to decrease the consumption of saiga meat?

17. If you were put in charge of protecting saiga, what would be your priority action for conservation? (*Prompt with examples if required*: public awareness and education, protected areas, improve local livelihoods, heavier penalties, more ranger patrols, cull wolves, etc.)

18. Any further comments?

Thank you very much for your time, your answers will be very useful for our research. Would you be able to introduce us to anyone else who might be able to answer these kinds of questions?

8.6. Key informant interview (Russian)

Доброе утро/день. Меня зовут <имя интервьюера>, а это <имя интервьюера>. Мы проводим исследования от лица студентки университета Лондона, Великобритания. Она пишет магистерскую диссертацию, и ей необходимо изучить быт местного населения и его взгляды на экологию и дикую природу плато Устюрт.

Сейчас мы собираем информацию о торговле сайгачьим мясом и рогами и потреблении сайгачьего мяса и рогов в регионе. Ваши мнения на эту тему и знания в этой области помогут нам понять роль сайгака в жизни жителей плато Устюрт. Все ваши ответы будут анонимными. Если какие-то вопросы покажутся вам слишком сложными или щекотливыми, вы вправе не отвечать на них. Также вы можете

> *ПРИМЕЧАНИЕ: в процессе интервью необходимо коснуться как можно большего количества вопросов; однако не обязательно это делать в интервью с каждым респондентом – интервью должны быть гибкими. Когда опрашиваемый касается интересной темы или дает интересные сведения, интервьюер должен попытаться раскрыть тему глубже, задавая дополнительные вопросы.*

Дата:	
Село:	
Имя интервьюера:	

остановить интервью в любое время. Вы хотите поучаствовать в интервью?

1. Информация социально-демографического характера: пол, возрастная группа, национальная принадлежность, уровень образования, род деятельности.

Торговля и потребление – мясо сайгака

2. Как вы думаете, где в вашем регионе потребляют больше всего сайгачатины? (Насколько часто люди покупают и едят мясо сайгака?)

3. Вы смогли бы рассказать о торговле сайгачатиной? (Скажите, пожалуйста, какое соотношение в процентах между мясом, потребляемым дома, в семьях, и мясом, потребляемым вдали от дома (населенных пунктов))

4. Каким образом происходит реализация мяса сайгака? (Открыто или скрытно)

5. Какова цена на сайгачатину в сравнении с другими доступными сортами мяса – говядиной или бараниной? (Спросите про цены за 1 кг)

6. Происходит ли торговля сайгачьим мясом между Казахстаном и Узбекистаном? Если да, то кто продает, а кто покупает?

Охота на сайгака

7. На сайгака охотятся чаще из-за рогов или ради мяса?

8. Назовите основные причины:
   a. Охоты на сайгака

        b.   Потребления сайгачатины?

9.   Заметили ли вы какие-либо изменения за последние 5 лет:
        a.   В количестве убитых во время охоты сайгаков;
        b.   В количестве мяса сайгака, потребляемого местными жителями?
Если да, опишите эти изменения и скажите, почему, по-вашему, они произошли?

Отношение людей и применение законодательства

10.   Люди знают, что охота на сайгака, торговля сайгачатиной и ее потребление являются противозаконными?

11.   Знают ли люди, что сайгак занесен в Красную Книгу Республики Узбекистан?

12.   Отражается ли как-то эта осведомленность людей на их поведении?

13.   Теперь оставим пока мясо сайгака. Как люди относятся к сайгаку как к животному? (Например, они считают его символом степи или просто относятся к нему как к животному, приносящему практическую пользу)

Последние события и сохранение сайгака в будущем

14.   Слышали ли вы когда-нибудь об Альянсе по Сохранению Сайгака, о мероприятиях, которые они проводят, например, День Сайгака, и об основанных ими организациях, например, Клуб Дикой Природы Степи? Если слышали, как вы думаете, насколько эффективно эти мероприятия и организации помогут сокращению торговли сайгачатиной и рогами сайгака их потребления?

15.   Слышали ли вы когда-нибудь об ограждении вдоль границы между Казахстаном и Узбекистаном? (Если не слышали, расскажите коротко.) Что вы думаете об этом ограждении? Изменило ли оно быт местного населения, передвижения сайгака? Повлияло ли оно на схему охоты на этого животного или изменило ли как-то поведение охотников?

16.   Какие меры необходимо принять для сокращения потребления мяса сайгака?

17.   Если бы вам поручили обеспечить сохранность сайгака, что бы вы сделали в первую очередь? (При необходимости, помогите респондентам примерами: повысить знания и осведомленность людей, создать охраняемые территории, улучшить уровень жизни местного населения, ввести более суровое наказание, увеличить количество инспекторов, отстреливать волков и т.д.)

18.   Есть ли у вас вопросы или комментарии?

Спасибо вам за то, что согласились уделить нам свое время; ваши ответы очень помогли нам в наших исследованиях. Вы смогли бы познакомить нас с кем-либо еще, кто согласился бы ответить на наши вопросы?

8.7. Key informant details

Nukus

K001	F	40-50	Ecologist (often worked and stayed in villages on the Ustyurt)
K002	M	50-60	Department of Sports Union for Hunting and Fishing
K003	M	30-40	Botanist (extensively worked in and around Ustyurt villages, particularly Jaslyk)
K004	F	40-50	Ornothologist (often worked and stayed in villages on the Ustyurt)
K005	M	40-50	Archaeologist
K006	F	40-50	Teacher

Tashkent

K101	M	60+	Head of Gosbiocontrol
K102	M	40-50	Specialist in biodiversity resources
K103	M	60+	Specialist in the use of natural resources

Kubla-na Ustyurt

K201	M	21-40	Driver at compressor station
K202	M	41-60	State pensioner
K203	M	21-40	Driver at compressor station

Kyr-Kyz

K301	M	41-60	Engineer
K302	M	21-40	Operator at compressor station
K303	M	41-60	Electrician

8.8. Tested differences in demographic variables between UCT control (C) and treatment (T) groups

UCT question	Variable	X-squared	DF	P-value
3.2. Outdoor activities (C = 51, T = 52)	Gender	1.86	1	0.173
	Ethnicity	1.26	3	0.739
	Employment	6.09	4	0.193
3.4. Meat eaten (C = 48, T = 56)	Gender	0.01	1	0.922
	Ethnicity	1.42	3	0.702
	Employment	2.04	4	0.728
3.5. Meat bought (C = 54, T = 50)	Gender	3.99	1	0.046
	Ethnicity	4.72	3	0.194
	Employment	2.95	4	0.566

8.9. Frequency distribution of knowledge scores (N=104) (mean = 5.6; median = 5)
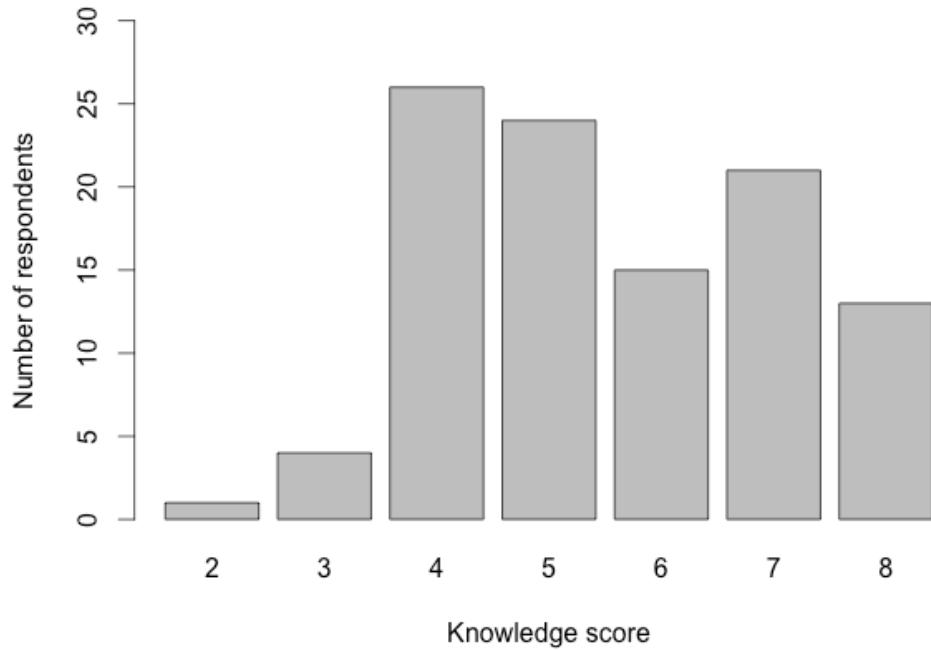
8.10. Knowledge scores of respondents who were unaware and aware of (a) Saiga Day (b) Steppe Wildlife Clubs and (c) Embroidery programmes and (d) who had attended Saiga Day or not (N=101)